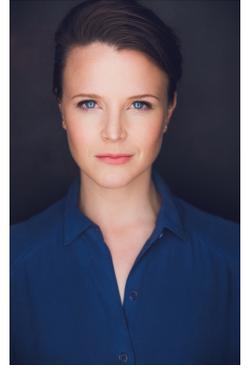# Professor Liberty Vittert

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EDUCATION

- **Massachusetts Institute of Technology (MIT), BSc**

  Cambridge, MA, September 2006 − June 2010

  Major in pure mathematics and a Concentration in political science

- **Le Cordon Bleu Paris, Diplome de Patisserie et Cuisine de Base**

  Paris, France, August 2010 − July 2011

  One year cooking school degree

- **University of Glasgow, School of Mathematics and Statistics, Ph.D.**

  Glasgow, UK, October 2011 − June 2015

  A study in pure statistics with a dissertation on facial shape analysis creating a novel method of shape analysis using inherent surface curvature and smoothing methods under Professor Adrian Bowman, world-leading facial analysis expert. This work has specific applications to facial recognition, facial analysis, emotional facial expression, and facial reconstruction surgery.

PROFESSIONAL APPOINTMENTS

- **Visiting Scholar - Harvard University**

  Department of Statistics (July 1, 2019 - July 1, 2020)

  During this year, I have been hired to design a new course that will become a core of Harvard's undergraduate curriculum with the working title of "Quantitative Reasoning"/"The Elements of Data Science". Using a case-based method in the vein of Harvard Business School, this will be the first of its kind and premier course in understanding the discipline of data science. My work also includes the Harvard Data Science Review (as detailed below) as well as working on my second non-fiction book.

  In terms of research, my team of collaborators is highly immersed in our project on facial shape analysis with Smile Train and NC Tech (Intel-funded) to help revolutionize the standard of care of surgery for children and adults suffering from facial deformities. The second-stage project is taking place across three Smile Train locations in Brazil with expected completion and final stage progress to Malawi, Uganda, and Ethiopia to begin in March 2020.

- **Professor of the Practice of Data Science - Olin Business School, Washington University in St. Louis**

  (May 1 2019 -)

- **Visiting Assistant Professor - Washington University in St. Louis**

  Department of Mathematics (August 2018 - June 2019)

  While undertaking the normal teaching responsibilities in mathematics and statistics, I continued my research with Smile Train on technologies that can be applied to both better the surgery and reduce the number of surgeries required for children with facial deformities, as well as put in new monitoring systems for the quality of these surgeries. Further to that, I will continued as a guest expert for major TV networks based in the United States.

- **Associate Editor - Harvard Data Science Review**

  Harvard University (2018 - Present)

  Data science is an emerging discipline that draws upon knowledge in statistical methodology and computer science to create impactful predictions and insights for a wide range of traditional scholarly fields. Founded in 2018, the Harvard Data Science Review will be the first of its kind, combining a scholarly journal, popular magazine, and platform for data science education. My

specific role includes interviewing for video publication and featured Q/A article for each issue, the cover individual (ex. Steve Ballmer, former CEO of Microsoft for the inaugural issue).

- **Visiting Fellow** Washington University in St. Louis Business School/Brookings Institute (2018 - Present) Giving one or two day seminars for Executive Education on "Data is a Company's Greatest Strategic Opportunity and Threat"

- **Faculty Scholar - Institute of Public Health**

  Washington University in St. Louis (October 2018 - Present)

  The Institute of Public Health improves, amplifies, and supports public health efforts around the world, bringing faculty, researchers, practitioners, staff and students from diverse disciplines together to share ideas, form partnerships and create innovative solutions to today's most pressing public health challenges through targeted forums, ventures, and opportunities to stimulate new approaches aimed at improving public health.

