

Margaret J. Foster

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EDUCATION

Duke University

Doctorate of Philosophy (PhD), Political Science, GPA: 3.67

Durham, North Carolina, USA

August 2014 – May 2020

McGill University

Master of Arts, Political Science, GPA: 3.59

Montreal, Quebec, Canada

August 2008 – May 2010

University of Pennsylvania

Bachelor of Arts with Distinction in International Relations, Cum Laude, GPA: 3.33

Philadelphia, Pennsylvania, USA

August 2004 – May 2007

EXPERIENCE

Duke University

Postdoctoral Research Fellow

July 2023 – Present

Durham, North Carolina, USA

- Lead a team scaling the implementation of a novel Bayesian Item Response Theory model; identify and initiate bespoke high-impact research opportunities using existing and novel data
- Principal developer of an R statistical package for production
- Manage junior scholars and external contractors through the production of analysis, statistical coding, and research products; implement and maintain detailed plans tracking goals, progress, and quality, own delivery of high-quality statistical and analytic products through the full research life cycle
- Use Python and R to develop statistical models and tools to extract, transform, and analyze data for both descriptive analysis and hypothesis-driven statistical tests; interpret and validate the results; present results for peer review; Identify and execute opportunities to use LLMs for complex social science research

The University of North Carolina, Chapel Hill

Postdoctoral Research Fellow

July 2020 – July 2023

Chapel Hill, North Carolina, USA

- Developed original research projects using machine learning and statistical modeling in domains with few measurement instruments, such as identifying change for 300+ militant groups and quantifying gridlock in 8,000+ paragraphs of international negotiations
- Created statistical programs in R and Python to extract, transform, and manage structured and unstructured data; conducted analysis using established and bespoke models; reported and presented the results for peer review
- Provided technical advice on machine learning and AI, research design, model development, fit, and appropriateness to researchers and practitioners; served on the leadership team of scholars using network analysis (APSA Political Networks section)
- Presented complex research to technical and non-technical audiences from community outreach to international professional conferences (e.g. Politics and Computational Social Science, Political Networks)
- Taught an introductory R programming, data science, and causal inference course to UNC undergraduates

Duke University

Doctoral Researcher

August 2014 – May 2020

Durham, North Carolina, USA

- Designed and executed individual and team-based research, specializing using quantitative text analysis, network modeling and simulation, applied Bayesian statistics, and statistical analysis of observational data
- Used Bash, R and SQL to process and develop original text datasets of 50,000+ content items from jihadi supporters (scraped from Telegram, Twitter, Ask.fm, and other social network platforms); 1,000 al-Qaeda documents posted online and on social networks; and 125 meeting minutes (8,500 speaker-paragraphs) from the World Trade Organization
- Prepared and gave presentations and memos distilling complex arguments/methods into clear and succinct analysis; taught research design, statistical analysis, and R programming to undergraduate, MA, and PhD students

SITE Intelligence Group

Consultant

Senior Analyst

Analyst

August 2010 – April 2023

August 2014 – April 2023

August 2010 – July 2014

June 2007 – August 2008

- Identified growth areas and spearheaded new organizational competencies in jihadi supporting and far-right online extremist communities for a private intelligence organization; carried out fast-moving self-directed and collaborative multi-platform qualitative research on open source, social network, and deep-web data platforms

- Produced daily strategic analysis cited by both media and government clients in support of analytic products, trend analysis, and expert-level reports in both core and developing areas of organizational expertise
- Trained and led teams of junior analysts in threat hunting, analysis, and presentations
- Conducted collaborative multi-platform qualitative research in French and English into deepweb jihadi-supporting online communities.

SELECTED PROJECTS

Measurement That Matches Theory

- **Substantive:** Led a team of PhD and MA students in designing, implementing, and validating a novel fully Bayesian Item Response Theory model that produces theoretically identified latent factors from existing data; applied the insights to produce research on international relations and conflict
- **Technical:** Developed a data pipeline to incorporate events data from multiple data sources to create a comprehensive dataset of violent and non-violent political mobilization; R, data visualization, statistical modeling (ANOVA, K-S tests; correlation tests; GLM models, Bayesian sampler)

Subject to Change

- **Substantive:** Used NLP to develop a novel way to measure organizational change using open-source data that is scalable to 300 + militant groups and measurably improves statistical models predicting conflict termination
- **Technical:** Adapted machine learning techniques (k-means clustering, random forest, t-SNE, and support vector machines) to quantify temporal changes in news articles; Used statistical models in R and Stata (linear regression with fixed effects, zero-inflated negative binomial models, survival models); and qualitative and quantitative assessment to validate the modeling approach

Developing Gridlock: Frames of Contestation at the World Trade Organization

- **Substantive:** Developed analysis of text that incorporated qualitative and quantitative insights to identify blockage and stagnation in an international forum and hypothesize conditions that would reduce the gridlock
- **Technical:** Used Natural Language Processing (NLP), named entity recognition, data visualization, and network analysis in R and Python to model negotiations across 20 years of international organization meetings; used digital transformation tools to scrape and import data from native pdfs from 120+ meetings and 8,500 paragraphs

Growth Trap: Grassroots-Driven Transformation of Militant Organizations

- **Substantive:** Developed a hypothesis about how the internal evolution of armed conflict actors impacts the local and regional geopolitical and security environment
- **Technical:** Used statistical modeling (GLM and logit models), game theory, and supervised machine learning to measure and validate theoretical predictions of geopolitical trends in an opaque data environment

Domino Effect: Network Structure and Recruit Cohesion

- **Substantive:** Designed a bespoke network simulation to test organizational fragmentation described in an extremist memoir
- **Technical:** Created and implemented a simulation applied to 3 network pairs and 1000s of membership conditions; extracted test statistics from results; modeled outcome using ANOVA and distributional tests

Gig Economy Insurgency

- **Substantive:** Identified that militant groups often use informal hiring arrangements and designed a typology of engagement types and their influence on the conflict
- **Technical:** Conducted a deductive theory-building analysis by using open source primary and secondary sources, including original data on foreign fighter organizational dynamics

PEER-REVIEWED PUBLICATIONS

Morucci, Marco, **Margaret J. Foster**, Kaitlyn Webster, So Jin Lee, David A. Siegel, Measurement That Matches Theory: Theory-Driven Identification in IRT Models. *American Political Science Review*. Conditionally Accepted (Dec. 2023).

Margaret J. Foster, Subject to Change: Quantifying Transformation in Armed Conflict Actors At Scale Using Text. *Political Science Research and Methods*. Conditionally Accepted (Oct. 2023)

Margaret J. Foster, Gig Economy Insurgency. *Studies in Conflict and Terrorism*. Revise and Resubmit (Aug. 2023)

Minhas, Shahryar, Cassy Dorff, **Margaret Foster**, Max Gallop, Juan Tellez, Howard Liu, and Michael Ward. 2021. Taking Dyads Seriously. *Political Science Research & Methods*. DOI: <https://doi.org/10.1017/psrm.2021.56>

Foster, Margaret J., and David A Siegel. 2019. Pink Slips from the Underground: Changes in Terror Leadership. *International Studies Quarterly*. DOI: <https://doi.org/10.1093/isq/sqz017>