Institution: University of York
Unit of Assessment: 4 - Psychology, Psychiatry and Neuroscience
a. Overview

Research in Psychology, Psychiatry and Neuroscience at the University of York is conducted primarily within the Department of Psychology, which includes the York Neuroimaging Centre. Researchers appointed to Hull-York Medical School (HYMS) who are based at the University of York conduct their research within cognate departments. The HYMS researchers reported here (*Baseler* and *Whittington*) are integrated into Psychology research groups.

Our research is mainly in the fields of Psychology and Neuroscience. It is structured into five groups – ***Perception & Action***, ***Cognition & Communication***, ***Development***, ***Social Perception & Interaction*** and ***Neuroscience Theory & Methods***. Several researchers have interests that span more than one group: we strongly encourage research that straddles traditional boundaries.

b. Research Strategy

The strategic aims for research during the assessment period were a) to develop strong and well-resourced research groups in selected areas that are capable of integrating psychological theory with both neuroscience perspectives and topics of significant practical importance and b) to establish an international reputation for world-class research by conducting and disseminating rigorous, innovative research that transforms thinking in core areas of the discipline and has significant social, educational, medical and economic impact. Evidence for the achievement of those strategic goals can be found:

1. in the range of our research funding, which includes grants from three different research councils, the European Commission, government, major charities and industry;
2. in the strength of our publications, which include papers in, for example, *Science*, *Nature Neuroscience*, *Neuron*, *PNAS*, *Journal of Neuroscience*, *Psychological Science*, *Journal of Experimental Psychology*, and *Child Development*;
3. in the close integration we have achieved between psychological theory, rigorous experimental methods and advanced neuroscience techniques, and
4. in the success of our engagement with impact, including impact on policy, ranging from reading and language in children through cochlear implants to interactions with industry focused on the development of novel imaging methods.

Future strategic aims and goals for research. Each of our research groups is now charged with:

1. identifying the fundamental questions that will be addressed by that group, the methods that will be employed and the facilities that will be required;
2. identifying the pathways to impact that will be developed and the support and infrastructure that will be required;
3. ensuring that all researchers are fully integrated into their research group through regular meetings, lab groups, peer review of grant applications and papers;
4. exploiting to the full the synergies that exist with other researchers in the University;
5. developing a plan for disseminating research findings through presentations at major conferences and publication in leading journals; and
6. increasing the recruitment of high-quality research students.

Each group has either one or two lead members with overall responsibility for these functions. The plans, and progress against them, are monitored by the Psychology Research Committee and the Science Committee of the York Neuroimaging Centre.

There have been a number of changes to the research environment during the assessment period in relation to staffing, research infrastructure and research management, linked to clear and explicit research plans and objectives for the next five years and beyond. New appointments have been made that strengthen our research areas and open up fresh lines of investigation and collaboration (section **c(i)**). These have been complemented by investment in research infrastructure to ensure that all researchers have access to the facilities they need to conduct their research (section **d**). We have also made significant changes to research management. Research groups have been given stronger remits and responsibilities. Research Support Officers have been appointed in

Psychology and HYMS to facilitate the process of identifying sources of research funding and submitting high-quality applications. The Director of Research for Psychology chairs the Departmental Research Committee, works with the University's Academic Coordinators for the Sciences and Social Sciences to assemble and shape bids for research funding, and organises internal triage where necessary. These changes have enhanced our responsiveness to national and international priorities and initiatives, including the ESRC's strategic priority of 'Influencing behaviour and informing interventions', the European Research Council's aim to develop the 'next generation of independent top research leaders in Europe', and the Wellcome Trust's Challenge on 'Understanding the brain'. Our fit with these priorities is reflected in recent ESRC Professorial Fellowship (*Meins*) and Future Research Leaders (*Over*) awards, an ERC Starting Grant (*Jefferies*) and Wellcome Capital and Strategic Awards worth £7.9M (*Green* and Duckett [Chemistry])

We have reviewed our mechanisms for the development, promotion and dissemination of research to optimize them to the external research environment. Academic staff are strongly advised to aim for substantial publications that make lasting contributions to their field, with an emphasis on quality over quantity. The University's interdisciplinary Wellcome Centre for Chronic Diseases and Disorders (C2D2) and the University's Research Priming Fund have contributed over £75k in pump-priming funds for psychology and neuroscience over the period. Academic researchers in Psychology receive an annual allocation of departmental funds to support research and dissemination costs, including travel to conferences and other labs. The Department has allocated over £270k (average £2.5k per researcher per year) to this form of individual research support, as well as providing support for the cost of open access publications.

