Jae Yeon Kim

Homepage: https://jaeyk.github.io GitHub: https://github.com/jaeyk E-mail: jkim638@jhu.edu

Academic appointments

Johns Hopkins University's SNF Agora Institute: Assistant Research Scientist (July 2024-); Research Fellow (January 2022-June 2024); Pre/Postdoctoral Fellow (Fall 2020-December 2021)

Harvard Kennedy School: Research Fellow, Center for Public Leadership (February 2024-)

KDI School of Public Policy and Management (in South Korea): Affiliate (2024-); Assistant Professor (2022)

Professional appointments

Code for America: Senior Data Scientist (January 2023-May 2024); Contracting Data Scientist (November 2024-)

Collaborated with the federal Office of Evaluation Sciences and California, New York, Colorado, and New Mexico state governments on safety net innovations

Other appointments and affiliations

Michigan and Georgetown's Better Government Lab: External Affiliate and Fellow (November 2024-)

UC Berkeley's Interdisciplinary Migration Initiative: External Affiliate (2023-)

Education

University of California, Berkeley, USA (on the Korea Foundation for Advanced Studies scholarship)

Ph.D., Political Science, 2021

Fields: American Politics, Comparative Politics, Political Behavior (with Distinction)

Dissertation: Essays on the Politics of Solidarity in Multiracial America

Committee: Paul Pierson (Co-Chair), Taeku Lee (Co-Chair), Eric Schickler, Irene Bloemraad

Co-Winner, Best Dissertation Award in Urban and Local Politics, APSA (2022)

Korea University, Seoul, South Korea (alternative military service: 2009-2010): B.A., English and Political Science (with Great Honors, 2012); Exchange student programs: Hong Kong (2016 Fall), Taiwan (2017 Fall)

Research focus

Substantive interests: Urban and local politics, Racial and ethnic politics, Civic engagement, Policy implementation Methodological interests: Data science, Survey methods, Experiments, Multi-methods

Awards

- 4. **Emerging Scholar Award in Civic Engagement**, American Political Science Association, 2024, "recognizes an individual who is making notable contributions in the research of civic engagement within five years of earning their terminal degree and whose career to date demonstrates significant promise in this area."
- 3. **Best Dissertation Award in Urban and Local Politics**, American Political Science Association, 2022, "given annually for the best dissertation on urban politics (domestic or international) accepted in the previous year."
- 2. Don T. Nakanishi Award for Distinguished Scholarship and Service in Asian Pacific American Politics, Western Political Science Association, 2020, "for making a significant contribution to the understanding of Asian Pacific American politics."
- 1. **Outstanding Graduate Student Instructor Award**, Graduate Division, UC Berkeley, AY 2016-2017, received by approximately **10 percent** of Graduate Student Instructors at Berkeley

Job Market Paper (data science and social policy implementation)

"Administrative Checkpoints, Burdens, and Human-centered Design: Increasing Interview Access to Raise SNAP Participation." (Jae Yeon Kim, Pamela Herd, Sebastian Jilke, Donald Moynihan, and Kerry Rodden). Revise & resubmit at the Journal of Policy Analysis and Management

Abstract: Federal policymakers have urged the use of human-centered design to reduce administrative burdens in policy implementation. In this study, we describe the potential of human-centered design principles to identify burdens, reducing the effects of what we label as administrative checkpoints. Administrative checkpoints - mandatory requirements that must be satisfied in order to progress in an administrative process - have disproportionate negative effects in excluding the public from receiving public services. Mandatory interviews are one such checkpoint. Based on consultation with safety net clients and caseworkers, we designed a field experiment (N=1,554) to minimize the exclusionary effects of mandatory interviews for SNAP applicants. Compared to a control group that received a traditional mailer reminder, SNAP applicants who also received texts reminding them of the interview and communicating flexible "interview anytime" scheduling options had a higher interview completion rate by 10 percentage points, a higher benefit-approval rate by 6 to 7 percentage points, and also completed interviews 3-4 days sooner. Follow-up surveys show that the text reminders reduced learning costs about the interview requirement and processes.