- **Honorary Fellow (Professor)- University of Glasgow**

  School of Mathematics and Statistics, (July 2019 - Present)

- **Visiting Scholar - Columbia University in New York City**

  Institute for Media Innovation (Spring/Summer 2019)

  Having won funding from the University of Glasgow under the Principal's Early Career Mobility Scheme, I worked under the sponsorship of Professor Mark Hansen, Director of the David and Helen Gurley Brown Institute for Media Innovation. This position has been moved one year later than intended due to a new position at Washington University in St. Louis

- **Mitchell Lecturer (Assistant Professor)**

  School of Mathematics and Statistics, University of Glasgow (August 2015 - June 2018)

- In non-technical terms, during my PhD I developed a novel method of facial mapping using statistics. In order to compare different human faces, we need a common map. Traditionally this map has consisted of a very few anatomical points on the face (23 points in total), for example, the tip of the nose or the corners of the mouth. This loses enormous amounts of information that allow us to better identify difference among faces. Our method maps the entire face giving a total of 922 points, using no external information. In technical terms, the method intrinsic surface information (curvature) to create a curve-finding algorithm along a manifold (3d facial surfaces as an application). However, this method still relies on the initial starting anatomical landmarks of a face or surface, which are manually marked. My current research consists of a Bayesian approach to automatic landmarking with a further aim to create a fully Bayesian approach to the analysis of manifolds in general.

- My current focus is as the Principal Investigator (PI) on a project with Smile Train (cleft lip/palate charity) using our novel statistical approach to revolutionize the standard of facial surgical care and assessment in developing countries including supervising a pilot project in Uttar Pradesh, India during 2018. This facial deformity affects not only appearance but also leads to malnutrition, speech impairment and many other physical and psychological deficits. My work is specifically in implementing this new technology we have developed as well as bringing together a multitude of partners including those that supply the underlying tech for taking the 3d images, in-country health boards, chambers of commerce, and funders. This project was a direct results of analysis and problem solving. This technology had never been imagined to be used for these purposes and, in fact, need to be re-packaged with additional support from other vendors in order to be implemented in developing countries. However with our successful pilot, we are applying for further funding to roll it out in multiple countries.

- I also consult edfor multiple private companies on data strategy and focus my pro-bono efforts on USA for the UN Refugee Agency (UNHCR) having championed an on-going data initiative, The Hive, which was recently named one of the most innovative non-profits by the Fast Company.

- I have been a supervisor to multiple PhD students and over 15 Master's students in projects ranging from shape analysis to river pollution investigations and apartment rental increases. Moreover, I have taught and re-designed over 6 different courses all with the aim to make statistics more approachable and understandable to non-math and non-statistics majors. Using examples relevant to the students themselves, and the public in general, the aim was to engage the students thoroughly with the subject.

- **Visiting Scholar - Columbia University in New York City**
  Graduate School of Journalism (January - June 2017)
  Having won funding from the University of Glasgow under the Principal's Early Career Mobility Scheme, I worked under the sponsorship of Steve Coll, the Dean of the Graduate School of Journalism at Columbia University. This project began the research and initial stages of writing a non-fiction book with the aim to bring sophisticated, statistical facial shape methods to a general audience. The work will move chapter by chapter through different human traits and syndromes discussing whether any predilection can be initially dictated by facial shape. For example, Down's Syndrome is clearly indicated by facial shape; however, mental illness, genius or criminality is a more questionable discussion with wide-ranging social implications.

Publications

- Author and Consulting Editor, "30 Second Data Science" (Quarto Publishers) publishing January 2020.
- Fox Business, columnist, "A Statistician's Guide to Life - weekly column on how to use data for better life decision making (launching November 2019)
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- Freelance Writer on statistical topics with articles appearing in Business Insider, Market Watch, International Business Times, US News, CBS News, Popular Science, Seattle Post, San Francisco Chronicle, City Lab, St. Louis Post Dispatch, Houston Chronicle, Denver Chronicle NPR, etc., (2017 - present)
- Fox News Channel, Weekly Opinion Editorial Data and Technology (2018 - present)
- (October 2018) Number 1 news trending story in the United States for over 24 hours.

