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Open Rank Search, Computational Social Science

Dear Members of the Search Committee,

I write to express my interest in your call for an open rank faculty position in Computational Social Science. I am an Assistant Professor of Instruction in the Department of Political Science at Northwestern University, where I teach courses on statistics, statistical computing, and computational social science and conduct research on applied statistics for the social sciences. My work is published or forthcoming in leading outlets, including *Political Analysis*, the *British Journal of Political Science*, *World Development*, and the *Journal of Experimental Political Science*.

My research agenda focuses on using tools from statistics and computational social science to improve research design before data collection. My current focus is on statistical precision. This is overlooked in the statistics, econometrics, and social science methodology literature in favor of identifying unbiased estimators. Implicitly, this literature assumes that one can improve statistical precision by just increasing sample size. This is not feasible in many social science applications due to practical or ethical considerations.

Focusing on surveys and experimental data, this agenda seeks to shape applied research by focusing on cases where one can seemingly improve statistical precision without sacrificing unbiasedness. As I show in my work, this usually implies unforeseen costs in other dimensions.

For example, in "Balancing Precision and Retention in Experimental Design", published in *Political Analysis*, I discuss how implementing alternatives to the standard experimental design, such as block randomization or repeated measures, may attenuate expected precision gains via explicit or implicit sample loss, a concern that prevents researchers from applying these techniques widely. Through three replications and six reanalyses of previously published experiments in leading political science journals, I show how precision gains from alternative designs can withstand significant degrees of sample loss.

As another example, in a solo-authored publication in the *Journal of Experimental Political Science*, I discuss the unforeseen costs of implementing double list experiments. This is a variant of the list experiment that promises narrower confidence intervals but comes with under-explored questionnaire design complications in the form of carryover design effects, a special kind of question order effect. I introduce statistical tests to diagnose this effect, which in turn facilitate the implementation of a more efficient technique.

One of the core lessons from my research program on statistical precision is that combining different techniques helps overcome their respective limitations. For example, in collaborative work in progress, I combine list experiments with questions from the network scale up method (NSUM), a popular technique in the health sciences, to improve the estimation of sensitive attitudes and behaviors. On the one hand, list experiments suffer from low statistical precision. On the other hand, generalizing to a population of interest through NSUM requires assumptions that are untenable in social science applications. By using NSUM questions as auxiliary information to the list experiment, we improve precision without introducing cumbersome assumptions.

My research also influences interdisciplinary work in comparative politics and political behavior. In a working paper, I follow on my team's efforts to incorporate NSUM into social science applications by documenting the prevalence of criminal governance strategies in Uruguay. This is the basis of a recently awarded *European Research Council Starting Grant* seeking to understand criminal governance in least-expected contexts from a comparative perspective, which will in turn serve as a platform for further methodological innovation in survey research.

As another example, in an article recently published in the *British Journal of Political Science*, I use an information experiment in Argentina to study gendered differential reactions to policy implementation. Previous work suggests that women face higher scrutiny for their performance in office. However, in the context of the implementation of a food distribution program, this paper find that voters are only responsive to performance information among men officeholders and tend to ignore performance information when told that an officeholder is a woman. This stems from voters' perception of men politicians as the default category, and the tendency to believe that women politicians' good performance stems from factors beyond the incumbent's control. This finding calls attention to an unforeseen informational imbalance on survey experimental work in the subject, which future studies should take into account.

My teaching focuses on making statistics accessible to diverse audiences through a combination of flexibility and accountability. At Northwestern, I am the central person teaching methods courses in the department. I teach the first course in the PhD sequence, focusing on Probability and Statistical Inference, the required undergrad-level Introduction to Empirical Methods, and an undergraduate research seminar on how experimentation and computational social science are used in academia, government, and industry to inform decision-making. This year, I am adding a graduate seminar on Machine Learning to my portfolio.

Beyond the classroom, I also engage in service activities congenial with program direction. I lead the Math Camp program for incoming political science and sociology PhD students and routinely meet those writing dissertations with a strong computational social science element. I run the Statistical Computing workshop that brings internal and external speakers to introduce cutting-edge developments in research methods and statistical programming. I collaborate with one (soon becoming two) undergraduate student on methods-related projects as part of the Farrell fellowship mentoring program, and advise senior theses in Political Science and the program in Mathematical Methods for the Social Sciences.

I am prepared to teach courses on computational social science, probability and statistics, statistical inferences, machine learning, statistical programming, and data visualization. You can find copies of current and future syllabi in my website.

I believe my expertise makes me an excellent fit at the University of Rhode Island and I see contributing to a brand new interdisciplinary program in computational social science as the ideal next logical step in my career. If you have any questions, you can contact me via email or phone.

Sincerely,

Gustavo Diaz
Assistant Professor of Instruction
Northwestern University