Dr Dimitra (Mimie) Liotsiou

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PROFILE & RESEARCH INTERESTS

I am an early-career researcher in computer science, data science, and computational social science, working on developing computational methods and tools for analysing patterns of behaviour in online interactions. In particular, my focus is on measuring the influence of Internet-mediated communications, information, and misinformation on real-world outcomes. I develop and apply AI methods from the fields of causal inference and of machine learning, as well as data science and social network analysis methods, while drawing upon the social sciences. I have experience of successful interdisciplinary collaborations, including with industry practitioners and policymakers, and my research has been featured in leading media outlets.

Keywords: social influence, causal inference, social media, social network analysis, computational social science, data science, social computing.

EDUCATION

PhD Computer Science, University of Southampton, UK *2014-18*
Awards: Full scholarship (funded by EPSRC, Roke Manor Research Ltd.), Best Poster award and full-length paper in peer-reviewed proceedings (International Conference on Social Informatics 2016).
Supervisors: Prof Luc Moreau and Prof Susan Halford
Thesis: Measuring the Social Influence of Online Communications at the Individual and Collective Level: A Causal Framework

MSc Operational Research (Distinction), University of Southampton, UK *2013-14*
Awards: Full scholarship, thesis prize.
Thesis: Projecting dental care need in England over the next 20-30 years (collaboration with the Department of Health, London).

BA (Hons.) Computer Science (2.1, 67.2%), University of Cambridge, St John's College, UK *2009-12*
Awards: Final-year thesis prize, first prize in second-year industry-commissioned group project competition.
Thesis: Parallelizing Ant Colony Optimization-Based Solutions to the Vehicle Routing Problem in Scala

International Baccalaureate Diploma, score: 45/45, Anatolia American College, Thessaloniki, Greece. *2007-09* Globally 0.19% of students achieved 45 out of 45.

EXPERIENCE

Postdoctoral Researcher, Oxford Internet Institute, University of Oxford, UK *2018 -*
Research on computationally analysing and measuring the impact and reach of online disinformation and propaganda, focusing on the US and EU. This included engaging with policy makers, industry practitioners and the media. Main projects:

- I built the Junk News Aggregator, a novel public platform consisting of three interactive tools for examining in real-time the content and popularity of public Facebook posts from US and EU junk news sources. Lead and implemented the full research life-cycle, project management of three external collaborators (system admin, front-end web developer, security tester). **Tools:** Python (scientific stack, HTTP requests), MySQL, Facebook API, Unix shell. **Selected press:** TechCrunch, Newsweek, BuzzFeed News.

- I conducted research on the Russian IRA's propaganda campaign across social media platforms around the 2016 US elections, being responsible for the analysis of the Instagram and Facebook datasets (hundreds of thousands of posts, over three years). Project for the US Senate. This work contributed novel findings, offering the most detailed and extensive insights on the subject to date. **Methods:** Linear regression (OLS, Poisson, Negative Binomial), decision tree -based machine learning regression and classification, sentiment analysis, feature engineering (publication forthcoming), exploratory, descriptive and longitudinal analyses. **Tools:** Python scientific stack. **Impact and press:** Report cited by the UK House of Commons Digital, Culture, Media and Sport (DCMS) Committee in their 'Final Report on Disinformation and 'fake news". Its value was recognised by top US and EU policymakers, academics, and leaders of civil society and civil rights groups. It was featured in leading media outlets, such as The Washington Post and The New York Times (including on the front page), MSNBC (interview), BBC.

Doctoral Researcher in Computer Science, University of Southampton, UK *2014-18*
For my PhD research, I proposed a novel causal inference framework for measuring social influence on the Web, using real-world online communications data. **Methods:** causal inference (graphical causal models, nonparametric estimation), neural networks for natural language processing (LSTM-based sentiment classification); social network analysis, graph theory, data mining. **Tools:** Python scientific stack, Unix shell.

Teaching Assistant in Computer Science, University of Southampton, UK *2014-16*

- PhD level: Machine Learning for Text Data in Python, short seminar
- Masters level: Social Network Analysis, group projects mentor
- Undergraduate level: Java Programming Labs, demonstrating for and marking Functional Programming in Scheme, coursework marking; Software Engineering, group projects mentor
- Other: Introduction to Data Science in Python for secondary-education teachers, seminar demonstrator.

Operational Research MSc Intern, Department of Health, UK Government, London, UK *2014*
Award-winning MSc dissertation project at the dentistry division of the Department of Health in London. I statistically analysed nation-wide dental health survey data (hundreds of variables for thousands of participants), using age-period-cohort modelling (self-taught on the job). I acquired knowledge on dentistry, liaised with domain experts.

Software Engineering Intern, Morgan Stanley, London, UK *2011*

- I built scheduling algorithms, that achieved a 30% improvement in the delivery rates of risk calculations to the traders' desks, and built a fully extensible computer grid simulator.
- I learned Scala from scratch. Mathematical and analytical work. Daily Scrum meetings with manager and team. Gained financial insight - online courses on derivatives and bonds, financial training sessions.
- I presented to team (Interest Rate Derivatives team) in London and Budapest, everyone was interested and impressed. My team's MD informed me in 2012 that my work was still being used and very valuable to them.

Programming Intern, Department of Physics, Aristotle University of Thessaloniki, Greece *2010*
I used Monte Carlo simulation to solve computational solid-state physics problems in Java.

SELECTED SERVICE

Among other peer-reviewed conferences and journals, I have served as a reviewer for the following:

- PC member for the ACM Conference on Hypertext and Social Media (2019)
- Reviewer for EPJ Data Science (2018).