Journal articles (13 publications since 2020)

Computational social science, democracy, and civic resilience

1. "The Unequal Landscape of Civic Opportunity in America." (Milan de Vries, **Jae Yeon Kim** and Hahrie Han) *Nature Human Behaviour*, Online First in November 2023 [replication]

Featured in: The Washington Post, Associated Press, Johns Hopkins University Homepage, HistPhil

2. "Civil Society, Realized: Equipping the Mass Public to Express Choice and Negotiate Power." (Hahrie Han* and **Jae Yeon Kim***) *The ANNALS of the American Academy of Political and Social Science*, Online First in March 2022 (Published in 2022, 699(1), 175-185) (* = co-lead authors.)

Computational social science, pandemic politics, hate crime, and misinformation

- "COVID-19 and Asian Americans: How Elite Messaging and Social Exclusion Shape Partisan Attitudes." (Nathan Chan, Jae Yeon Kim, and Vivien Leung) Perspectives on Politics, Online First in December 2021 [replication]
 Featured in: Washington Post's Monkey Cage, FiveThirtyEight
- "Misinformation and Hate Speech: The Case of Anti-Asian Hate Speech During the COVID-19 Pandemic."
 (Jae Yeon Kim* and Aniket Kesari*) Journal of Online Trust and Safety, 2021, 1(1) (* = co-lead authors.)
 [replication]

Featured in: Platformer

Urban and local politics

- 1. "How Other Minorities Gained Access: The War on Poverty and Asian American and Latino Community Organizing." (Jae Yeon Kim), *Political Research Quarterly*, Online First in December 2020 (Published in 2022, 75(1), 89-102) [replication]
- 2. "Racism Is Not Enough: Minority Coalition Building in San Francisco, Seattle, and Vancouver." (Jae Yeon Kim), *Studies in American Political Development*, 2020, 34(2), 195-215 [replication]

Featured in: Scope Conditions, UC Berkeley Canadian Studies Program

3. "Integrating Human and Machine Coding to Measure Political Issues in Ethnic Newspaper Articles." (Jae Yeon Kim), *Journal of Computational Social Science*, 2021, 4(2), 585-612 [replication]

Early version received **the 2020 Don T. Nakanishi Award** from the Western Political Science Association (Asian Pacific Americans and Politics Best Paper Award)

¹Project partner: Colorado State Government, Code for America

Race and social science theories and methodologies

- "Rewiring Linked Fate: Bringing Back History, Agency, and Power." (Reuel Rogers* and Jae Yeon Kim*)
 Perspectives on Politics, Online First in December 2021 (Published in 2023, 21(1), 288-301) (* = co-lead authors.)
 [replication].
- 2. "Validated Names for Experimental Studies on Ethnicity and Race." (Charles Crabtree, **Jae Yeon Kim**, S. Michael Gaddis, John B. Holbein, Cameron Guage, and William Marx) *Nature Scientific Data*, Online First in March 2023 [replication] [R package]

Gender and ethnicity in East Asia

- "Contested Identity and Prejudice Against Co-ethnic Refugees: Evidence from South Korea." (Jae Yeon Kim and Taeku Lee) Political Research Quarterly, Online First in December 2022 (Published in 2023, 76(3), 1433-1444) [replication]
- 2. "Identity and Status: When Counterspeech Increases Hate Speech Reporting and Why." (Jae Yeon Kim, Jaeung Sim, and Daegon Cho) *Information Systems Frontiers*, Online First in January 2022 [replication]

Data science pedagogy and training

- "Training Computational Social Science Ph.D. Students for Academic and Non-Academic Careers." (Aniket Kesari*, Jae Yeon Kim*, Sono Shah*, Taylor Brown*, Tiago Ventura*, and Tina Law*) PS: Political Science & Politics, Online First in September 2023 (Published in 2024, 57(1), 101-106) (* = co-lead authors.) [slides]
- 2. "Teaching Computational Social Science for All." (Jae Yeon Kim and Margaret Ng) *PS: Political Science & Politics*, Online First in February 2022 (Published in 2022, 55(3), 605-609)

Conference and workshop proceedings

1. "Intersectional Bias in Hate Speech and Abusive Language Datasets." (Jae Yeon Kim, Carlos Ortiz, Sarah Nam, Sarah Santiago, and Vivek Datta), 2020, Proceedings of the Fourteenth International AAAI Conference on Web and Social Media (ICWSM), Data Challenge Workshop [replication]

Featured in: *AlgorithmWatch Newsletter*

Manuscript under review (2 R&R and 2 under review)

