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Abstract

This article considers the role of generalization in comparative case studies, using as exemplars the contributions to this special issue on climate change politics. As a research practice, generalization is a logical argument for extending one's claims beyond the data, positing a connection between events that were studied and those that were not. No methodological tradition is exempt from the requirement to demonstrate a compelling logic of generalization. The article presents a taxonomy of the logics of generalization underlying diverse research methodologies, which often go unstated and unexamined. I introduce the concept of resonance groups, which provide a causeway for cross-system generalization from single case studies. Overall the results suggest that in the comparative study of complex political systems, case study research is, *ceteris paribus*, on par with large-N research with respect to generalizability.

Comparative politics is the systematic study and comparison of domestic politics in different countries around the globe. Although one often hears of "the comparative method," there is no standard methodology for achieving this ambitious goal, in the sense of a uniformly applicable set of techniques.¹ Comparative studies do, however, share a common methodological challenge: How can we make meaningful comparisons across complex systems? Given the bewildering heterogeneity within and across countries, provinces, cities, and regions, how can researchers produce the sort of generalizable knowledge that is indispensable for a cumulative research program and for the transfer of practical lessons across borders?

When political scientists discuss the challenge of generalization, it is usually in reference to case study methods. Celebrated for their empirical richness, case studies are nonetheless criticized for a perceived inability to generate theoretical insights beyond the case in question. Goertz and Mahoney observe that "large-N researchers can assert that their findings are general even if it is unknown whether they can extend to cases beyond the sampled population. By contrast, researchers who study one or a few cases are much more vulnerable to the charge that their findings are not generalizable."² Indeed, case study

1. The term "the comparative method" was emphasized by Arendt Lijphart (1971), who focused on controlled-comparison methodologies in the tradition of John Stuart Mill.

2. Goertz and Mahoney 2009, 307.

methods are often derided as a sort of pre-quantitative exercise – suitable at best for generating suggestive hypotheses whose real test requires large-N quantitative approaches. Given the close connection between generalization and theory, and the centrality of theory to all social science inquiry, this is a serious charge – relegating case study methods, and qualitative research generally, to a lower status in academia and in the many applied professions that use social science to inform decision-making.

In this article I take up the question of generalization in comparative politics, using as exemplars the contributions to this special issue on climate change politics. First, I revisit the idea of generalizability as traditionally understood within the social sciences. Rescuing this concept from a narrowly statistical interpretation, and considering its broader role in scientific and historical inquiry, permits a more rigorous concept of generalizability that applies to both quantitative and qualitative research. As a research practice, *generalization is a logical argument for extending one's claims beyond the data*, positing a connection between events that were studied and those that were not. No methodological tradition should be considered exempt from the requirement to demonstrate a compelling logic of generalization. This is true of a cross-national statistical study that uses a few simple measures to make larger claims about the attributes of entire political systems, and is equally true of case study research in which investigators deploy logical arguments to generalize their findings across systems. I present a taxonomy of the logics of generalization underlying various research methodologies, from controlled experiments to historical narrative, which often go unstated and unexamined. For case study research in particular, I propose the concept of resonance groups to describe phenomena found in multiple political systems that, when illuminated by new research attentive to group characteristics, provide a causeway for cross-system generalization from single case studies.

Generalization and Complex Systems

Researchers use the term “generalization” to mean many things. For some, it denotes how widely a descriptive or causal proposition has been observed. By this definition, an explanation is only as generalizable as has been empirically confirmed. This definition does not adequately capture the challenge of generalization, because even when a phenomenon has been observed repeatedly and in many contexts (whether through statistics, case studies, or mixed methods), documented “sightings” are small in number relative to the frequency and scope of occurrence posited by a theory. As ecologists Dan Doak and Scott Mills point out, theory aspires to generalization beyond the data.³ I believe that a theoretically useful notion of generalization should therefore focus our attention on the practical challenge of moving from the facts at hand to broader claims about policy and politics.

3. Doak and Mills 1994.

The great promise of comparative political inquiry is that it is theoretically oriented yet attentive to the political and historical contexts of particular places⁴ – what Forsyth and Levidow call “comparison *and* diversity.”⁵ Translating this into methodological terms, comparative research requires generalization under conditions of high complexity. The emphasis on cross-system comparison is what distinguishes comparative politics from idiographic research traditions, including much of the work in ethnography and applied policy analysis, which often place less emphasis on generalizations that traverse borders. A second dimension of the comparative methodological challenge is that the objects of comparison – whether bureaucratic politics, policy change, local social capital, NGO influence, federalism, or state–business relations – are embedded in complex systems, and therefore their causes and consequences can be quite distinct from one place to the next. Often referred to as national or local context,⁶ the complexity of these systems derives from combinations of human creativity (individuals and groups pushing a society in novel directions),⁷ social connectivity (a group’s efforts reverberating throughout the system),⁸ multiple causation (social outcomes resulting from multiple necessary or sufficient conditions),⁹ and historical and institutional path dependence,¹⁰ among other factors.

To appreciate the consequences of this complexity, consider that international climate policy would probably look quite different today if election officials in Palm Beach County, Florida, had not decided to use the butterfly ballot design in the US presidential election of 2000, which confused voters and was sufficient to swing that historically close election to George W. Bush (who opposed action on climate change) over Al Gore.¹¹ The geopolitical consequences of this “butterfly effect” (to play on the well-known example from chaos theory) demonstrate that generalizing about complex systems is no easy feat.

