Alex **Muhl-Richardson**

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I am a behavioural scientist interested in using psychology and data to address real-world problems, whether this is developing new approaches to improving human performance at airport security or understanding the impact of zebra stripes on predator behaviour. I have a particular interest in how individual differences in cognitive, affective and personality factors can explain human behaviour and have extensive experience collecting and working with large datasets, including behavioural, eye movement and psychophysiological data.

Experience

Senior Lecturer in Behavioural Science — *Camberley, UK*

Department of Communication and Applied Behavioural Science, Royal Military Academy Sandhurst — *11/2021 - Present*

- Behavioural science research, focussed on the challenges of a military learning environment
- Used R to process, analyse and visualise survey and interview data, generating research outputs to inform best practice
- Developing and delivering evidence-based courses for the British Army and military audiences internationally

Research and Teaching Associate — *Cambridge, UK*

Cognition and Motivated Behaviour Lab, Department of Psychology, University of Cambridge — *04/2021 - 11/2021*

- Developed behavioural tasks in Python for experimental psychology research on learning and memory
- Collected data to validate tasks, used R for data processing, analysis and visualisation

Research Associate — *Cambridge, UK*

Visual Cognition Lab, Department of Psychology, University of Cambridge — *04/2018 - 04/2021*

- Responsible for a series of projects on attention and cognition, including experimental design, data collection and writing papers
- Developed experimental tasks in Python, MATLAB and JavaScript, web-scraped images for experimental stimuli
- Conducted data analysis, including significance testing, linear fixed and mixed models, decision modelling, and clustering in R and Python

Research Associate — *Nottingham, UK*

Department of Psychology, Nottingham Trent University — *11/2017 - 04/2018*

- Supported multiple projects across the department, contributing to experimental design, data collection and analysis and writing papers
- Designed and conducted experiments, involving eye tracking, neuroscience datasets and driving performance

Education

PhD Psychology — *Southampton, UK*

Centre for Vision and Cognition, School of Psychology, University of Southampton — *2013 - 2018*

- Main research project: Individual Differences in Dynamic Visual Search
- Led a four-year programme of research - developing research questions, experimental design, data collection, analysis and publishing papers
- Received PhD studentship (£85,502) from the Defence Science and Technology Laboratory, delivered outputs to government stakeholders

MSc Psychological Research Methods (Distinction) — *Sheffield, UK*

Department of Psychology, University of Sheffield — *2012 - 2013*

- Main research project: The effects of autistic traits on social attention during deception
- Received the Michael Siegal prize for the best research project in the cohort

BA (Hons) Philosophy and Psychology (Upper Second Class) — *Sheffield, UK*

Department of Psychology, University of Sheffield — *2009 - 2012*

- Main research project: The effects of display medium on memory - a comparison of LCD and E Ink displays
- Carried out additional project to research and develop training for vibro-tactile sensory augmentation equipment for fire and rescue services

Skills

Behavioural Science

Experiment, survey and interview design, eye and mouse tracking, data collection and participant recruitment, including online platforms like Gorilla, PsychoPy, Qualtrics and Prolific, report writing and output generation

Statistics and Modelling

Null hypothesis significance testing, linear fixed and mixed models, clustering, outlier detection, decision modelling, Bayesian inference

Programming Languages

R, Python, MATLAB, JavaScript, SQL

Projects

Improving Human Performance in X-ray Baggage Screening

Visual Cognition Lab, Department of Psychology, University of Cambridge *2018 –> 2021*

- This project focussed on developing novel training to improve human performance while using the next generation of computed tomography baggage screening technology in airports
- Collected behavioural data from approximately 400 human research participants with applied visual search tasks programmed in Python and online with the Gorilla platform; conducted statistical analysis and modelling of decision-making, null hypothesis significance testing, Bayesian model comparisons and linear mixed-effects models
- Won funding from the Defence and Security Accelerator (worth £266,359), worked closely with government and industry stakeholders (e.g., Dstl, QinetiQ), outputs included three published papers and a library of three-dimensional computerised tomography images for training and security research

Individual Differences in Dynamic Visual Search

Centre for Vision and Cognition, School of Psychology, University of Southampton *2013 –> 2017*

- This project examined the individual cognitive, affective and personality factors that can impact human attention and the relevance of this to complex real-world visual tasks, such as air traffic control
- I developed experimental tasks to collect behavioural responses, eye movements and physiological data from human participants, modelled human performance using Signal Detection Theory and conducted statistical analysis including linear mixed-effects models
- Outputs from this project included presentations at national and international conferences, two published papers and project pages available on Github (github.com/alexmuhl-r/Dynamic-Visual-Search) and the Open Science Framework (osf.io/ahufd)

Selected Publications

1. Parker, M. G., Muhl-Richardson, A., & Davis, G. J. (2022). Enhanced threat detection in three dimensions: An image-matched comparison of computed tomography and dual-view X-ray baggage screening. *Applied Ergonomics*, *105*, 103834. https://doi.org/10.1016/j.apergo.2022.103834
2. Muhl-Richardson, A., Tortosa-Molina, M., Recio, S. A., Parker, M. G., & Davis, G. J. (2022). Attenuating the "attentional white bear" effect enhances suppressive attention. *Attention, Perception, & Psychophysics*, *84*(8), 2444–2460. https://doi.org/10.3758/s13414-022-02560-w
3. Muhl-Richardson, A., Parker, M. G., Recio, S. A., Tortosa-Molina, M., Daffron, J. L., & Davis, G. J. (2021). Improved X-ray baggage screening sensitivity with "targetless" search training. *Cognitive Research: Principles and Implications*, *6*, 33. https://doi.org/10.1186/s41235-021-00295-0
4. Muhl-Richardson, A., Parker, M. G., & Davis, G. (2021). How the Zebra got its Rump Stripes: Salience at Distance and in Motion. *bioRxiv*. https://doi.org/10.1101/2021.04.16.440148
5. Muhl-Richardson, A., Godwin, H. J., Garner, M., Hadwin, J. A., Liversedge, S. P., & Donnelly, N. (2018). Individual Differences in Search and Monitoring for Color Targets in Dynamic Visual Displays. *Journal of Experimental Psychology: Applied*, *24*(4), 564–577. https://doi.org/10.1037/xap0000155

Selected Presentations

1. Muhl-Richardson, A., Parker, M. G., & Davis, G. (2023). Visual Salience at Distance and in Motion: How the Zebra got its Rump Stripes. *Experimental Psychology Society London Meeting, University College London, UK*, Talk.
2. Muhl-Richardson, A., Parker, M. G., Tortosa-Molina, M., Recio, S. A., & Davis, G. (2020). The Attentional White Bear as a Failure of Proactive Suppression. *Object, Perception, Attention & Memory Conference, Austin, USA*, Talk.
3. Muhl-Richardson, A., Recio, S. A., & Davis, G. (2018). Distractor Suppression in Visual Search. *Applied Vision Association Christmas Meeting, Birkbeck, University of London, UK*, Poster.