

MSc Dissertations in Psychology 2011-12

This document lists the academic staff available to supervise MSc dissertations, along with a brief statement of research interests, and a description of projects that each staff member is willing to supervise. In some cases, specific projects may be described; in others, a more broad description of a research area is given. In addition to the specific topics suggested, it is possible for you to suggest your own topic to a potential supervisor. Further information on staff and their research interests can be gained by following the 'people' link from the psychology homepage: <http://www.psy.ed.ac.uk/people>

It is up to you to approach supervisors to discuss topics. Your dissertation topic will be negotiated with your supervisor and must be agreed by both parties. Any student can be supervised by any staff member, provided that the topic is approved by your taught Programme Director as a topic relevant to your MSc programme.

Once you have agreed upon a dissertation topic with a supervisor, the Programme Director must be informed, and asked to approve the topic. Only then will your project with that supervisor be confirmed.

Your dissertation topic must be confirmed by the beginning of February at the latest, and ideally earlier, especially if the project is complicated or will involve special populations (e.g. children, neuropsychological patients)

Please be aware that supervisors will have limited places, so you should not necessarily expect to be accepted for your first choice of project.

The recommended word limit for the dissertation is between 8,000 and 10,000 words. For certain projects, it may be necessary for students to write a slightly longer dissertation, and you should consult your supervisor if you feel that this may apply to you. Dissertations longer than 15,000 words will not be considered.

The submission deadline for the dissertation is 4pm, Friday 17th August 2012. For details of how to format the dissertation, and binding and submission instructions, please see the PPLS Taught Masters Handbook - also available on the PPLS PG website.

Dr Sharon Abrahams

Office: S11

Email: s.abrahams@ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience

Research interests

Neuropsychology (executive and memory functions, social cognition, behaviour abnormalities) and neuroimaging (functional and structural) in dementia. My primary focus is on motor neurone disease and frontotemporal dementia.

Projects

Social Cognition in Dementia

This project will involve collection of data on some experimental measures of social cognition and tests sensitive to dysfunction of the orbitofrontal cortex in patients with motor neurone disease some of who may have frontotemporal dementia. The battery of tests include a new measure of understanding social scenarios, interpretation of direction of eye-gaze and also tests dependent on more orbitofrontal dysfunction, including variants of the I. The battery of tests has already been designed and pilot data has been collected.

Girardi, A., MacPherson, S. E., Abrahams, S. Deficits in Emotional and Social Cognition in Amyotrophic Lateral Sclerosis. *Neuropsychology* 2011, Vol. 25, No. 1, 53–65

Gibbons ZC, Snowden JS, Thompson JC, Happe F, Richardson A, Neary D. Inferring thought and action in motor neurone disease. *Neuropsychologia* 45, 1196–1207 (2007).

Meier SL, Charleston AJ, Tippett LJ. Cognitive and behavioural deficits associated with the orbitomedial prefrontal cortex in amyotrophic lateral sclerosis. *Brain* doi: 10.1093/brain/awq254 (2010).

Screening for Cognitive impairment in Motor Neurone Disease

This project will involve using a new screening measure which we have developed to detect behavioural and cognitive changes in Motor Neurone Disease. The measure is a 20 minute assessment which can be undertaken at the patients' homes. The study aims to

determine the sensitivity of this new measure to detect change in MND and to test interrater reliability.

Abrahams, S., Goldstein, L.H. and Leigh, P.N. (2005) Cognitive change in amyotrophic lateral sclerosis: a prospective study. *Neurology*, **64** 1222-1226

Abrahams, S., Leigh, P.N., Harvey, A., Vythelingum, N., Gris , D. & Goldstein, L.H. (2000). Verbal fluency and executive dysfunction in Amyotrophic Lateral Sclerosis (ALS). *Neuropsychologia*, **38**, 734-747.

Elamin M, Phukan J, Bede P *et al*. Executive dysfunction is a negative prognostic indicator in patients with ALS without dementia. *Neurology* **76**, 1263–1269 (2011).

Dual task and Speed of processing in Multiple Sclerosis and Parkinson's Disease

This project will involve the use of a new methodology designed to dissociate dual task decrements from slowed speed of processing, independent of motor functioning. The study will compare speed of processing and working memory theories of cognitive dysfunction in these disorders. 2 groups of patients will be assessed and compared to healthy age matched controls. This study uses a newly developed task which measures both speed of processing using a computerised visual discrimination task combined with a dual task methodology of digit recall. The study aims to show differential effect of aging on dual task and speed of processing.

Kaschel R. Logie RH. Kazen M. Della Sala S. Alzheimer's disease, but not ageing or depression, affects dual-tasking. *Journal of Neurology*. 256(11):1860-8, 2009 Nov.

Sarah E. MacPherson, Sergio Della Sala, Robert H. Logie and Gordon K. Wilcock. Specific AD impairment in concurrent performance of two memory tasks. *Cortex* (2007) Volume: 43, Issue: 7, Pages: 858-865

Joint projects with Marion Murray, Clinical Neuropsychologist, Astley Ainslie Hospital, Edinburgh. Primary contact for this project is Marion.Murray@nhslothian.scot.nhs.uk
Comparison of performance of healthy controls on two cognitive screening measures the LASCA (Lothian Assessment for Screening of Cognition in Aphasia) and the ACE-R.

Cognitive deficits are common consequences of stroke. However, it can be difficult to identify stroke survivors' cognitive deficits because many individuals experience aphasia and many existing cognitive assessments involve verbal instructions - sometimes quite complex ones - or else require the person being tested to give a verbal response. A new screening tool for assessing cognition in those with aphasia is being devised (Lothian

Assessment for Screening of Cognition in Aphasia - LASCA). To establish how valid the assessment may be and to establish 'normal' cut-offs so that patients' scores can be interpreted with reference to how individuals without neurological or language impairment would be expected to perform in different areas of cognitive functioning a normative sample of health controls must also be recruited. The following research projects could be considered from the data obtained from these healthy controls.

Use of CogniPlus in rehabilitation of visual attention deficits in stroke

CogniPlus is a computerised attentional retraining tool to be used for improving either attention problems or visual inattention/neglect after stroke. The following project would use a series of single case designs to determine the efficacy of this tool in stroke rehabilitation.

Background

Attentional deficits are a common consequence of stroke and after six weeks, it's estimated that around 20% to 43% of people who have had a stroke will continue to experience attentional impairment. Research has found that attentional problems are linked to poorer recovery, instability, falls and impaired dual task performance. Evidence also suggests that the degree of impairment appears to predict the likelihood of a person being able to return to work.

ATTENTION RETRAINING PROGRAMME

Computerised software which aims to train different aspects of attention exists. Studies on the efficacy of non-specific retraining for patients with diffuse brain damage, like head trauma have shown positive effects of training on different attention and intellectual functions. However, other studies concerning people with more localised brain damage, such as that seen in stroke, have suggested that it could be advantageous to train different attention functions more specifically.

Retraining can however, be extremely intensive. People were individually trained for forty minutes to an hour a day, five days a week for a total of twelve to fourteen sessions.

This study would investigate the utility of a computerised attention retraining programme (either for one specific type of attention or for visual inattention) using a single case study design.

Dr Thomas Bak

Office: S1 (CAVE: on sabbatical until 15 January 2012)

Email: thomas.bak@ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience, Centre for Clinical Brain Sciences (due to the emphasis on language my projects are suitable to students with linguistics as well as psychology background).

Research interests

Interaction between cognition (in particular language) and movement in neurodegenerative diseases: Motor Neuron Disease (MND), Multiple Sclerosis (MS), Progressive Supranuclear Palsy (PSP) and Corticobasal Degeneration (CBD)

Bilingualism and cognitive functions

Adaptation of cognitive tests to different linguistic and cultural environments

Projects

Language and cognition in MND, PSP, CBD and MS

Projects will be based on our current research conducted in these diseases and will include cognitive evaluation of patients and their relatives. They will require disclosure checks to obtain permission to work with vulnerable groups and willingness to travel to examine patients at their homes.

Bak TH (2011) Why movement and cognition belong together. *Nature Reviews Neurology*. 7, 10-12.

The influence of bilingualism on cognitive function and dementia

This project compares cognitive functions in monolingual and bi-/multi-lingual healthy participants and/or demented patients. In Scotland, the largest bilingual population can be found on the Western Isles (Outer Hebrides), but the students could also examine available populations in other countries.

Bialystok E, Craik FIM, Freedman M (2007) Bilingualism as a protection against the onset of symptoms of dementia. *Neuropsychologia*, 45, 459-464.

Adaptation of cognitive and linguistic tests to different cultures and languages

This project could be of interest to students with native languages other than English who wish to work on adaptation of cognitive tests for their respective countries.

Mathuranath PS, Hodges JR, Mathew R, Cherian PJ, George A, Bak TH (2004) Adaptation of the ACE for a Malayalam speaking population in southern India. *International Journal of Geriatric Psychiatry*, **19**, 1188-1194.

Prof Timothy Bates

Office: F33

Email: t.bates@ed.ac.uk

Principal research grouping: Differential; HCN.

