

Bayesian set-theoretic analysis unfolds with no distinction between observations about causal mechanisms and other kinds of observations about cases. By this point in the book, then, we've moved to a position quite closely aligned with the second view of within-case analysis I articulated above.

It seems, then, that the book is torn on the same issue that divides qualitative methodologists: should we prioritize evidence of mechanisms as our primary element of within-case analysis, or should the net of evidence we consider be cast more widely? Can we draw conclusions about a cause based on logical regularity alone? Or must the set-based approach that lies at the heart of Mahoney's logic of social science also bring along an emphasis on causal mechanisms? Here, the regularity model of causality is doing a lot of work in holding these two elements of causal appraisal together. In my view, the connection between these two elements is not sufficiently elaborated in Mahoney's book—the book simply states that the regularity model entails both

of these elements, but the causal mechanism component, not being grounded in ontological first principles, feels like it has an ambiguous logical status in the framework of causal appraisal Mahoney proposes.

All this is intended not as a criticism of the book, but as a two-fold invitation. First, I encourage Jim and others to develop further for us the logic of the regularity model and to spell out how both of its components are necessary, and how they can be derived from the underlying ontology from which his logic of social science departs. Second, I invite all of us to make explicit the tension between the two views of within-case analysis that I have articulated here, and to engage with one another on this crucial issue rather than eliding it with the anodyne label of “process tracing” that can mean different things to different people. On this issue, and many others, *The Logic of Social Science* generates much food for thought and great payoffs to substantive engagement. I expect we'll be discussing many aspects of the book for some time to come.

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Qualitative and Multi-Method Research Fall 2021 - Spring 2022, Vol. 19.2 / 20.1 <https://doi.org/10.5281/zenodo.6448199>

Author's Response: The Logic of Social Science and Contemporary Political Science

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I would like to thank the five commentators in this symposium (Jennifer Cyr, Gary Goertz, Alan M. Jacobs, Carsten Q. Schneider, Hillel David Soifer) for their engagement with and thoughtful discussions of *The Logic of Social Science* (LSS). Their comments focus mainly on Part I (Ontology and Epistemology) and Part II (Methodological Tools) of the book, and I will also concentrate on these parts. For interested readers, Part

III (Explanatory Tools) concerns theory building and formulating explanations.

Causal Heterogeneity: Ubiquitous and Inscrutable

LSS develops a positive argument about a new scientific-constructivist approach for social science research; it is mainly concerned with formulating tools

to implement this approach in substantive research. To motivate the approach, however, the book argues in chapter 3 that unrecognized heterogeneity is a serious problem for counterfactual theories of causality in the social sciences (e.g., Rubin 1974; Holland 1986; Woodward 2003; Morgan and Winship 2015). *LSS* asserts that this heterogeneity is ubiquitous and inscrutable. According to *LSS*, unrecognized heterogeneity may well explain why social scientists have found it so difficult to generate stable and sound causal inferences using counterfactual theories of causality (unlike epidemiologists and natural scientists who study approximate natural kinds). *LSS* proposes that the solution is not to try to model this heterogeneity (because it is inscrutable), but to accept it as a basic part of what it means to study social categories.

LSS links causal heterogeneity to a referential mismatch between social categories (e.g., *democratic regimes, development*) and natural kinds (e.g., *sodium salts, ionization*). Causation occurs at the level of natural kinds, but this causation is disconnected from and not captured by our social science categories. Social science categories are mind-dependent entities in the sense that their existence as categories depends on individuals sharing an understanding of their meaning (von Wright 1971; Searle 1995). In this respect, social categories are different from natural kinds, whose existence is not dependent on human beings (or at least far less dependent on human beings) (Churchland 1985; Ellis 2001; Miller 2000). For example, the events that we call revolutions do not exist in the world in the same way that the chemical element copper exists in the world. Copper has certain properties (e.g., its atomic structure) and certain causal powers (e.g., copper is an electrical conductor) independent of human beliefs; copper possesses these properties and powers in an identical form across all human societies regardless of their specific beliefs and values.

The natural substances and properties that compose a social category are not homogeneous across the members of the category. Instead, at the level of their natural kind composition, social science categories are heterogeneous. For example, while all revolutions are constituted in part by hydrogen, oxygen, and other elements, the key defining similarities shared by all revolutions cannot be reduced to natural kinds. Revolutions do not have a one-to-one correspondence (either in the sense of bijection or surjection) with a particular set of defining natural substances and properties in the external world. Instead, certain entities are revolutions because (and insofar as) we share an understanding of the meaning of the category *revolution*. The categories we use to define *revolution* are social categories themselves that depend equally on our minds for their existence. Our definitions of social categories do not refer to or bottom out with

natural kinds. Social categories are mind-dependent all the way down.

