

The Logic of Historical Explanation in the Social Sciences

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Historical explanations seek to identify the causes of outcomes in particular cases. Although social scientists commonly develop historical explanations, they lack criteria for distinguishing different types of causes and for evaluating the relative importance of alternative causes of the same outcome. This article first provides an inventory of the five types of causes that are normally used in historical explanations: (1) necessary but not sufficient, (2) sufficient but not necessary, (3) necessary and sufficient, (4) INUS, and (5) SUIN causes. It then introduces a new method—sequence elaboration—for evaluating the relative importance of causes. Sequence elaboration assesses the importance of causes through consideration of their position within a sequence and through consideration of the types of causes that make up the sequence as a whole. Throughout the article, methodological points are illustrated with substantive examples from the field of international and comparative studies.

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Historically oriented researchers in the social sciences often seek to explain particular outcomes in one or more specific cases. They ask questions such as “What caused World War I?” (e.g., Lebow, 2000; Levy, 1990), “What produced exceptional growth in a few East Asian countries?” (e.g., Deyo, 1987; Haggard, 1990), and “Why did the United States embark on a distinctive trajectory of social welfare provision?” (Skocpol, 1992). In addressing these questions, researchers try to identify the causes of a particular outcome of interest.

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Unfortunately, it is not always clear what they mean when they assert that some factor is a “cause” of the specific outcome. For example, in his famous book *Liberalism, Fascism, or Social Democracy*, what does Gregory Luebbert (1991) mean when he argues that a prewar alliance between liberals and labor was a cause of liberal democracy in interwar Britain, France, and Switzerland? Or to take the case of Kathleen Thelen (2004) in her book *How Institutions Evolve*, what does she mean in asserting that the German Handicraft Protection Law of 1897, originally designed to shore up support among a reactionary artisanal class, was a cause of contemporary Germany’s vocational training system? Clearly, there are different legitimate responses to these questions. Yet, at present, the range of these answers is not well understood, much less formally explicated. Moreover, the importance of different answers for the status of one’s explanation is not well appreciated.

In this article, we provide a framework for clarifying the meanings and uses of *cause* in historical explanation. In doing so, we draw on the philosophy of logic, especially recent work on necessary and sufficient causes in the social sciences (e.g., Goertz & Starr, 2003; Ragin, 2000). This literature is appropriate for the kind of explanation that we consider where the goal is the identification of the causes of particular events, rather than the estimation of probabilistic causal effects for large populations of cases. We bring together the various kinds of causes discussed in this literature and add new possibilities to create a comprehensive inventory of the types of causes employed in historical explanation. We suggest that from the perspective of logic, there are five types of causes used in historical explanation. An individual cause may be (1) necessary but not sufficient, (2) sufficient but not necessary, (3) necessary and sufficient, (4) INUS, or (5) SUIN. We describe and formally define each of the types below.

Building on this inventory of causes, we then explore how sequence analysis helps researchers evaluate the relative importance of particular causal factors. We do so by extending insights from the elaboration model, originally formulated by Paul Lazarsfeld (see Kendall, 1982), to ideas of necessary and sufficient causation. We call our resulting approach the *method of sequence elaboration*. This is a technique for evaluating the importance of a given causal factor through consideration of its position within a sequence and through consideration of the different types of causal factors that make up that sequence.

Sequence elaboration uses logical rules that generate precise answers in assessing the importance of causes. As such, sequence elaboration provides a basis for arriving at solutions to longstanding problems that have preoccupied

historical researchers in the social sciences. For example, historical researchers have long wondered when a set of causes from one historical period can be said to be more important than causes located during an alternative period. As Barbara Geddes (2003, p. 140) puts it, "If two path-dependent arguments set out to explain the same outcome, and one argument concludes that choices made at one historical juncture determined the final outcome while the other identifies a different juncture as critical, how can we tell which is correct?" How indeed, especially if only one or a small number of cases are analyzed?

Likewise, analysts have focused much discussion and debate over the question of when an intervening causal factor can be said to represent a "causal mechanism" (see Gerring, 2007, for a literature review). For our purposes, this issue can be posed as follows: If multiple causes are linked together in a historical sequence, how would we know when an intervening causal factor is more important than the initial causal factor that launches the sequence itself? Assume, for example, that David Waldner (1999) is correct that the effect of high levels of elite conflict on poor economic performance in Syria and Turkey ran through an intervening cause, namely, the absence of a developmental state. Does the existence of this intervening cause (nondevelopmental state) serve to diminish the importance of the initial cause (elite conflict)? How would we know for these specific cases?

At present, scholars who pursue historical explanation lack clear answers to questions such as these. They are thus forced to devote much time and energy arguing about which historical period or which factor in a sequence is the most important determinant of a given outcome. This article provides a new set of tools for addressing these issues.

Situating Historical Explanation

Historical explanations are inferences about the causes of specific outcomes in particular cases. They are intended to explain outcomes that have already happened, either in the distant past or in the recent past. The goal of the analysis is precisely to explain the specific past occurrences; the question of whether and how the resulting explanation might then be generalized is a secondary concern.

This mode of explanation is common in contemporary social science. In sociology, it is prominent in the field of comparative-historical analysis (Adams, Clemens, & Orloff, 2005; Mahoney & Rueschemeyer, 2003). In political science, approximately half of the articles in leading comparative

politics journals pose questions in which the goal is to explain particular outcomes that occurred in specific cases (Mahoney & Terrie, 2008). Historical explanations are also common among scholars who work on international relations (Bennett & Elman, 2007) and in the subfield of American political development (Pierson, 2007). Indeed, historical explanation is a standard approach for case study and small-N research in general.

Historical explanations can be contrasted with explanations that seek to estimate the average effects of variables within large populations of cases. In these latter works, causes are understood to make outcomes more likely on average; they are “probability raisers” (Gerring, 2005). A huge methodological literature addresses the statistical issues associated with this approach to causation (for a recent literature review, see Brady, 2008). With historical explanation, by contrast, researchers tend to view causes as necessary and/or sufficient for outcomes of interest (Mahoney & Goertz, 2006). All of the major cross-case methods employed with historical explanation—the methods of agreement and difference, typological methods, counterfactual analysis, Boolean algebra, and fuzzy-set analysis—understand causes using ideas of necessity and/or sufficiency (e.g., Elman, 2005; George & Bennett, 2005; Goertz & Levy, 2007; Mahoney, 1999; Ragin, 1987, 2000). There is also a well-established philosophical literature that sees logical relationships of necessity and sufficiency as underpinning causality (e.g., Woodward, 2003).