This is not a challenge common to all research on the global environment. Atmospheric chemists have established that the global warming potential of methane is twenty-one times that of carbon dioxide—a result that holds true whether the gas is emitted in Kenya or China. Even when there is high spatial heterogeneity, as is true of species and ecosystems, natural scientists can count on the generalizability of many of their results across time. When a botanist discovers the mechanism of reproduction for China’s dawn redwood tree, or of the giant thistle endemic to Mount Kenya, that knowledge will be relevant for many

4. Lichbach and Zuckerman 2009.

5. Forsyth and Levidow, this issue, p. 144.

6. See Goodin and Tilly 2006; Pepinsky 2014.

7. Creativity in the sense used here denotes everything from Mao’s “war against nature” (Shapiro 2001), to DuPont’s invention and promotion of alternatives to ozone-depleting chemicals, to the entrepreneurial activities of the founders of the European Union.

8. Jervis 1997.

9. Equifinality denotes a condition of multiple sufficient causes—when the same outcome arises from different causal pathways in different situations (George and Bennett 2005). Multiple necessary causes are described as indiscriminate pluralism (Steinberg 2007).

10. Pierson 2000.

11. The causal impact of the butterfly ballot design was established in Brady et al. 2001.

thousands of years.¹² Contrast this with a question exploring how policymakers in China and Kenya make decisions regarding forestry; quite apart from spatial differentiation, pursuing the question in 1960 versus 2000 would produce starkly different answers. The fact that our results could be irrelevant in the near future arguably increases the pressure to ensure that they generalize across space now.

The challenge of making generalizations about complex systems may help explain why much of the recent renaissance in qualitative and mixed research methods has issued from the field of comparative politics. This literature has upended the inherited wisdom regarding the practice of qualitative research, placing it on a sounder conceptual and methodological foundation. King, Keohane, and Verba's book *Designing Social Inquiry* inspired this outpouring of research through an appealing but ultimately flawed argument that all qualitative research must conform to the logic of statistical inference.¹³ Using regression analysis as a metaphor for best practices in social science, these authors (and others before them) offer dictums that make perfect sense in large-N covariance studies, yet bear no relation to historical process tracing or other forms of within-case causal assessment. Thus we are told that when choosing cases, researchers must never select on the outcome variable; that one cannot return to a case to test a hypothesis generated by the case; and that causal inference is impossible without variance in outcomes across cases. The new qualitative methods literature has thoroughly discredited these claims, describing how case study methods, and within-case process tracing in particular, rely on inductive procedures that are different in kind from those of covariance analysis and must be guided by different criteria for analytic rigor.¹⁴ Still, many of these myths persist. As Bent Flyvbjerg remarks, "If you read such criticism of a certain methodology enough times, or if you hear your thesis advisers repeat it, you begin to believe it may be true."¹⁵

No aspect of case studies has received more criticism than their purported inability to generalize. Even researchers who champion case study methods are quick to assert that generalization is their principle vulnerability. In a recent volume on process tracing, Frank Shimmelfennig writes, "Whereas process tracing maximizes the internal validity of causal inferences, it does not generate any external validity per se."¹⁶ Researchers such as George and Bennett, building on earlier work by Eckstein,¹⁷ have questioned this assumption, elucidating the many ways in which case studies contribute to theory development; when

12. Researchers in the field of ecology routinely grapple with elements of complexity including interaction effects, stochastic population dynamics, and even changing boundary conditions in a warming climate. But the challenge is not of the same order of magnitude as that involved in comparative political inquiry.

13. King et al. 1994.

14. Mahoney 2010; Brady and Collier 2010; McKeown 2010; George and Bennett 2005; Hall 2003.

15. Flyvbjerg 2006, 220.

16. Shimmelfennig 2014, 103–104.

17. Eckstein 1975.

conducted properly, case studies have theoretical implications that go well beyond the particular places and events under investigation.¹⁸ But we still lack a framework that can place diverse methodological approaches side by side to understand in a more systematic way how they accomplish generalization and how case study methods fit into this larger picture. To address this gap, in the remainder of the paper I will describe some of the most commonly used logics of generalization across the sciences, and consider those deployed by five articles in this issue dealing with the comparative politics of climate change.¹⁹ The results suggest that even the most ardent defenders of case study methods are too timid in their conclusions. I will argue that in the comparative study of complex political systems, case study research is, *ceteris paribus*, on par with large-N research with respect to generalizability.

Logics of Generalization

Generalization is a type of inference that leverages information and insights from the social facts that researchers measure – through statistics, interviews, participant observation, archival research, and the like – to help explain broader collections of social phenomena that they do not measure. This larger aspiration is often described as the scope or domain of a study, aptly summarized by George and Bennett: “To what range of institutional settings, cultural contexts, time periods, geographic settings, and situational contexts do the findings apply?”²⁰ To draw a plausible connection between the two – the immediate object of study and the broader phenomena of interest – all approaches to generalization are founded on particular logical arguments.

To appreciate the diverse logics of generalization, let us return for a moment to the natural sciences, which provide a backdrop against which we can more clearly discern the distinctive challenges of generalization in comparative politics. In January 2015, the journal *Nature* reported that researchers had discovered an ancient human skull in a cave in Israel that links early humans from Eastern Africa to those of the Mediterranean region.²¹ This single observation was greeted by experts around the globe as strong evidence that humans and Neanderthals lived in the Near East at the same time. How is such a generalization possible from a single piece of evidence? Why was this result not shrugged off with the same criticism often directed at case study results – that “it’s just one skull”?