Research interests

I work mostly on the genetics of behaviour: From genes for memory and reading, to politics and favoritism. I can offer training in most methods related to individual differences.

Projects

Does personality have aspects?

What lies beneath the five-factor model of personality? The consensus is that under each of the broad domains such as agreeableness lies 6 facets. Alternatively, there might be fewer, more, or a complex two-layered structure. We would test this hypothesis in a dataset of some 20,000 subjects.

DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the Big Five. *Journal of Personality and Social Psychology*, 93(5), 880-896.

Finding out about the mind using twins

We have used twin studies to show a range of things about the mind; from the notion that there are 6 biological sources of well-being, to genes for religious faith. This area is rich for additional study. Topics that are ready to go include: What is self-esteem? Does personality explain morality? Does intelligence alter religious faith? Does the environment interact with genes to influence cognition as suggested by Ceci, or as suggested by?

Archontaki, D., Lewis, G. J., & Bates, T. C. (under review). Genetic influences on psychological well-being: A nationally representative twin study. *Journal of Personality*.

Lewis, G. J., & Bates, T. C. (2010). Genetic Evidence for Multiple Biological Mechanisms Underlying Ingroup Favoritism. *Psychological Science*, 21(11), 1623-1628.

What makes a building beautiful?

I've worked for some time on a theory of beauty in architecture arguing that, like human beauty, the build environment can be objectively measured and improved. There are still several nice ideas to test in this theory: We could see how we can generate lasting increases in well-being through architectural design, or generalise the results to other aesthetics.

Prof Holly Branigan

Office: S13

Email: holly.branigan@ed.ac.uk

Principal research grouping: Language, Cognition and Communication

Research interests

I am interested in syntactic representation and processing in production, communication in a dialogue, and the development of syntax in first and second language acquisition.

Projects

Repetition of structure in children's dialogue

Children often imitate or repeat the language they hear around them, and this is thought to play an important role in language acquisition. Recent work has shown that they sometimes repeat abstract grammatical structure, as well as particular words or phrases. This tendency towards grammatical repetition suggests that children have abstract representations of at least some aspects of grammar, in contrast to some theories of language acquisition. We have developed a dialogue 'game' that allows us to investigate children's grammatical repetition: an experimenter and a child take it in turns to describe cards to each other in a 'snap' game. The project will use this task to study the circumstances under which children repeat grammar. Students would need a disclosure check in order to work with children, and should be prepared to undertake all data collection before the end of June.

Huttenlocher, J., Vasilyeva, M. & Shimpi, P. (2004). Syntactic priming in young children. *Journal of Memory and Language*, 50, 182-195.

Priming cooperation in lexical alignment

There is substantial evidence that conversational partners converge, or align, their behaviour at many different levels, and that this has a social basis to at least some degree (e.g., partners who converge behaviour are judged more favourably than those who do not). In this project we examine whether speakers who have been primed with a cooperative goal are more likely to align their choice of label for objects with more than one potential name.

Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: The perception-behavior link and social interaction. *Journal of Personality and Social Psychology*, 76, 893-910.

Dr Martin Corley

Office: G30

Email: Martin.Corley@ed.ac.uk

Principal research grouping: Language, Cognition and Communication

Research interests

Much of my research centres on the production and comprehension of errors in speech: how do errors come about? What do they tell us about the processes involved in speaking? Are listeners sensitive to speech disfluencies, and if they are, what use can they make of them?

Projects

I'd be interested in supervising any dissertation which takes a cognitive perspective to (imperfect) spoken communication, from the view of either the speaker or the listener, or both. Note that ERP projects are highly complex and would only be suitable for pairs of students working together. Some example project areas are listed below:

Interactivity and Monitoring in Speech Production

What can the production of “slips of the tongue” tell us about the ways in which speech is produced, and the ways in which language is represented? There are a range of possibilities in this area, ranging from articulographic analysis of elicited speech errors (programming ability an advantage) to investigations of the “inner voice” of people silently reciting tongue-twisters (see first and second references, respectively).

Corley, M., Brocklehurst, P. H., & Moat, H. S. (2011). Error biases in inner and overt speech: Evidence from tongue-twisters. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 37, 162-175.

McMillan, C. T., & Corley, M. (2010). Cascading influences on the production of speech: Evidence from articulation. *Cognition*, 117, 243-260.

Speaker Modelling

We know that speakers can design their utterances around the needs of the listener, but to what extent does the listener take their knowledge about the speaker into account when the speaker makes errors? Projects in this area would typically involve eyetracking or ERPs.

Arnold, J. E., Hudson Kam, C. L., & Tanenhaus, M. (2007). If you say *thee uh* you are describing something hard: The on-line attribution of disfluency during reference comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 33, 914-930.

Repairs in Speech

Speakers often revise their – change their minds about what they are saying, but how are listeners affected by repairs? Do “signals” such as “er” help them identify repairs? Projects in this area would typically involve eyetracking or ERPs.

Corley, M. (2010). Making predictions from speech with repairs: Evidence from eye movements. *Language and Cognitive Processes*, 25, 706-727.

Prof Sergio Della Sala

Office: F6

Email: sergio@ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience

Research interests

Interests in cognitive neuropsychology, in particular in amnesia, visuo-spatial and representational neglect, apraxia and the cognitive deficits of Alzheimer's Disease.

Projects

Anosognosia for memory deficits

Anosognosia is a common occurrence following brain damage and manifests itself as a lack of awareness for motor or cognitive (such as memory) impairment. Assessments for anosognosia of memory deficits are still underdeveloped. Commonly anosognosia for memory disorders is assessed by means of structured interviews or rating scale. The main aim of the proposed project is to devise new and reliable tests to assess different types (explicit, behavioural and implicit) of anosognosia of memory impairment.

Clare L, Markova I, Verhey F, Kenny G. Awareness in dementia: A review of assessment methods and measures. *Aging & Mental Health*, 2005; 9: 394-413.

Cocchini G, Beschin N, Cameron A, Fotopoulou A., Della Sala S. Anosognosia for motor impairment following left-brain damage. *Neuropsychology* 2009; 23: 223-30.

Cocchini G, Beschin N, Fotopoulou A, Della Sala S. "Explicit and implicit anosognosia for upper limb motor impairment" *Neuropsychologia*, 2010; 48:1489-1494.

Object centred neglect and pseudoneglect

Following a right hemisphere lesion, patients present with "neglect", they tend to ignore the left side of space. Healthy individuals tend to show "pseudoneglect", ignoring to a much less extent the right side. There are many types of neglects, one is labelled object-centred; however this has been observed in non-reversible stimuli only with words (and faces) and in left handed people with a right-sided lesion. Would object-centred neglect exist for other non-verbal stimuli? Would object-centred pseudoneglect exist?

Della Sala, S., Darling, S. & Logie, R.H. (2010) Items on the left are better remembered. *The Quarterly Journal of Experimental Psychology*, 63:(5) 848-855.

Pia, L., Nepp-Modona, M., & Folegatti, A. (2010) Object-centred pseudoneglect for non-verbal stimuli. *Exp. Brain Res.*, 200: 61-66.

Scmitz, R. & Peignex, P. (2011) Age-related changes in visual pseudoneglect. *Brain and Cognition*, 76: 382-389.

Retroactive interference as a possible account of forgetting

Recent work by our team shows that memory difficulties can be substantially alleviated if the time that follows learning is devoid of further material ('Minimal Interference'). Our follow up research indicates that minimal interference enhances memory by allowing a spared consolidation process to function in amnesic patients. The aim of the proposed

project is to further explore the theoretical basis of this fascinating finding and to begin to address its potential utility in every day life.

Cowan, N., Beschin, N., & Della Sala, S. (2004). Verbal recall in amnesiacs under conditions of diminished retroactive interference. *Brain*, *27*, 825-834.

Dewar, M., Fernandez Garcia, Y., Cowan, N., & Della Sala, S. (2009). Delaying interference enhances memory consolidation in amnesic patients. *Neuropsychology*, *23*, 627-634.

Wixted, J.T. (2004). The Psychology and neuroscience of forgetting. *Annual Review of Psychology*, *55*, 235-269.

Wild card

I am prepared to be approached by students who have their own ideas for projects in my area of expertise. I am prepared to supervise students working in pairs.

Dr Maria Garraffa

Office: S25

Email: mgarraff@staffmail.ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience, Language Cognition and communication

Research interests

My main interest is in Language Pathologies. My research focuses on Syntax in acquired and developmental language disorders. My practical aim is to develop theoretical instruments to investigate language impairments and to share these instruments with Linguists, Psychologists and Neuroscientists.

Projects

I am happy to supervise student projects on Natural Language and Language Pathologies.

Familiarity with Linguistics would be an advantage but not essential.

Sentence processing AND verbal working memory in Acquired Language disorders

Broca's aphasia has been associated with a deficit in the syntactic algorithm involved in sentence comprehension. At the same time greater memory load is combined with comprehension of complex sentences.