Our view is that scholars must be open to working with different understandings of causation depending on their research goals. There is little reason to reject *a priori* whole traditions of causal analysis on ontological grounds. When one seeks to explain particular events, one almost naturally thinks in terms of necessary and sufficient causes. When one analyzes causal patterns in large populations, on the other hand, one more naturally views causes as factors that make outcomes more likely on average. We focus on understandings of causation associated with necessary and/or sufficient causes (including their derivatives) because they are so closely linked to historical explanation as practiced in the social sciences. Our intention in this article is not to sort out the relationship between these two longstanding approaches.¹ In the conclusion, nevertheless, we briefly consider how our arguments might be extended into a probabilistic large-N setting.

Types of Causes

In this section, we describe and explore five kinds of causes that can be used with historical explanation. We also introduce criteria for assessing the

relative importance of two or more causes of the same type. These considerations set the stage for our subsequent presentation of sequence elaboration.

Necessary Causes

Of the causes that may be used in historical explanation, perhaps the one that first comes to mind is a necessary cause. A necessary cause entails the claim that an outcome would not have occurred if the cause had been absent, though the cause's presence did not guarantee the outcome. A famous example is Barrington Moore's (1966) argument that a strong bourgeoisie was necessary for a revolutionary breakthrough to democracy (i.e., "no bourgeoisie, no democracy"). Goertz (2003a) lists 150 other examples from various domains of social science research. Although the mechanics of necessary causes seem easy, mistakes are surprisingly common. In fact, a sophisticated and growing methodological literature—both qualitative and quantitative—is dedicated to testing hypotheses about necessary causes (Brady & Collier, 2004; Braumoeller, 2003; Braumoeller & Goertz, 2000; Clark, Gilligan, & Golder, 2006; Dion, 1998; Eliason & Stryker, *in press*; Goertz, 2006; Ragin, 1987, 2000, 2006).

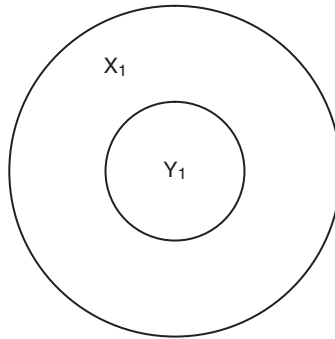
Various approaches can be used to formally define a necessary cause, each of which highlights some features but deemphasizes others. A standard logical approach views a necessary cause dichotomously and defines it as "if not Y , then not X ." Braumoeller and Goertz (2000) use probability theory to define a necessary cause: $P(X = 1|Y = 1) = 1$. One can also use 2×2 tables for the purpose of definition. When a necessary cause is at work, the cell where the cause is absent and the outcome is present must be empty. Necessary causes can also be conceptualized with continuous measurement. For example, when a necessary cause is plotted on an X - Y scattergram, with both variables standardized to range from 0 to 1, the data points assume a triangular shape with no cases above the bisecting diagonal line (e.g., Ragin, 2000). Some other definitions employ calculus and fuzzy logic (Goertz, 2003b; Ragin, 2000).

We choose to define a necessary cause using set theory. The approach allows us to illustrate ideas with simple Venn diagrams that become useful in the later discussion of causal sequences. With a set-theoretic approach, a necessary cause can be defined as

X_1 is a necessary cause of Y_1 if Y_1 is a subset of X_1 .

As Figure 1 shows graphically, any case that is a member of the set Y_1 must also be a member of the set X_1 .² However, a case's membership in the set

Figure 1
Set-Theoretic Conceptualization of a Necessary Cause

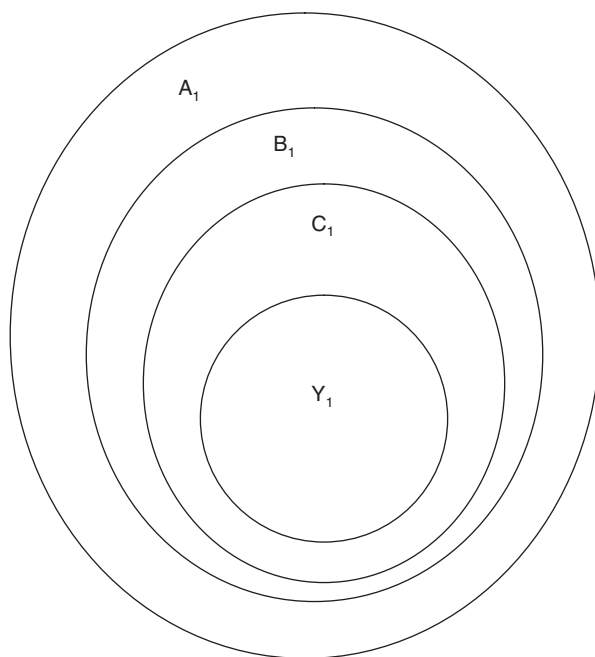


X_1 does not ensure that it is also a member of the set Y_1 . X_1 is thus necessary but not sufficient for Y_1 . This set-theoretic illustration is fully consistent with the definitions above; it says the same thing in a different way.

One common concern about necessary causes is that they may be trivial or unimportant (Downs, 1989). Importance can, of course, be judged using subjective criteria, such as the normative relevance of a necessary cause or its standing within a theoretical tradition. However, as Braumoeller and Goertz (2000) suggest, it is also possible to evaluate importance using empirical criteria. With such criteria, the degree of importance of a necessary cause is determined by the frequency at which the cause is present irrespective of the presence/absence of the outcome. Fully trivial necessary causes are always present, regardless of the presence of the outcome. They are thus not correlated with the outcome of interest. For example, gravity is a trivial necessary cause of revolution, because gravity is simply always present regardless of whether or not a revolution happens. Necessary causes are more important to the extent that they are present only when the outcome is present. As this is increasingly true, the presence of a necessary cause increasingly predicts the presence of the outcome.

