Gabriel Strain

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SUMMARY

I am entering the final year of my PhD at the University of Manchester in Computer Science. My primary research focus is the exploitation of facets of human perception to facilitate better data visualization design. More specifically, I am aiming to improve the perception of correlation in scatterplots by modifying certain visual features, and have currently published two papers on the topic. I have also worked as a research assistant investigating issues around transparent and explainable AI in the workplace, and have explored trust in data visualization as part of a co-supervised Master's project. I have extensive teaching experience in Computer Science, Psychology, and interdisciplinary units. The ultimate goal of my research is to provide empirically-derived tools for data visualisation designers to create better visualisations, and to establish my methodological framework as a standard for simple, large-scale, and reproducible visualisation testing and design.

EDUCATION

UNIVERSITY OF MANCHESTER

PhD Candidate • 2021-Present

- Supervised by an interdisciplinary team consisting of Prof. Caroline Jay, Prof. Andrew Stewart (Department of Computer Science) and Dr. Paul A. Warren (Division of Psychology, Communication and Human Neuroscience).
  - Ran experiments (n = 750) investigating the effects of changing visual factors on correlation perception in scatterplots.
  - Published full paper in IJHCS and short paper in IEEE Vis 2023 VisXVision workshop.
  - Partially corrected for long-standing correlation underestimation bias by manipulating point size and contrast.
  - All work done strictly according to principles of open and reproducible research, including open code and software, publicly-available data, and fully executable papers using Docker containers.

MRes Psychology • 2020-2021 • Graduated: – Distinction

- Fully online MRes undertaken during COVID-19 pandemic. Thesis supervised by Prof. Andrew Stewart and in collaboration with Duncan Bradley (PhD candidate).
  - Developed broad range of research skills, including quantitative and qualitative analysis, advanced statistical analysis, and open research.
  - Co-authored paper (in review) with Duncan Bradley, Prof. Andrew Stewart, and Prof. Caroline Jay.

BSc Psychology | 2017-2020 • Graduated: – Upper Second Class Honours

- Studied a wide variety of contemporary and historical issues in psychology, including behavioural, cognitive, and perceptual psychology, group dynamics, and statistics. Scored highly (82%) on dissertation supervised by Prof. Andrew Stewart.

TEACHING EXPERIENCE

GRADUATE TEACHING ASSISTANT 2021 - Present • University of Manchester

- AI: Robot Overlord, Replacement, or Colleague? | Interdisciplinary
  Flagship interdisciplinary unit bridging the gap between computer science, philosophy, and sociology. I supervised five groups over two years in an asynchronous format. I was responsible for the facilitation of group work, including discussions, debates, and short assignments. In addition I devised and delivered a seminar on generated text and LLMs.
- Reproducible Data Science | MSci Biology
  Instructed students on reproducible data science and statistical analysis using R. Topics covered include data wrangling, linear modelling, and open science.

- **Perception and Action | BSc Psychology**
  Delivered seminars on essay-writing and exam essay-writing through the lens of a variety of perceptual psychology topics, including mirror neurones, object recognition, and spatial perception.
- **Data Science | BSc Computer Science**
  Ran lab sessions exploring the basics of data science and statistics through python.
- **Fundamentals of Databases | BSc Computer Science**
  Instructed students in the theory and practice of relational database management, from requirement interpretation and normalisation through to basic SQL and implementation.

RESEARCH SUPERVISOR 2022-Present

- Co-supervised master's theses on topics such as trust in data visualization and visual factors influencing correlation perception.
- Provided year-long support and guidance, from conceptualisation through data-collection, analysis, and writing.

PROFESSIONAL RESEARCH EXPERIENCE

RESEARCH ASSISTANT | University of Manchester | 2022-Present

- Worked on SMARTER project with Dr. Markel Vigo, Dr. Jonathan Carlton, Mohammed Alhamadi, and KultraLab. My responsibility was the completion of a systematic review into explainability and transparency with regards to the use of AI for learning and training in the workplace.

STUDENT PARTNER PROJECT MEMBER | staff-student course consultancy project | 2019

- Selected as a member of a staff-student group reviewing and re-designing small group teaching on the BSc Psychology degree at UoM.
- Used agile principles to systematically review and improve small group teaching across the degree program.

PUBLICATIONS AND PROJECTS

ADJUSTING POINT SIZE TO FACILITATE MORE ACCURATE CORRELATION PERCEPTION IN SCATTERPLOTS

Workshop paper: IEEE Vis 2023 VisXVision

Gabriel Strain, Andrew J. Stewart, Paul Warren, Caroline Jay

- Utilised an extension of the novel point contrast adjustment described below to further correct for systematic correlation underestimation in scatterplots.

THE EFFECTS OF CONTRAST ON CORRELATION PERCEPTION IN SCATTERPLOTS

Journal paper: IJHCS

Gabriel Strain, Andrew J. Stewart, Paul Warren, Caroline Jay

- Create novel point contrast encoding, in which point contrast was reduced as a function of residual magnitude, to correct for historic underestimation of correlation in scatterplots.

RESEARCH PRESENTATIONS

- **Manchester Vision Network (MVN 2023):** Novel Techniques to Facilitate More Accurate Correlation Perception in Scatterplots.
- **UoM PGR Symposium 2023:** Point Size and Contrast Adjustments for Scatterplot Optimisation
- **Manchester Vision Network (MVN 2022):** The Impact of Visual Factors on Perceived Correlation in Scatterplots.

SKILLS

PROGRAMMING

- R and Tidyverse R to advanced level.
- Intermediate Python.
- Basic SQL.

EXTRACURRICULAR

- Manchester Medic's Choir Conductor (2016-2017, 2021-2023).

- Manchester Pint of Science Organiser (public engagement event, 2023).

REFERENCES

PROF. ANDREW J. STEWART

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PROF. CAROLINE JAY

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