Data science and social policy implementation

 "Administrative Checkpoints, Burdens, and Human-centered Design: Increasing Interview Access to Raise SNAP Participation."² (Jae Yeon Kim, Pamela Herd, Sebastian Jilke, Donald Moynihan, and Kerry Rodden). Revise & resubmit at the Journal of Policy Analysis and Management

Race and solidarity politics

- 1. "Unlinking Linked Fate: The Push and Pull Factors of Group Consciousness." (Jae Yeon Kim, Joan Cho, DG Kim, and Taeku Lee) [pre-registration] Presented at 2022, 2023, 2024 APSA, Harvard, UC Berkeley, UCLA, Johns Hopkins, Dartmouth, Wesleyan
- 2. "Solidarity Between People of Color: Two Blockage Experiments Suggest It Is Casual and Resistant to Divisive Threats." (Jae Yeon Kim, Efrén Pérez and Kasheena Rogbeer). Revise & resubmit at the Journal of Experimental Political Science
- 3. "Steady as It Goes: Three Studies Stress-Testing Political Solidarity Between People of Color." (Kasheena Rogbeer, **Jae Yeon Kim**, and Efrén Pérez).

²Project partner: Colorado State Government, Code for America

Working papers

Data science and social policy implementation

- 1. "Problematizing Policy Implementation." (with Akshay Mangla)
- 2. "Evaluating the Impacts of Answering Sensitive Questions on SNAP Application Completions." (with Pamela Herd, Nathaniel Olin, Eric Gianella, and Donald Moynihan)³ [pre-registration]
- 3. "Evaluating Form Modifications to Make It Easier to Report Income on Benefits Applications." (with Blair Read, Stephanie Tepper, and Mary Clair Turner) [pre-registration]⁴
- 4. "Civic Tech in the U.S. Safety Nets: Reducing Administrative Burden by Rewiring Public Organizations." (with Eric Gianella and Maximilian Hell)
- 5. "The Alignment Problem: The Case of Field Experiments in the U.S. Safety Nets." (with Florian Keppeler) [slides] [talk] Presented at the University of Toronto, 2024 Public Management Research Conference, 2024 Korean Summer Workshop on Causal Inference

Tech policy adoption and implementation

- 1. "Privacy Law Diffusion Across US State Legislatures." (with Aniket Kesari)
- 2. "Contracting for Fair AI: A Computational Text Analysis of State AI Procurement Contracts," (with Aniket Kesari)

Big data and civic engagement

- 1. "Navigating the Thicket: Metrics Management in U.S. Civic Life." (with Liz McKenna)
- "Historical Legacies and Civic Inequality in America." (with Milan de Vries and Hahrie Han) Presented at 2024 APSA and 2024 WPSA
- 3. "MapAgora: American Civic Opportunity Datasets." (with Milan de Vries)

Race and social science theories and methodologies

1. "Everyday Experiences and Asian American Identity." (with Taeku Lee)

Books

"Public Interest Data Science: Harnessing Data for Good." (in Korean; Sejong Books 2023)

Featured in *The Chosun Ilbo*, *Maeil Business*, *The Korean Economic Daily*, *Kyunghyang Shinmun*, and *Hankyoreh* (major Korean newspapers across the ideological spectrum)

Book chapters

- 2. "An Introduction to Computational Tools and Techniques for Social Science Research." (**Jae Yeon Kim**) In Nelimarkka, M. and Merhout, F. (Eds.) *Teaching Computational Social Science*. Under contract with *Edward Elgar Publishing*
- 1. "Machines Do Not Decide Hate Speech: Machine Learning, Power, and the Intersectional Approach." (Jae Yeon Kim) In C. Strippel, S. Paasch-Colberg, M. Emmer J. Trebbe (Eds.), *Challenges and Perspectives of Hate Speech Analysis*, 2022, (pp. 261-275). Digital Communication Research (open-access book series by the German Communication Association).