LSS briefly discusses the consequences of inscrutable causal heterogeneity for counterfactual theories of causality in terms of a violation of the Stable Unit Treatment Value Assumption (SUTVA) (Rubin 1974). These consequences could also be discussed in terms of massive unrecognized subgroup heterogeneity, which affects both experimental and observational research. In his commentary, Jacobs neither endorses nor disputes the argument that unrecognized heterogeneity is a serious problem for scholars who seek to make valid causal inferences using a counterfactual theory of causality. Instead, his approach is to argue that a regularity theory of causality, which *LSS* advocates, may be equally vulnerable to this problem.

Psychological Essentialism Disguises Category Heterogeneity

LSS argues that social scientists (like all human beings) experience the bias of psychological essentialism. Psychological essentialism is a human disposition in which we believe that the members of a category share underlying essences that endow them with an identity and a predictable nature. The scientific evidence in support of the proposition that human beings engage in psychological essentialism is extensive and convincing (see Gelman 2003; Newman and Knobe 2019). This bias causes us to perceive heterogeneous natural entities as homogeneous social entities. We are psychologically disposed to overlook heterogeneity among the members of a given social category.

Our psychological essentialism is highly functional and probably necessary for the existence of social institutions and human civilization. Because we are usually not aware that social institutions are dependent on our beliefs for their existence, we tacitly accept those institutions as basic facts about the world—we experience them as objective reality (Berger and Luckmann 1966). Psychological essentialism also underpins our capacity to make useful generalizations about social categories and their relationships (see Gelman 2003, 27-43). This orientation provides a basis for inductive inference: all entities of the same kind have similar natures because they share essential properties. Social scientists follow psychological essentialism when they understand regularities in terms of the efficacious properties possessed by social categories.

Yet the commonness and the utility of a psychological orientation do not establish its truth (Dennett 1987). Understanding reality often depends on departing from our commonsense orientations, helpful as they otherwise may be. *LSS* develops a scientific approach that aims to allow researchers to make inferences about social

categories without engaging in psychological essentialism.

Why Category Heterogeneity Does Not Raise the Same Problem for a Regularity Theory of Causality

A regularity theory of causality avoids problems arising from category heterogeneity by assuming that causality is a logical and spatiotemporal relationship among social categories (see Mahoney and Acosta 2021). A regularity theory does not assume that a change on a causal factor will produce (probabilistically) any net change on the outcome—it rejects the basic starting point of a counterfactual theory of causality. A regularity theory also rejects the idea that causal factors are efficacious entities in possession of inherent causal powers. A regularity theory leaves the question of why a regularity exists “unexplained”; the theory does not require an account of why the regularity exists in order for the relationship to qualify as a causal relationship (Beebe 2006).

Nevertheless, a regularity theory sets up demanding criteria for a relationship to qualify as a causal relationship. It proposes that causality exists between social category X and social category Y if three conditions obtain: (1) temporal succession (X precedes Y in time), (2) spatiotemporal contiguity (X makes direct or indirect contact with Y in space and time), and (3) logical regularity (X is part of the fully minimized solution set that is constantly conjoined with Y).

The second component of this definition differentiates a regularity theory from counterfactual dependence theories that do not require as a matter of definition that cause and outcome be connected in space and time. Regularity theorists meet this requirement by focusing on the causal chain that connects a cause to an outcome (e.g., Glennan 2009; Hedström and Swedberg 1998; Mayntz 2004). With a regularity theory, each link in the causal chain is itself a regularity among categories; causation among temporally separated categories is a series of regularities that unfold over time. Thus, as Soifer correctly notes, the idea of a regularity is prior to the idea of a mechanism in this theory. However, a regularity theory insists on the identification of mechanisms—defined as intervening regularities—to demonstrate causality.