The answer is that archaeologists have a stock of knowledge, based on the insights of many studies that came before, about the variability of skull morphology within biological species and human populations. On this basis, they

18. George and Bennett 2005. See also Levy and Goertz 2007; Rueschemeyer 2003.

19. I devote less attention to the Forsyth and Levidow article only because these authors do not feature a specific set of empirical findings.

20. George and Bennett 2005, 199.

21. Hershkovitz et al. 2015.

can reasonably infer that this one skull exemplifies the characteristics of an entire human population. This logic of generalization is founded on an understanding of the relationship (including the degree of similarity, or unit homogeneity) between that which is measured and the larger class of phenomena to which it belongs. Importantly, these scientists are not relying on statistical logic; statistical inference is but one example of a much broader set of logics at our disposal for producing generalizable knowledge.²² The field of experimental physics, for example, makes little use of statistical analysis. In biology, researchers generalize findings from one species to others by recourse to the logic of shared evolutionary lineage. For example, the mechanism of circadian rhythms (the internal clock) was first studied in fruit flies but was subsequently generalized to mammal species.²³

Every logic of generalization must answer the following question: Why should we believe that these findings enhance our understanding of phenomena that the investigators did not study directly?²⁴ In the social sciences, it is often said that the results of a case study provide at best an interesting hypothesis with regard to results elsewhere, whereas a large-N study is capable of testing such hypotheses in a systematic way. I believe this is a false distinction. One of the casualties of using statistics as a metaphor for all social inquiry is the misleading vocabulary used to describe a case study, which is characterized as a single observation. An observation, or data point, is dimensionless; the only way to expand the empirical range of the explanation, according to this mental construct, is to increase the number of cases.

However, any given case study contains within it numerous events, actors, historical processes, and causal mechanisms.²⁵ In their “case” of state–business relations in the renewable energy sector in Brazil and China, for example, Hochstetler and Kostka (this issue) describe numerous events taking place in multiple time periods and decision-making arenas. Here is but one of many events supporting their conclusion that state–business relations assume a corporatist form in China: “Xinyu officials also introduced LDK Solar’s business to the managers of the local branches of various state-owned banks.”²⁶ Each of these events, in turn, is comprised of countless conversations, decisions, organizational contexts, incentive structures, framing arguments, and other social facts. It is the

22. For additional examples of non-statistical generalization, see the excellent discussion in Gobo 2008.

23. Bechtel 2009.

24. I avoid using the term “directly observed” because researchers rarely witness the events they describe, instead relying on news reports, interviews, count data, and various types of descriptive inference. Descriptive inference and measurement validity are separate considerations from the logic of generalization as defined here.

25. King et al. (1994) point out that investigators can increase the number of observations within a qualitative case study, but do not acknowledge that historical process tracing methods already draw causal inferences on the basis of numerous such observations. Instead these authors argue, in effect, that process tracing must be transformed into covariance analysis in order to draw valid conclusions.

26. Hochstetler and Kostka, this issue, p. 87.

nested nature of social reality – complex interactions of components belied by the simple terminology of “events” and “cases” – that give rise to the distinctive advantages of historical process tracing relative to covariance analysis. A historical narrative is like a mile-long accordion, with the investigator selectively expanding or contracting segments in order to examine and showcase the component causal relationships that led to a given outcome.

When we understand a case to be not merely a single observation, but something with dimension – containing far more information than any researcher can reasonably investigate – it follows that the comparative study of complex political systems entails two types of generalization: within-system generalization and cross-system generalization. Cross-system generalization asks questions like, do the results from China apply to Brazil? Within-system generalization asks, do these findings accurately reflect what is taking place in China?

Case studies are deep and narrow, while large-N approaches are broad and shallow. The subject matter of comparative politics, however, is both broad and deep. It is tempting to believe that large-N studies are inherently more generalizable because, after all, they at least sample something empirically in many systems. But in the context of complex systems, *the results of a large-N study that is broad and shallow provide merely a hypothesis with regard to what is actually taking place in any one of these political systems.* Large-N and case study methods are on equal footing with regard to generalizations about complex systems.

An example can be found in research on the Environmental Kuznets Curve, described by Harrison (this issue). This empirical pattern, based on measurements of aggregate pollution and national wealth, suggests that for some pollutants there is an inverted U-shaped curve, in which countries at an intermediate level of economic development are the most polluted while the poorest and wealthiest nations have comparatively low levels of pollution. From this observation, researchers have inferred a causal model of domestic politics in which a society tolerates pollution during the early stages of industrialization as a necessary sacrifice for the sake of economic growth.²⁷ We do not really know if the Environmental Kuznets Curve generalizes as an explanation for environmental outcomes because its posited causal model has not actually been tested in those systems; it is a hypothesis that requires more research to confirm or refute.²⁸ Both qualitative and quantitative approaches observe a small portion of empirical reality relative to the expansive ambitions of comparative politics, and infer others.²⁹

The ubiquity of this challenge for both quantitative and qualitative methodologies is obscured by the distinction commonly made between internal and

27. See Arrow et al. 1995, 92.

28. Stern 2004.

29. It is the explanatory power of a broad and shallow measure relative to the complexity of political systems that gives rise to its hypothetical nature. In contrast, the global warming potential of methane is not a shallow measure; it adequately characterizes the (non-complex) characteristics of methane with respect to its ability to trap heat.

external validity. In experimental settings, where conditions are carefully controlled and intervening variables are few, it seems reasonable to draw a sharp distinction between challenges of validity internal to the test and those involved in extrapolating test results to the wider world. When studying complex systems, characterized by streams of historical events displaying both contingency and recurrent patterns across cases, researchers must make logical inferences of many and varied sorts when attempting to draw a plausible connection between the empirical focus of a given study and the broader goal of social science explanation.³⁰ In the next section I describe a number of these logics as they are used in research practice.