A simple example using a Venn diagram can help to illustrate these ideas. In Figure 2, the outcome set is a rainbow, and three necessary causes are considered: (A_1) daytime, (B_1) sunshine, and (C_1) sun shower (i.e., sun accompanying or immediately following rain). All three of these factors are necessary causes (i.e., a rainbow cannot occur in their absence). Of the three necessary causes, however, the most important one is sun shower, whereas

Figure 2
The Relative Importance of Necessary Causes: An Example

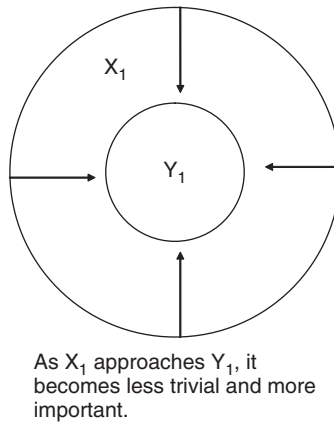


A_1 = Daytime
 B_1 = Sunshine
 C_1 = Sun shower
 Y_1 = Rainbow

daytime is the least important. One can think about this in terms of correlations: Sun shower is more strongly correlated with rainbow than is daylight. When multiple necessary causes of the same outcome are present, the one that is the rarest is the most empirically important (Honoré & Hart, 1985).

It is useful to present these ideas about the relative importance of necessary causes more generally. In Figure 3, as X_1 approaches Y_1 , it becomes increasingly more important. By contrast, as the set for X_1 becomes further from overlapping with the set for Y_1 , it becomes an increasingly less important necessary cause. The implication of this finding, which will be explored further below, is that as a necessary cause approaches the threshold of also

Figure 3
Framework for Assessing the Relative
Importance of Necessary Causes



being a sufficient cause, it becomes less trivial and more important (see also Ragin, 2006; Goertz, 2006).

Sufficient Causes

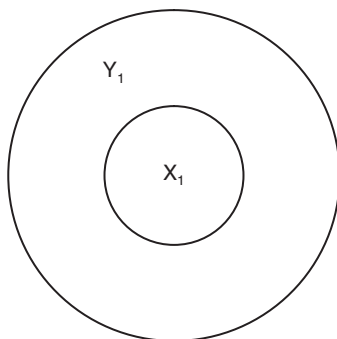
In historical explanations, it is possible for an individual cause to be sufficient—but not necessary—for an outcome. A sufficient cause is one whose presence inevitably leads to the outcome, though the outcome can occur through other means as well. For instance, Daniel Goldhagen (1996) argues that a culture of virulent anti-Semitism was sufficient to cause Germans to be motivated to kill Jewish people. Alternative causal factors, such as the Nazis and Hitler, may have led to the same result, but they were not necessary. Germany's anti-Semitism was enough by itself to deliver the motivational basis for the Holocaust.³

From a set-theoretic perspective, a sufficient cause can be defined as follows:

X_1 is a sufficient cause of Y_1 if X_1 is a subset of Y_1 .

Figure 4 shows the set-theoretic relationship for causal sufficiency. Any case that is a member of the category X_1 must also be a member of the category

Figure 4
Set-Theoretic Conceptualization of a Sufficient Cause

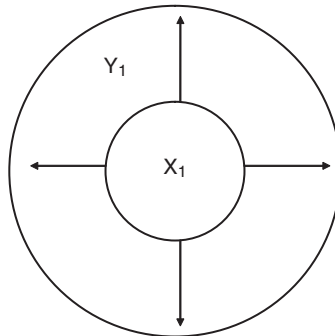


Y_1 . However, a case can achieve membership in the category Y_1 without being a member of the category X_1 . X_1 is sufficient but not necessary for Y_1 .

We can also apply the ideas of relative importance discussed above to sufficient causes. A fully trivial sufficient cause is one that would produce the outcome of interest if it were present, but it is never actually present and thus never actually produces this outcome. For instance, the sun not rising would be sufficient for a bad harvest, but since it always does rise, the cause is trivial (and not empirically correlated with bad harvests). As Figure 5 suggests, a sufficient cause becomes less trivial and more important to the extent that it is the exclusive factor that produces the outcome in question—that is, a sufficient cause becomes more important as it approaches the threshold of also being a necessary cause or, again, as X_1 approaches Y_1 (Goertz, 2006; Ragin, 2006). The relative importance of two or more sufficient causes can thus be evaluated by the extent to which they occur, thereby generating the outcome of interest. All else being equal, when there are two sufficient causes for a given outcome, the one that is more frequently present is the more important one.

This discussion of the relative importance of alternative sufficient causes, like the one of the relative importance of necessary causes above, implies that one needs to make systematic reference to a population of cases to evaluate the importance of a cause. After all, assessing the frequency of a cause relative to an outcome requires more than one case. Not surprisingly, therefore, analysts to date have thought about estimating the relative importance of necessary

Figure 5
Framework for Assessing the Relative
Importance of Sufficient Causes



As X_1 approaches Y_1 , it
 becomes less trivial and more
 important.

causes and sufficient causes using populations of cases (Eliason & Stryker, in press; Goertz, 2006; Ragin, 2006). When applied to Venn diagrams, the assumption is that the relative size of a circle is directly proportional to the number of cases that have the variable value represented by that circle. We show below, however, that use of temporal sequences allows one to assess the relative importance of causes even when only a single case is analyzed.

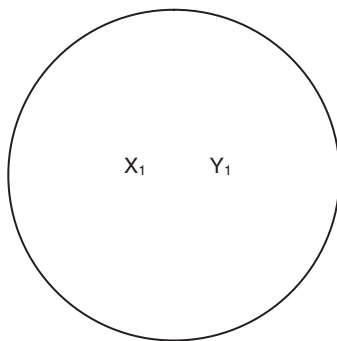
Necessary and Sufficient Causes

Individual causes that are necessary and sufficient for a given outcome are rarely proposed in the social sciences. Indeed, it is hard to find any examples in the literature. Nevertheless, because these kinds of causes are logically possible, we mention them here and define them formally as

X_1 is a necessary and sufficient cause of Y_1 if the set of X_1 is identical to the set of Y_1 .

As Figure 6 shows, the set-theoretic relationship is one of perfect overlap. Any case that is a member of one set is also a member of the other set. The presence/absence of a case in one set perfectly predicts its presence/absence in the other. Although necessary and sufficient causes are rare or nonexistent

Figure 6
Set-Theoretic Conception of a Necessary and Sufficient Cause



in the social sciences, they are nevertheless the gold standard of causation against which all other kinds of causes can be assessed. A cause becomes more important as it becomes closer to being necessary and sufficient.

