

Bianca (Pint) Pires

Social and Decision Analytics Lab
Biocomplexity Institute of Virginia Tech
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EDUCATION

2014 **Ph.D., Computational Social Science**

George Mason University, Krasnow Institute for Advanced Study, Fairfax, VA
Dissertation: *When People Rebel: A Computational Approach to Violent Collective Action*
Committee: Andrew Crooks (Advisor), Robert Axtell, William Kennedy, Richard Medina

2003 **M.A., Business Administration – International Business**

University of Florida, Warrington College of Business, Gainesville, FL
Graduated First in Class

2002 **B.S., Industrial & Systems Engineering**

University of Florida, College of Engineering, Gainesville, FL
Graduated with Highest Honors

EMPLOYMENT

- 2014-Present **Postdoctoral Fellow**, Social & Decisions Analytics Laboratory, Biocomplexity Institute of Virginia Tech, Arlington, VA
- 2012-2013 **Graduate Research Assistant**, Department of Computational Social Science, Krasnow Institute for Advanced Study, George Mason University, Fairfax, VA
- 2011-2012 **Embedded Analyst**, Palantir Technologies, McLean, VA
- 2008 **Graduate Research Assistant**, Department of Statistics, Volgenau School of Engineering, George Mason University, Fairfax, VA
- 2003-2011 **Managing Consultant**, IBM Global Business Services, Advanced Analytics & Optimization, Washington, DC

RESEARCH INTERESTS

My research interest involves understanding and exploring complex social systems using computational methods, including agent-based modeling (ABM), social network analysis (SNA), and geographic information systems (GIS). Through the integration of ABM, SNA, and GIS, I have developed agent-based models that balance theory and empirical data in the creation of the environment and agents, including agents' communication networks and behavior. These models explore such research areas as collective action, social influence, knowledge sharing, attitude formation, and diffusion processes.

GRANTS

- 08/2016 – 08/2017 **Army Research Institute (ARI) Early Career Award**, *Proof of Concept: Development of a Framework to Model Dynamic, Multi-Level Interactions within an Organization*. (\$128,460).
PI: **Pires, B.** Co-PIs: Molfino, E. and Ziemer, K.

PUBLICATIONS

Peer Reviewed Publications

- Pires, B.** and Crooks, A., 2017, Modeling the Emergence of Riots: A Geosimulation Approach. *Computers, Environment and Urban Systems*, 61, pp. 66-80.
- Pires, B.** and Crooks, A., 2016, *The Geography of Conflict Diamonds: The Case of Sierra Leone*, in the post-proceedings of the 2016 International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRIMS), 28th June – 1st July, Washington, DC, pp. 335–345.
- Pint, B.**, Crooks, A., and Geller, A., 2010, *Exploring the Emergence of Organized Crime in Rio de Janeiro: An Agent-Based Modeling Approach*, in the post-proceedings of the Second Brazilian Workshop in Social Simulation (BWSS), 24th – 25th October, São Bernardo do Campo, Brazil, pp. 7–14.

Non-Refereed Reports

- Keller, S., Shipp, S., Orr, M., Higdon, D., Korkmaz, G., Schroeder, A., Molfino, E., **Pires, B.**, Ziemer, K., & Weinberg, D. (2015). Leveraging External Data Sources to Enhance Official Statistics and Products. Social and Decision Analytics Laboratory in the Biocomplexity Institute of Virginia Tech.

Papers in Progress

- Pires, B.** *Challenges and Opportunities for Modeling Violent Collective Action Computationally: Balancing Theory and Data.*
- Pires, B.** and Crooks, A. *A Social Network Approach to Spatiotemporal Event Analysis: The Case of the FARC in the Colombian Conflict.*
- Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A. *Towards an in silico Experimental Platform for Air Quality: Houston, TX as a Case Study.*
- Pires, B.**, Goldstein, J., Higdon, D., Korkmaz, G., Keller, S., Shipp, S., Hamall, K., and Koehler, A. *A Bayesian Simulation Approach for Supply Chain Synchronization.*
- Ziemer, K., **Pires, B.**, Lancaster, V., Keller, S., Orr, M., and Shipp, S. *Explaining High School Dropout: Geographic disparities in Kentucky.*
- Ziemer, K., Keller, S., Angelotti, K., Norman, B., Orr, M., **Pires, B.**, and Shipp, S. *Assessing Alternative Sources of Data.*

PRESENTATIONS (*Denotes Speakers(s))

Peer Reviewed Conference Presentations

- *Pires, B.** and Crooks, A. *The Geography of Conflict Diamonds: The Case of Sierra Leone*. Paper presented at the 2016 International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRIMS), 28th June – 1st July, Washington, DC.
- *Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A., 2015, *Towards an in silico Experimental Platform for Air Quality: Houston, TX as a Case Study*. Paper presented at the Computational Social Science Society of the Americas (CSSSA) 2015, 29th October – 1st November, Santa Fe, NM.