Established researchers are expected to submit at least one substantial grant application a year, and this expectation has been integrated into annual performance review. Researchers planning to submit a grant application are expected to make a presentation within the Department at an early stage in order to obtain feedback while the ideas are still fluid. When the application has been drafted they are required to obtain comments from two colleagues, one close to the topic of the proposal and one a little more distant. Those comments are reviewed by the Head of Department before the application is signed off. The Research Support Officer checks the draft application against funder requirements and helps with costings and submission.

Research groups: achievements and goals. The membership and research highlights of our groups are shown below. We have room for only a sample of the achievements here so we have listed 4 for each group. †Staff appointed since 2008; *Early Career Researcher; §Staff employed in the York Neuroimaging Centre.

Perception & Action. *Altmann*, *Andrews*, *Baker*†*, *Barraclough*†, *Baseler*†*, *Evans*†*, *Gennari*, *Gouws*§, *Green*, *Jenkins*†, *Johnston*†, *Mattys*†, *Millman*§, *Morland*, *Prendergast*§, *Quinlan*, *Rueschemeyer*†*, *Simpson*§, *Summerfield*, *Thompson*, *Tipper*†, *Wade*†, *Young, Zentner.*

Highlights: York's Vision researchers have established 1. the importance of gain control mechanisms; for example contrast normalization has a profound effect on population responses in area V1; 2. that visual area LO1 processes orientation while LO2 processes shape; 3. that adult visual cortex does not reorganize in response to macular degeneration, demonstrating a limit on cortical plasticity; and 4. that the characteristics of binocular rivalry show that the visual system is optimized for viewing naturalistic stimuli. Auditory scientists have shown 1. that human sound localisation can be explained with an opponent channel model of spatial representation; 2. that knowledge of the identity and location of a talker aids speech perception in multi-talker environments; 3. that there are automatic interactions between the auditory perception of pitch and the visual features of location, size and spatial frequency; and 4. clarified the role of the right hemisphere in emotional responses to music. Our Action group has made important contributions to understanding the integration of action and sensory information, including 1. somatosensory cortex integrates action and object information to anticipate the sensory consequences of actions (including painfulness); 2. sentences that describe changes to objects caused by actions generate competing representations that are resolved by a region of left ventrolateral prefrontal cortex; 3. strong evidence for common vision-action mirror system representations from multi-voxel pattern analysis of fMRI data; and 4. after-effects imply object-centred rather than viewer-centred representations of body motion. Our Face Perception researchers have shown 1. that automatic face recognition based on image averaging can approach 100% accuracy; 2. that neural responses to expression and gaze in the posterior superior temporal sulcus interact with facial

identity; 3. that the amygdala responds categorically to gradual changes in facial expressions while the superior temporal sulcus response in continuous; and 4. that the right superior temporal sulcus responds in a supra-additive manner to facial and vocal emotion.

Cognition & Communication. *Altmann*, *Baddeley*, *Ellis*, *Evans*†*, *Gaskell*, *Gennari*, *Goebel*, *Hayiou-Thomas*, *Henderson*†*, *Jefferies*, *Jenkins*†, *Hartley*, *Mattys*†, *Quinlan*, *Rueschemeyer*†*, *Slocombe, Smallwood*†, *Tipper*†, *Whittington*†*, Young*

Highlights: York's Language researchers have made important contributions to the understanding of embodied cognition and how sleep consolidates lexical memories, including 1. that sleep facilitates the consolidation of newly-learned words in memory, and this is associated with spindle activity; 2. that the amount of physical effort implied in sentences correlates with activation levels in motor execution areas; 3. that even indirect requests for actions activate cortical motor areas; and 4. that shared mechanisms between comprehension and production create different degrees of sentence difficulty based on verb roles. Our Cognition and Memory researchers have established 1. that both executive and default network regions are activated during mind wandering which attenuates the processing of sensory information; 2. that superior recall of sentences over word lists does not depend on attentionally-limited executive processes; 3. that repetitive TMS applied to the temporal poles disrupts category-general semantic processing; and 4. that semantic impairments caused by brain damage can affect either semantic representations or semantic control depending on the lesion site.

