PLAUSIBLE REASONING AND HEURISTIC METHODOLOGY IN HUMAN GEOGRAPHY: AN INVESTIGATION OF COLORECTAL CANCER INCIDENCE AND INEQUALITIES IN URBAN TEXAS, 1999–2019

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This dissertation builds upon George Pólya's heuristic method of inductive and analogical reasoning to contribute to research methodology and causal reasoning in the fields of human geography and population health. This study is especially concerned with empirical analyses that refer to dynamic social structures, as such topics fall outside the remit of popular statistical methods for 'causal inference'. Plausible reasoning is presented here as a practical methodology that aims to specify the logical relations behind judgments of credibility and to leverage them in heuristic and dialectic fashion to aid in the processes of posing research questions, formulating conjectures, debating the weight of evidence, and clarifying analogies. After Harold Jeffreys, this dissertation presents probable inference as an epistemological complement to 'critical realist' theories of science.

The dissertation develops a theoretical basis for this position (Chapters 1 and 2) and deploys the methodology in two distinct investigations. The first case study (Chapter 3) deploys Pólya's theory of analogy and a Monte Carlo study to connect the concept of 'spatial confounding' from spatial statistical theory to qualitative forms of reasoning that are concerned with causality, explanation, and empirical test. Chapter 3 presents analogy as a practical methodological strategy that can support the process of theorization. Practically,

the chapter introduces two heuristics for spatial reasoning and explains why the same spatial information can have diverging inferential consequences depending on the structure of the argument in which it is embedded. The chapter defends conventional spatial-statistical models from recent criticisms by grounding them in patterns of plausible reasoning.

The second investigation (Chapter 4) combines plausible reasoning with realist theories of causality to investigate a potential causal explanation for a persistent racial disparity in colorectal cancer (CRC) incidence among screening-age adults (50–79) in Texas. This chapter investigates the hypothesis that racial residential segregation is the driving force behind black-white CRC incidence inequality in the metropolitan regions surrounding Houston and Dallas-Fort Worth. A heuristic concept of 'weight of evidence' motivates the design of a study with the potential to impose new empirical constraints on explanations of the disparity and, specifically, to differentiate between two classes of possible component causes—those composite forces that are tied to the geography of racial segregation or ghettoization and those that are not necessarily tied to that geography. Through analyses of georeferenced CRC patient data from the Texas Cancer Registry, transformations of the social geography of the CRC burden are uncovered, revealing that the bulk of the racial disparity is increasingly accounted for by CRC inequalities outside of historically segregated neighborhoods. This pattern emerged in tandem with broadly impacting geographic and class-based CRC inequalities within these dynamic urban regions. The concluding chapter contends that plausible reasoning is a promising and practical methodological complement to critical realism that can support the development of strategies for investigating causal explanations that pertain to dynamic social structures.