³Project partner: California State Government, Code for America

⁴Project partner: Federal Office of Evaluation Sciences, California State Government, Code for America

Research Brief and Public Writing

- "The Uneven Landscape of Civic Opportunity in the United States: What We Discovered While Mapping The Modern Agora." (Jae Yeon Kim), HistPhil, January 25, 2024
- 5. "Behind the Paper: The Unequal Landscape of Civic Opportunity in America." (Jae Yeon Kim), Springer Nature: Social Sciences Community, November 13, 2023
- 4. "Episode 3.4: Race-based Coalitions in Three Chinatowns." (Jae Yeon Kim), Scope Conditions, June 14, 2023
- 3. "Good Troublemakers Are the Key to Fixing Democracy in South Korea." (Jae Yeon Kim), Korea Pro, May 16, 2022.
- 2. "Thanks to Trump's Rhetoric, Asian Americans Are Moving Toward the Democratic Party." (Nathan Chan, **Jae Yeon Kim**, and Vivien Leung), *Washington Post's Monkey Cage*, March 30, 2021
- 1. "The Three Tales of Chinatown: Why Racism Is Not Enough to Create a Race-based Coalition among Marginalized Groups." (Jae Yeon Kim), UC Berkeley Canadian Studies Program, March 29, 2021

Grants and Fellowships

External

- 5. **Global Research Agenda Grant**, Social Sciences Korea, 2024-2026: USD \$572,390 / 750,000,000 KRW (with Woo Chang Kang, Byoungha Lee, Inbok Rhee, Sunkyung Park, John S. Kuk, and Donghyun Danny Choi)
- 4. **Democracy Visiting Fellowship**, Ash Center for Democratic Governance and Innovation, Harvard Kennedy School, August 2020-July 2021 (declined due to logistics)
- 3. **Post-SICSS (Summer Institute in Computational Social Science) Grant**, Russell Sage Foundation, 2019: \$6,462 (with Jaren Haber and Nick Camp)
- 2. **Korea Foundation for Advanced Studies Doctoral Fellowship** (in tuition scholarship and stipend), 2014-2019: \$220,033 (1 of 2 in political science selected nationwide)
- 1. California Poverty and Socioeconomic Inequality Fellows Program, Blum Initiative for Global and Regional Poverty Studies, 2017: \$500

Internal

- 11. Faculty Research Grant, SNF Agora Institute, Johns Hopkins University, 2023-
- 10. Data Science Fellowship, D-Lab, UC Berkeley, Fall 2020-Spring 2021
- 9. **Data Science Education Fellowship**, D-Lab and Data Science Education Program, UC Berkeley, Spring 2020
- 8. **American Democracy Project Fellowship**, Center for the Study of American Democracy, UC Berkeley, 2019-2020: \$3,000
- 7. **Doctoral Completion Fellowship**, Graduate Division and Department of Political Science, UC Berkeley, 2019-2020: \$28,000
- 6. Department Fellowship, Department of Political Science, UC Berkeley, 2014-2019
- Berkeley Empirical Legal Studies Graduate Fellowship, Center for the Study of Law and Society, UC Berkeley, 2017: \$1,000
- 4. Edward Hildebrand Research Fellowship, Canadian Studies Program, UC Berkeley, 2017: \$3,500
- 3. Graduate Fellowship in Korean Studies, Institute of East Asian Studies, UC Berkeley, 2016-2018: \$15,350
- 2. Graduate Fellowship in East Asian Studies, Institute of East Asian Studies, UC Berkeley, 2015: \$3,480
- 1. Academic Excellence Scholarships, Korea University, 2004, 2005, 2006, 2007, 2011

Invited Talks

2025 Northwestern (American Politics Workshop, scheduled)

2024 Yale University (American Politics and Public Policy Workshop)

Michigan State University (American Politics Workshop)

UC Berkeley (Identity and Politics Workshop)

University of Colorado Boulder (Information Science Seminar)

University of Toronto (Toronto Data Workshop)

Korean Summer Workshop on Causal Inference

UC Berkeley (Summer Institute in Migration Research Methods)

Johns Hopkins (SNF Agora's P3 Lab)

University of Minnesota (Political Methodology Colloquium)

UCLA (Race, Ethnicity, Politics, & Society Lab)

University of Washington (Data Science Seminar)

2023 Stanford (APARC and KFAS joint conference)

Florida Atlantic University (SICSS-South Florida)

2022 University of British Columbia (Scope Conditions podcast)

National University of Singapore (Department of Communication and New Media)

Seoul National University (Institute of Social Science)

Korea University (Office of Information Technology and Service)

Ewha Womans University (Graduate School of International Studies)