The main purpose of the project is to explore the overlap of non-standard comprehension and low working memory performance in healthy controls. Preliminary contacts have been made to assess patients with aphasia.

A strong interest in Clinical Studies is essential.

Caplan D, Waters G, Dede G, Michaud J, Reddy A 2007. A study of syntactic processing in aphasia I: behavioral (psycholinguistic) aspects. *Brain & Language*, 101 (2): 103-50.

Caplan D, Waters G, Kennedy D, Alpert N, Makris N, Dede G, Michaud J, Reddy A 2007 [A study of syntactic processing in aphasia II: neurological aspects](#). *Brain & Language* 101 (2): 151-77.

Caramazza, A. and Zurif, E.B. 1976. Dissociation of algorithmic and heuristic processes in language comprehension. Evidence from aphasia. *Brain & Language* 3: 572-82.

Gordon, P., Hendrick, R., Levine, W. 2002. Memory-load Interference in Syntactic Processing. *Psychological Science* 2002 13 (5) 425 – 430.

The development of Syntax in children with Specific Language Impairment

Specific Language Impairment (SLI) is a condition of delayed or impaired language acquisition that occurs in children with otherwise normal development. The nature of the linguistic delay is still a subject of research as it appears in rather variable forms across languages and affects a wide range of grammatical domains.

The project's purpose is to assess linguistic abilities in pre school children with typical and atypical development and those areas that are more compromised in children with SLI with an emphasis on language comparisons.

This project may be done in pairs. A strong interest in Developmental Psychology is required.

Fattal,I., Friedmann,N.,Fattal-Valevski 2011 The crucial role of thiamine in the development of syntax and lexical retrieval:A study of infantile thiamine deficiency. *Brain*,134 (6) 1720-1739.

Miller and Deevy, 2006. Structural priming in children with and without SLI. *Clinical Linguistics and Phonetics*, 20, 387-399.

Novogrodsky, R. and Friedmann, N. 2006 The production of relative clauses in SLI: A window to the nature of the impairment. *Advances in Speech-Language pathology*, 8, 364 – 375.

Dr Elena Gherri

Office: S41

Email: elena.gherri@ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience

Research interests

I use psychophysiological (EEG, ERP) and behavioural measures to investigate several aspects of perception, attention and action. My research has focused upon elucidating the links between attention and action: specifically, the perceptual consequences of movement planning and the nature of the action-perception coupling (mandatory vs. optional).

Dissociating eye movement and visual attention:

Previous studies have shown that the systems involved in the control of spatial attention and eye movement are substantially overlapping (c.f. Corbetta, 1998). But the full extent of such overlap, and of any independence, remains debated. Some authors suggest only partial overlap between brain mechanisms for attention and eye movements (e.g. [Kowler et al., 1995](#)). On this perspective, although attention and saccade plans are functionally coupled when selecting the goal for an eye movement, shifts of attention may occur in the absence of any eye movement activation, that is links between attention and eye movements are optional. Others suggest stronger overlap. On the influential premotor theory of attention, spatial motor plans are considered the primary means of directing spatial attention ([Rizzolatti et al., 1994](#)). From this perspective, the main difference between saccades and covert shifts of attention is simply that the motor plan is actually executed only in the former case. According to this view links between attention and eye movements are mandatory.

The aim of this project is to use electrophysiological measures to investigate whether links between eye movements and spatial attention are optional or mandatory. A new experimental paradigm will be implemented (adapted from Gherri & Eimer, 2010) in which

participants will be instructed to covertly shift their attention to a left or right location (attention task), and to simultaneously prepare an eye movement toward the same location or to a location on the opposite side of space (oculomotor task), as indicated by a cue presented at the start of each trial. Cues will be followed either by a central Go signal, requiring execution of the prepared oculomotor response (oculomotor task) or by a peripheral visual stimulus, which will require a target–non-target discrimination (attention task).

Investigating the control mechanisms of spatial attention

Shifts of spatial attention are known to be associated with lateralised ERP components that can be observed in the cue-target interval of attentional cueing tasks. These components are supposed to reflect brain activity within frontal and posterior areas of the frontoparietal attentional control network. Crucially, very similar components have also been observed in purely motor tasks where a cue instructed participants to prepare a spatially-directed saccadic eye movement (e.g. Eimer et al., 2007), suggesting that shifts of attention are elicited towards the movement goal during covert eye movement preparation. Aim of this project is to investigate whether these components would also be triggered during cued attentional shifts when an oculomotor response is *simultaneously* prepared towards an opposite location. If links between spatial attention and response preparation are mandatory, oculomotor response preparation should interfere with attentional orienting in this condition, resulting in attenuated or even absent cue-locked lateralized components.

Investigating the effects of spatial attention on visual processing

Modulations of event-related brain potentials elicited by peripheral visual stimuli presented at attended versus unattended locations will be used as a measure of the effects of spatial attention on visual processing. If the mechanisms involved in spatial attention and oculomotor responses are inevitably linked, it should be impossible to direct visual attention to one side while simultaneously preparing an eye movement towards an opposite location and this should be reflected by the absence/reduction of the attentional

modulations of visual processing in this condition. In contrast, if such links are optional, attentional and oculomotor processes may be spatially decoupled and analogous attentional modulations should be observed regardless of eye movement direction (same or opposite location).

Special requirements: In this study, event-related brain potentials will be recorded from the participants' scalp during the experiment. Students will learn to collect and analyze ERP data. For this reason, students should be already familiar with statistical data analysis (in particular ANOVAs) and SPSS. This project is ideal for two students working together during data collection. Successively, each student will analyze a different part of the ERP data. One student will focus his/her analysis on the lateralized ERP components indicative of covert attention shifts elicited by the cues, while the other student will analyze the ERPs triggered by the peripheral targets.

Corbetta M. Frontoparietal cortical networks for directing attention and the eye to visual locations: identical, independent, or overlapping neural systems? *Proceeding of the National Academy of Science USA*. 1998;95:831–838.

Eimer, M., Van Velzen, J., Gherri, E., & Press, C. (2007). ERP correlates of shared control mechanisms involved in saccade preparation and in covert attention. *Brain Research*, 1135, 154–166.

Gherri, E., & Eimer, M. (2010). Manual response preparation disrupts spatial attention: an electrophysiological investigation of links between action and attention. *Neuropsychologia*, 48(4), 961-9.

Kowler E, Anderson E, Doshier B, Blaser E. The role of attention in the programming of saccades. *Vision Research*. 1995;35:1897–1916.

Rizzolatti G, Riggio L, Sheliga B. Space and selective attention. In: Umiltà C, Moscovitch M, editors. *Attention and Performance XV*. MIT Press; Cambridge MA: 1994. pp. 231–265.

Dr. Wendy Johnson

Office: F8

Email: wjohnson@staffmail.ed.ac.uk

Principal research grouping: Differential Psychology

Research interests

Individual differences: structure of intelligence and personality, life-span development of intelligence and personality, health and aging, genetic and environmental transactions and their influence on behavior, intelligence, and personality.

Projects

Pretty much anything, but especially anything related to intelligence, personality, academic achievement, health outcomes (mental and physical), genetics, sample selection, cognitive and physical ageing, or education. I could supervise any of the research methodology students. Many students who work with me will end up using archival data from existing studies. While this simplifies the data accumulation process considerably, these projects usually make it up in complexity of statistical analysis. Students working with me should have solid basic analytical skills and willingness and ability to acquire more.

Dr Peter Lamont

Office: F34

Email: Peter.Lamont@ed.ac.uk

Principal research grouping: History and Theory of Psychology

Research interests

I am interested in the history of unorthodox psychological knowledge, beliefs about extraordinary (e.g. paranormal) phenomena, and the history and psychology of magic (conjuring). My research is primarily historical and discursive, based upon historical and discourse analysis of textual sources.

Projects

I would be happy to supervise any topic relating to unorthodox psychological knowledge, or beliefs about extraordinary (e.g. paranormal) phenomena, past or present, that takes an historical or discursive approach. I would be prepared to supervise any topic in the history of psychology, providing it considers the reflexive nature of psychological knowledge (i.e. how is knowledge about thought and behaviour shaped by the time and place in which it is produced, and how does it in turn shape what people think and do?).

All projects would involve either historical or discourse analysis, or both. For examples, see:

Lamont, P. (2010). Reflexivity, the role of history, and the case of mesmerism in early Victorian Britain. *History of Psychology*, 13(4), 393-408.

Lamont, P. (2010). Debunking and the psychology of error: a historical analysis of psychological matters. *Qualitative Research in Psychology*, 7(1), 34-44.

Dr Billy Lee

Office: S40

Email: b.lee@ed.ac.uk

Principal research grouping: Language, Cognition and Communication

Research interests

I am interested in phenomenological psychology: the use of experience-near qualitative methods to interview and understand people's distinctive lived experiences. I have supervised projects exploring gender, identity, sexuality, relationships, health, illness, and other areas of lived experience. My current research on the 'talking cure' explores the development of therapeutic listening in trainee counsellors.