Development. *Goebel*, *Hayiou-Thomas*, *Henderson*†*, *Mattys*†, *Meins*†, *Over*†*, *Zentner*

Highlights: Work on Cognitive Development at York has established 1. that speech impairments in children have a stronger genetic basis than generalized language impairments, which appear to be more environmental in origin; 2. that consolidation of vocabulary is associated with sleep in children; 3. that children with autism spectrum disorder show intact early access to the meanings of words but impaired selection between alternative semantic representations in later processing; and 4. that infants respond to music with rhythmic movements which result in displays of positive affect when they are coordinated with the music. In the area of Social Development, our researchers have shown 1. that indices of mind-mindedness in mothers relate to social-cognitive outcomes in children; 2. the moderating influence of attachment patterns on children's' ability to deal with conflicting claims made by their mother and a stranger; 3. that viewing third-party ostracism primes affiliative imitation in children; and 4. that affiliative priming mechanisms are also evident in the helping behaviour of 18-month-old children. .

Social Perception & Interaction. *Bull, Clarke, Jenkins*†*, Johnston*†*, Lewis*†**, Meins*†*, Over*†**, McDougall, Tipper*†*, Young, Zentner*

Highlights: Research in the broad area of Social Perception and Interaction has identified 1. genetic evidence for multiple biological mechanism underlying in-group favouritism; 2. underlying dimensions of individual responses to the emotional content of music; 3. that a range of first impressions in interpersonal perception can be accommodated within a three-factor model based on perceived approachability, dominance and youthful attractiveness; and 4. that gender differences in mate preferences with presumed evolutionary roots decline as nations' gender parity increases.

Neuroscience Theory & Methods. *Gouws*§, *Green, Hymers*§, *Johnson*§, *Prendergast*§, *Wade*†, *Whittington*†

Highlights: Neuroscientists at York have shown 1. that a metal complex can facilitate the reversible interaction of *para*hydrogen with an organic substrate, allowing an 800-fold increase in proton, carbon, and nitrogen signal strengths; 2. the role of long-range suppressive mechanisms in negative BOLD responses in V1 and inhibition between hippocampus and entorhinal cortex; 3. that periodic concatenation underlies interactions between gamma and beta rhythms in neocortex; and 4. the potential value of novel MEG analysis methods based on the consistency of the neural responses measured with beamforming techniques.

Research goals. The research goals of our groups for the next 5 years in relation to both fundamental research and impact are now summarised.

Perception & Action. Our Vision researchers plan to understand the unique roles played by individual extrastriate visual field maps in spatial vision, investigate the nature of visual gain control and attention in normal observers and clinical patients (including patients with Parkinson's disease

and epilepsy), and explore which neuronal populations in the early visual system are influenced by attention and how that is constrained by the underlying neuroanatomy. They will link computational models of the early visual system derived from behavioural data to population-level neural activity measured electrically at the scalp, study the way that genetic neuronal disease alters visual responses in animal models and explore how plastic brain changes that follow visual field loss may help or hinder new restorative treatments of eye disease. The Faces group is developing a new model of face perception based on image properties and applying this to neuroimaging data. The Action group will study how actions are processed in sequences and social contexts, and elucidate the neural mechanisms underlying action recognition, including the contribution of social context.

Cognition & Communication. Language researchers will model the interface between the speech processing system and general cognition from both cognitive and neuroscience perspectives, explore the value and the limitations of "embodied cognition" accounts of language processing and study how social knowledge of speakers influences language comprehension. Comparative research will apply a multimodal perspective to chimpanzee communication, seeking clues to the possible origins of human communicative abilities. Research on semantic processing will clarify the role of semantics in mediating between perception, action, language and social interaction and study how semantic cognition emerges from interactions between widely-distributed cortical areas, breaks down following different types of brain injury, and whether electrical stimulation and cognitive training can improve the rehabilitation of comprehension problems following brain damage.

Cognitive researchers plan to understand how perceptual and conceptual grouping principles determine the contents of visual short-term memory, explore the relationship between intrinsic functional changes in brain activity and the quality and content of self-generated thought, investigate the cognitive and neural basis of retrospective time estimation, and develop computer games that bias preference and choice implicitly with a view to promoting a healthier lifestyle in children and adults. Research on Sleep, Learning and Memory will seek a better understanding of the neural mechanisms of word learning in relation to sleep consolidation, understand the role of sleep in language learning and study the possible relationship of sleep abnormalities to developmental disorders.