2021 Stanford (New Research from the Journal of Online Trust and Safety's Inaugural Issue)

University of Minnesota (American Politics Colloquium)

Cornell (Democratic Vulnerabilities and Pathways for Reform Conference)

Johns Hopkins (SNF Agora Institute's P3 Lab)

2020 UC Berkeley (Computational Social Science Forum)

Conference and Workshop Presentations

* APSA = American Political Science Association, MPSA = Midwest Political Science Association, WPSA = Western Political Science Association, APPAM = Association for Public Policy Analysis and Management, PMRC = Public Management Research Conference, IC2S2 = International Conference for Computational Social Science

2024 APPAM (scheduled), APSA, PMRC, WPSA, Annual Research Conference on the American Political Economy, IC2S2 (tutorials), Stanford PhD Pathways (Data Science Across Industries Panel), Politics of Race, Immigration, and Ethnicity Consortium (Claremont Graduate University & UC Riverside)

2023 APSA

2022 APSA, MPSA, International Conference on Method Triangulation (Academia Sinica and TIGCR)

2021 APSA, Asian Online Political Science Seminar Series, The Junior Law & Politics Research Community, D-Lab Data Science Fellows Talk (UC Berkeley)

2020 APSA, Joint Political Computational Social Science and Political Network Conference, International AAAI Conference on Web and Social Media Data Challenge Workshop, Summer Institute in Computational Social Science Festival, Data Science Showcase (UC Berkeley), D-Lab Data Science Fellows Talk (UC Berkeley)

2019 MPSA, WPSA, Research Workshop in American Politics (UC Berkeley), Political Behavior Workshop (UC Berkeley), Canadian Studies Colloquium (UC Berkeley), Text Analysis Across Domains, Data Science Showcase (UC Berkeley)

2018 APSA, MPSA, WPSA, Politics of Race, Immigration, and Ethnicity Consortium, Association for Asian Studies

2017 MPSA, California Poverty and Socioeconomic Inequality Fellows Symposium

Teaching

Original textbook: Computational Thinking for Social Scientists (work-in-progress)

Teaching training: Certificate in Teaching and Learning in Higher Education, GSI Center, UC Berkeley, May 2021 Graduate seminars

KDI School: R Fundamentals for Public Policy (Spring 2022, Fall 2022 [2x]), Data Visualization and Communication (Summer 2022)

UC Berkeley: An Introduction to Computational Tools and Techniques for Social Science Research (Instructor of record: Spring 2019, Spring 2021 [2x], Graduate student instructor with Rachel Bernhard: Fall 2016), Research Workshop on Computational Tools for Digital Data Collection (with Nick Kuipers: Fall 2020)

Undergraduate lectures

UC Berkeley: Introduction to Empirical Analysis and Quantitative Methods (with Laura Stoker: Fall 2016)

Pre-conference tutorials

International Conference for Computational Social Science Science (IC2S2 '24, July 2024): Training Computational Social Science PhDs for Academic and Non-academic Careers

Summer Institute in Computational Social Science-Howard R Bootcamp (SICSS-Howard, June 2021). *Invited instructor*

Workshops

Berkeley Interdisciplinary Migration Initiative: Summer Institute in Migration Research Methods (Summer 2024). *Invited instructor*

Korea University Institute of Politics: Digital Data Collection (Summer 2022). Invited instructor

UC Berkeley D-Lab (Summer 2020-Summer 2020): Fairness and Bias in Machine Learning, Machine Learning in R, SQL for R Users, R Package Development, Functional Programming in R, Advanced Data Wrangling in R, Reproducible Project Management in R, R fundamentals

Guest lectures

2024: Johns Hopkins (Democracy by the Numbers, scheduled)

2023: Wesleyan (Challenges to Democracy in East Asia)

2022: National University of Singapore (Digital Communications and Analytics), KAIST (Data Analysis for Green Business and Policy, Science, Technology, and Society), Korea University (Introduction to Political Science), Sungkyunkwan University (Methods of Economic Data Analysis)

2021: KAIST (Data Analysis for Green Business and Policy), Dartmouth (Experiments in Politics)

Advising

Harvard (2023, master students): Alison Yuhan Yao (Data Science; Currently: a data scientist at Microsoft)

KDI School (2022, master students): Lesego B. Otlhabanye (Development Policy, Currently: a management consultant at Growth Matrix Solutions)