Academic Publications

- Liberty Vittert, Adrian W. Bowman, Stanislav Katina. *Statistical models for manifold data with applications to the human face.* Annals of Applied Statistics. Accepted..
- Baoqing Sun, Matthew P. Edgar, Richard Bowman, Liberty Vittert, Stuart Welsh, A Bowman, and MJ Padgett. *3d computational imaging with single-pixel detectors.* Science, 340 (6134): 844-847 ,2013.
- Susan Fitzer, Liberty Vittert, Adrian Bowman, Nicholas Kamenos, Vernon Phoenix, Maggie Cusak. *Ocean acidification and temperature increase impact mussel shell shape and thickness: problematic for protection?* Ecology and Evolution, 5 (21): 4875-4884, 2015.
- Katina et al. *The definitions of three-dimensional landmarks on the human face: an interdisciplinary view.* Journal of Anatomy, 228 (3): 355-365, 2016.
- Liberty Vittert, Stanislav Katina, Adrian Bowman. *Reliability and Validation of 3d Stereophotogrammetry Systems.* American Journal of Physical Anthropology. In Submission.
- Liberty Vittert, Adrian Bowman, Ashraf Ayoub, et al.. *Orthognatic Surgery Intervention using 3D Facial modeling.* Journal of Anatomy. July 2018.

  In preparation:
- Adrian Bowman, Liberty Vittert, Stanislav Katina. *Face3D.* R Cran package.
- Stanislav Katina, Adrian Bowman, Liberty Vittert. *Shape Visualisation.*JCGS.
- Liberty Vittert, Adrian Bowman, Ashraf Ayoub, Anas Almukhtar. *3-dimensional statistical modelling approach to the post-operative reprecussions of orthodontic bracket intervention.*
- Liberty Vittert, Adrian Bowman, Vincent Macaulay. *A Bayesian approach to a 3-dimensional Automatic Landmarking and Curves Identification Process.*
- Reviewer, American Statistical Association (ASA) Journal 2018

- Reviewer Biomedical Statistics Journal 2017

EXPERIENCE

Public Speaking Engagements

I have been invited to give multiple academic, as well as public talks both about technical statistical information, as well as to a wider general audience. In order to demonstrate my ability to explain technical issues is an approachable manner, I have included audience feedback from talks when available. The key aspect, in my mind, in doing this is to have empathy and an emotional intelligence, showing an understanding of how those without technical training will learn, and more importantly be interested in the technical work. Finding a way to make the work connect to the individual personally is the key to an understanding and motivation from that individual's perspective.

- Invited Speaker, European Research Consortium of Informatics and Mathematics, "Data Ethics" London, UK, December 2019
- Keynote Speaker, Women in Data Science Conference. Saint Louis November 2019
- Invited Speaker, Joint Statistical Meetings 2019, "Communicating to the Masses: Sharing Statistics and Data Science in a World of Sound Bites, Social Media, and Popular Press", Denver, August 2019
- Invited Session Organizer, World Statistics Conference, Kuala Lumpur, Malaysia, "Ethics of Data", August 2019
- International Air Transport Association (IATA), "Data, Aviation's Most Strategic Opportunity and Greatest Threat" Keynote Speaker, Symposium, Greece June 2019
- Speaker, Executive Education Seminar, Washington University in St. Louis "Calling BS: Finding the Truth and Lies in Data", April 2019
- National Museum of Scotland, First Minister of Scotland's Annual Gala Keynote Speaker, April 2019
- Case Lecture Invited Speaker, St. Louis University, April 2019
- Seminar Speaker "The Future of Data", Washington University in St, Louis, April 2019
- Data Fest, Panelist Speaker, "The Future of Work, Industry 4.0" Edinburgh UK, March 2019
- Data Summit, Keynote Speaker, Edinburgh UK, March 2019
- Stats + Stories Podcast Series, Featured Guest, February 2019
- Science on Tap, Washington University in St. Louis February 2019
- Emeritus Professors Speaking Series, Washington University in St. Louis, January 2019
- CityWire Keynote Speaker, New York City, Fall 2018
- Joint Statistical Meetings 2018, organizer of two invited sessions "The Future of Statistics and the Public" and "Statistical Ergonomics", Vancouver, Canada
- DigitalDNA keynote conference speaker, Belfast, UK, "Data: our greatest strategic threat and opportunity", June 2018
- TedX Glasgow panelist "Big Data and Cambridge Analytica, What's the Real Story", June 2018
- Royal Statistical Society Young Researcher's Symposium. "Data: greatest strategic threat or opportunity?". May 2018
- Royal Statistical Society Lancashire. "The Future of Shape Analysis", May 2018
- Edinburgh Science Festival, Keynote Speaker, "Statistics and Public Opinion" April 2018.