A Taxonomy of Generalization

How do different families of research methods approach the shared challenge of generalization across and within complex political systems? Table 1 summarizes the research questions explored by the five empirical articles in this special issue of *Global Environmental Politics*, along with a sample of the logics they deploy when generalizing their findings. These particular studies do not rely heavily on large-N statistical techniques as the basis for generalizations, and so I also discuss, by way of comparison, Ronald Inglehart's work on postmaterial values, which draws primarily on cross-national public opinion surveys, as well as research on the Environmental Kuznets Curve.³¹ Table 2 situates these studies in a broader schema of the logics of generalization used in comparative political inquiry.

From Sample to Population

The best-known logic of generalization is sampling theory, which underlies conventional (non-Bayesian) statistical analysis. Among the many advantages of sampling theory, it is an explicit logic that can be applied in a wide range of settings, and provides a transparent standard of rigor for those who use it. In particular, sampling theory tells us just how confident we should be about making the move from an observed sample to an unobserved population. This is the familiar terrain of standard error estimates and the Central Limit Theorem. In the earlier (non-statistical) example of the ancient human skull, archaeologists generalized from one new discovery based on a broader understanding of the subject matter that preceded the discovery – namely, skull morphology does not vary widely within a species. In contrast, a researcher who is a novice with respect to the subject matter of a statistical study can nonetheless produce a reliable estimate of the degree to which a sample reflects the characteristics of a defined population. This is possible because of the logic of generalizability

30. The limitations of the distinction between internal and external validity are acknowledged by Campbell and Stanley, who first proposed these concepts. See Campbell 1986.

31. Inglehart 1995.

Table 1
Case Studies

<i>Authors</i>	<i>Question</i>	<i>Political Systems Studied</i>	<i>System Resonance*</i>	<i>Resonance Groups*</i>
Barrett	Does political decentralization increase vulnerable groups' access to climate adaptation funding?	Kenya	African countries share high vulnerability to climate change impacts	Politics of decentralization; adaptation finance; political participation; sub-national resource distribution
Harrison	How do fossil fuel endowments shape domestic political support for climate policies?	Norway, British Columbia	All countries export, import, and/or consume fossil fuels	Political economy of domestic climate policymaking; interest-based decision-making
Houle, Lachapelle and Purdon	What explains sub-national political entities' posture toward cap-and-trade climate policies?	California, Quebec, New Mexico, British Columbia	North America; sub-federal political units around the globe	Sub-federal climate policy; federalism; cap-and-trade policy
Hochstetler and Kostka	Why do countries build the energy infrastructure they do, and why might they turn to renewable fuel sources?	China, Brazil	Large emerging powers	State-business relations (corporatism, pluralism); the politics of energy policy
Kashwan	What affects a country's choice of land tenure regimes when implementing forest-based climate mitigation policies (REDD+)?	Mexico, India, Tanzania	Africa, Asia, Latin America	Benefit-sharing in forestry; post-colonial bureaucracies; power-centric model of institutions; REDD+ programs

*See Table 2 and discussion for details.

Table 2

Logics of Generalization

<i>Family of Methods</i>	<i>Generalizing from (measured, observed)</i>	<i>Generalizing to</i>	<i>Logic of Generalization</i>	<i>Example</i>
<i>Within-system Generalization</i>				
Statistics	Sample	Defined population	Sampling theory. Distribution of sample traits reflects population distribution, following random assignment or unbiased selection.	Public opinion surveys of post-materialist attitudes (Inglehart, 1995)
Statistics	Defined population	Characteristics of the political system in which the defined population is situated	Broader arguments that the chosen variables fairly represent the system characteristics in question	Assessing whether post-materialism and the Environmental Kuznets Curve reflect social concern for the environment (Dunlap & York, 2012)
Case studies (process tracing)	Case	Characteristics of the political system in which the case is situated	Humean repetition of examples within the case; broader arguments that the case study reflects the system characteristics in question	China's corporatist system consistently affects private sector energy investment (Hochstetler & Kostka, this issue)

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Table 2
(Continued)

<i>Family of Methods</i>	<i>Generalizing from (measured, observed)</i>	<i>Generalizing to</i>	<i>Logic of Generalization</i>	<i>Example</i>
<i>Cross-system Generalization</i>				
Statistics	Large number of political systems	Political systems beyond those studied	Sampling theory (if drawn from representative sample) or other Humean repetition arguments	Assertion that the Environmental Kuznets Curve represents a general social phenomenon
Statistics and case studies	Findings within an influential political system	Other political systems	Though not necessarily similar, other systems are directly impacted by the influential system	Decisions made by fossil fuel exporters, and by China and Brazil, affect us all (Hochstetler & Kostka; Harrison; both this issue).
Statistics and case studies	Findings within the political system studied	Comparable phenomena in other political systems	System resonance: The system studied shares relevant macro-level traits with other systems	India, Tanzania, and Mexico represent diverse regional characteristics (Kashwan, this issue)
			Resonance groups: Ubiquitous problems, programs, and patterns of social interaction share many characteristics across borders.	Sub-national governments are taking the lead on climate policy (Houle et al., this issue). The politics of decentralization (Barrett, this issue)