INUS Causes

Most historical explanations suggest that multiple causal factors combine together to produce particular outcomes. The individual causal factors are neither necessary nor sufficient; rather, they are part of an overall combination that is sufficient for the outcome. For example, Moore's (1966) argument suggests that democratic pathways in the modern world required both a strong bourgeoisie and an aristocracy that either aligned with this bourgeoisie or was historically weakened. There are thus two combinations that generate the outcome: (a) a strong bourgeoisie that is allied with aristocratic elites, or (b) a strong bourgeoisie and a weak aristocracy. While a strong bourgeoisie is a necessary cause, the aristocratic alliance cause and the weak aristocracy cause are not individually necessary. When combined with a strong bourgeoisie, however, each combination becomes sufficient. As another example, Downing (1992) argues that liberal democracy in Europe was brought about by medieval constitutionalism in combination with any one of four other possible factors (none of which is individually necessary): (a) geographical features that provided a natural barrier to invading armies, (b) commercial wealth, (c) access to special foreign

resources, and (d) alliances. According to Downing, when any one of these four combined with medieval constitutionalism, European countries avoided a “military revolution” and thereby preserved a pro-democratic constitutional heritage and established early democracy.

The causal factors emphasized in these arguments are mostly INUS causes (the exceptions are those factors that are necessary causes). An INUS cause is by itself neither necessary nor sufficient. Instead, it is one cause in a larger combination that is sufficient (but not necessary) for the outcome. The INUS acronym comes from the philosopher Mackie, who defined it as follows: “An *insufficient* but *necessary* part of a condition which is itself *unnecessary* but *sufficient* for the result” (Mackie, 1965, p. 246; see also Mackie, 1980). INUS causes also form the backbone of Ragin’s (1987, 2000) work on qualitative comparative analysis. These causes can be specified with Boolean equations that use the logical AND (i.e., &) and the logical OR (i.e., v). For example, Moore’s argument above can be summarized as follows:

$$Y_1 = X_1 \& (A_1 \vee B_1), \quad (1)$$

where Y_1 = democratic pathway, X_1 = strong bourgeoisie, A_1 = alliance between bourgeoisie and aristocracy, and B_1 = weak aristocracy. In the equation, X_1 is a necessary cause, whereas A_1 and B_1 are INUS causes.

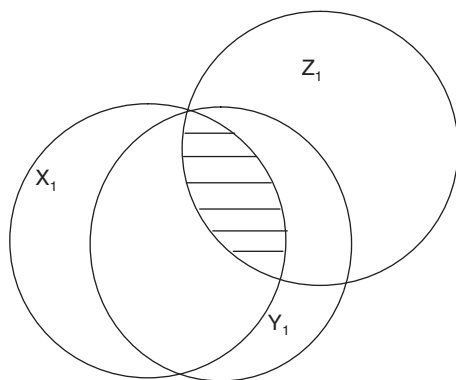
Using set theory, INUS causes can be formally defined as follows:

X_1 is an INUS cause of Y_1 if the overlapping set created by X_1 and one or more other causal factors is a subset of Y_1 .

Figure 7 presents the Venn diagram that illustrates this idea. In the diagram, neither X_1 nor Z_1 is necessary or sufficient for Y_1 . The absence of necessity is illustrated by the fact that a case can achieve membership in the category Y_1 without being a member of either X_1 or Z_1 . Likewise, the absence of sufficiency is clear from the fact that some cases are members of X_1 or Z_1 but not of Y_1 . However, the space where the sets for X_1 and Z_1 overlap is fully contained within the Y_1 set. This overlapping space meets the set-theoretic criteria for causal sufficiency. Any case that is a member of both X_1 and Z_1 must also be a member of Y_1 . X_1 and Z_1 are therefore INUS causes of Y_1 .

The relative importance of two or more INUS causes can also be assessed. The rule here is as follows: An INUS cause becomes more important as it approaches the threshold of becoming a sufficient cause. For

Figure 7
Set-Theoretic Conception of INUS Causes



example, in Figure 7, X_1 is the more important INUS cause because it is closer than Z_1 to being sufficient for Y_1 all by itself. We can see this with the fact that most of the set-theoretic space of X_1 is contained within Y_1 , whereas most of the set-theoretic space of Z_1 falls outside of Y_1 .

SUIN Causes

A final kind of cause is used when analysts regard the constitutive attributes of a necessary cause as causes themselves. This type is what we call, to make a parallel with Mackie's (1965) terminology, a SUIN cause: a *sufficient* but *unnecessary* part of a factor that is *insufficient* but *necessary* for an outcome. SUIN causes treat defining constitutive features of a necessary cause as causes themselves. For example, a well-known theory holds that nondemocracy (i.e., a nondemocratic dyad) is necessary for war (Russett, 1993). There are various attributes that on their own would constitute nondemocracy, including fraudulent elections, high levels of repression, and severe suffrage exclusions. By virtue of defining nondemocracy by themselves, each of these conditions is a SUIN cause of war. Each condition is neither individually necessary nor sufficient for war but rather one of several factors that can constitute nondemocracy, which is necessary for war. Thus, a high level of repression is not necessary for war, but it is a SUIN cause of war—that is, when it is present, a necessary cause

(nondemocracy) is present. Or to develop another example, consider again Moore's (1966) argument. He suggests that a strong bourgeoisie can be defined in terms of either economic or political power. In this framework, substantial bourgeois economic power and substantial bourgeois political power are each SUIN causes of democracy. That is, neither of them is a necessary cause of democracy, but either one of them ensures the presence of a factor that is necessary for democracy. We can summarize this idea as follows:

$$Y_1 = X_1 \& Z_1; X_1 = A_1 \vee B_1, \quad (2)$$

where Y_1 = democratic pathway, X_1 = strong bourgeoisie, Z_1 = politically subordinate aristocracy, A_1 = politically powerful bourgeoisie, and B_1 = economically powerful bourgeoisie. Here A_1 and B_1 are SUIN causes of a democratic path.

Using set theory, a SUIN cause is defined formally as follows:

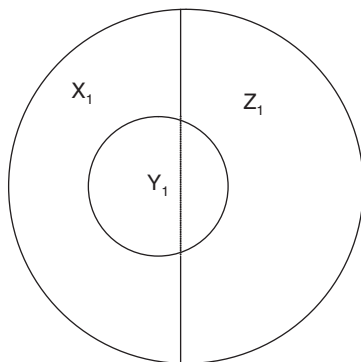
X_1 is a SUIN cause of Y_1 if Y_1 is a subset of the joint space created by X_1 when combined with one or more other causal factors.