Projects

Exploring Lived Experience

I would be happy to consider project proposals on any area of lived experience that holds interest or significance for the student. The qualitative method I recommend is Interpretative Phenomenological Analysis (IPA). This is a relatively new psychological technique that has been used extensively in the areas of health, sexuality, gender, and identity. IPA is inductive, rather than hypothesis driven. It brackets preconceptions and assumptions and attempts to give an experience-near account of the phenomenon under investigation. As part of your project, you will identify, recruit, and interview up to six participants; transcribe the audio recordings; analyze the transcripts; and contextualise your findings. Your data should enable you to critique existing psychological knowledge using the experiential accounts of your participants.

Langdrige, D. (2007). *Phenomenological Psychology: Theory, Research and Method*. Pearson Prentice Hall.

Larkin, M., Watts, S. and Clifton, E. (2006). Giving voice and making sense in interpretative phenomenological analysis. *Qualitative Research in Psychology*, 3, 102-120.

Reid, K., Flowers, P., and Larkin, M. (2005). Exploring lived experience. *The Psychologist*, 18 (1), 20-23.

Smith, A., Flowers, P., and Larkin, M. (2009). *Interpretative Phenomenological Analysis*. Sage Publications.

Dr Alison Lenton

Office: S5

Email: a.lenton@ed.ac.uk

Principal research grouping: Differential Psychology; Human Cognitive Neuroscience

Research interests

At present I am primarily interested in situational influences on the self. In particular, my co-investigator, Prof Constantine Sedikides (University of Southampton), and I have an ESRC grant to support research identifying the factors that contribute to making people feel like their true, authentic self (see our project website: projectself.psy.ed.ac.uk). I use experimental and quantitative methods in my studies.

Projects

State Authenticity 1 & 2

We have a number of proposed studies related to the ESRC grant and would be happy to have a postgraduate student collaborate with us on any of these (or variants).

Heppner, W. L., Kernis, M. H., Nezlek, J. B., Foster, J. D., Lakey, C. E., & Goldman, B. M. (2008). Within-person relationships between daily self-esteem, need satisfaction, and authenticity. *Psychological Science, 19*, 1140-1145.

Fleeson, W. & Wilt, J. (2010). The relevance of big five trait content in behavior to subjective authenticity: Do high levels of within-person behavioral variability undermine or enable authenticity achievement? *Journal of Personality, 78*, 1353-1382.

Prof Robert Logie

Office: F9

Email: rlogie@staffmail.ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience

Research interests

I am interested in any area of human memory and particularly working memory throughout the adult lifespan. My research primarily uses the methods of experimental cognitive psychology.

Projects

Professor Logie would be happy to discuss projects on his topics of interest. These projects would be most suited to students who have taken the optional course on Working Memory running in semester 1, unless this topic was already well covered in their undergraduate psychology degree courses before commencing the MSc. Four specific possible project topics are:

Multitasking

This refers to the ability to undertake a range of tasks in a limited period, and is required in both personal and professional everyday life. Although multitasking has been studied in patients with frontal lobe damage and in specialist groups of experts such as in aviation, almost no research has addressed how it is achieved by healthy people who have no particular expertise in multitasking or how this ability is affected through middle and older age. This project would involve using a virtual environment in which participants complete errands to study planning, prospective and working memory.

Logie, R.H., Trawley, S. & Law, A.S. (2011). Multitasking: Multiple, Domain-Specific Cognitive Functions in a Virtual Environment. *Memory and Cognition*, doi: 10.3758/s13421-011-0120-1.

Trawley, S.L., Law, A.S. & Logie, R.H. (2011). Event based prospective remembering in a virtual world. *Quarterly Journal of Experimental Psychology*. DOI:10.1080/17470218.2011.584976

Impact of the fMRI environment on cognitive function

There has been a dramatic growth in the use of brain imaging techniques, such as fMRI to study the neuroanatomical correlates of human cognition. However, very little is known about how the physical environment of the fMRI scanner affects the cognition that is being studied, and whether the way in which participants perform cognitive tasks changes when they are tested within the scanner relative to a standard laboratory. Using a

full size simulator of an fMRI scanner, this project will investigate the impact on the cognitive strategies of participants of the fMRI environment relative to testing in a standard behavioural laboratory setting.

Gutchess, M.S. & Park, D.C. (2006). fMRI environment can impair memory performance in young and elderly adults. *Brain Research*, 1099, 133-140.

Logie, R.H., Pernet, C.R., Buonocore, A., Della Sala, S. (2011). Low and High Imagers Activate Networks Differentially in Mental Rotation. *Neuropsychologia*, 49, 3071– 3077.

Logothetis, N. (2008). What we can do and what we cannot do with fMRI. *Nature*, 453, 12th June, 869-878.

Mazard, A., Mazoyer, B., Etard, O., Tzourio- Mazoyer, N., Kosslyn, S.M. & Mellet, E. (2002) Impact of fMRI Acoustic Noise on the Functional Anatomy of Visual Mental Imagery. *Journal of Cognitive Neuroscience*, 14 (2) p172-186

Raz, A, Lieber, B., Soliman, F., Buhle, J., Posner, J., Peterson, B.S. & Posner, M.I. (2005). Ecological nuances in functional magnetic resonance imaging (fMRI): psychological stressors, posture, and hydrostatics. *NeuroImage* 25, 1 – 7

Visual working memory

Visual working memory refers to the ability to hold and process the appearance and location of objects that have been recently seen, or perhaps the order in which they appeared. The ability to do so can be affected by whether items to be remembered comprise simple shapes or colours, or comprise combinations (or bindings) of e.g. colour, shape and location. The ability to do so can also be affected by how much prior knowledge the participant has of the object concerned - can they generate a visual image of the item or is it completely novel? This project would involve conducting experiments on immediate visual memory and the interface between long-term stored visual knowledge and the temporary retention of the visual features of objects.

Borst, G., Niven, E.H. & Logie, R.H. (2011). Visual mental image generation does not overlap with visual short-term memory: A dual task interference study. *Memory and Cognition*, doi: 10.3758/s13421-011-0151-7.

Logie, R.H., Brockmole, J.R. & Vandembroucke, A. (2009). Bound feature combinations in visual short-term memory are fragile but influence long-term learning. *Visual Cognition*, 17, 160-179.

Van der Meulen, M., Logie, R.H. & Della Sala, S. (2009). Selective interference with image retention and generation: Evidence for the workspace model. *Quarterly Journal of Experimental Psychology*, 62, 1568-1580.

Working Memory Capacity

There is an ongoing debate as to whether working memory comprises a single, attentional resource that can be switched to focus on different tasks or aspects of a task, or comprises

multiple, specialised resources that can operate in parallel. There is also a debate about whether working memory capacity can be increased by training. This project would undertake experiments to address this debate using complex working memory capacity tasks by examining, for example, the extent to which processing and memory rely on attention switching between them, whether people can undertake ongoing processing at the same time as holding items in working memory, and whether training of working memory actually does increase its capacity, or simply reduces the load on working memory through, for example, learning strategies.

Barrouillet, P. & Camos, V. (2007). The time-based resource-sharing model of working memory. In N. Osaka, R.H. Logie, & M. D'Esposito (Eds.) *The Cognitive Neuroscience of Working Memory*. Oxford, UK: Oxford University Press, pp 59-80.

Duff, S.C. & Logie, R.H. (2001). Processing and storage in working memory span. *Quarterly Journal of Experimental Psychology*, 54A, 31-48.

Jaeggi, S.M., Buschkuhl, M., Jonides, J. & Perrig, W.J. (2008). Improving fluid intelligence with training on working memory. *Proceedings of the National Academy of Sciences of the United States of America*, 105(19), 6829–6833.

Johnson, W., Logie, R.H. & Brockmole, J.R. (2010). Working Memory Tasks Differ in Factor Structure Across Age Cohorts: Implications for Dedifferentiation. *Intelligence*, 38, 513-528.

Logie, R.H. (2011). The functional organisation and the capacity limits of working memory. *Current Directions in Psychological Science*, 20(4), 240-245.

Moody, D.E. (2008). Can intelligence be increased by training on a task of working memory? *Intelligence*, 37, 327-328.

Schmiedek, F., Lövdén, M. & Lindenberger, U (2010). Hundred days of cognitive training enhance broad cognitive abilities in adulthood: findings from the COGITO study. *Frontiers in Aging Neuroscience*, 2, Article 2. doi: 10.3389/fnagi.2010.00027

Unsworth, N., Redick, T.S., Heitz, R.P., Broadway, J.M. & Engle, R.W. (2009). Complex working memory span tasks and higher-order cognition: A latent-variable analysis of the relationship between processing and storage. *Memory*, 17, 635- 654.

Dr Michelle Luciano

Office: S26

Email: michelle.luciano@ed.ac.uk

Principal research grouping: Differential Psychology

Research interests

My research involves investigating the influence of genes and the environment on cognitive performance, personality and mood. In terms of cognitive abilities I have a special interest in reading and language abilities and in terms of personality and mood I am interested in the contributions of social, psychological and health factors in understanding their aetiology. I am willing to supervise any projects related to either genetic or environmental factors or the interaction of the two.