"System" denotes a self-identified political system, such as a country, province, town, or region. All logics address the question: Why should we believe that these findings enhance our understanding of phenomena that the investigators did not study directly?

underlying the standard error, which is calculated from the measured variation within the sample, and nothing more. If the observed outcome is quite similar from one observation to the next within the sample, then the investigator need not include a very large number of observations, whereas wide variation requires a larger sample size to justify the claim that the sample characteristics generalize to those of the defined population. The underlying logic of sampling theory is that if the sample is chosen at random, or if it is deliberately chosen in such a way that the investigator can credibly claim that it mirrors relevant characteristics of the defined population (regions, income levels, and the like), then the probability distribution of traits in the sample reflects that of the defined population.

From Population to Political System

There are a number of additional moves that researchers must make when offering within-system generalizations based on statistical methods (the second row of Table 2). Researchers typically sample a population, such as urban residents, that does not reflect the full array of characteristics of the population to which they hope to generalize. The onus is on the investigators to identify, report, and where possible correct for these biases, using a knowledge of prevailing conditions not so very different from that deployed by archaeologists in our earlier example. When analyzing results from the World Values Survey, the empirical basis of Inglehart's research on postmaterialism, researchers typically multiply the data by factors that assign a weight to each response according to the degree to which the survey respondent's background (age, education level, urban resident, etc.) reflects that of the country as a whole.

Of greatest interest is what happens next. Let us assume that a statistical study meets the logical tests of sampling theory, and of the relation between the defined population and the relevant scope population. The investigator still must provide a distinct logical justification for why a small number of measures – a few questions on a survey, or a couple of relevant statistics on national wealth, trade, or pollution levels – might offer valuable insights into the characteristics of *any* complex political system. For Inglehart, the interesting question is not just why individuals think the way they do, but why entire societies adopt certain sets of values rather than others, how this changes over time, and the implications for political life – including the preponderance of “policies designed to solve environmental problems” and ultimately “changes in the geophysical environment.”³² This requires generalization from post-material attitudes to environmental concern writ large (which includes many material dimensions, such as access to drinking water); from public concern to social mobilization (which is affected by factors such as education levels and the protection of civil rights); from social mobilization to policymaking

32. Inglehart 1995. Quotes pp. 57 and 61.

(which often results from small groups of concerned interests rather than mass pressures); and from laws to actual pollution levels, which are determined by agency capacity, corruption, and many other factors. I emphatically do not wish to suggest that statistical methods are any less reliable or valuable than case studies as a basis for generalization about political systems. The challenge facing anyone who wishes to use postmaterialism as an explanation for variance in environmental policy outcomes merely illustrates the broader point that no methodology is immune to the challenge of generalization in comparative political inquiry.

From Case to Political System

The term “case study” is used in many ways and with divergent meanings – from the teaching case, which presents scenarios to generate reflection and discussion, to the idiographic case that makes little attempt to generalize beyond its empirical bounds. Here I am interested in the branch of case study methods for which generalization is a *sine qua non*. As described by Walton, “At bottom, the logic of the case study is to demonstrate a causal argument about how general social forces take shape and produce results in specific settings.”³³ A case is, by this definition, a case of *something* – an instance of a broader phenomenon – and the connection between the particular and the general is guided by logics and practices that often include statistical methods, but are rarely limited to them. A case is not synonymous with a country or a political system, and carries no hard-wired requirement regarding scope or scale. It is a particular manifestation of a class of events – whether Dryzek and colleagues’ comparison of environmental mobilization in four industrialized democracies (offered as cases of social movement impact),³⁴ or Tsai’s study of West Gate, a village of 3,900 people in Fujian Province, China, presented as a case of solidarity group influence on government provision of public goods.³⁵

When making generalizations within a political system, practitioners of case study methods typically rely heavily on historical process tracing; indeed, it is the one method used by every empirical study in this special issue. Although rarely acknowledged, the logic of generalization underlying process tracing has something in common with quantitative approaches – the use of covering laws. Carl Hempel, building on the insights of David Hume, described covering laws as statements about causation derived from observed regularity – a repeated relationship between a given antecedent and an outcome.³⁶ In quantitative analysis, this repetition can be displayed succinctly as points on a graph. With process tracing, the examples are usually presented in narrative form, and thus history is “long on the page” in order to provide the reader with convincing

33. Walton 1992, 122.

34. Dryzek et al. 2003.

35. Tsai 2007.

36. Hempel and Oppenheim 1948.

evidence that a causal relationship manifests itself on numerous occasions.³⁷ For example, in this issue Barrett finds that Kenya's early decentralization reforms allowed local communities only token opportunities to take part in decisions governing the distribution of funds for adaptation to a changing climate. After observing weak participation repeatedly and in various locations, and finding similar patterns in the published literature, Barrett offers the generalization that weak participation was a characteristic of this political system prior to the implementation of Kenya's new constitution in 2010. Barrett cannot, of course, document all or even most examples of exclusion throughout the political system prior to the constitutional reforms, but instead generalizes from the observed to the unobserved using the logic of Humean regularity.