Figure 8 presents the Venn diagram for a SUIN cause. In this figure, neither X_1 nor Z_1 is necessary or sufficient for Y_1 . However, the joint space occupied by these causes is a superset of Y_1 . Because membership in this superset is necessary for membership in Y_1 , the factors X_1 and Z_1 are SUIN causes.

To assess the relative importance of two or more SUIN causes, one needs to compare the extent to which each cause is necessary for the outcome. The rule here is as follows: A SUIN cause becomes more important as it approaches the threshold of becoming a non-trivial necessary cause. For example, in Figure 8, X_1 is the more important SUIN cause because it is closer than Z_1 to being necessary for Y_1 . Most of the set-theoretic space of Y_1 overlaps with X_1 , whereas most of the set-theoretic space of Y_1 does not overlap with Z_1 . It is in fact possible that an individual SUIN cause would not overlap with the space of the outcome at all. These nonoverlapping SUIN causes are trivial, and they can be regarded as unimportant.

In sum, five kinds of causes—necessary, sufficient, necessary and sufficient, INUS, and SUIN causes—may be used in historical explanations. When a researcher asserts that some specific factor is a cause of some specific outcome, he or she must mean that the factor in question corresponds

Figure 8
Set-Theoretic Conception of SUIN Causes



to one of these five types. Within a framework of necessary and sufficient conditions, which is the basis for logic, there are no other straightforward possibilities.⁴

The Method of Sequence Elaboration

Historical explanations make reference to sequences of linked causal factors; outcomes are explained by connected events that unfold over time. As Clayton Roberts (1996) puts it, historical researchers “explain [outcomes] by tracing the sequence of events that brought them about” (p. 16). An excellent literature addresses many of the issues that arise in the analysis of historical sequences, including temporal ordering, duration, critical junctures, and path dependence (e.g., Abbott, 2001; Pierson, 2004). Within this literature, our contribution is to use a logic-driven approach for conceptualizing and analyzing causation. We ask what happens when one elaborates an initial explanation of an outcome through the introduction of antecedent and intervening causal factors. We show how the new causal factors can contextualize, diminish, or even make illogical the initial explanation. This knowledge allows one to assess the relative importance of causes located at different points in time. We call the overall procedure the *method of sequence elaboration*.

Extending the Elaboration Model to Historical Explanation

Originally developed by Paul Lazarsfeld and his associates at Columbia University, the elaboration model was part of the move of early quantitative social science toward multivariate analysis and the effort to distinguish correlation from causation (Kendall, 1982). The central procedure of the model is to elaborate an initially bivariate relationship through the introduction of a third variable. In some cases, the new relationships created from the third variable confirm the original relationship, increasing one's confidence that it is a causal association. In other cases, elaboration through a third variable calls into question the initial relationship, leading one to believe it is a spurious relationship.

Although this model was developed for the analysis of broadly correlational relationships, with some modifications, it can be extended to the kinds of causal factors that are used in historical explanation. The basic application remains the same: The analyst begins with an initial relationship and then further evaluates it through the introduction of new factors, either antecedent or intervening (or both).

To illustrate these ideas, consider a relationship in which X_1 is believed to be a necessary cause of Y_1 . This relationship can be specified as $X_1 -n-\> Y_1$. One way of using sequence elaboration is to consider an antecedent causal factor—that is, a third cause (Z_1) that is temporally prior to both X_1 and Y_1 . Sequence elaboration leads the researcher to explore the possible causal relationships between Z_1 and X_1 and between Z_1 and Y_1 . Specifically, the researcher explores the following two unknown relationships:

$$\begin{array}{c} Z_1 -?-> X_1 -n-\> Y_1 \\ || \quad \text{---} ? \text{---} \quad \uparrow \end{array}$$

Different causes can be combined to create alternative causal paths. Sequence elaboration evaluates the implications of the new relationships for the importance of the original causal factor. Depending on the type of relationship that exists between Z_1 and X_1 and between Z_1 and Y_1 , the initial cause could be diminished or contextualized, as we show below.

Sequence elaboration can also be used with intervening causes. For example, again consider a researcher who finds that X_1 is a necessary cause of Y_1 ; that is, $X_1 -n-\> Y_1$. With an intervening cause (Z_1), the analyst explores the following relationships:

$$\begin{array}{c} X_1 -?-> Z_1 -?-> Y_1 \\ || \quad \text{---} n \text{---} \quad \uparrow \end{array}$$

Depending on the relationships that exist between X_1 and Z_1 and between Z_1 and Y_1 , the initial relationship again could be diminished or contextualized.

Antecedent and intervening factors used with sequence elaboration can take the form of any of the five kinds of causes specified above. In the discussion that follows, however, we shall focus on necessary causes and sufficient causes. We choose not to focus on causes that are simultaneously necessary and sufficient because they are so seldom used in the social sciences.⁵ Concerning INUS causes and SUIN causes, they raise issues that parallel those of sufficient causes and necessary causes, respectively. For instance, imagine with the first example above that the antecedent control factor Z_1 is an INUS cause of X_1 and a necessary cause of Y_1 ; that is:

$$\begin{array}{c} Z_1 \text{ -INUS-} X_1 \text{ -n-} Y_1 \\ \parallel \text{ ————— n ————— } \uparrow \end{array}$$

Although Z_1 is not by itself sufficient for X_1 , the fact that it is an INUS cause means (by definition) that it is part of a combination of factors sufficient for X_1 . This larger combination has the same status for the purpose of sequence elaboration as a sufficient cause. Hence, when using sequence elaboration, a combination of INUS causes can be treated in the same way as a sufficient cause. Likewise, a combination of SUIN causes can be treated in the same way as a necessary cause.