Projects

Some suggestions for projects include 1) testing candidate gene (informed by previous genetic studies on humans and animals) effects on general and/or specific cognitive abilities 2) investigating the role of inflammatory biomarkers on cognitive change in old age 3) testing for (candidate) gene x environmental (e.g., lifestyle variables) interaction effects on anxiety and depression, and 4) heritability analysis of cognitive abilities using extended pedigree data. Data collection has been completed for these research projects, therefore, there will be a great emphasis on statistical modeling (primarily using general linear models within a multivariate context), and for projects involving genetic modelling, background reading on genetic theory will be essential. My recent publications outline the types of analyses I conduct and the samples I work on, so if you have your own ideas that build on any of these, I would be happy to discuss these.

Dr Graham MacKenzie

Office: S29

Email: graham.mackenzie@ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience

Research interests

I am interested in memory and face recognition, and I study them by using event-related potentials (ERPs) and behavioural methods.

Projects

What retrieval processes support visual memory?

Long-term visual memory for real-world scenes has a massive capacity but little is known about the retrieval processes that access visual information from its store. Dual process models propose that familiarity and recollection are independent retrieval processes that support recognition memory, and a number of behavioural methods have been developed to assess the contribution of these processes to recognition memory performance. This project will use behavioural methods to investigate long-term visual memory and is suitable for either a single student or a pair of students to work in tandem.

Brady, T.F., Konkle, T., Alvarez, G.A., & Oliva, A. (2008). Visual long-term memory has a massive storage capacity for object details. *Proceedings of the National Academy of Sciences*, 105: 14325-14329.

Yonelinas, A.P. (2002). The nature of recollection and familiarity: A review of 30 years of research. *Journal of Memory & Language*, 46: 441-517.

The caricature effect in face identification

Sketch artists caricature faces by enhancing distinctive features, whereas psychologists caricature faces by increasing the overall distance of their features with respect to the features of an average face. The caricature effect is a recognition advantage for caricatures over veridical faces, and it has been observed using line drawings (Benson & Perrett, 1994) and photographic stimuli (Lee, Byatt & Rhodes, 2000), although photographic stimuli have produced mixed results. In parallel research, it has been shown that averaging together multiple photographs of the same person creates a facial representation that is recognised more accurately than any individual photograph (Jenkins & Burton, 2008). This project will investigate the effects of caricaturing and/or averaging

familiar faces on the access to identity representations stored in memory and is suitable for either a single student or a pair of students.

Hancock, P.J.B., Bruce, V., & Burton, A.M. (2000). Recognition of unfamiliar faces. *Trends in Cognitive Sciences*, 4: 330-337.

Yonelinas, A.P. (2002). The nature of recollection and familiarity: A review of 30 years of research. *Journal of Memory & Language*, 46: 441-517.

Professor Alasdair McClullich and Dr Zoe Tieges

Office: S1642, Royal Infirmary Edinburgh, Little France

Email: Zoe.Tieges@ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience, Centre for Cognitive Aging and Epidemiology

Projects

Neuropsychology of Delirium

This project will be run in association with Alasdair MacLullich, a professor in geriatric medicine in the Royal Infirmary of Edinburgh. The main area of interest is: attentional deficits in delirium.

The project deals with examining cognitive differences among patients with delirium and controls.

More specifically, the topic of research will involve the investigation of attentional deficits in critical care patients with and without delirium. A longitudinal study that deals with changes in attention over time in these patients is also possible. Students will have the opportunity to contribute their own ideas to this project.

This is a challenging project, which involves testing many patients who are very ill., often outside office hours. The student(s) will be based in the Royal Infirmary of Edinburgh.

Brown LJ, Fordyce C, Zaghdani H, Starr JM, MacLullich AM, detecting deficits of sustained visual attention in delirium. *J Neurol Neurosurg Psychiatry*. 2010.

Brown LJ, McGrory S, McLaren L, Starr JM, Deary IJ, MacLullich AM. Cognitive visual perceptual deficits in patients with delirium. *J Neurol Neurosurg Psychiatry*. 2009 80:594-9.

Dr Rob McIntosh

Office: UF36

Email: r.d.mcintosh@ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience

Research interests

I am interested in visual perception, attention and the control of action in humans.

In addition to the following suggestions, I am happy to discuss students' ideas for any projects related to visuomotor behaviour, visual attention, or any of the projects ongoing in the Visuomotor Lab (www.psy.ed.ac.uk/people/rmcinto1/VMLprojects.html).

Projects

Mirror-writing

Mirror-writing, the writing of letters or words in mirror-reversed form, can arise spontaneously after brain damage, is common amongst children learning to write, and is intentionally practiced by some rare individuals (most famously, Leonardo Da Vinci, Lewis Carroll). This intriguing phenomenon has received relatively little neuropsychological investigation. This project will study the phenomenon of mirror-writing either in children learning to write, in normal adults, or in exceptional individuals who are practiced and skilled in mirror-writing, such as the mirror-artist that we have been studying (you can watch a short BBC film about this research at: http://www.psy.ed.ac.uk/people/rmcinto1/BBC_mirror_writing.wmv).

Della Sala S, Cubelli R (2007) 'Directional apraxia': A unitary account of mirror writing following brain injury or as found in normal young children. *Journal of Neuropsychology*, **1**: 3–26.

Schott GD (2007) Mirror writing: neurological reflections on an unusual phenomenon. *Journal of Neurology, Neurosurgery & Psychiatry*, **78**: 5–13.

Motor imagery

When we imagine moving, many of the same motor systems in our brains are active as when we make real movements. One way to probe motor imagery is to ask people to make laterality (left or right) judgements about pictures of hands and feet. People seem to solve this task by imagining moving their own limbs to match the picture. Performance on such tasks is selectively impaired by conditions such as writers cramp (Fiorio et al, 2006), amputation (Nico et al, 2004) and congenital limb absence (Funk & Brugger, 2008). This project will examine in more detail the mental processes that are engaged when people make laterality judgements for pictures of hands and feet.

Fiorio M, Tinazzi M & Aglioti SM (2006). Selective impairment of hand mental rotation in patients with focal hand dystonia. *Brain* **129**: 47-54.

Funk M & Brugger P (2008). Mental rotation of congenitally absent hands. *Journal of the International Neuropsychological Society* **14**: 81-89.

Nico D, Daprati E, Rigal F, Parsons L & Sirigu A (2004). Left and right hand recognition in upper limb amputees. *Brain* **127**: 120-132.

Vision and action

In the visuomotor lab, we study various aspects of the visual control of action, including the range of visual cues used to guide action, and the role of attentional resources and conscious awareness in skilled manual performance. Below, I suggest a few different questions that you might tackle:

Familiar size in action

If people are familiar with the true size of an object, they can use this knowledge to estimate how far away that object is. We have found that people use this information when they reach out to grasp an object (McIntosh & Lashley, 2008). We showed this by having people grasp matchboxes repeatedly and then, on critical trials, replacing the standard matchbox with a scaled-down or scaled-up replica. When the scaled-down replica was presented, people assumed that the box was larger and further away than it really was, thus reaching too far and opening their hand too wide (opposite effects were seen for the scaled-up replica). A subsequent study suggested that people may use this cue only for objects (like matchboxes) that are familiar from everyday life, not novel ones that have just been learned about in the lab (Borchers et al, 2011). It would be interesting to test more directly whether people's daily experience does indeed predict their use of familiar size. For instance, we might predict that smokers would have a strong mental representation of the size of a 20-pack of cigarettes, and would reach too far if presented with a scaled-down replica, even without any laboratory learning; non-smokers should not do this because they would not be so familiar with the size of a 20-pack (this is just an example; you may have better ideas for what real-world objects we could use).

Borchers S, Christensen A, Ziegler L & Himmelbach, M. Visual action control does not rely on strangers — effects of pictorial cues under monocular and binocular vision. *Neuropsychologia* **49** (2011) 556–563

McIntosh RD & Lashley G (2008). Matching boxes: familiar size influences action programming. *Neuropsychologia* **46**: 2441-2444.

Cognition in action

Our moment-to-moment actions proceed mostly without much thought, but certain aspects seem to require more cognitive effort. Creem & Proffitt (2001) showed that, while distracted by a difficult mental task, people will do daft things like picking up spoons by their bowl-end rather than by their handle. At the same time, the execution of those actions remained very skilful. This suggests that deciding *how* to pick something up may take cognitive effort, but carrying out the action once the decision has been made is automatic. This project will extend this method to study the ‘end-state-comfort’ phenomenon, in which people choose actions that minimise postural awkwardness. We would predict that this kind of action selection, like tool grasping, should require cognitive involvement, resulting in poor choices of grasp posture under dual-task conditions, but that the quality of the grasp itself will not be similarly affected. Several other aspects of action selection and guidance could be investigated by similar means.

Creem SH, Proffitt DR (2001). Grasping Objects by Their Handles: A Necessary Interaction Between Cognition and Action. *Journal of Experimental Psychology: Human Perception and Performance*, **27**: 218-228.