Generalizing Across Systems

Generalizing across political systems—one of the hallmarks of comparative research—presents challenges that differ in kind from much of the research on topics like international environmental diplomacy. If a researcher wishes, for example, to compare the negotiation processes surrounding the biodiversity and ozone treaties, generalization is made easier by the fact that many aspects of these decision-making arenas are the same, conforming to international legal norms and the standard operating procedures of the United Nations, and involving predictable collections of actors such as the G-77 and the European Union. Contrast this with the challenge facing Harrison in her comparison of results from Norway and her native British Columbia, which are in many respects "different worlds." To gain an intimate knowledge of any political system requires extensive field research. The learning curve is steep: Master the language, read the newspapers, travel about the country, conduct preliminary interviews, build a modicum of trust within the relevant communities and social networks, all after reading the relevant scholarly research – and you just might be qualified to ask a good research question. As Skocpol argues,³⁸ comparativists must often rely on the secondary literature in the construction of comparative cases, and presumably this was part of Harrison's research strategy; even then, acquiring a working knowledge of within-system political dynamics carries a high cost. We need theory and associated logics of generalization as a medium for intellectual exchange across borders precisely because comparativists cannot specialize in a large number of political systems.

Let us briefly consider some of the better-known cross-system logics in Table 2 before turning to the concept of resonance, which I argue is the most important logic underlying cross-system generalization from case studies. One logic is that deployed in studies that use statistical methods to measure a

37. Whereas statistical results can be presented in their totality, process tracing typically requires that the researcher only shares a small portion of the repetitions observed; this constraint is most acute when presenting results within an article rather than a book.

38. Skocpol 1984, 382–383.

phenomenon in a large number of political systems and then go one step further, suggesting that the findings apply to an even greater number of systems. An example is provided by Richard Culas's study of the Environmental Kuznets Curve with respect to deforestation: "The results based on the panel data analysis of 43 countries, covering the period 1970–1994, provides [*sic*] evidence that an inverted U-shaped EKC fits for Latin America and Africa, while a U-shaped EKC applies to Asia."³⁹ Hume's logic of regularity is the underlying rationale for the move from the systems studied to those that were not. The relationship has been observed so often that the investigator offers it as a covering law – a contingent generalization about the relationship between economic growth and deforestation.

A second logic guiding cross-system generalization is even more straightforward. The results of a case study may generalize – increasing our understanding of phenomena in political systems other than those studied – because the domestic actors and events it describes directly impact those of other political systems. It is revealing that among the articles in this issue, Hochstetler and Kostka's analysis of energy policy in Brazil and China devotes the least space to generalizing to other political systems. There is a justifiable sense that energy policy in China and Brazil helps us to understand climate policymaking in other political systems because the decisions made by these behemoths directly shape every country's energy policy, through their economic and geopolitical influence.

System Resonance

The logic of system resonance runs as follows: There are categories of political systems that share certain characteristics in common. These characteristics affect numerous phenomena within these systems in similar ways. Therefore a study conducted within one such system is likely to bolster our understanding of the phenomenon in question (climate policy, state–society relations, etc.) in related political systems.

Examples of system resonance are plentiful. Authoritarian political regimes tend to restrict information flows and repress social mobilization. Systems with traditions of collectivism tolerate comparatively high levels of government intervention in the economy. Poor countries are characterized by fragile regimes and high dependence on commodity exports. Europe's post-communist countries share the struggles of institution-building in the post-Soviet era, promoting human rights, navigating relations with Russia, and (for many) accession to the European Union. Any given political system has many attributes, from which it follows that (1) resonance between two political systems is never absolute, and (2) each system resonates with more than one collection of political systems.

39. Culas 2012, 44.

The logic of system resonance often appears in the justifications that researchers provide for their choice of cases in qualitative research and for the scope of political systems included in large-N studies. One of the earliest attempts to delineate a logic of generalization in case study research is Przeworski and Teune's book *The Logic of Comparative Social Inquiry*, published in 1970.⁴⁰ Of particular relevance is their description of the most-different systems approach to case selection. These authors argued that if the same phenomenon is observed in multiple social systems, the outcome cannot be attributed to system characteristics. In practice, this logic has been translated into a research design in which case studies are chosen to represent a diversity of political systems, with the hope of increasing the generalizability of the results. This is the logic used by Kashwan in selecting Mexico, India, and Tanzania in his analysis of forest-based climate mitigation, to encompass the diversity in land property regimes found in different regions of the world. The logic of system resonance does not rest on a naive assumption that any one country can display all the relevant characteristics of the larger collection. Mexico's *ejido* system of community land management, for example, is unique by Latin American standards. But there are still many affinities among resonant systems, such as a shared history of colonial land management regimes throughout Latin America, where many countries were governed by the *encomienda* and *hacienda* systems under Spanish rule, underwent politically contentious attempts at land reform throughout the twentieth century, and contemporaneously witnessed an unprecedented increase in mobilization by indigenous groups demanding land rights beginning in the 1980s.⁴¹ To study one political system within a resonance group is to study attributes shared by many systems in that group.