UC Berkeley (2018-2021, undergraduate students via Data Science Discovery Program and Undergraduate Research Apprentice Program): Noor-Ul-Ain Ali (Data Science, Currently: a Research Associate at UCSF), Riya Shrestha (Molecular Environmental Biology & Toxicology, Currently: an intern at Beta Hat), Carlos Ortiz (Data Science, Currently: a Data Scientist at Snap), Sarah Nam (Immunology & Data Science, Currently: a Senior Associate at

Cancer Study Group), Sarah Santiago (Applied Mathematics, Currently: a Senior Analyst at Goldman Sachs), Vivek Datta (Computer Science & Data Science, Currently: a Software Engineer II at Amazon), Angela Yip (Political Science), Brenna Uyeda (Environmental Economics and Policy), Gregory Eng (Political Science & History, Currently: an Attorney at the Internal Revenue Service), Jenny Feng (Political Economy & Education)

Service

Professional service

Advisory council, Summer Institute in Computational Social Science, 2023-

Member, Best Dissertation Award Committee, APSA's American Political Economy Section, 2024-2025

Member, Emerging Scholar Award Committee, APSA's Civic Engagement Section, 2024-2025

Program committee, IC2S2 (8th International Conference on Computational Social Science), University of Chicago, 2022

Co-organizer:

First Summer Institute in Computational Social Science in South Korea (SICSS-Korea), KAIST and KDI School, Fall 2021-Summer 2022

First Summer Institute in Computational Social Science in the San Francisco Bay Area (BAY-SICSS), UC Berkeley and Stanford University, Fall 2019-Summer 2020

Journal reviewer: Proceedings of the National Academy of Sciences, American Political Science Review [5x], Political Communication [2x], Political Behavior [5x], Political Research Quarterly [4x], Politics, Groups, and Identities [2x], Journal of Urban Affairs, PLOS ONE [2x], Journal of Open Source Software [2x]

Grant reviewer: Time-sharing Experiments for the Social Sciences

Departmental service

KDI School (2022): Curriculum Committee, Research Project Deliberation Committee, Internal Review Board, KDIS Frontiers in Data and Policy Talk Series (founder and coordinator)

UC Berkeley (2015-2021): Berkeley Historical Social Science Workshop (co-founder and coordinator, Fall 2019), Faculty Hiring Committee (graduate student representative, Fall 2016, Fall 2018) [2x], Diversity Action Committee (member, Spring 2015-Spring 2021)

Additional Training

Summer Institute in Migration Research Methods (SIMRM), UC Berkeley, 2024 (fully funded and invited)

The Consortium on the American Political Economy (CAPE) Summer Academy, UC Berkeley, 2024 (fully funded and invited)

Summer Institute in Computational Social Science (SICSS), Princeton University, 2019 (fully funded and invited) Inter-university Consortium for Political and Social Research (ICPSR), University of Michigan, 2017 (fully funded)

Languages

Proficient in R, Python, SQL, Command Line (UNIX/Linux)

Fluent in English and Korean (native), (declining) intermediate knowledge of Mandarin Chinese and Japanese

Others

Citizenship: Republic of Korea Permanent Residency Status: U.S.A.

References

Paul Pierson (Co-Chair)

John Gross Distinguished Professor, Political Science Director of the Berkeley Economy and Society Initiative University of California–Berkeley pierson@berkeley.edu

Hahrie Han (Postdoctoral Advisor)

Stavros Niarchos Foundation Professor, Political Science Director of the SNF Agora Institute Johns Hopkins University hahrie@jhu.edu

Irene Bloemraad (Dissertation Committee)

Professor, Department of Political Science and Sociology President's Excellence Chair in Global Migration Co-Director, Centre for Migration Studies University of British Columbia i.bloemraad@ubc.ca

Taeku Lee (Co-Chair)

Bae Family Professor of Government Harvard University President-Elect American Political Science Association taekulee@fas.harvard.edu

Donald Moynihan (Applied Policy Research)

J. Ira and Nicki Harris Family Professor Ford School of Public Policy University of Michigan President Association of Public Policy and Management dmoyn@umich.edu

Daniel Hopkins (Data Science/Research Methods)

Julie and Martin Franklin Presidential Professor Political Science, Communication, Information Science University of Pennsylvania danhop@sas.upenn.edu

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