Dijkerman HC, McIntosh RD, Schindler I, Nijboer TCW & Milner AD (2009). Choosing between alternative wrist postures: action planning needs perception. *Neuropsychologia* 47: 1476-1482.

The automatic pilot of the hand

When the target of a reaching movement jumps suddenly, people update their reach to take account of the jump, often without any awareness that they have done so. This updating of reach trajectories, sometimes called the ‘automatic pilot’, depends upon the integrity of superior parietal lobe pathways (Desmurget et al, 1999; Pisella et al, 2000). This project will investigate how trajectory corrections are affected by stimulus and task manipulations, such as the visual properties of the target before and after the jump, or concurrent attentional demands.

Desmurget D, Epstein CM, Turner RS, Prablanc C, Alexander GE, Grafton ST. Role of the posterior parietal cortex in updating reaching movements to a visual target. *Nature neuroscience* **2**: 563-567.

Pisella L, Gréa H, Tilikete C, Vighetto A, Desmurget D, Rode G, Boisson D, Rossetti Y (2000). An ‘automatic pilot’ for the hand in human posterior parietal cortex: toward reinterpreting optic ataxia. *Nature neuroscience* **3**: 729-736.

Speed-accuracy trade-offs in grasping

One of the few true laws to which psychology can lay claim is Fitts’ law, which describes the speed-accuracy trade-off in simple movements (the faster you move, the less accurate you can be). I have been running a series of experiments to discover whether Fitts’ principles can be extended to the more complex situation of reaching and grasping. The

clear answer so far is that grasping movements do obey lawful speed-accuracy trade-offs, but of a different form to Fitts' original equation. This project will investigate further the relationship between speed and accuracy in grasping, by studying the manner in which people grasp objects that impose different accuracy constraints in different spatial dimensions. This project will employ an optoelectronic (Optotrak), or electromagnetic (Minibird) motion tracking system. The student will gain experience in the kinematic analysis of human movements.

For an example of a (flawed) attempt to apply Fitts' law to prehension, on which we will improve, see:

Bootsma RJ, Marteniuk RG, MacKenzie CL, Zaal FTJM (1994) The speed-accuracy trade-off in manual prehension: effects of movement amplitude, object size and object width on kinematic characteristics. *Experimental Brain Research* **98**: 535-541.

Dr Kate Messenger

Office: TBC (Dec 2011)

Email: ktmesseng@gmail.com

Principal research grouping: Language, Cognition and Communication

Research interests

I am interested in children's first language acquisition and language processing, in particular in their development, production and comprehension of syntax.

Projects

Syntactic priming and implicit learning effects

Syntactic priming studies provide evidence suggesting that adults and children store abstract mental representations of language: speakers are more likely to use a particular sentence structure, such as a passive (*the cat was chased by the dog*), if they've just heard a sentence with the same structure (*the dog was scratched by the cat*) and therefore the same abstract representation, than if they've just heard a sentence with a different syntactic structure (*the cat scratched the dog*). Some studies with adults suggest that syntactic priming also reflects an implicit learning effect in the language representation system, and that this learning effect is similar to child language learning, but not much is known about whether children show long-term learning effects from priming. This project will investigate whether priming effects in children reflect long-term syntactic learning. The study will involve playing picture description games with children.

Students would need a disclosure check in order to work with children, and should be prepared to undertake all data collection before the end of June.

Bencini, G., & Valian, V. (2008). Abstract sentence representations in 3-year-olds: Evidence from language production and comprehension. *Journal of Memory and Language* 59, 97–113.

Dr. Alexa Morcom (<http://www.ppls.ed.ac.uk/psychology/people/alexa-morcom>)

Office: S30

Email: alexa.morcom@ed.ac.uk

Research groupings: Human Cognitive Neuroscience, Cognitive Neuroimaging Group (Centre for Cognitive and Neural Systems), Centre for Cognitive Ageing and Cognitive Epidemiology

Research interests

My main research interest is in memory: basic memory mechanisms, and how memory changes as we age. I use behavioural as well as neuroimaging methods (ERPs and fMRI). Episodic memory involves conscious long-term memory for specific events. It is one of the mental abilities most affected by ageing. Age-related episodic memory decline is characterised by particular problems remembering details, context, and associations between items (3, below). Events are less likely to be recollected, and things are more likely to seem non-specifically familiar (1). Importantly, older people are prone not only to failing to remember unique events, but also to false memories, that is, mistakenly 'remembering' events that did not happen.

My current research examines how episodic memory changes in ageing, and investigates the basic mechanisms of episodic and procedural memory.

Projects

Basic mechanisms projects are possible in many cases where a project theme focuses on ageing, as this kind of understanding forms the basis for research into ageing.

I am happy to discuss the supervision of other potential projects related to my research, as well as those outlined below. Student input into the dissertation topic is encouraged. Please note that the fMRI analysis project is a demanding one that would not suit everybody. Also note that I offer more projects than I can supervise students, in order to maximise your choice.

Please do come and see me if you are interested in doing a project with me.

Project 1: Episodic memory and episodic memory in ageing

This theme covers 3 possible projects. These (1:2) are useful general references:

1. Eichenbaum H, Yonelinas AP, Ranganath C 2007. The medial temporal lobes and recognition memory. *Annu Rev Neurosci*, 30:123–52.
2. Shing YL, Werkle-Bergner M, Brehmer Y, Muller V, Li SC, Lindenberger U (2009) Episodic memory across the lifespan: The contributions of associative and strategic components. *Neurosci Biobehav Rev*. 34: 1080-1091.

Project 1a. Ageing and false memory.

Why do older adults mistake new items for old ones? Is this because they have difficulties with cognitive control, possibly due to frontal lobe damage (4)? Or is it because they do not encode memories distinctively, possibly due to medial temporal lobe damage (4)? Some research has suggested the former, based on evidence that semantic links between different items are particularly important in false memories in older adults, and that they are more prone to forming general or ‘gist-based’ memories (3).

3. Koutstaal W. 2006. Flexible remembering. *Psychon Bull Rev.* 13(1):84-91.
4. Yassa MA, Lacy JW, Stark SM, Albert MS, Gallagher M, Stark CE. 2010. Pattern separation deficits associated with increased hippocampal CA3 and dentate gyrus activity in nondemented older adults. *Hippocampus*. [Epub ahead of print]

Project 1b. ‘Environmental support’ for older adults’ memory.

Another area of interest is in the circumstances under which ‘environmental support’ for memory encoding can reduce older adults’ recollection. Some studies have found that providing strategic support reduces age-related impairments (5), whilst others have not (6). The potential for support for older adults’ memory has important practical implications, but also provides opportunities to evaluate the extent to which older adults’ memory difficulties stem from problems with memory control, and if so, whether this affects encoding or retrieval (6).

5. Naveh-Benjamin M, Brav TK, Levy O. 2007. The Associative Memory Deficit of Older Adults: The Role of Strategy Utilization. *Psychol Aging.* 22(1): 202–208
6. Luo L, Craik FI. 2009. Age differences in recollection: Specificity effects at retrieval. *J Mem Lang* 60:421–436.

Project 1c. Retrieval search and strategy in ageing.

A little studied aspect of episodic memory is the search process – how do people constrain memory search when they are seeking particular information? Are such strategic processes impaired in ageing? Some evidence suggests that older adults sometimes fail to use specific memory search strategies (7; see also 2). This may contribute to recollective decline, and may increase the risk of false memory (7; 2) .

7. Jacoby LL, Shimizu Y, Velanova K, Rhodes MG. 2005. Age differences in depth of retrieval: Memory for foils. *J Mem Lang.* 52:493-504.

Procedural memory and procedural memory in ageing

Procedural learning and memory involves learning and expressing knowledge about regularities in the environment without necessarily having explicit (declarative) knowledge of what is learned.

Project 2. Probabilistic procedural learning in ageing.

An alternative approach to the traditional serial reaction time task in assessing people's learning of a 'hidden' sequence is a fully probabilistic approach in which the variability of the sequence is also manipulated. This allows the dissociation of predictability and surprise using a model of the subject as an ideal Bayesian observer and information theoretic indices. Using such an approach, a recent fMRI study showed hippocampal activation with variations in uncertainty about the sequence (6).

This project would explore this aspect of uncertainty using a similar behavioural task, and examine how performance changes with ageing with the prediction that sensitivity to changes in sequence uncertainty will be reduced. This project is suitable for someone not scared of mathematics or programming – although some coding has already been done in MATLAB for such an analysis.

In addition, a study of a probabilistic task in ageing without the Bayesian analysis may be an option. Previous studies have shown that older adults may be impaired particularly at learning higher-order information in a procedural task (9).

8. Harrison LM, Duggins A, Friston KJ. 2006. Encoding uncertainty in the hippocampus. *Neural Netw.* 19(5):535-46.
9. Howard JH Jr, Howard DV. 1997. Age differences in implicit learning of higher order dependencies in serial patterns. *Psychol Aging.* 12(4):634-56.