PUBLICATIONS

Peer-reviewed publications

Liotsiou, D., Moreau, L. and Halford, S. (2016) Social influence: From contagion to a richer causal understanding. In *International Conference on Social Informatics (pp. 116-132). Springer, Cham.* (Author copy)

White papers

Howard, P.N., Ganesh, B., Liotsiou, D., Kelly, J., and François, C., (2018) The IRA, social media and political polarization in the United States, 2012-2018. *University of Oxford, UK: Project on Computational Propaganda. comprop.oii.ox.ac.uk. 46 pp. (Author order: Oxford P.I., then Oxford postdocs alphabetically, then collaborators from Graphika).* (Link)

Preprints

Liotsiou, D., Kollanyi, B. and Howard, P.N. (2019) The Junk News Aggregator: Examining junk news posted on Facebook, starting with the 2018 US Midterm Elections. arXiv preprint arXiv:1901.07920

Peer-reviewed conference presentations

Liotsiou, D., and Howard, P.N (2019) Measuring the influence of online misinformation: A hierarchy of social media data. *The 5th Annual International Conference on Computational Social Science (IC2S2), Amsterdam, Netherlands.* (Author copy)

Liotsiou, D., Moreau, L., and Halford, S. (2017). Social Influence: From contagion to a richer causal understanding. *The 5th Annual UK Causal Inference Meeting, University of Essex, UK.*

Working papers

Liotsiou, D., Ganesh, B., and Howard, P.N. Engagement with IRA propaganda across social media around the 2016 US elections: Characteristics of the most popular content.

Liotsiou, D., Moreau, L., and Halford, S. A causal methodological framework for conceptualising and measuring social influence in online communications using observational data.

Liotsiou, D., Kollanyi, B. and Howard, P. Comparing social media engagement across traditional news, online news, and junk news, in the context of the 2018 US midterm elections.

Theses

Liotsiou, D. (2018) Measuring the social influence of online communications at the individual and collective level: A causal framework. PhD Thesis.

Liotsiou, D. (2014) Projecting dental care need in England over the next 20-30 years. MSc Thesis.

Liotsiou, D. (2012) Parallelising ant colony optimisation-based solutions to the vehicle routing problem in Scala. BA (Hons) Thesis.

Other Selected Talks and Presentations

Liotsiou, D. (2019) Online information and misinformation: Engagement and influence. (2019) The Oxford Policy Exchange Network, University of Oxford, UK.

Liotsiou, D., Moreau, L., and Halford, S. (2017). Social Influence: From contagion to a richer causal understanding. Data Natives Meeting. City University of London, UK.

HONOURS & AWARDS

Best poster award, International Conference on Social Informatics, Seattle, WA, USA *2016*
For the poster accompanying the full-length 17-page paper (in proceedings) 'Social Influence: From Contagion to a Richer Causal Understanding', reflecting my PhD work on proposing a novel causal framework for social influence on the Web. This work was also presented as a short talk.

Sponsor prize for MSc dissertation, Department of Health UK & University of Southampton *2014*
I was awarded the sponsor prize for my MSc dissertation, on projecting dental care need in England over the next 20-30 years.

Prize (high commendation) for BA dissertation, University of Cambridge. Score: First Class (82%). *2011-12*
Thesis involving writing multi-agent biologically-inspired reinforcement learning Artificial Intelligence algorithms, to solve the Vehicle Routing Problem (strongly NP-hard combinatorial optimization problem). I wrote and compared several variants of sequential and parallel code, and ran them on a 32-core machine. Very successful results, comparable to those in current scientific research.

First prize in Cambridge Group Project Competition - project manager, 6 weeks *2010-11*

- I was project manager in a team of six, plus contributing as a regular member. We built a Twitter analysis web application for the tech company Red Gate. First Prize, for 'Most Impressive Professional Achievement'.
- I coordinated and prioritized the team's efforts under strict deadlines, wrote extensive documents and presentations, negotiated with the client, presented and demonstrated to Lab staff and professional guests.

TECHNICAL SKILLS

Languages: Python (scientific stack: pandas, numpy, scipy, statsmodels, matplotlib, networkx, scikit-learn, keras, IPython/Jupyter Notebooks), MySQL, Java, Scala, Unix shell, LaTeX; Some experience in: R, HTML, CSS, C++ and C, ML, Prolog.
Frameworks & Practices: Git, Spring, Perforce, JIRA, Scrum, Agile.
APIs: RESTful APIs (HTTP-based), especially the Facebook Graph API.
Operating Systems: Experienced in Mac OS X, Linux, MS Windows.
Software Packages: MS Office (incl. VBA), SPSS, SAS, Minitab.

LANGUAGES

English (native-level), modern Greek (native), French (intermediate/fluent)

EXTRACURRICULAR ACTIVITIES & STUDIES

Music critic for the Southampton University culture magazine (award nomination) *2013-15*

Model United Nations (several international conferences) *2007-08*
Chairperson, ambassador and delegate in several international Model United Nations conferences (Dublin, Paris, Athens, Thessaloniki), in the Economic & Social Council and the Climate Change Committee. Public speaking in front of 500 participants, leadership in diverse teams, critical thinking.

Music studies, at music school (conservatoire) *1998-2007*

Certificate in Theory of Music (Advanced Harmony, Figured Bass, Solfège, Dictée, Counterpoint, History and Morphology of Music, Choir, Piano), equivalent to ABRSM 7. Classical guitar studies (advanced, level 6/9). Choir singing as a soprano, including solo – national awards, performed Benjamin Britten's War Requiem with the Cyril and Methodius choir and the London Symphony Chorus (2002).

Other interests

Playing guitar, ukulele and piano; drawing, painting, analog and digital photography; reading books and independent magazines particularly on art, creativity and culture; going to art exhibitions; swimming, squash; travelling.