  "In the past 25 of years of being a part of the Edinburgh Science Festival, this was hands down the best talk I have ever been to. Truly Remarkable."

- Royal Statistical Society Webinar "The career value of effective communication skills" April 2018
- Harvard University, School of Psychology, "Statistics and Opinion", April 2018
- CCA Global Keynote Speaker, CX Forum, March 2018
- UK National Audit Office (governmental audit body) "How to Communicate Dodgy Data", March 2018
- Standard Life keynote speaker Technology and Change Conference, "The Lies of Money and Aging", February 2018

  "Best session of the day!! Funny, engaging and I'm already keen to hear more. Brilliant! "

  "I'd give you six stars if I could. Great presentation. Please come back every year!"

  "Wonderful session. Really clicked things into place for me regarding data and stats."

  "FANTASTIC - my favourite break-out of the day. - wow! This has changed my view on how I look at headlines and will also change my approach to which questions I should ask within work."

- American Statistical Association "Communicating Technical Information to Non-Technical Audiences", December 2017

  "Outstanding job - educational and fun to hear about your creative processes for generating pieces for different audiences"

- Scottish Finance Director's Forum, Keynote Evening Speaker, "Public Opinion and Statistics", November 2017
- CCA keynote conference speaker, "Statistics of Customer Service", November 2017
- Low Moss Prison, "Statistics of Crime", October 2017
- Esri, ArcGIS geographical mapping software, Keynote Speaker "Statistics and Geography", October 2017

  "Keynote was superb! " "The key note speaker was brilliant." "I loved Liberty's closing speech, it was amazing."

- Advice Direct Scotland, Evening Guest Speaker "The Statistics of Public Opinion", September 2017

  "Liberty enthralled and inspired the Advice Direct Scotland audience with her amazing ability to de-mystify statistics and challenge our thinking"

- Moderator, Bloomberg's Data for Good Conference, USA for UNHCR, New York, NY, September 2017
- Joint Statistical Meetings Panelist, Essential Skills for Communication Statistics. Topic-Contributed Session. July 2017
- World Statistics Conference, Marrakech, Morocco, "Telling statistical stories and teaching good data sense to the public.", July 2017
- Royal Statistical Society/Glasgow Science Festival, June 2017
- STEM Panel - The Science of Confidence - How Women and Girls can Master the Tech Revolution, Baltimore MD, April 2017
- University of Glasgow Women in STEM, International Women's Day, March 2017
- Washington University in St. Louis, Seminar, "Mapping the Human Face", February 2017
- European Research Consortium of Informatics and Mathematics, Smoothing methods for complex data, December 2016
- P-Spline talks, Bilbao, Session, P-Spline Smoothing with 2D Manifold Curvature, December 2016
- Masterclass Royal Society, How did OJ do it? Statistics in the Law. October 2016
- Royal Statistical Society Conference, Manchester, UK, Industry and Commerce: Compression, Compaction, and Visualisation, Statistics with a Human Face Visualisation, September 2016

- Royal Statistical Society Science Festival, "How to win the Lottery and Get Away with Murder June 2016

- Masterclass Royal Society, Codes, Secrets, and Lies, November 2015

- First Tuesday Club, University of Glasgow, October 2015

- Face3D Consortium, University of Glasgow Facial Asymmetry and Reconstructive Surgery, June 2015

Honors and Awards

- Representative of the Royal Statistical Society (RSS) to the American Statistical Association (ASA), June 2019 - present

  Serving as the representative of the RSS to the ASA, including as a voting member of JSM coordination and other procedural matters.