***Pint, B.**, Crooks, A., and Geller, A., 2010, *Exploring the Emergence of Organized Crime in Rio de Janeiro: An Agent-Based Modeling Approach*. Paper presented at the Second Brazilian Workshop in Social Simulation (BWSS), 24th – 25th October, São Bernardo do Campo, Brazil.

Other Conference Presentations

***Pires, B.** *Challenges and Opportunities for Modeling Violent Collective Action Computationally: Balancing Theory and Data*. Paper presented at the International Congress on Agent Computing, 29th – 30th November, Fairfax, VA.

***Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A., 2016, *An in silico Platform for Environmental Coupling*. Poster presented at the Association for Public Policy Analysis & Management (APPAM), 3rd – 5th November, Washington, DC.

***Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A., 2016, *An in silico Platform for Environmental Coupling*. Presentation at the International Society of Exposure Science (ISES), 9th – 13th October, Utrecht, The Netherlands.

***Pires, B.**, 2015, Crowd-Sourcing Big Data from Smartphone Apps for Transportation Research: Role of Statistics and Challenges. Panel conducted at the Joint Statistical Meetings (JSM), 8th-13th August, Seattle, WA. With: Feng Guo and Elaine Murakami.

***Pires, B.**, Korkmaz, G., Ensor, K., Higdon, D., Keller, S., Lewis, B., and Schroeder, A., 2015, *An in silico Platform for Environmental Coupling*. Poster presented at the International Symposium for Next Generation Infrastructure, 13th – 15th September, Washington, DC.

Keller, S., Schroeder, A., Shipp, S., Higdon, D., Korkmaz, G., Molfino, E., Orr, M., **Pires, B.**, and *Ziemer, K., 2015, *Data: The new asset class*. Poster presented at the International Symposium for Next Generation Infrastructure, 13th – 15th September, Washington, DC.

***Pint, B.**, Crooks, A., 2013, *The Impact of a Slum's Social Dynamics and Geospatial Landscape on the Emergence of Riots: The Case of Kibera*, The Association of American Geographies (AAG) Annual Meeting, 9th – 13th April, Los Angeles, CA.

***Pint, B.**, *Horvath, R., *Zhang, S., and *Haruta, A., 2011, *High-end ICT Talent Development and Retention*, Stakeholders Workshop on e-Government Strategic Plan, 9th – 10th March, Nairobi, Kenya.

Pint, B., Levitt, T., and *Laskey, K., 2008, *Inferring Threat Group From IED Incident Reports*, The Military Operations Research Society (MORS) Symposium, 10th – 12th June, New London, CT.

*Sutherland, S., Ni, H. and **Pint, B.**, 2007, *Canada Post Strategic Network Optimization Model*, The Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, 4th – 7th November, Seattle, WA.

***Pint, B.**, Cohen, J. and Ellison, L., 2003, *Case Study: Alpharma & the Brazilian Market*, in the post-proceedings of The Business Association of Latin American Studies (BALAS) Conference, 9th – 12th April, São Paulo, Brazil.

Professional Presentations

*Keller, S., *Shipp, S., Higdon, D., *Korkmaz, G., *Molfino, E., *Orr, M., ***Pires, B.**, Schroeder, A., Weinberg, D., *Ziemer, K., 2015, *Leveraging External Data Sources to Enhance Official Statistics and Products*, Final project presentation to U.S. Census Bureau, 18th December, Suitland, MD.

***Pint, B.**, 2013, *The Geography of Conflict Diamonds: The Case of Sierra Leone*. Krasnow Institute for Advanced Study, George Mason University seminar series, 8th February, Fairfax, VA.

- *Pint, B.**, 2011, *Corporate Service Corp Experience in Kenya*. IBM Advanced Analytics & Optimization brown bag series, 10th June, Herndon, VA.
- *Pint, B.**, *Horvath, R., *Zhang, S., and *Haruta, A., 2011, *High-end ICT Talent Development and Retention*, Final project presentation to the Minister of Information Communications and Technology, 18th March, Nairobi, Kenya.
- *Pint, B.**, 2008, *Activity-Based Costing at U.S. Customs & Border Protection*. IBM Operations Analytics brown bag series, 17th October, Fairfax, VA.

SKILLS

Research Methods/Techniques

Agent-based modeling, social network analysis, geographic information systems, large-scale data analysis, microsimulation, discrete-event simulation, database design and development, activity-based costing

Software/Programming Languages

Java, SQL, R, Python, MASON, NetLogo, AnyLogic, ArcGIS, Palantir, UCINet, NetDraw, Gephi, PostgreSQL, VBA, MS Access, LaTeX

Languages

Portuguese (proficient)

RESEARCH EXPERIENCE

2014 – Present **Postdoctoral Associate**, Social & Decisions Analytics Laboratory, Biocomplexity Institute of Virginia Tech, Arlington, VA

Apply quantitative and computational methods (e.g., agent-based modeling, social network analysis, geographic information systems, discrete-event simulation) to large-scale health, industry, education, and organizational issues using R, Python, ArcGIS, and SQL. Write peer-reviewed publications and reports. Mentor high school and undergraduate summer students. Selected projects include:

Army Research Institute's Development of a Framework to Model Dynamic, Multi-level Interactions within an Organization: Principal Investigator for an early career grant to create an agent-based model using Python that simulates dynamic social networks within a hospital. Applying a computational model of cognitive theory to explore how knowledge spreads throughout an organization.