Development. York's Developmental researchers will build causal models of language learning impairments and understand how best to promote language learning across development, explore the longitudinal predictors of arithmetic development and cross-cultural differences in counting behaviour, and identify the genetic and environmental risk factors for developmental language impairments. They will use the concepts and methods of 'mind mindedness' to target interventions at children with aggression and other behavioural problems, and will develop and evaluate an intervention package to improve infant-parent interaction with a view to incorporating the intervention into antenatal classes.

Social Perception & Interaction. Research on Social Perception & Interaction will elucidate the relationship between social imitation, group loyalty, social exclusion and discrimination in children (including cross-cultural variation), analyse the interactions occurring during Prime Minister's Questions from an interdisciplinary perspective, and explore the biological basis of social attitudes and their relation to personality.

Neuroscience Theory & Methods. The top priority for Neuroscience research at York is to take hyperpolarisation methods through the pre-clinical phase to first-in-human use in medical imaging, demonstrating their ability to greatly improve sensitivity and to image specific molecules in a way that has hitherto been impossible in clinical contexts.

c. People

c. 1. Staffing strategy and staff development

Fifteen of the 26 submitted researchers have been appointed during the assessment period. We have taken care to maintain the strength of all of our research groups, looking for synergies between new and existing researchers and also for the potential to introduce new and often interdisciplinary lines of investigation. We have also appointed at different levels of experience, recruiting a blend of established research leaders at professorial level (*Mattys*, *Meins*, *Tipper*, *Wade*, *Whittington*), mid-career researchers at senior lecturer or reader level (*Jenkins*, *Smallwood*) and outstanding early career researchers at lecturer level (*Baker*, *Baseler*, *Evans, Henderson*,

Lewis, Over, *Rueschemeyer*), so that each of our groups includes a blend of researchers at different levels of seniority.

We take very seriously the need to integrate and develop all researchers, of which an important group are our early career researchers. In 2007 the Department established an Early Career Researchers Forum (ECRF) whose purpose is to provide an environment in which ECRs (post-doctoral fellows and final year PhD students as well as academics) can find professional and personal support. The Forum organises academic and social events. The programme is supported financially by the Department but otherwise operates independently and reflects the interests and needs of the ECRs. Recent events have included a course on brain dissection, a self-taught Matlab tutorial, a workshop on scientific writing given by two professional science writers, a seminar on how to get research published, a seminar on CV presentation and interview technique, and a discussion of how to balance family life with an academic career.

In 2011 the Department established a Committee on Personal and Professional Development which works closely with the ECRF to guarantee that the development needs of all researchers are met. That committee's remit includes ensuring that we continue to adhere to the principles of the Concordat to Support the Career Development of Researchers. Psychology was closely involved in the development of the University's Concordat Action Plan 2012-14. In addition to our internal training, the University offers training in a wide range of areas including grant writing, data protection, public engagement in research, open access, career planning, academic integrity and ethics, project management and managing research staff.

Staff development is supported through a system of annual performance review. Staff appointed below professorial level are also assigned research mentors who support them and with whom they discuss their research strategy in relation to publications, grants, collaborations, dissemination and impact. Researchers appointed to their first lectureship posts are given a light first year in terms of teaching and administration in order that they can build up their research careers. University-funded Anniversary Lectureships have allowed *Gennari*, *Hartley, Hayiou-Thomas* and *Over* relief from teaching and administration to develop their research. The criteria for promotion are clear and accessible and discussed at meetings with mentors and performance reviewers. During the period, *Gennari* and *Slocombe* have been promoted to senior lectureships while *Andrews*, *Gaskell, Jefferies* and *Thompson* have been awarded personal chairs. In 2010, the University of York became one of the first 10 HEIs to achieve EU recognition acknowledging our alignment with the principles of the European Charter for Researchers and Code of Conduct for their Recruitment. We are one of only a handful of Psychology Departments to have been given an Athena Swan Silver Award in recognition of the support we offer to female researchers and other female members of staff.