It is equally important to be attentive to what we might call system dissonance – attempts to generalize results to political systems that do not share one or more causally relevant conditions present in the political system where the research was conducted. It is fairly obvious that one must be careful when attempting to generalize results from Bhutan to Russia, but system dissonance can take more subtle forms. One of the most common approaches to case selection in comparative politics, employed by a number of articles in this issue, is the controlled-comparison method, and in particular Przeworski and Teune's "most similar system" design. With this approach, which traces its origins to John Stuart Mill's method of difference, the investigator chooses political systems that are similar with respect to some relevant system characteristics, thereby isolating the (non-systemic) causes of an outcome. Przeworski and Teune made the mistake, common in small-N covariance studies that use the language of experimental control, of suggesting that any factors held constant across cases can be eliminated as potential causes of an outcome: "the factors that are common to the countries are irrelevant in determining the behavior being explained

40. Przeworski and Teune 1970.

41. Steinberg 2015, pp. 63–86.

since different patterns of behavior are observed among systems sharing these factors."⁴²

This patently false statement has caused considerable confusion among practitioners of case study methods. Controlled comparison can only show that a potential cause is insufficient for explaining the marginal difference in outcomes across the cases studied.⁴³ Consider the following example: Two race horses of the finest caliber are matched in almost every respect, and both are ridden by jockeys of similar rank. The only difference is that one horse has a longer nose than the other, and this accounts for its slight edge in reaching the finish line first. To conclude on this basis that the controlled-for variables (pedigree, training regimen, jockey experience, and the like) are irrelevant to winning a horse race would clearly be a mistake. Control is simply a useful design strategy for focusing attention on subsets of the many forces bearing on social outcomes in complex political systems. The essential point is that when generalizing from a controlled-comparison study to other systems, the investigator must allow the controlled-for factors back into the mix of potential causes. This applies to assertions in the articles in this issue about having controlled for interests, ideas, or institutions as the driving force behind domestic climate policy outcomes.

Resonance Groups

While system resonance is a well-established logic of generalization in case study research (where it appears under various names), we can extend this logic to resonance groups. I define resonance groups as categories of social problems and processes that share many characteristics in common across borders. In this sense, they are connected; a finding that applies to one of them often sheds light on many of them. As a logic of generalization, resonance groups provide a means of generalizing from either large- or small-N methods but are especially relevant to case studies, because these are often mischaracterized as incapable of generalizing to phenomena in political systems other than those in which the study was conducted.

One type of resonance group is a collection of policies or programs surrounded by actor networks whose members routinely exchange information and ideas across borders. This sort of cross-system diffusion is well known to scholars of global environmental politics. Officials from national park systems carefully study the practices of other countries. Multinational corporations carry with them established norms for the regulation of chemicals. Program designs are diffused across borders by institutions ranging from the British Empire to Greenpeace and the World Bank.⁴⁴ At subnational levels, "administrative conjunction" occurs among local governments guided by similar policy norms and

42. Przeworski and Teune 1970, p. 34.

43. Steinberg 2007.

44. Holzinger et al. 2008; Garcia-Johnson 2000; Steinberg 2003; DiMaggio and Powell 1983.

agency structures.⁴⁵ These exchanges produce a measure of convergence and a willful connection through actor networks. A new research finding regarding the cross-system resonance group carries implications for its individual components, and insights from individual cases can illuminate the larger collection.

For example, Peluso and other political ecologists document how national parks are sometimes used as a pretext for governments to criminalize the traditional activities of rural inhabitants and evict them from their lands.⁴⁶ This kind of generalization is a cautionary tale. It may or may not portend in a given political system or a particular protected area, but it warrants further investigation in many of them, given widespread characteristics of land conservation policy in the tropics such as legal pluralism (state policies imposed on traditional land rights regimes) and land management agencies guided by scientific forestry philosophies inherited from the colonial era. When Peluso recast the concept of “poaching” as an attempt by local Javanese to engage in traditional extraction activities that were criminalized by the state, this insight resonated throughout the broader group of cases, suggesting that researchers everywhere might take a second look at the true meaning of successful forest policy.

Another cautionary tale emerging from a single case can be found in the 9/11 attacks on the United States. Responses to terrorism comprise a resonance group characterized by state responsibility for domestic security, common tactics used by terrorist organizations, and similar vulnerabilities such as ports and large public gatherings. Every government in the world studied what happened on 9/11 because it carried implications for their own security. In other instances a single case, such as forest conservation policy in Costa Rica, or the expansion of reproductive health programs in Bangladesh, offers a proof of concept that resonates with similar efforts in other political systems.

A recent example of a resonance group can be found in the dozens of national programs launched under the auspices of the UN program on Reducing Emissions from Deforestation and Forest Degradation (REDD+).⁴⁷ Kashwan argues that nations typically have multiple and conflicting property rights regimes regarding land use, and therefore the implementation of REDD+ can be understood as a case of institutional choice, with all of the political contestation this implies. It is not immediately obvious to climate researchers and practitioners who do not specialize in the study of land rights that such a choice exists. Thus Kashwan opens up an important line of investigation relevant to the larger resonance group. Gerring refers to this as a “pathway case.”⁴⁸ A new concept or causal mechanism developed in a narrow range of political systems – such as Putnam’s study of social capital in Italy, or Dauvergne’s findings on patronage

45. The term is from Frederickson 1999, as discussed in Sellers 2005.

46. Peluso 1992.

47. Under REDD+, industrialized countries can meet a portion of their responsibility to reduce atmospheric carbon dioxide by paying developing countries for the carbon sequestration services provided by forests.

48. Gerring 2007.

networks and deforestation in southeast Asia⁴⁹ – helps to reveal new facts in many political systems, the significance of which may not have been obvious even to those intimately familiar with those systems. In this respect, a resonance group is a distinct logic from that of Humean regularity; when conducted properly, a case study is not just one more bean placed on a scale weighing the preponderance of evidence. It has implications for our understanding and interpretation of the other pieces of evidence, resonating throughout a far-reaching empirical domain.