With the third component, the analyst identifies a fully minimized solution set consisting of all conditions and/or combinations of conditions that are *sufficient* for the outcome. A solution set is *fully minimized* if all redundancies are removed from both necessary conditions and sufficient conditions. This solution set is sometimes referred to as consisting of “minimally necessary disjunctions of

minimally sufficient conditions” (Baumgartner 2008, 23). Every individual condition makes a difference to at least one aspect of the explanation of the outcome. Thus, every individual condition in the solution set is a *cause* of the outcome (assuming the other two criteria are in place). The need for solution sets that do not contain any redundant conditions connects a regularity theory to QCA and other methodologies that use logical minimization techniques to remove non-essential conditions and arrive at parsimonious solution sets (see Baumgartner 2008, 2013; Graßhoff and May 2001; Ragin 2008; Schneider 2018; Schneider and Wagemann 2012; Oana, Thomann, and Schneider 2021). In principle, these parsimonious solution sets weed out all spurious factors that do not play a role in the explanation of the outcome.¹

This approach to causality might seem to be an inferior option when compared to sophisticated counterfactual theories of causality. Yet these sophisticated theories are always premised on the idea that variable values are homogeneous across cases. They always assume that a given unit change on a variable represents the same basic occurrence across cases. If we reject these assumptions for social categories, as I fear we must, we need to seriously reconsider the utility of counterfactual theories of causality for the analysis of social categories. As currently formulated, counterfactual theories of causality are appropriate for the study of natural kinds but not for most of the phenomena studied by social scientists.

A regularity theory of causality is appropriate for the analysis of social categories that refer to heterogeneous natural entities. For instance, consider the following Boolean solution set: $AB \vee CD \rightarrow Y$, where \vee is the Logical OR and \rightarrow is sufficiency. Let us assume that condition A is heterogeneous in the following way: $X \vee Z \rightarrow A$. The fact that condition A is heterogeneous in this way does invalidate or even raise any special concerns about the validity of the original solution. Certainly, we can rewrite the original equation to highlight the heterogeneity (i.e., $[(X \vee Z) \& B] \vee CD \rightarrow Y$), but it is not necessary to do so to preserve validity. With a regularity theory of causality, findings are stable as one moves from the full population to subsets of cases. The original finding $AB \vee CD \rightarrow Y$ remains stable and applicable regardless of whether one looks at only cases with X , only cases with Z , or any other subset of cases. With a regularity theory, the researcher does not need to model or even know about subgroup heterogeneity when specifying a causal model.

The upshot is that a regularity theory of causality has significant advantages over a counterfactual theory in a context of massive *unrecognized* (and indeed *unrecognizable*)

1 The ability of QCA and other large-N set-theoretic approaches to identify non-spurious regularities in the face of data with limited diversity is the topic of debate both within the set-theoretic community and between set-theoretic researchers and their critics (see Thomann and Maggetti 2020 for a literature review).

heterogeneity. Whereas this underlying heterogeneity does not affect the validity of findings using a regularity theory of causality, it is potentially devastating for the validity of findings using a counterfactual theory of causality. *LSS* provocatively suggests that these problems of heterogeneity explain why talented social scientists who use a counterfactual theory of causality with social categories (as opposed to categories corresponding to natural kinds) encounter great difficulty generating stable and consistent results that are widely accepted as true.

Note that the differing tolerance of a regularity theory vs. a counterfactual theory for unrecognized heterogeneity derives from their alternative conceptions of causality: a regularity theory sees causality as a logical and spatiotemporal pattern that exists between categories; a counterfactual theory sees causality as the “difference-making” effects of variables net of everything else. To be sure, a regularity theory of causality faces many very serious challenges to generating valid inferences in practice. As Schneider notes, the use of this theory of causality does not ensure that the analyst has correctly identified all important causal factors.² The argument of *LSS* is that a regularity theory of causality is appropriate as an *understanding and definition* of causality for research in the social sciences. It suggests that the same is not true of a counterfactual theory of causality.

Within-Case Analysis

Goertz is correct that most of the methodological tools developed in Part 2 in *LSS* focus on the within-case analysis of individual cases. I certainly hope that this fact does not kill my beloved comparative-historical analysis! After all, comparative-historical researchers depend primarily on within-case analysis for their causal arguments. As Goertz and I wrote in our *Two Cultures* book:

In small-N qualitative research, the main leverage for causal inference derives from within-case analysis, with cross-case methodologies sometimes playing a supporting role.

In large-N statistical research, the main leverage for causal inference derives from cross-case analysis, with within-case methodologies sometimes playing a supporting role. (2012, 88)

If *LSS* had focused on large-N analysis, it would have had to say much more about QCA and other cross-case methods. But the book explicitly focuses on case study and small-N methods. *LSS* combines “possible worlds” semantics, counterfactual analysis, and set-theoretic

analysis as tools for analyzing regularities when only one case is under study. The book shows how assertions about causation necessarily invoke possible or counterfactual cases. By explicitly weighting these possible cases, the book shows how one can use a regularity theory of causality even when only a single actual case is under study.