- Co- PI for EPSRC IAA Grant for £ 30,000 for funding to continue the Smile Train pilot project in Brazil for Spring 2019

- Representative of the International Statistical Institute (ISI) to the American Statistical Association (ASA), June 2018 - June 2019 (1 year term)

  Serving as the representative of the ISI to the ASA, including as a voting member of JSM coordination and other procedural matters.

- White House Fellows National Finalist, June 2018

  In June of 2018 I was invited as a national finalist for the White House Fellows program, with the aim to find applicable technology and data for government use in public service.

- Smile Train Pilot Project in Uttar Pradesh India, March-June 2018. $100,000 incoming matching grants

  I am leading a project that aims to use new technology we developed ourselves, as well as implementing other partner technologies, to revolutionize the standard of care for facial reconstruction in developing countries. Our pilot has been successful and we are now in the process of applying for further funding.

- BBC Expert Women Panel, March 2018

  Chosen to speak to future BBC expert women contributors on how to explain technical issues on television.

- Glasgow Knowledge Exchange Grant for Public Engagement, December 2017- June 2018. $13,000 grant plus additional $13,000 in private funding and $130,000 in matching funding.

  I won funding to produce a new television pilot that aims to take health issues and make them interesting and informative for a non-traditional audience, namely the top 25% most deprived in the population. Generic television does not reach this demographic anymore, online streaming services have well-exceeded traditional network broadcasts. This pilot is specifically about alcohol and has been created in an informative, yet fun/reality television setting. In order to produce this on such a low budget, I found external private funding, and had the equivalent of £100,000 GBP donated in time from celebrities as well as location fees etc. The show is aired December 2018.

- Elected Member of the ISI (International Statistical Institute), October 2017 - present

  An individual is nominated by another (President Elect) to become an elected member of the international statistical body of statisticians, only when an individual has shown to be established in their career and has made significant contributions to the statistical profession.

- Judge, Statistic of the Year, Royal Statistical Society, September 2017- present

- Glasgow Crucible Researcher June 2017

- TedX Glasgow Speaker June 2017 "How to Win the Lottery and Get Away with Murder"

  Chosen to be a speaker for TedX Glasgow for the 2017 theme "Lead or Follow" at The SEC Armadillo in Glasgow to an audience of 1800 individuals showcasing the way data and numbers

can be used to manipulate and misrepresent, as well as accidentally misinterpret information to the public and how to identify these inaccuracies in one's every day life.

- Ambassador, Royal Statistical Society, May 2016

  After a rigorous application process, I was chosen to be an ambassador for the Royal Statistical Society (European/UK professional statistical body) and represent the RSS for media appearances, etc.

- Royal Pairing Scheme, July 2016 - November 2017

  One of thirty scientists in the United Kingdom chosen to pair with a Parliamentarian at Westminster for Knowledge Exchange.

- STEM for Britain finalist, December 2017

  An exhibition of selected early-career research scientists' work whom Parliament determined are an essential part of continuing progress in and development of UK research - held in the House of Commons.

- BBC Expert Women, March 2017

  One of twenty women chosen from over seven hundred applicants to become a BBC Woman Expert Contributor for BBC Television and Radio Programs.

Board/Consulting Experience

- Board Member USA for UNHCR (UN Refugee Agency) (April 2015 - present)

  A 501(c)3 operating as the United Nation High Commissioner for Refugee's (UNHCR) arm tasked with fundraising, awareness and education in North America. The charity has grown from a giving of $21 million in 2014 to a giving in excess of $70 million in 2017. My main area of expertise on the board is how data can be used further to continue growth. Navigating the bureaucracy of the United Nations, as well as UNHCR specifically (with an annual expenditure of $4 billion, but a budget of $8 billion) can be an incredibly difficult task at times, especially when our contribution is relatively small. But by building relationships, navigating different sources, and overall creating team work, we have been highly successful in our remit. As a board member I have been the Board liason to the Hive (data initiative) and founder of the Humanitarian Coalition - the next generation of philanthropists and change-makers in the Refugee work sphere.