Project 3. fMRI data analysis

There is a project available based on a functional magnetic resonance imaging (fMRI) dataset that has already been collected, examining basic neural mechanisms of memory in young adults (there are 2 possible datasets, one is a study of episodic memory, and one is a study of probabilistic procedural learning). This would be a particularly challenging project and you should only think about doing it if you are happy with, and possess a sound understanding of, statistics. You should also be highly computer literate. Although there is no data collection, the analysis is considerably more complex than behavioural data analysis.

However, the point is not to learn about statistics, but to learn hands-on about cognitive neuroimaging. You will be expected to motivate and define an analysis strategy to test key hypotheses, and to interpret and discuss the results. I will consider potential students and provide more information about this project on a case by case basis.

Project 4. Scene Semantics in Visual Long Term Memory

This project is supervised by Dr. Morcom but is part of a collaborative project with Dr. George Malcolm, Psychology and Cognitive Neuroimaging Centre, Glasgow University. Humans have a remarkable ability to remember scene images stored in visual long-term memory (VLTM), even when such images were only presented for a brief amount of

time. Standing (11), for instance, found that after being presented with 10,000 scene images, participants displayed around ~80% recall accuracy. However, it remains uncertain as to how such a high performance is achieved.

Konkle et al., (10) found evidence that VLTM representations go beyond simply remembering the category a scene belonged to (e.g., an image of a city). Scenes, however, can be labelled at different levels of category specificity, such as the superordinate (e.g., outdoors), basic (city) and subordinate (Paris) levels (12). The proposed study, therefore, seeks to further explore the extent of the semantic detail stored in VLTM, and how this impacts on episodic (recognition) memory.

10. Konkle T, Brady TF, Alvarez GA & Oliva A. (2011). Scene Memory is More Detailed Than You Think: The Roler of Categories in Visual Long-Term Memory. *Psychol Science*. 21: 1551-1556.
11. Standing, L. (1973). Learning 10,000 pictures. *Q J Exp Psychol*. 25, 207–222.
12. Tversky, B., & Hemenway, K. (1983). Categories of environmental scenes. *Cognit Psychol*. 15, 121–149.

Dr Antje Nuthmann

Office: S31

Email: Antje.Nuthmann@ed.ac.uk

Principal research grouping: Human Cognitive Neuroscience

Research interests

My research interests include perceptual, oculomotor and attentional control in scene viewing and reading. Because human visual perception involves active information seeking via eye movements, much of my work focuses on what determines *where* and *when* we move our eyes. I thus use eye tracking as my primary behavioural method. I approach basic theoretical issues concerning attention and eye movements with corpus-analytical, experimental and computational techniques. I do basic research and do not work with patients.

Projects

The role colour plays during visual search: An eye-tracking study

The study is designed to investigate how colour facilitates gaze during real-world search. Generally, colour should help guide attention to potential target locations in the scene. Scenes will be presented (a) in full colour, (b) in grey, (c) grey in central vision and coloured in peripheral vision, and (d) coloured in central vision and grey in peripheral vision. The two latter conditions will use a gaze-contingent window that follows a participant's gaze in real-time. These four conditions will be crossed with a manipulation of the search cue: the search object will be cued either with a word label or a picture of the target. Participants' eye movements will be recorded during search. The project requires the student to learn the eye-tracking methodology.

Hwang, A.D., Higgins, E.C. & Pomplun, M. (2007). [How chromaticity guides visual search in real-world scenes](#). Twenty-Ninth Annual Meeting of the Cognitive Science Society, 2007, Nashville, Tennessee.

Hansen, T., Pracejus, L., & Gegenfurtner, K. R. (2009). [Color perception in the intermediate periphery of the visual field](#). *Journal of Vision*, 9(4):26, 1-12.

How do the regions of the visual field contribute to visual search in real-world scenes? An eye-tracking study comparing dynamic and static scenes

Background: When we inspect a real-world scene, we are not able to see all of the objects or elements in the scene equally well. This is because of visual acuity limitations. The perception of detail is limited to the foveal region, i.e., a very narrow region of space around the current point of gaze.

Research question: What are the relative contributions of foveal vs. extrafoveal vision in dynamic compared to static scenes? (dynamic scene = 20 sec movie clip, static scene = one snapshot/frame of the movie clip)

Methodology: An eye-contingent display change technique will be used to create a viewing experience where the subject will be free-viewing the dynamic vs. static scenes with gaze-contingent “Blindspots” or “Spotlights”. The study will be an extension of a previous MSc project and related work on static scenes in the lab.

Requirements: The project requires the student to learn the eye-tracking methodology. The student does not need to implement the experiment (too difficult). Data analysis will be restricted to global eye-movement measures yet willingness to (learn how to) use flexible analysis software like R or Matlab is required.

Larson, A. M., & Loschky, L. C. (2009). [The contributions of central versus peripheral vision to scene gist recognition](#). *Journal of Vision*, 9(10):6, 1-16. (no eye tracking, no search, static scenes, but great literature review)

Dorr, M., Martinetz, T., Gegenfurtner, K. R., & Barth, E. (2010). [Variability of eye movements when viewing dynamic natural scenes](#). *Journal of Vision*, 10(10).

Eye-movement control during visual object processing

In the field of real-world scene perception, researchers typically work with depictions of real-world scenes that are presented to participants on a computer screen. It comes with the real-world approach that the arrangement of objects or elements in the scene is typically not experimentally controlled. The proposed project intends to complement current research on scene perception by using sparse but highly controlled stimulus displays. In the study, eye movements will be recorded while subjects view linear arrays of four objects. A possible experiment could look like this: The factors (1) processing difficulty (i.e., visual complexity) of a target object, and (2) spatial distance between the target object and the preceding object will be manipulated. Resulting effects on landing positions within the target object and the fixation duration on the target object as well as their interactions will be examined.

The project requires the student to learn the eye-tracking methodology.

Henderson, J. M. (2003). Human gaze control during real-world scene perception. *Trends in Cognitive Sciences*, 7(11), 498-504. (general introduction to eye guidance in scenes)

Nuthmann, A., & Henderson, J. M. (2010). [Object-based attentional selection in scene viewing](#). *Journal of Vision*, 10(8):20, 1-19.

Henderson, J. M. (1993). Eye movement control during visual object processing: Effects of initial fixation position and semantic constraint. *Canadian Journal of Experimental Psychology*, 47(1), 79-98.

Dr Lars Penke

Office:B3

Email:lars.penke@ed.ac.uk

Research Grouping: Differential Psychology

Research interests

Evolutionary significance of individual differences, especially of general intelligence, personality traits, and attractiveness; genetics; cognitive aging, especially in relation to the brain's white matter integrity; evolutionary psychology of human mate choice and mating behaviour.

Projects

Measuring facial and body symmetry in 3D

The newly established Symmetry Lab is equipped with highly accurate 3D body and face scanners, which allow us to take detailed measures of for example symmetry, masculinity-femininity, and components of attractiveness. Such measures have been shown to be related to various aspects of cognitive ability, personality and social behaviour. I can supervise students who want to work with me on testing various such associations. Possible projects include, but are not limited to: (1) Fluctuating asymmetry of the body and face as a correlate of intelligence and processing speed, (2) Links between the Dark Triad of personality (Machiavellism, Narcissism and psychopathy), attractiveness and muscularity, or (3) Are aggressiveness, social dominance and political orientation partly determined by body built?

Brown, W. M., Price, M. E., Kang, J., Pound, N., Zhao, Y., & Yu, H. (2008). Fluctuating asymmetry and preferences for sex-typical bodily characteristics. *Proceedings of the National Academy of Sciences USA*, *105*, 12938–12943.

Penke, L., Bates, T. C., Gow, A. J., Pattie, A., Starr, J. M., Jones, B. C., Perrett, D. I., & Deary, I. J. (2009). Symmetric faces are a sign of successful cognitive aging. *Evolution and Human Behavior*, *30*, 429-437.

Banks, G. C., Batchelor, J. H., & McDaniell, M. A. (2010). Smarter people are (a bit) more symmetrical: A meta-analysis of the relationship between intelligence and fluctuating asymmetry. *Intelligence*, *38*(4), 393-401.

Lukaszewski, A. W., & Roney, J. R. (2011). The Origins of Extraversion: Joint Effects of Facultative Calibration and Genetic Polymorphism. *Personality and Social Psychology Bulletin*, *37*(3), 409-421.

Sell, A., Tooby, J., & Cosmides, L. (2009). Formidability and the logic of human anger. *Proceedings of the National Academy of Sciences of the United States of America*, *106*(35), 15073-15078.

Price, M. E., Kang, J. S., Dunn, J., & Hopkins, S. (2011). Muscularity and attractiveness as predictors of human egalitarianism. *Personality And Individual Differences, 50*(5), 636-640.

Prof Martin Pickering

Office: S12

Email: martin.pickering@ed.ac.uk

Principal research grouping: Language , Cognition, Communication

Research interests

I am interested in language production, comprehension, dialogue, bilingualism, and reading. At the moment, I am particularly interested in studying interactive language as a form of “joint action” (whereby the use of prediction and covert imitation appears to make “smooth” dialogue possible), and in the question of whether interlocutors represent their partners’ utterances in the same format as their own. However, I am also interested in “traditional” psycholinguistic questions, particularly as relating to syntax, semantics, and discourse.