Prudent financial planning within a rolling five-year cycle ensures that all appointments are affordable and sustainable. Our current financial plan allows for the appointment of four additional academic staff over the next two years. Our ability to appoint creative and productive researchers at all levels, recruiting from within the UK and overseas (e.g., *Baseler* and *Wade* from the Smith-Kettlewell Eye Research Institute, San Francisco, *Evans* from Harvard Medical School, and *Over*, *Rueschemeyer* and *Smallwood* from Max Plank Institutes), speaks to our strong international reputation and the long-term sustainability of our staffing structure.

c. II. Research students

The Department of Psychology admits 10-12 new PhD students a year. Each student is allocated a desk in a shared office and provided with a new PC on arrival. PhD students are expected to meet with their supervisors at least fortnightly. Their progress is closely monitored through termly meetings of a Thesis Advisory Panel (TAP) which alerts the Graduate Studies Committee to any problems. A "PhD buddy" system pairs 1st with 2nd year PhD students, helping to create a sense of community across year groups. All students become members of lab groups which are also attended by academic staff and post-doctoral fellows. They give annual talks on their work to the whole Department. First year PhD students attend training courses in research skills and in professional and generic skills while third year students become members of our Early Career Researchers Forum which introduces them to post-doctoral fellows and junior faculty, and encourages them to think about career progression. Students are allocated £750 for travel to conferences or other meetings during their PhD. They have access to a pool of undergraduate

research participants who are paid by the Department if necessary. The Department of Psychology committed more than £65k to participant payment for PhD student experiments and related costs during the period.

Careful selection, supervision, training and monitoring of PhD students has resulted in 90% of full-time PhD students beginning between 2006/7 and 2008/9 submitting their theses within four years and being awarded the PhD. We expect each PhD student to appear as first author on at least one paper in a refereed journal. *Lovett* won the Pauline Ashley prize from Deafness Research UK, enabling her to spend 3 months working at the University of Washington, Seattle. *Vredeveldt's* PhD thesis won the BPS Social Psychology Section award for best PhD in 2012 and the American Psychology-Law Society prize. PhD students in Psychology during the REF period have moved on to post-doctoral or other research positions at many leading UK and overseas institutions. .

We are increasing PhD student numbers significantly. We have recently launched a new PhD programme in Cognitive Neuroscience and Neuroimaging which will admit students with backgrounds in Psychology, Physiology, Neuroscience, Biology, Medical Sciences and other cognate subjects. We are also part of the ESRC White Rose Doctoral Training Centre which gives PhD students access to training opportunities and facilities across the Universities of Leeds, Sheffield and York.

d. Income, infrastructure and facilities

Research income. Over the period, we have obtained grants from BBSRC, EPSRC, ESRC, the European Commission, British Academy, Royal Society, Advanced Bionics UK, Reckitt Benkiser, NHS, Department of Education, Home Office, Big Lottery Fund, Deafness Research UK, Research Into Ageing, the Stroke Association, the Leverhulme Trust and Wellcome. A number of major new grants will generate significant research spend in future, including Fellowships awarded to *Meins* and *Whittington*, and grants to *Mattys* and *Tipper*. A £4.37M Wellcome Trust Strategic Award to *Green* (Psychology) and Duckett (Chemistry) for hyperpolarisation research has just started.

Nature and quality of the research infrastructure and facilities. The York Neuroimaging Centre provides a major focus for researchers in all our groups. On campus and functioning first and foremost as a research centre, it is a major factor in our ongoing ability to recruit excellent researchers. The assessment period has seen a £300k investment in new computer hardware and infrastructure in the centre, including a new 16-channel parallel MRI coil for human studies (£30k) and facilities for transcranial direct current stimulation (TDCS). A TMS laboratory has been created within the Department of Psychology including two MagStim Rapid2 stimulators.

Total investment on TMS equipment over the period has been £72.5k. Psychology has also invested around £140k in portable multiple dense electrode array EEG systems for research with both children and adults. Family-friendly facilities for Developmental research have been established in the University's Wolfson Suite. These include facilities for studying children's hearing and the development of language and literacy. *Whittington's* research on neural networks has been accommodated in the Department of Biology through internal investment of £426k in equipment and refurbishment.

Important developments in advanced neuroscience methods are taking place in YNiC and the adjacent Centre for Hyperpolarisation in Magnetic Resonance (CHyM), a new centre housed in purpose-built accommodation funded by the Wellcome Trust, Wolfson Foundation, Bruker Biospin and EPSRC (over £12.5M over the last four years). CHyM currently employs 8 post-docs. It is equipped with three new NMR machines, a chemistry facility, low field MRI facility, biological preparation and incubator facility, plus new equipment for Infra-red spectroscopy, glc and mass spectrometry. These developments are based on an interdisciplinary collaboration of *Green* (Psychology), Duckett (Chemistry) and other researchers in Biology, Chemistry, HYMS and Psychology that was actively facilitated by the University of York. They hold out the prospect of novel, fast, high resolution imaging whose applications will include animal models of ageing and neurodegeneration and will be a major focus for research at York over the next decade.