Contextualized, Diminished, and Illogical Relationships

Let us return to the example of an initial finding about a necessary cause (i.e., $X_1 \text{ -n-} Y_1$). Suppose a researcher discovers an antecedent cause that produces the following relationships:

$$\begin{array}{c} Z_1 \text{ -n-} X_1 \text{ -n-} Y_1 \\ \parallel \text{ ————— n ————— } \uparrow \end{array}$$

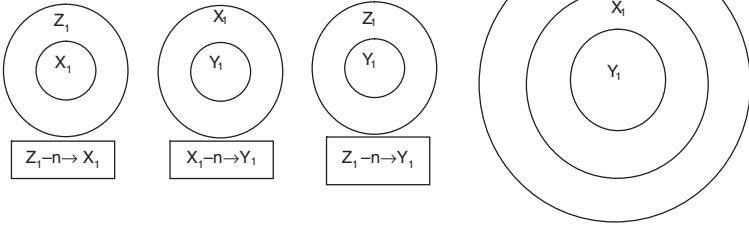
In addition to X_1 being a necessary cause of Y_1 , we also see that Z_1 is a necessary cause of both X_1 and Y_1 . To make this concrete, we can refer back to Downing's (1992) argument, which holds that medieval constitutionalism is a necessary cause of early democracy in historical Europe. Downing further implies that the prior Roman Empire was necessary for medieval constitutionalism and also early democracy. Thus, Downing's argument could be seen as following the form above, where Z_1 = Roman Empire, X_1 = medieval constitutionalism, and Y_1 = early democracy.

Figure 9
Illustration of Sequence Elaboration: A Contextualizing
Antecedent Cause

Model Explored:

$Z_1 - n \rightarrow X_1 - n \rightarrow Y_1$

$\parallel \text{-----} n \text{-----} \uparrow$



The question posed by sequence elaboration concerns how the new causal relationships introduced by Z_1 affect our understanding of the initial $X_1 - n \rightarrow Y_1$ relationship. For example, in the case of Downing, should we consider the Roman Empire to be the “more important” cause of early democracy, given that it came first in time? Or should we treat medieval constitutionalism as more important (like Downing)? By specifying the Venn diagrams that correspond to the causal relationships, we can definitively answer this question—at least from a logical perspective. Figure 9 presents the relevant Venn diagrams.⁶ The figure includes the three set-theoretic diagrams for $Z_1 - n \rightarrow X_1$, $X_1 - n \rightarrow Y_1$, and $Z_1 - n \rightarrow Y_1$. It then combines these diagrams into a single one that illustrates the overall set-theoretic relationships among the three factors. This final illustration shows that Z_1 is a superset of both X_1 and Y_1 because it is necessary for both of these factors. X_1 is a superset of Y_1 because X_1 is necessary for Y_1 . Given these relationships, we can readily assess the relative (logical) importance of Z_1 versus X_1 as causes of Y_1 : X_1 is more important. This is true because the set for X_1 more closely overlaps with the set for Y_1 . The conclusion derives from the rule introduced above concerning the relative importance of necessary causes: As a necessary cause approaches the threshold of also being a sufficient cause, it becomes more important. Since X_1 is closer to this threshold than Z_1 , X_1 is the more important necessary cause. In the case of Downing’s work, the implication is that medieval constitutionalism is a more important necessary cause of early democracy than the Roman Empire, just as Downing suggests.

This example shows how the introduction of a third factor contextualizes the initial finding. The original necessary cause (X_1) remains the most important cause in the sequence, but we now have additional information about the causes of this cause itself. Indeed, we can generalize the logic of this example with the following rule:

In a sequence of linked necessary causes, where each cause is necessary for each subsequent cause and the final outcome of interest, the importance of a cause increases as it becomes more temporally proximate to the outcome.

It is also possible, however, that the introduction of an antecedent factor will diminish an original relationship. Let us again assume that the initial relationship posits a necessary cause. But now imagine that when a third cause is introduced, we discover the following relationships:

$$\begin{array}{ccccc} Z_1 & -s \rightarrow & X_1 & -n \rightarrow & Y_1 \\ || & \xrightarrow{\quad n \quad} & & & \uparrow \end{array}$$

The antecedent factor Z_1 is necessary for Y_1 , as before, but it is also now sufficient for X_1 (as opposed to necessary). For example, imagine that Downing's (1992) argument had been that the Roman Empire was sufficient for medieval constitutionalism and necessary for democracy. Would the Roman Empire then be the more important necessary cause of early democracy? The answer is yes, and we can understand why this is logically the case by looking at the relevant Venn diagrams. Figure 10 models the relationships. As shown, although both Z_1 and X_1 are necessary causes of Y_1 , Z_1 is now the more important one, because the set for Z_1 more closely overlaps with the set for Y_1 . In this example, then, the initial cause is diminished once we introduce a third factor. The more decisive cause becomes the antecedent factor.

In addition to contextualizing or diminishing an initial relationship, sequence elaboration can generate a logical impossibility that then requires the analyst to locate the source of error responsible for the illogical finding. For instance, imagine that one again starts with the finding that X_1 is a necessary cause of Y_1 and then discovers the following relationships:

$$\begin{array}{ccccc} Z_1 & -n \rightarrow & X_1 & -n \rightarrow & Y_1 \\ || & \xrightarrow{\quad s \quad} & & & \uparrow \end{array}$$

Here the antecedent factor (Z_1) is necessary for X_1 and sufficient for Y_1 . Yet this overall finding is impossible. To see why, we can once again refer to

Figure 10
Illustration of Sequence Elaboration: A Diminishing Antecedent Cause

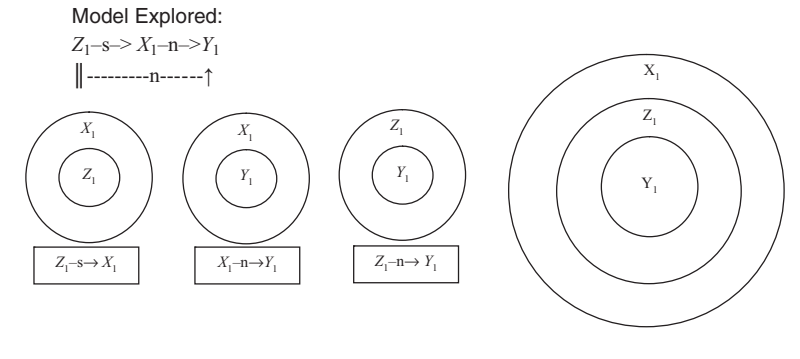
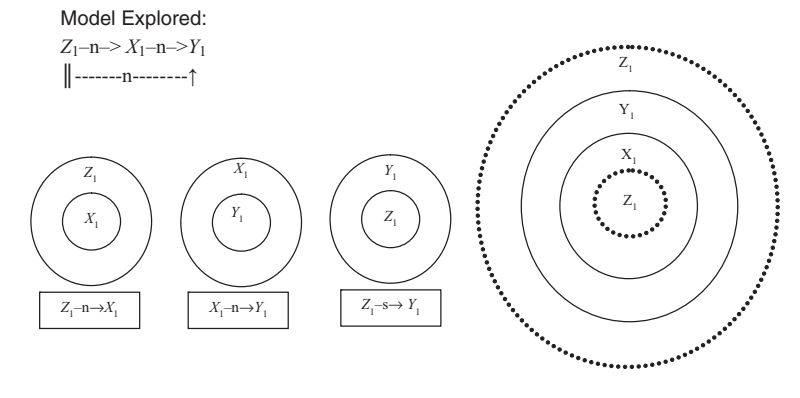


