

# ROSA LAVELLE-HILL, PHD

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## SUMMARY

- Interdisciplinary researcher with skills and experience in Data Science, Psychology, and Education Research.
- Worked in collaborative multi-disciplinary teams in various domains including applied data science, environmental psychology, health psychology, consumer psychology, education/learning analytics, and modern slavery.
- Specialised in building predictive models which are interpretable, user-centric, fair and ethical.
- Has a deep understanding in how to design and conduct social science research using big data and digital traces.

## EDUCATION

- PhD, Big Data Psychology, University of Nottingham (UoN), 2020
- First Class Honours BSc (with international travel) in Psychology, UoN, 2015; Lund University, Sweden (2013-2014)
- A levels in Biology, Psychology and Art (A,A,A) from Central Sussex College, Haywards Heath, 2011

## TECHNICAL SKILLS

- **Data Science:** Problem formulation, research design, model specification and selection, hypothesis testing, algorithm interpretability and explainability, variable importance, random set analysis, sentiment analysis, data management and cleaning, data storage and security, assessing generalisability and bias, responsible AI.
- **Machine Learning Methods:**  
*Unsupervised:* feature reduction techniques (Non-negative Matrix Factorisation (NMF), Principle Components Analysis (PCA), Factor Analysis), clustering (K-means, Gaussian Mixture Models, K-nearest neighbour), Natural Language Processing (NLP);  
*Supervised:* linear regression models, with regularisation (i.e. lasso, ridge), logistic regression, decision trees, Bayesian Additive Regression Trees (BART), random forests, and some competency with neural networks.
- **Psychology:** Inferential statistics, Bayesian methods, Personality, psychometrics, experimental design, big data analytics
- **Programming Languages:** Python, R, SQL, Luigi pipeline, LaTeX
- **Software Skills:** QGIS, Docker and DockerHub, Git and GitHub, cloud computing platforms Azure and Amazon Web Services (AWS), Excel, Orange

## RESEARCH EXPERIENCE

### The Alan Turing Institute

Research Associate

October 2019 to present

- Working collaboratively using machine learning, artificial intelligence, and bayesian statistics to help prevent modern day slavery (MDS), human trafficking, and other exploitative crimes.
- Project 1: Using open source data, machine learning and contemporary variable importance analysis to detangle the national level predictors of MDS prevalence in data that is "small n, large p" in nature.
- Project 2: Working in partnership with UK law enforcement officers and NGOs to provide automated risk detection of sexual exploitation using online sex worker adverts, NLP, and machine learning models.
- Project 3: Leveraging digital phone records, mobile money data and satellite imagery to map vulnerability to exploitation in Tanzania and Malawi.

### University of Nottingham

Researcher and Independent Consultant

Feb 2017 to Present

- Working on the design, implementation, and evaluation of decision support algorithms for marking student essays.
- Project 1: Investigating biases in academic grading, and trialling the introduction of algorithms to help reduce such biases, as well as alleviating cognitive load for academics.
- Project 2: Using questionnaire data alongside students' digital footprints to better understand the impact of COVID-19 on learning, and whether black and ethnic minority groups have been disproportionately affected.

### Imperial College London

Data Science for Social Good, Research Fellow

June 2019 to Sept 2019

- Part of a three-person data science team who designed and built a recommender system with the goal of improving employment outcomes in Portugal.
- This involved partnering with IEF (the national Institute for Employment and Vocational Training in Portugal), harnessing their data to optimise and personalise their services - ultimately supporting people to find the right employment, quicker.
- Co-built an end-to-end Luigi pipeline for the decision support tool's integration into existing data systems.

## INTERNSHIPS

- 2018 - Consumer Behaviour Research, Ipsos MORI
- 2015 - Psychology and Big Data, Horizon Digital Economy Research, UoN
- 2013 - Developmental Psychology Research, UoN

## TEACHING EXPERIENCE

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- Feb, 2021 and 2019 - Guest Lecturer to UoN Business Master's students
- Feb, 2020 - Lecture for Teaching Week, part of UCL's LIDO PhD Programme
- 2018-2019 - Assisted teaching for Introduction to Python, SQL, and Business Analytics for UoN Business Master's students
- 2018-2019 - Co-supervisor for UoN Business Analytics Master's dissertation projects
- 2018-2019 - Taught two UG student classes in Excel at UoN Business School
- 2015-2016 - Private tutor in UGs in Cognitive Psychology
- 2015-2016 - Demonstrator in labs, UoN Psychology UGs

## AWARDS

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- 2019 - UoN Graduate School Travel Prize to present at ISSID (awarded maximum and matched by Horizon CDT)
- 2018 - European Conference on Personality Scholarship
- 2015 - Nottingham Advantage Award (NAA) (Modules: French, Cultural Awareness, and Sports Leadership)

## CONFERENCE PRESENTATIONS

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- 2020, virtual - Data for Policy 2020. *Machine Learning Methods for "Small-n, Large-p" Problems: Understanding the Complex Drivers of Modern-Day Slavery.*
- 2019, London - DSSG Data Fest. *Building a Recommender System to Improve Employment Outcomes in Portugal.*
- 2019, Florence - International Society for the Study of Individual Differences (ISSID) Conference. Volume 157, ISSN 0191-8869. <https://doi.org/10.1016/j.paid.2019.109684>. *Psychological and Demographic Predictors of Plastic Bag Consumption in Transaction Data.*
- 2019, Hanoi - World Personality Conference. *Bags of money or bags of Impulsiveness? Psychological and Demographic Predictors of Plastic Bag Consumption in Big Data.*
- 2018, Zadar - European Personality Conference. *Using Machine Learning Techniques to Examine the Relationship between Money, Personality, and Well-being.*
- 2018, London - GovTechLab Knowledge Transfer Consortium. *Big Data for Social Good.*
- 2018, Cardiff - Guest Research talk. *Machine Learning, Psychology and Mass Datasets: Understanding Societal Issues.*

## PUBLICATIONS

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- Lavelle-Hill, R. E., Mazumder, A., Smith, G., Goulding, J. (2021) Machine Learning Methods for "Wicked" Problems: Understanding the Complex Drivers of Modern-Day Slavery. *Nature Social Sciences and Humanities Communications.*
- Lavelle-Hill, R. E., Smith, G., Bibby, P., Clarke, D., Goulding, J. (2020). Psychological and Demographic Predictors of Plastic Bag Consumption in Transaction Data. *Journal of Environmental Psychology*
- Lavelle-Hill, R. E., Skatova, A., Goulding, J., Bibby, P., Clarke, D. (2020). Buying what people like you buy: Personality Homophily and Well-being in Consumer Behaviour. (*pre-print*)
- Tomas, C., Whitt, E., Lavelle-Hill, R., Severn, K. (2019). Modelling holistic marks with analytic rubrics. In *Frontiers in Education* (Vol. 4, p. 89). Frontiers.

## OTHER ACHIEVEMENTS

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- 2016-2019 - Campaign Ambassador, UoN
- 2017-2018 - Race Director and Event Organiser of Notts Triathlon to raise money for the Children's Brain Tumour Research Centre, with over 500 participants and over £4,000 secured in sponsorship.
- 2016-2017 - President, University of Nottingham Triathlon Club