The interesting approach described by Goertz in his commentary is a medium to large-N set-theoretic method that uses a regularity theory of causality. It resembles the method of analytic induction, as described by Charles Ragin in a new draft book manuscript. I note that while Goertz separates a regularity theory from a focus on mechanisms, this separation is not technically correct: Hume was clear that the analysis of causal links is an essential part of a regularity theory of causality (see Mahoney and Acosta 2021). Schneider points out that many scholars have lost sight of the importance of spatiotemporal connection as a defining component of a regularity theory of causality. I place some of the blame for this misunderstanding on Hempel’s (1942) covering law model of explanation, which does not require any spatiotemporal connection between cause and outcome. The conflation of a regularity theory of causality with the covering law model of explanation is unfortunate.

In his commentary, Soifer raises important questions about the relationship between the specification of causal chains and the use of specific observations for evaluating propositions. He points out that methodologists who work on process tracing are pulling in two separate directions: (1) the study of causal chains, intermediary mechanisms, and causal flow processes; and (2) the identification of specific observations that carry substantial weight in the assessment of explanations—regardless of whether these observations are intermediary mechanisms. Soifer is correct that earlier discussions of process tracing often focused on (1) (e.g., George and Bennett 2005), whereas more recent discussions of process-tracing tests often emphasize (2) (e.g., Fairfield and Charman 2017). Soifer inquires about the relationship between these two directions, asking whether they are competing, separate, complementary, or even essential for each other.

To answer Soifer, I believe that the two kinds of process tracing are complementary and must be joined together to adequately assess causal arguments (see also Beach and Pedersen 2013). When using a regularity theory of causality, it is essential to pursue the study of causal chains and intermediary mechanisms. A good causal argument links causal factors to an outcome across time and space. One of the reasons why I find comparative-historical analysis so compelling is its orientation toward

2 Going forward, machine learning and computation techniques could be used with QCA to select potential causal factors. The two methodologies nicely complement one another: computational methods help identify potential causal factors, and QCA methods remove redundancies to arrive at parsimonious solution sets (thanks to Qin Huang of Northwestern University for this insight).

sequential arguments that connect historical causes to more contemporary outcomes. At the same time, I believe that scholars must support their arguments about causal chains through the use of specific observations that have probative value in adjudicating among rival explanations. To evaluate the proposition that *X* causes *Y*, one normally asks questions about the intermediary events that should be observed (or should not be observed) if this proposition is true. In identifying these intermediary events, one simultaneously creates a causal chain argument and locates a critical observation for evaluating the truth of the proposition (see chapter 4 of *LSS*).

Set-Theoretic Analysis as a Constructivist Approach

LSS argues that a constructivist approach to social categories is essential for the social sciences. The book specifically recommends treating categories as sets in which other categories (also sets) can have membership, no membership, or partial membership.³ The book contends that these sets are ultimately located in human minds as conceptual spaces (cf. Gärdenfors 2000; 2014). This approach creates an ontology in which social categories are inherently mind-dependent entities. While categories make reference to objective natural kinds in the world, those natural kinds are heterogeneous in their composition for any given social category. The one thing that all members of a social category have in common is their shared activation of conceptual spaces corresponding to the category within human minds.

Constructivist set-theoretic analysts do not arbitrarily categorize entities in the social world. Rather, these scholars establish boundaries and membership values on the basis of the *meanings* of social categories within one or more communities or societies. Constructivist set-theoretic analysts use a broadly *interpretive approach* to elucidate the meaning of categories within particular communities. Interpretation is needed for calibrating categories and for coding whether specific cases are members, non-members, or partial members of categories. The quest to understand the meaning of social categories in specific contexts often requires expert knowledge of the relevant

communities and societies. The interpretive aspects of constructivist set-theoretic analysis link this approach to qualitative data collection techniques such as ethnography and interviews.