Figure 11
Illustration of Sequence Elaboration: An Illogical Result



Venn diagrams. As Figure 11 shows, if X_1 is really a necessary cause of Y_1 , then it is logically impossible for Z_1 to be simultaneously necessary for X_1 and sufficient for Y_1 . The finding would require Z_1 to be both a subset and a superset of X_1 (which we illustrate with the dotted circles in the figure). Because this is not possible, one of the three specified relationships must be incorrect. It could be that the original relationship (i.e., $X_1-n \rightarrow Y_1$) is wrong, though the error could also be with one of the other two new relationships.

Inventory and Examples

With the procedures discussed above, it is possible to systematically assess the implications of sequence elaboration for various alternative causal relationships. In Table 1, we consider the 16 possibilities that apply to hypotheses that posit necessary causes and sufficient causes.⁷ The first four types in the table (1a, 1b, 1c, 1d) reflect the possibilities that can happen when an initial necessary causal relationship is elaborated with an antecedent cause. For example, in type 1d, an initial necessary causal relationship is elaborated with an antecedent cause that is sufficient for both the original cause and the outcome. The next four types (2a, 2b, 2c, 2d) show the results for an initial necessary causal relationship that is elaborated with an intervening cause. The following four (3a, 3b, 3c, 3d) summarize the possibilities for a sufficiency relationship elaborated with an antecedent cause. And the final four (4a, 4b, 4c, 4d) apply to a sufficiency relationship elaborated with an intervening cause.

Our discussion is organized around the three basic results that can occur with sequence elaboration when applied to necessary and sufficient causes: contextualization, diminishment, and logical impossibility.

Contextualization

Sequence elaboration will contextualize an initial relationship when no logical contradictions occur and the new causal factor is not more important for the outcome than the original causal factor. There are different types of contextualization. In one type, the new cause is the same kind of cause for the final outcome as the original factor but a less important one (this applies to 1a, 2c, 3d, and 4b in Table 1). For instance, in the historical context of Western Europe, Luebbert (1991) argues that a prewar alliance between liberals and labor (i.e., a lib-lab alliance) was sufficient to generate a path that ultimately culminated in liberal democracy during the interwar period. (Because lib-lab alliances required the broad context of Europe, they are actually an INUS cause.) Luebbert contextualizes this argument with an examination of the antecedent factors that explain why a lib-lab alliance developed in some European countries but not others. He finds that the critical antecedent factor is the extent of political cohesion of middle classes. His argument is that cohesive middle classes were sufficient for lib-lab alliances because cohesive middle classes gave liberals the power and security to safely align with unions and worker organizations. The strong implication is that these cohesive middle classes were themselves sufficient to set into motion the pathway that eventuated in democracy.

Table 1
Inventory of Sequence Elaboration Results

	Initial X_1/Y_1 Relationship	Third Factor (Z_1)	New Relationships	Result
1a	$X_1 -n\rightarrow Y_1$	Antecedent	$Z_1 -n\rightarrow X_1$; $Z_1 -n\rightarrow Y_1$	Z_1 contextualizes the initial relationship.
1b	$X_1 -n\rightarrow Y_1$	Antecedent	$Z_1 -n\rightarrow X_1$; $Z_1 -s\rightarrow Y_1$	Logically impossible.
1c	$X_1 -n\rightarrow Y_1$	Antecedent	$Z_1 -s\rightarrow X_1$; $Z_1 -n\rightarrow Y_1$	Z_1 diminishes the initial relationship.
1d	$X_1 -n\rightarrow Y_1$	Antecedent	$Z_1 -s\rightarrow X_1$; $Z_1 -s\rightarrow Y_1$	Z_1 contextualizes the initial relationship.
2a	$X_1 -n\rightarrow Y_1$	Intervening	$X_1 -n\rightarrow Z_1$; $Z_1 -n\rightarrow Y_1$	Z_1 diminishes the initial relationship.
2b	$X_1 -n\rightarrow Y_1$	Intervening	$X_1 -n\rightarrow Z_1$; $Z_1 -s\rightarrow Y_1$	Z_1 contextualizes the initial relationship.
2c	$X_1 -n\rightarrow Y_1$	Intervening	$X_1 -s\rightarrow Z_1$; $Z_1 -n\rightarrow Y_1$	Z_1 contextualizes the initial relationship.
2d	$X_1 -n\rightarrow Y_1$	Intervening	$X_1 -s\rightarrow Z_1$; $Z_1 -s\rightarrow Y_1$	Logically impossible.
3a	$X_1 -s\rightarrow Y_1$	Antecedent	$Z_1 -n\rightarrow X_1$; $Z_1 -n\rightarrow Y_1$	Z_1 contextualizes the initial relationship.
3b	$X_1 -s\rightarrow Y_1$	Antecedent	$Z_1 -n\rightarrow X_1$; $Z_1 -s\rightarrow Y_1$	Z_1 diminishes the initial relationship.
3c	$X_1 -s\rightarrow Y_1$	Antecedent	$Z_1 -s\rightarrow X_1$; $Z_1 -n\rightarrow Y_1$	Logically impossible.
3d	$X_1 -s\rightarrow Y_1$	Antecedent	$Z_1 -s\rightarrow X_1$; $Z_1 -s\rightarrow Y_1$	Z_1 contextualizes the initial relationship.
4a	$X_1 -s\rightarrow Y_1$	Intervening	$X_1 -n\rightarrow Z_1$; $Z_1 -n\rightarrow Y_1$	Logically impossible.
4b	$X_1 -s\rightarrow Y_1$	Intervening	$X_1 -n\rightarrow Z_1$; $Z_1 -s\rightarrow Y_1$	Z_1 contextualizes the initial relationship.
4c	$X_1 -s\rightarrow Y_1$	Intervening	$X_1 -s\rightarrow Z_1$; $Z_1 -n\rightarrow Y_1$	Z_1 contextualizes the initial relationship.
4d	$X_1 -s\rightarrow Y_1$	Intervening	$X_1 -s\rightarrow Z_1$; $Z_1 -s\rightarrow Y_1$	Z_1 diminishes the initial relationship.