As Forsyth and Levidow argue in this issue, actions by governments or communities to adopt a given normative framework or policy practice should not be accepted at face value. It may be that there is no resonance group at all – that the “adopting” parties have simply appropriated global frameworks, such as the UN’s Green Economy Initiative, to win legitimacy or foreign aid, all the while carrying on with preexisting domestic priorities. Forsyth and Levidow are deeply skeptical of what they perceive to be a homogenizing tendency of comparative political theory, which might highlight similarities and convergent practices while downplaying the role of local knowledge production. Although I believe these authors underestimate the degree to which researchers in comparative politics are attentive to local contexts, this is precisely the sort of skepticism that is required when making the case for the existence of a resonance group.

Even absent deliberate exchanges of information across political systems, resonance groups exist when similar patterns of social interaction are found in many societies, giving rise to recurring political dilemmas. Corruption, gender relations, coalition building among political parties in parliamentary systems, and civil-military relations in fragile democracies share many attributes across borders. A clear illustration is found in the politics of fossil fuel dependence, discussed in this issue by Harrison and by Houle, Lachapelle, and Purdon. Houle et al. compare the postures of California, Quebec, New Mexico, and British Columbia with respect to cap-and-trade policies to reduce carbon emissions. Resonance between these cases and decision-making in other political systems is established by the observation that sub-national political systems (cities, provinces) around the globe are increasingly taking the lead in responding to climate change, even in the absence of national policy.

Harrison uses an especially clever approach for identifying a resonance group, deploying a mixed-method strategy that includes a large-N measure – the Balance of Emissions Embodied in Trade – to conceptually rope together all the world’s nations with respect to the nature of their economic relationship to fossil fuels. She demonstrates that political incentives for proactive climate policies vary depending on a country’s reliance on fossil fuel exports, on manufacturing that uses these fuels, and on the import of carbon-intensive goods. Having established that there is resonance among countries so situated, the behavior of subsets of this resonance group is more easily understood.

49. Putnam 1993; Dauvergne 1997.

Through her case studies, Harrison demonstrates that fossil fuel exporters like Norway and British Columbia can afford to adopt ambitious climate policy goals because fossil fuels account for a comparatively small portion of their domestic energy consumption. These findings offer insights into climate politics that extend far beyond the particular cases studied. Harrison is handing researchers everywhere a clue to help in their investigations of the factors that lead political systems to embrace or shun climate policies.

Conclusion: Implications for Research Practice

Practitioners of case study methods have at their disposal a wide array of tools to facilitate generalization from particular cases to broader questions bearing on politics and policy. Ironically, when critics claim that one cannot generalize from case studies because these break the conventions of statistical analysis, they are committing an error of generalization – extending conclusions beyond the boundary conditions of their subject matter without offering a logical justification. From the standpoint of knowledge accumulation, the “just a case study” refrain is counterproductive because the very assertion that case study methods cannot generalize in principle leads researchers to offer fewer generalizations in practice. If generalization from case studies is logically impossible, why bother?

Alternatively, if the findings from case studies are potentially every bit as generalizable as those of large-N methodologies, how can we best realize that potential? At the most fundamental level, researchers employing case study methods should consider raising their ambitions with respect to generalization. VanDeveer and I have argued that the field of comparative environmental politics is hampered by a proliferation of studies that do not attempt to draw on or contribute to insights beyond the geographical borders of their field research.⁵⁰ To rectify the situation, I believe researchers must devote more explicit attention to developing and explaining the logics of generalization they employ. Generalizability is too often described in passing by qualitative and quantitative studies alike, with inadequate attention given to the relevant points of comparison between the events under investigation and others to which the research findings might apply, both within and across political systems. The dual challenge of comparative politics – offering generalizations while engaging complexity – demands more of the social scientist than is required of investigators in many other fields. Mixed methods that pair quantitative cross-system measures with case studies provide a valuable but only partial solution to this challenge, because they do not test propositions in depth across a large number of cases. Practitioners of mixed methods must still rely on logical arguments to generalize beyond the events they study directly.⁵¹

50. Steinberg and VanDeveer 2012.

51. See Tsai 2007.

An explicit focus on generalization can improve the practice of historical process tracing. Process tracing produces causal conclusions by breaking down distant correlations (China's corporatist system and its proactive solar policy) into ever-smaller causal couplings (government-sponsored industry events, new relationships forged at those events, and so on) that can be examined empirically to assess their plausibility. There comes a point, however, when the investigator must decide whether to move on, satisfied that a causal relationship has been sufficiently established in a given piece of the story. As the historian Clayton Roberts observes,⁵² the most adept researchers are intimately familiar with the background conditions (the covering laws, in Hempel's terminology) that characterize particular places and times, which enables them to judge the plausibility and significance of particular pieces of evidence and to decide whether further investigation is warranted.

This carries important implications for the practice of field research in comparative politics. To the extent that scholars can draw on a deep well of generalizable knowledge bearing on their subject matter – developed, shared, and refined by others in the field – they can make better professional judgments to guide the collection of evidence and inform the difficult choices made by researchers with limited time in the field. But we must do more than draw on the contributions of scholars who inhabit the more theoretical corners of our disciplines. It is easy for researchers working on pressing social problems to become so drawn into our subject matter that we neglect to contribute to the public good of theory development across the social sciences. The question should no longer be whether we can generalize from case studies, but whether we are prepared to make an intellectual commitment to doing so.

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52. Roberts 1996.

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