Psychology has also established a state-of-the-art Sleep Laboratory which represents an institutional investment of £70k and comprises two bedrooms equipped with PCs for running experiments, video cameras, speakers for playing auditory stimuli and a monitoring suite equipped

with state-of-the-art polysomnography system. Existing laboratory space has been extensively refurbished and new laboratories have been created to accommodate other new researchers.

In total, the University has spent £250k on laboratory space in Psychology over the period plus an additional £700k in start-up costs for new appointments in Psychology and Neuroscience.

Cross-HEI shared or collaborative use of research infrastructure. The York Neuroimaging Centre has hosted researchers from the Universities of Birmingham, Bradford, Durham, Kent, Leeds, Newcastle, Northumbria, Sheffield and Southampton. Researchers from the University of Edinburgh have used York's sleep lab. York researchers have made use of research facilities at the Universities of Bradford, Dundee, Glasgow, Hull, Manchester and Sheffield (Royal Hallamshire Hospital).

Policy and practice in relation to research governance. Research policy and strategy in Psychology are overseen by a Psychology Research Committee chaired by the Director of Research. Its membership reflects the composition of the Department and includes representatives from the Early Career Researchers Forum. University Research Committee facilitates inter-disciplinary developments and the establishment of new research centres, and dispenses research priming funds. It has produced the University Research Strategy and a Statement on Research Performance Expectations which, among other things, establishes guidelines and expectations for researchers at different levels in terms of publication, grants and dissemination. Ethical issues are handled by a Psychology Ethics Committee and a separate Research Ethics and Governance Committee which approves all neuroimaging experiments. Our research is conducted in accordance with the RCUK Policy and Code of Conduct on the Governance of Good Research Conduct, the UK Research Integrity Office's Code of Practice for Research and the MRC's Principles and Guidelines on Good Research Practice.

e. Collaboration and contribution to the discipline or research base

Participation in the peer-review process. York researchers are actively engaged in the peer review process through involvement with funding bodies and scientific journals. *Altmann* has served as a member of the ESRC Grants Assessment Panel A, NIH Grants Review Panel (Language and Communication Study Section), the Grants Review Panel of the Spanish Ministry for Science and Innovation and the German Excellence Initiative DFG Grants panel. *Andrews* has served on the Wellcome Trust Basic Science Interview Committee and *Baddeley* on the Defence Scientific Advisory Committee. *Barraclough*, *Gaskell, Jefferies, Mattys* and *Tipper* have been members of the ESRC Peer Review College and *Gaskell* is a member of the ESRC Research Seminars Commissioning Panel. *Green* is a member of the Wellcome Trust Expert Advisory Panel and the MRC Bioinformatics Advisory Panel. *Mattys* is a member of the College of Reviewers for the Canada Research Chairs Program. *Summerfield* was Chief Research Advisor to Deafness Research UK from 2007 to 2010. *Young* has been a member and chair of British Academy Standing Committee S6 (Psychology).

Journal editorships. Our commitment in the peer-review process is also reflected in our involvement with scientific journals. *Altmann* is Editor-in-Chief of *Cognition*, *Thompson* is Editor of *Perception* and *iPerception*, *Tipper* was editor of the *Quarterly Journal of Experimental Psychology* from 2009 to 2012. Emeritus professor *Hall* is Editor-in-Chief of *Learning and Behavior* while emeritus professor *Monk* is an Associate Editor of *Human Computer Interaction* and *ACM Transactions on CHI*. York researchers have acted as Associate Editors / Editorial Board Members / Consulting Editors for a wide range of journals including *Cochlear Implants International, Cognition*, *Cognitive Neuropsychology*, *Cognitive Processing, Cortex*, *Journal of Experimental Psychology: Human Perception and Performance*, *Journal of Memory and Language*, *Neuropsychologia* and *Visual Cognition*.