Yet the ultimate goal of constructivist set-theoretic analysis is not primarily interpretive; researchers do not stop with an analysis of meaning structures and semiotics. Instead, constructivist set-theoretic researchers ultimately seek to make generalizations about regularities that objectively exist among social categories within particular communities. Some generalizations concern combinations of conditions that are nearly sufficient for an outcome. Other generalizations concern categories that are important INUS conditions for an outcome, such as conditions that are frequently necessary and somewhat sufficient for an outcome. Constructivist set-theoretic analysts not only seek to discover regularities; they also use knowledge of regularities to explain occurrences in specific cases. For example, they may draw on the preexisting knowledge that membership in social category *X* is nearly necessary for membership in social category *Y* in order to explain why outcome *Y* occurred in an individual case.

Schneider asks where constructivism ends and formal logic takes over in constructivist set-theoretic analysis. The answer is that constructivism ends with the constitution and coding of categories and the creation of scope boundaries. At this point, the logical machinery of set-theoretic analysis is used for the objective assessment of propositions and the discovery of regularities among categories. As the book makes clear, I treat first-order logic as an objective feature of reality that is essential for valid inference and reasoning. I explicitly reject radical constructivist views that see logic itself as a social construction. I believe constructivist set-theoretic analysts need to pay attention to robustness tests, the properties of algorithms, and other technical aspects involved in the scientific assessment of relationships among social categories. Schneider is right that students tend to struggle with formal logic, and I believe that logic (ideally with set theory) should be a basic component of graduate training in political science.

3 Schneider argues that the label *continuous-set analysis* is problematic because it does not privilege the membership value of 0.5, which is the point of maximum ambiguity (the same could be said of the label *fuzzy-set analysis*). Schneider is correct that I believe the values of 0 and 1 are the qualitative anchors (see Wolff 2020 on the qualitative-quantitative distinction). And I am sensitive to the fact that a 0.5 threshold is essential for important QCA procedures; I agree that 0.5 is an *extremely useful* threshold for the purposes of substantive analysis. However, I think the label *fuzzy* is a disaster for set-theoretic analysis: the label is deeply misleading about category boundaries, which are sharp and bright and not at all blurry or hazy. There is nothing fuzzy about continuous-set measurement. I considered the label *permeable-set analysis*, but ultimately went with the more attractive *continuous-set analysis*. I hope some others will do the same. I originally encountered the label “continuous-set analysis” when reading McNeil and Freiburger (1993, 30).

Let me use this footnote to make one more point regarding Schneider’s excellent comments: I disagree that a case with 0.3 membership in *tall person* should be classified as a tall person. That person is slightly tall or a little tall, such as a woman of 5 feet and 7 inches in the United States. Note that this person will have no membership in the category *short person*. The person has 100% membership in *slightly tall person* and 0% membership in *short person*.

The kind of constructivism endorsed in *LSS* differs from the constructivism endorsed by Alexander Wendt in his seminal *Social Theory of International Politics* (1999). Whereas Wendt adopts a critical realist position in which social categories are in part self-organizing entities (72–77), I embrace an experiential realist position in which social categories are not self-organizing entities.⁴ A social category certainly refers to “physical” entities in the world (i.e., natural kinds), but these entities are heterogeneous in their composition; they require human minds to make them members of a given social category (von Wright 1971; Searle 1995; Reed 2008). Unlike Wendt, then, I argue that social categories are dependent on human minds for their existence *as particular categories* at all levels of analysis. Without human beliefs, we are left with natural kinds that do not group together in ways that overlap with our social categories. In this sense, I offer a stronger version of constructivist ontology than does Wendt in his magnificent *Social Theory of International Politics*.

The Science in Social Science

Science is an epistemology that consists of general and public procedures rooted in logic for using evidence to derive beliefs about the truth of propositions concerning the actual world. Constructivism is an ontology in which a social category is understood to be a mind-dependent entity; a social category refers to natural entities in the world, but those natural entities require human minds to become categories. *LSS* calls for an approach to social science that is both scientific and constructivist—that is, *scientific constructivism*.

Scientific constructivism is not common because many constructivists are skeptical about science (as conventionally defined), whereas many scientifically inclined social scientists are skeptical about constructivism. The mistake of many constructivists is to reject logic as subjective and optional; this mistake leads them to at times fall off the epistemological ledge into relativism about truth and reality. By contrast, the mistake of scientifically inclined social scientists is to believe that essentialism is appropriate for the study of social reality; this mistake leads them to reify social categories and to work under false assumptions.

LSS proposes set-theoretic analysis as a scientific-constructivist approach. With this approach, categories are sets, and sets are located in the mind, existing ontologically prior to the entities they classify. The boundaries of a set determine whether entities are members of the set; the properties of the entities do not determine the boundaries of the set. Membership boundaries can shift without any changes at all in the properties of the entities. Entities are

similar or different *because of* their set membership. *LSS* shows how this approach to sets offers a constructivist alternative that avoids essentialism, recognizes the mind-dependent nature of categories, and lends itself quite naturally to scientific research (see chapter 2 of *LSS*).