Projects

Joint production of utterances

People have more difficulty initiating a longer or more complex utterance than a shorter one, presumably because their advance planning gets in the way of their current speech. If they represent other people’s utterances in the same format as their own utterances, they should also experience difficulty if they initiate and their partner completes a long or complex utterance. We investigate this question by having pairs of participants describe scenes.

Gambi, C., & Pickering, M.J. (in press). A cognitive architecture for utterance coordination. *Frontiers in Cognition*.

Structural priming and language production.

People tend to repeat the abstract structure of utterances that they have recently used or heard others’ use. For example, they are more likely to use a passive if they have just encountered a passive than otherwise. In this project, we use structural priming to investigate the way language is represented and used during production. I would be particularly interested in supervising projects in languages other than English. It would also be possible to look at cross-linguistic priming in bilinguals.

Pickering, M.J., & Ferreira, V.S (2008), Structural Priming: A critical review. *Psychological Bulletin*, 134, 427-459

Language switching in bilinguals

Some evidence suggests that bilinguals can activate aspects of the grammar of both of their languages when speaking. In this project, we consider how bilinguals produce single-language utterances and utterances involving language-switching mid-utterance. For example, do they sometimes use the grammar of one language and the words from the other language? What does this suggest about way in which languages are represented?

Hatzidaki, A., Branigan, H.P., & Pickering, M.J. (2011). Co-activation of syntax in bilingual language production. *Cognitive Psychology*, 62, 123-150.

Dr Richard Shillcock

Office: 4.24 Informatics Forum

Email: rcs@inf.ed.ac.uk

Principal research grouping: Language , Cognition, Communication

Research interests

I am interested in the reading of single words, the reading of texts, hemispheric effects on processing. The relevant techniques involve eye-tracking (recording precisely where people are looking with each eye), haploscopic presentation (presenting different stimuli to the two eyes), simple tachistoscopic presentation (presenting timed stimulus materials on a simple screen).

Projects

Analysing eye-movements in anaphoric reference

We will look at an existing, but unexplored large data-set of eye-movements in reading and we will study those saccades (eye-movements) that cross an anaphoric referring expression (e.g. a pronoun like “it”). We will test the hypothesis that interpreting a referring expression involves “replacing” it with the antecedent in a way that affects the spatial perception of the text; in short, readers will move their eyes farther across an “it” referring to “chimpanzee” (a long word) compared with an “it” referring to “ape” (a short word). One version of this experiment (using small numbers of specially written stimulus materials in a factorial experiment) has been reported by Wayne Murray (Dundee) at the ECEM eye-movements research conference, but not formally written up. This version of the experiment will use more realistic reading materials and a larger number of instances. This experiment can be conducted with corpora of eye-movements across texts in English, Spanish, Hebrew, or Arabic, which may suit native speakers of one of those languages. The paper below is an introduction to eye-movements in reading. No experience necessary for this project.

Starr, M.S & Rayner, K. (2001). Eye-movements during reading: some current controversies. TRENDS in Cognitive Sciences Vol.5 No.4 April 2001, 156-163.

Interocular lexical priming with a low-spatial frequency prime

We will use the haploscope to present a word to one eye and a low spatial frequency (blurred) version of that word to the other eye. We will time the lexical decision to that

word. We will test the hypothesis that the low spatial frequency stimulus facilitates its partner stimulus more than is the case when the two stimuli are both the same word, with no low-spatial frequency image. We will test the hypothesis that binocular rivalry does not readily occur with compatible stimuli (i.e. when the two versions are the same word).

A good starting reference is: http://www.scholarpedia.org/article/Binocular_rivalry

Effects of font averaging in word recognition

We will use the morphing techniques employed in face recognition research to produce the average image of a word in the main fonts encountered in reading. We will test the hypothesis that responses to such an image will be faster than to a single-font version of the same word.

This reference addresses some of the related issues in face recognition:

Hancock, P.J.B., Bruce, V. & Burton M.A. (2000). Recognition of unfamiliar faces. *Trends in Cognitive Sciences*, 4, 330-337.

Artificially induced slips of the tongue in Chinese

We will use a laboratory technique for inducing word blends and other errors in Chinese. We will test the hypothesis that there is a hierarchy of information types in controlling the pronunciation of Chinese characters. We will assess such dimensions as tone, character frequency, the frequency, consistency and transparency of the semantic radical, and the frequency and consistency of the phonetic radical.

Any paper dealing with the artificial elicitation of speech errors (cf. Baars) will introduce the issues. The application to Chinese will be breaking new ground.

Dr Caroline Watt

Office: S33

Email: Caroline.Watt@ed.ac.uk

Principal research grouping: Differential; Koestler Parapsychology Unit.

Research interests

The psychology of paranormal beliefs and experiences, specifically precognitive dream experiences. For further background information, please check out my personal website here:

<http://www.koestler-parapsychology.psy.ed.ac.uk/cwatt/>

...and the KPU website here:

<http://www.koestler-parapsychology.psy.ed.ac.uk/index.html>

Contact me for more details of research in the area of precognitive dream experiences.

Projects

There is room for flexibility on project topics, but I have three main areas of interest concerning the psychology of precognitive dream experiences, i.e., links between these experiences and:

1. creativity / propensity to find/see correspondences
2. processes of selective recall
3. sensitivity to implicit/weak sensory information

I am currently working on a three-year research fellowship on these topics, and it is anticipated that any MSc project that I supervise would contribute to this programme.

Dr. Alexander Weiss

Office: B18

Email: alex.weiss@ed.ac.uk

Principal research grouping: Differential Psychology

Research interests

Broadly speaking, I am interested in personality and subjective well-being. I study these via several techniques, especially those that lend themselves to answering evolutionary questions. These include studying these traits in other species (especially nonhuman primates); behavior genetic studies; and examining relationships between personality and outcomes, including mortality, aging, and depression. I believe more powerful and convincing studies are those that use multiple approaches. I am also interested in multivariate statistical analysis, including factor analysis, structural equation modeling, growth curve analysis, and survival analysis.

Projects

I am willing to supervising students interested in a broad range of questions related to personality evolution. Come to me and we shall discuss whether your project is something that I could potentially supervise.

Dr. Sue Widdicombe

Office: UF35

Email: s.widdicombe@ed.ac.uk

Principal research grouping: Language Cognition & Communication

Research interests

My interests relate to issues of self and identities. Identity is recognized as important throughout the human sciences, and there are many different perspectives on the nature of identity. What characterizes my approach is a concern to study how individuals ‘do’ identity, that is, how they construct and mobilize particular identities in interaction with others and with what effects (interpersonal, social, ideological). Related to this is an interest in interaction, discourse and conversation analysis, and in how studies of particular interactions (e.g. psychotherapeutic, counselling) can be applied.

Projects

I would be happy to supervise projects related to any of the areas above: identities (e.g. those related to youth culture, national, religious) and how they are constructed (for example, in conversation, through internet forums, news interviews, institutional interaction and so on). I would also supervise projects that analyse interaction (such as parliamentary debate, board meetings, therapy, internet interaction and so on), to see how the business at hand gets done (of making decisions, formulating clients’ problems and finding solutions, developing relationships etc).

I am happy to discuss your ideas for work in these or closely related areas.

I would also be happy to supervise a project on the following topic:

‘Should we feel guilty?’: a discursive approach to collective guilt

We can think of numerous examples throughout history where one group has behaved towards another group in an aggressive or unjust manner. Examples include slavery, the Holocaust, the treatment of indigenous people in New Zealand and Australia, the invasion of Iraq, discrimination against women and ethnic minorities, apartheid. One possible response to these historical events is a feeling of ‘collective guilt’. Social psychologists have tried to measure this feeling, to ascertain its antecedents and consequences, and its relation with social identity. This project, by contrast, will adopt a discursive approach and examine the meanings of ‘our’ guilt, when notions of collective guilt are mobilised, how such feelings are avoided, denied or justified within a particular context. The data collected for this project could include interviews, online forum or parliamentary discussions and so on and the focus could be on a particular conflict

situation, or inequalities among people, environmental behaviour, or any other situation which is likely to be associated with feelings of collective guilt.

McGarty, C., Pedersen, A., Leach, C.W., Mansell, T, Waller, J. & Blieue, A.M. (2005). Group-based guilt as a predictor of commitment to apology. *British Journal of Social Psychology*, 44, 659-680.

Doosje, B., Branscombe, NR., Spears, R. & Manstead, ASR. (1998) Guilty by association: When one's group has a negative history. *Journal of Personality and Social Psychology*, 75, 872-886.

Augoustinos, M. & LeCouteur, M. (2004). On whether to apologize to Indigenous Australians: The Denial of White Guilt. In NR. Branscombe & B. Doosje (eds.) *Collective Guilt: International Perspectives*. Cambridge: Cambridge University Press.