- Interim Chair Elect, American Statistical Association (ASA) Special Interest Group on Data Communication (2019 - present)

- Olin Business School, Washington University in St. Louis, Executive Education Seminars (2019 - present)

  Leading one-day seminars for current executives giving a comprehensive framework of how to understand the common misinformation around the theme of modern data science. Using real-life examples, we learn specific tools to understand what questions we should be asking of data in order to spot the lies, damned lies, and statistics (with a little fake news thrown in there for good measure)

- Board Member, The Hive, Data Advisory Board UN Refugee Agency (February 2017 - present)

  After joining the board of USA for UNHCR, I championed a data initiative brought directly from UNHCR called the Hive. Two years after its inception, it was named a Top 6 Fast Company's Most Innovative for Non-Profit. We use sophisticated data modeling to identify new donors and also raise awareness. For example, we identified individuals interested in sports with a baseball-themed ad campaign that compared the daily number of new refugees to the capacity of Wrigley Field which led to a 200,000 person engagement with a 80 percent retention of donors (versus the usual 20 percent). Being overseen by both UNHCR and USA for UNHCR lead to a need to navigate through many different stakeholders. The issue of this specific project not showing financial return in the first year (which in a business setting can be appropriate, but is not looked upon fondly in a non-profit setting) created an enormous need to justify, pacify, and motivate many different individuals to allow this to grow.

- Board Member, University of Glasgow Campaign Fundraising Leadership Board (2018-present)

Fundraising board of the University of Glasgow to raise $150 million for the newest campaign project

- Newman Prize Committee, John Burroughs (November 2011 - present)

  Interestingly, while this is a small committee at my high school, in some ways, it has been one of the most educational experiences I have been part of. All juniors are invited to write down 5 names of living americans they want to spend an hour with. The students go through 12 minute interviews with the committee and a winner is chosen. That winner gets a fully-funded trip to spend an hour with one of the individuals on his or her list. I am the committee member that has been in charge of getting the commitment from the famous living american for the past 7 years. From Theodore Olsen, to Martha Stewart, and Amar Bose, getting through to these individuals and convincing them to participate in this has been one of the biggest challenges I have regularly encountered.

- Board Member, MIT Alumni Club of GB (April 2016 - present)

  Fundraising and awareness for MIT in the UK

Media/TV contribution work

As both a statistician and as a chef I have appeared regularly as a contributor on major news networks, as well as having my own television show on national television in the UK. Below are some selected networks and positions. See Non-Academic Publications for more details.

- NBC News, contributor appearance on topics such as the lottery etc. (2019)
- Named top 40 coolest person in Scotland 2018. Herald Newspaper
- NPR contributor for "Happening Now" (2018 - present)
- The Conversation, opinion contributor (2018 - present)
- BBC Newsnight on-air and data visualization contributor 2018
- The Times, statistics contributor 2018
- PBS Nova on-air contributor for statistics 2017
- BBC Radio Scotland, Resident Statistician, Stephen Jardine show, recurring weekly 20 minute statistical discussion debunking the news of the week 2017-2018.
- BBC Statistical Expert, on-air, recurring (2016 - present) numerous appearances since the start of 2016 discussing polling, woman in mathematics, fun probability statistics, etc.
- Channel 4 Statistical Expert on-air, recurring shows i.e. Bizarre ER and Supershoppers
- STV Scotland Tonight Statistical Expert on-air, recurring (2016 - present) (Scottish Television Network, owned by ITV) Numerous contributor appearances for statistical questions/stories
- STV City election expert on-air, full coverage for US Election 2016 and show special
- Fox News Channel Guest 2014, 2015, New York
- "Research In Scotland" on-air pieces on STV2 (Scottish Television Network) - showcasing my colleagues research in "What is Going on In Research In Scotland" pieces
- Host (BBC Best Cook in Britain Pilot), 2017
- Host (Scottish Television Network (STV), owned by ITV), Liberty's Great American Cookbook
- TV show airing nationwide on STV utilising cooking from Le Cordon Bleu Paris
- Website - www.theamericancook.com
- STV Glasgow/Edinburgh feature contributor (2014 - 2018)
- Westender Magazine Contributor (2014 - present)

Languages

Russian language competency

French language competency