Army Research Institute's Military Attrition: Developing an agent-based model in Python that simulates attrition of military personnel over time.

Towards an *in silico* Experimental Platform for Air Quality: Developed a spatiotemporal model using R and PostgreSQL that integrates the population dynamics of 4.9 million synthetic residents of the Houston metropolitan area with ozone concentration levels obtained from 47 monitors.

Proctor & Gamble's End-to-End Supply Chain Synchronization: Developed an end-to-end data model using R and PostgreSQL to repurpose vast amounts of disparate transactional data. The data model included screening, cleaning, and restructuring of the data as well as understanding table linkages and relationships. Developed a discrete-event simulation of the shipping and transportation

processes. Trained the P&G team on the models developed and provided guidance on how to operationalize this research.

U.S. Census Bureau's Leveraging External Data Sources to Enhance Official Statistics and Product: Developed expertise in state sources of education data, especially Statewide Longitudinal Data Systems (SLDS). Conducted comparative analysis in R of SLDS data to American Community Survey data. Conducted logistic regression on special topics, e.g., high school dropouts and English proficiency of students, and co-authored a Census Bureau report.

2012 – 2013 **Graduate Research Assistant**, Department of Computational Social Science, Krasnow Institute for Advanced Study, George Mason University, Fairfax, VA
Office of Naval Research's Mason-Yale Project on Computational East Africa: Developed an ABM that integrates SNA and GIS in MASON, a multi-agent simulation library core in Java, to explore the onset of riots in a Kenyan slum.

2008 **Graduate Research Assistant**, Department of Statistics, Volgenau School of Engineering, George Mason University, Fairfax, VA
Department of Defense's Joint IED Defense Organization: Developed a Bayesian Network Classifier to infer threat group based on the features associated with an Improvised Explosive Device (IED) incident.
Mentored and oversaw the work of two undergraduate students.

PROFESSIONAL EMPLOYMENT

2011 – 2012 **Embedded Analyst**, Palantir Technologies, McLean, VA
Led on-site training courses and created training materials for Immigration & Customs Enforcement (ICE) analysts.
As Project Manager, worked with developers and the business team to ensure the successful implementation of Palantir at U.S. Customs & Border Protection (CBP) field offices across the country.
Met prospective clients in Brazil's law enforcement community. Delivered product demos and led follow-up conference calls.

2003 – 2011 **Managing Consultant**, IBM Global Business Services, Advanced Analytics & Optimization, Washington, DC
As part of IBM's Corporate Service Corp, created recommendations for developing and retaining high-end Information and Communications Technology (ICT) talent in Kenya.
As Project Manager at U.S. Customs & Border Protection (CBP), was accountable for IBM internal financial and business controls on the project, as well as for managing, overseeing, and distributing project deliverables.
Developed a microsimulation for CBP's Budget office that used employee-level data to project the agency's salaries and benefits costs, totaling \$6 billion a year.
Lead analyst for Canada Posts' Strategic Optimization of Processing Network project. Interviewed clients to understand their operations, identify and collect data, and evaluate data deficiencies. Designed and developed a database in MS Access to house the model's data needs.

Led and coordinated the U.S. Postal Service's simulation modeling effort. Developed a tool in MS Access and VBA to automate the population of the input data into seven different discrete-event simulation models.

AWARDS AND RECOGNITIONS

George Mason University funding to attend The Association of American Geographers (AAG) annual meeting, 2013

Palantir Technologies award for full tuition costs, 2011

IBM award for full tuition costs, 2007-2011

IBM Corporate Service Corp, 2011

Profiled on IBM.com, 2008

IBM Service Excellence Award, 2008

IBM BRAVO! Award, 2008

IBM Operations Analytics King of Delivering Value to the Client Award, 2007

IBM BRAVO! Award, 2005

U.S. Postal Service Account Excellence Award Winner, 2005

IBM Operations Analytics Hardest Worker Award, 2005

University of Florida funding to attend The Business Association of Latin American Studies (BALAS) Conference, 2003

PROFESSIONAL MEMBERSHIPS

2015 – present Computational Social Science Society of the Americas (CSSSA)

2016 – present The Institute for Operations Research and Management Sciences (INFORMS)

2015 – present American Statistical Association (ASA)

Referee/Reviewer: Transactions in GIS