Fellowships and awards. ESRC Fellowships have been granted to *Altmann*, *Gaskell* and *Meins*. *Jefferies* holds an ERC Early Career Researcher award. *Wade's* transfer from the US to York was facilitated by a Marie Curie Career Integration Grant while *Whittington* holds a Wellcome Trust Senior Fellowship Award. *Hayiou-Thomas* was a Visiting Fellow at Yale University in 2012. *Jefferies* was awarded the Elizabeth Warrington Prize of the British Neuropsychological Society in 2008 and the Cortex Prize of the Federation of European Societies of Neuropsychology (ESN) in 2010 for "the best scientific output of a European-based neuropsychologist within 7 years from their PhD". *Slocombe* gave the British Science Association's Charles Darwin Award lecture in 2009

and received the Comenius Early Career Psychologist Award from the European Federation of Psychologists Associations (EFPA) in the same year. *Jenkins* was awarded the Royal Society of Edinburgh's RSE/Macdougall Brisbane medal for early career researchers and was awarded an Invitation Fellowship from the Japan Society for the Promotion of Science. *Quinlan* received the BPS Cognitive Section Award in 2008. *Tipper* received the EPS Mid-Career Award in 2009. *Baddeley* was elected a Fellow of the British Academy in 2008. *Baddeley* and *Young* are the two most recent recipients (2012 and 2013 respectively) of the BPS Research Board's Lifetime Achievement Awards. Members of the Psychology Department were appointed during the period to two of the most prestigious positions in UK academic life (*Gathercole* to Director of the MRC Cognition and Brain Sciences Unit, Cambridge, and *Snowling* to President of St John's College, Oxford).

Scientific societies and conferences remain a major focus for disseminating and exchanging ideas. *Quinlan* and *Tipper* have served as members of the committee of the Experimental Psychology Society. *Quinlan* is also a member of the BPS Research Board and on the BPS Doctoral and Spearman Award Committee. *Jefferies* is a member of the Committee of the British Neuropsychological Society. York researchers present regularly at conferences and have organised several scientific meetings over the period. They have given numerous invited and keynote lectures at major conferences. For example, *Jefferies* gave the Cortex Prize Lecture to the Federation of European Societies of Neuropsychology, Amsterdam, 2010, *Meins* gave the Johnson Memorial Lecture at the University of Maryland, 2009, *Summerfield gave the* American Auditory Society Annual Conference Endnote Lecture in Scottsdale, Arizona, 2012, *Tipper* gave invited lectures to the National Physical Laboratory and Hallym and Korea University, Seoul while *Young* gave an invited presentation to the Max Coltheart Festschrift 2009 and keynote addresses at UCL, Dijon and Jena.

Dissemination. In a world where Neuroscience is little understood and Psychology is still widely misunderstood, we take dissemination very seriously. Successful dissemination feeds back into improved recruitment of PhD students, post-docs and other researchers as well as raising our profile with relevant professional groups who are then more willing to participate in impact activities. *Ellis* was President of the Psychology Section of the British Science Association in 2008-9. *Slocombe* and *Jenkins* have also served on the BSA Psychology section committee, *Jenkins* as EPS representative and Recorder since 2012. *Over's* research has been featured in The New Statesman, La Recherche and Medical News Today, while *Meins'* research featured in the BBC's *All in the Mind* series (2013).

Effective collaboration. York researchers are sought after as collaborators. They enjoy a wide range of productive collaborations, both nationally and internationally as illustrated by the submitted publications. Our industrial and public sector collaborators include Bruker Biosciences, Reckitt Benckiser, Unilever, schools and education authorities, and UK Prison and Probation Services.

In conclusion, we believe that the **vitality** of our research environment is evidenced by the quality of our researchers and the outputs they produce, our portfolio of research funding, our active lab groups and seminar series, our extensive investment in research infrastructure and pump-priming, our strong and productive national and international collaborations, the number of fellowships and other awards we hold, our engagement with research funders and scientific societies, and the care with which we develop ECRs and PhD students (reflected in our Athena Swan Silver Award and our high PhD completion rates). The **sustainability** of our research environment is evidenced by the careful financial management that has enabled us to continue investing in appointments and facilities, the high quality of the appointments we are able to make, the processes we have put in place to develop both early-career and established researchers, the appointment of Research Support Officers in Psychology and HYMS to boost research income and increase our ability to respond to national and international initiatives, and the growing number of collaborative links both within and beyond the University of York to sustain and refresh our Psychology and Neuroscience research in years to come.