

# MACIEJ KOS

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## EDUCATION

**Northeastern University**, Boston, MA Expected 2022  
*Ph.D. Candidate in Computer Science/ Personal Health Informatics (GPA: 4.0)*

*Dissertation*: Digital biomarker of cognitive health: unobtrusive monitoring of cognitive changes using smartphones

*Research interests*: data science, machine learning, mHealth, health informatics, quantitative UX

*Selected awards*:

- **ACM/Intel Corporation Computational and Data Sciences Fellowship, 2017 – 2021**
  - **NIH National Institute of Aging, Predoctoral Fellow (F99), 2020 - 2022**
  - Northeastern University Dissertation Grant, 2020
  - **Google Scholar, 2020**
  - Grace Hopper Conference, 2019 – Google Travel Award
- [Multiple conference, workshop, and summer school awards omitted]*

**University of Michigan**, Ann Arbor, MI 12/2012  
*M.A. in Information Science*

**Barcelona Graduate School of Economics**, Barcelona, Spain 07/2009  
*M.Sc. in Economics of Science and Innovation*

## EXPERIENCE

**Northeastern University** Boston, MA  
**Graduate Researcher** 09/2015 – present

**"Measurement of collective physical distancing during the COVID-19 outbreak using large-scale mobility data"** in collaboration with the MOBS lab, PI: Alessandro Vespignani

- Developed an approach for reducing selection bias in smartphone location data of over 40 million US users by combining well-established statistical techniques with multivariate simulations applied to geospatial socio-demographic data (Python, R).
- Helped build a pipeline for processing of over 0.5 petabyte of data (Python, BigQuery).

**"Strengthening Human Adaptive Reasoning and Problem-solving"** in collaboration with Harvard, Oxford, and HoneyWell

- Built a statistical model to characterize the relationship between different types of brain stimulation, estimates of fluid intelligence, and performance during adaptive cognitive training (R).
- Helped develop a computational model of participants' performance during adaptive cognitive training (R).

**"WearTech - determining the accuracy of wearable sensors for ambulatory stress monitoring"**

- Used machine learning and signal processing techniques to develop a method for removing motion artifacts from heart rate data (R).
- The developed method improved upon Microsoft's state-of-the-art algorithm.

**Roku**

Remote

**Research Data Scientist Intern**

06/2021 – 09/2021

***“Development and assessment of algorithms for creating lookalike audiences (ads)”***

- Implemented and assessed methods for creating lookalike audiences using behavioral data (lift > 20x)
- Proposed novel algorithms for lookalike creation.

**Google**

San Francisco, CA

**UX Research Intern (quantitative)**

05/2019 – 09/2019

***“Quantification of Material Design (Google’s open-source design system)”***

- Developed an algorithm for computing website’s cognitive complexity based on Shannon’s entropy.
- Prototyped analytics pipeline to parse 400 billion pages and fuses Google’s diverse signals about each website (e.g., vertical, location, reach).

**Philips Healthcare Research**

Cambridge, MA

**Research Intern (Clinical Data Analytics)**

05/2018 – 09/2018

***“Intensive care unit of the future: health informatics technologies for preventing critical illness brain injury (CIBI)”***

- Proposed and prototyped system architectures and UX of two clinical decision support systems for preventing delirium and CIBI using ICU data.
- Submitted two patent applications (internally).

**Polish National Science Center** Research Grant

Poland &amp; Boston, MA

**Investigator / Research Group Manager**

07/2013 – 05/2018

***“Genetic health-risk information avoidance”***

- Conceptualized the study and wrote Research Strategy of a winning grant application (\$77 000; the largest grant awarded to researchers at the economics department).
- Wrote software for running online experiments, managed online and offline experiments with > 1000 participants (Python).
- Analyzed data and presented findings at four conferences.

**Agile Axons** (self-employed)

Poland and Rome, Italy

**User Experience and Research Consultant**

01/2013 – 08/2015

- Led a UX team developing a consumer-facing mobile app for a large Italian telco (with **McKinsey** and **Ericsson**).
- Consulted on research design and statistical programming for behavioral finance and economics projects.

**Other:** Research Assistant (University of Michigan), Localization Tester (EA), and more.

## SKILLS

**Programming:** Python, R, Stata, SQL (GCP BigQuery, AWS Athena)**Statistics:** GLM (univariate, multivariate, some multilevel), SEM, psychometric modeling**Machine Learning:** PCA, factor analysis, clustering, SVMs, ridge regression, logistic classification, random forests**Other:** data visualization, network analysis, qualitative UX research**Eager to learn:** signal processing, computer vision, deep learning, NLP

## SIDE PROJECTS

**Child Aid:** analyzed data and consulted on research design for a large-scale experimental intervention to increase literacy of Guatemalan children.

**Lives of Dissidents:** led UX research and design effort to help launch a charity project dedicated to spreading the message of peaceful dissent as a means of dissolving oppression.

#### ADDITIONAL ACTIVITIES

- Ad hoc reviewer for SIG Human-Computer Interaction, IEEE Engineering in Medicine and Biology Society, and American Medical Informatics Association
- Northeastern Personal Health Informatics Faculty Committee, 2018/2019 – elected student representative
- Personal Health Informatics seminar, 2016/2018 – organizer
- University of Michigan, Rackham's International Connect, 2010/2011 – mentor
- Poland Foresight 2020 national research program – external expert
- Baltic Science Festival, 2007/2008 – departmental coordination team member

#### PAPERS, PRESENTATIONS, AND POSTERS (SELECTED, PEER-REVIEWED, AND NOT PEER-REVIEWED)

1. Klein B., LaRock R., McCabe S., Torres L., Friedland L., **Kos M.**, Privitera F., Lake B., Kraemer M., Brownstein J.S., Lazer D., Eliassi-Rad T., Scarpino S.V., Vespignani A., Chinazzi M. (2020). *Reshaping a nation: Mobility, commuting, and contact patterns during COVID-19.* Presentation at COVID-19 Satellite of Sunbelt XL, International Sunbelt Social Network Conference, virtual
2. **Kos M.** (2020). *Towards a digital biomarker of cognitive health: passive monitoring of cognitive changes using smartphone-based data.* Poster presentation at the Computing Research Association Grad Cohort Workshop, Austin, TX
3. **Kos M.**, Yew J. (2019). *Computational methods for understanding cognitive density preferences, foundations for adaptive user interfaces.* Google Ph.D. Intern Research Conference, Mountain View, CA
4. **Kos M.**, Pavel M., Jimison H. (2019). *How to Validate Heart Rate Monitoring Wearables for Just-in-Time Adaptive Health Interventions? Development of Comparison Testing Guidelines.* Poster presentation at the Annual American Medical Informatics Association Symposium, Washington, DC
5. **Kos M.**, Ponnada A., Pavel M., Intille S. (2019). *Evidence That Microinteraction Ecological Momentary Assessment ( $\mu$ EMA) is a Non-Reactive In-Situ Affect Assessment Method.* Poster presentation at the Society for Affective Science Annual Conference in Boston, MA
6. **Kos M.**, Gordon C., Li X., Khaghani-Far I., Pavel M., Jimison H. (2017). *The Accuracy of Monitoring Stress from Wearable Devices.* Poster presentation at the Annual American Medical Informatics Association Symposium, Washington, DC
7. **Kos M.**, Li X., Khaghani-Far I., Gordon C., Pavel M., Jimison H. (2017). *Can accelerometry data improve estimates of heart rate variability from wrist PPG sensors?* Paper presentation at the 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, South Korea