The fact that social categories are dependent on subjective beliefs does not mean that social scientists cannot arrive at objective truths about propositions concerning those social categories (to respond to Cyr’s concerns). To be sure, propositions using social categories are bound by scope conditions in which the categories carry a specific meaning. However, this dependence on semantic context does not make the truth of propositions relative to particular places and times. Instead, it makes the existence of the propositions themselves relative to particular places and times. Outside of certain context, a given proposition carries a different meaning, and thus it is not the same proposition.

Social scientists can never be *certain* about the truth of a proposition. However, this uncertainty is not an artifact of a relativism distinctive to the study of mind-dependent categories. Rather, uncertainty is inherent to scientific findings in general (Popper 1934/1968). Science can only deliver approximate truth or highly likely truth, not absolute truth. Well-formulated propositions are either 100% true or 100% false, but our *certainty* about whether they are true or false is never 100%.

Scientific Constructivism, Now and in the Future

Cyr asks about the reception of scientific constructivism within political science. Who will embrace the overall approach of the book? Who will follow *LSS* by explicitly using constructivist set-theoretic analysis? These questions are appropriate given a context in which: (1) a counterfactual theory of causality is almost universally embraced in quantitative political science; (2) set-theoretic analysis is at best viewed with suspicion and at worst dismissed in quantitative political science; and (3) constructivists are on the margins of quantitative political science. *LSS* argues that all three of these trends are unfortunate, but that does not make them any less serious as obstacles.

In the short run, set-theoretic researchers who already see themselves as employing interpretive analysis are good candidates for the explicit use of scientific constructivism. Likewise, constructivist researchers in IR with scientific leanings are good candidates; in fact, many of these scholars may already see themselves as scientific constructivists though not under that label. Likewise, many qualitative researchers are already employing set-

4 Like Wendt (1999), I adopt a scientific realist position regarding *natural kind categories*. We both believe that a structured reality exists independent of all human observers, and we believe that natural science is successful because it at least partially models this reality.

theoretic tools in an implicit way (Goertz and Mahoney 2012); these scholars can use specific methodological and theoretical tools of *LSS* even if they do not identify with scientific constructivism. With respect to quantitative and experimental political scientists, I hope that the arguments about essentialism, heterogeneity, and set-theoretic analysis might merit some consideration and discussion. Quantitative scholars have much to give to the field of large-N set-theoretic analysis with respect to designing new tools and helping solve problems. These positive interventions would also allow qualitative researchers to feel more comfortable using set-theoretic analysis explicitly in their work. On the flip side, I think the ideas that animate set-theoretic analysis could be productively incorporated into a new potential outcomes framework that is connected to a regularity theory of causality rather than a counterfactual theory of causality (as Jacobs' comments hint at). This framework would require the efforts of our most talented quantitative methodologists.⁵

Cyr and I disagree on one point: the difficulty of pursuing scientific-constructivist work. I think she overstates this difficulty for many qualitative researchers. The main requirement of this kind of work is the treatment of social categories as continuous sets that exist in the mind and that are used to classify heterogeneous

entities in the natural world. This approach is not totally different from what qualitative political scientists in the field of comparative-historical analysis are already doing (including Cyr herself!). If one accepts the argument that qualitative researchers are often "closet" set-theoretic analysts (at least some of the time), then it is not operationally difficult for these researchers to explicitly treat their categories as mental sets (at least some of the time). I do not think the move to an explicit scientific-constructivist approach involves a revolutionary new way of thinking about social reality for these particular scholars. And the advantages of explicitly conducting scientific-constructivist research are considerable: more valid and transparent conclusions by virtue of practicing better science through the self-conscious application of general rules and procedures.

The legacy of *LSS* will depend on how scholars react to its central arguments (or do not react), and how they choose to use (or not) its methodological and theoretical tools. If the book were to contribute to some larger reorientation toward scientific constructivism in political science, it would do so because it codifies principles and methods that some scholars in the discipline already embrace and use.

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⁵ I see the potential outcomes framework as separate from a counterfactual or interventionist understanding of causality. I think much can be gained by finding synergies between possible world semantics as used in set-theoretic analysis and the potential outcomes framework as used in quantitative political science.

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