The structure of this part of Luebbert's argument thus follows type 3d in Table 1:

$$\begin{array}{c} Z_1 -s\rightarrow X_1 -s\rightarrow Y_1 \\ \parallel \quad \text{---s---} \uparrow \end{array}$$

where Z_1 = historically cohesive middle classes, X_1 = prewar lib-lab alliance, and Y_1 = interwar liberal democracy. Although both Z_1 and X_1 are

sufficient causes of Y_1 , the original causal factor X_1 is the more important one from a logical perspective. Both Z_1 and X_1 are subsets of Y_1 , but X_1 is the larger subset and thus is closer to being necessary as well as sufficient for the outcome (this can be shown with Venn diagrams following the rules discussed above). This result accords nicely with Luebbert's own position, which treats lib-lab alliances as a decisive cause, while relegating middle-class cohesion to a less important antecedent cause.

With this kind of contextualization, where the new factor is a less important cause of the final outcome than the original causal factor, as represented by types 1a, 2c, 3d, and 4b in Table 1, sequence elaboration provides a fairly modest gain in terms of explaining the actual outcome itself. If the new causal factor is antecedent and less important than the original causal factor (as in 1a, 3d), we learn mostly about "causes of the initial cause" (not mainly about the causes of the outcome itself). By contrast, if the new factor is intervening and less important than the original causal factor (as in 2c, 4b), we are inclined to treat it as a "partial mechanism" that contextualizes the original argument. To see how this works, let us continue with the Luebbert example, now focusing on an intervening cause. Luebbert suggests that in countries where middle classes were not cohesive, lib-lab alliances did not form. The absence of these lib-lab alliances is treated as a necessary cause of both fascism and social democracy. One reason why the absence of lib-labism had this effect is that it inevitably generated strong and independent labor movements that were not constrained by liberal tutelage. These strong labor movements were necessary for fascism or social democracy. Thus, this part of Luebbert's argument can be specified like type 2c:

$$\begin{array}{c} X_1 -s \rightarrow Z_1 -n \rightarrow Y_1 \\ \parallel \quad \text{---} \quad n \quad \text{---} \quad \uparrow \end{array}$$

where X_1 = liberal-labor division, Z_1 = strong labor movement, and Y_1 = fascism or social democracy. Here both a lib-lab division and a strong labor movement are necessary causes of fascism or social democracy, but the original causal factor (lib-lab division) is the more important one from a logical perspective. The intervening cause (strong labor movement) provides one of the mechanisms through which the decisive cause exerts its effect.

In other cases of contextualization, the new factor is not the same kind of cause for the final outcome as the original causal factor (types 1d, 2b, 3a, and 4c in Table 1). In these instances, we find it useful to distinguish between "background contextualization" and "pathway contextualization." Background contextualization occurs when either an antecedent factor

(type 3a) or an intervening factor (type 4c) is necessary for the final outcome, while the original causal factor is sufficient for this outcome. When this is true, the new factor provides an essential context—or background—that must be present for the sufficient cause to exert its effect.

An example of background contextualization is found in James Mahoney's (2001) *The Legacies of Liberalism*. Mahoney's work includes the argument that a particularly radical form of state militarization and class polarization during the 19th century, what he calls "radical liberalism," was sufficient to breed pathways culminating in harsh military-authoritarian regimes in Guatemala and El Salvador. The study further argues that before the liberal reform period, certain conditions—partially centralized states and incipient export economies—had to be in place for liberal leaders to enact these radical reforms. Overall, this part of the argument follows type 3a:

$$\begin{array}{c} Z_1 -n-\> X_1 -s-\> Y_1 \\ || \text{-----} n \text{-----} \uparrow \end{array}$$

where Z_1 = partially centralized state and incipient export economy, X_1 = radical liberalism, and Y_1 = military authoritarianism. In the argument, while antecedent conditions (Z_1) provide a contextual backdrop, the main causal action happens with radical liberalism (X_1). The antecedent conditions play a background role, one that helps us understand how radical liberalism was possible in these countries.

Pathway contextualization, by contrast, happens when either an antecedent factor (1d) or an intervening factor (2b) is sufficient for the outcome, while the original factor is necessary for the outcome. In the latter case (2b), the new factor provides one of multiple paths through which the original cause exerts its effect. As an example, let us return once more to Luebbert's (1991) argument. We noted that lib-lab divisions are treated as a necessary cause of fascism and social democracy in interwar Europe. For Luebbert, the most decisive factor determining whether a case actually becomes either fascist or social democratic is the interwar alliances made by parties representing farmers. When farmers' parties made alliances with workers' parties, powerful "red-green" coalitions developed that were sufficient for social democracy (Sweden, Denmark, and Norway). By contrast, when farmers' parties allied with urban middle classes, "brown-green" coalitions developed that gave support to far-right and fascist parties seeking to undermine strong labor movements (Germany, Italy, and Spain). Both of these arguments follow the logic of type 2b:

$$\begin{array}{c} X_1 -n \rightarrow Z_1 -s \rightarrow Y_1 \\ \parallel \text{-----} n \text{-----} \uparrow \end{array}$$

$$\begin{array}{c} X_1 -n \rightarrow Z_2 -s \rightarrow Y_2 \\ \parallel \text{-----} n \text{-----} \uparrow \end{array}$$

where X_1 = liberal-labor division, Z_1 = red-green alliance, Z_2 = brown-green alliance, Y_1 = social democracy, and Y_2 = fascism. In the arguments, a lib-lab division is a necessary cause of both social democracy and fascism. However, the intervening factor (either a red-green or brown-green alliance) represents the causal pathway through which this factor exerts its effect. Thus, a prewar liberal-labor division “mattered” for interwar Europe because it allowed for one of two pathways that generated a particular kind of interwar regime. Sequence elaboration contextualizes the original finding by showing us these pathways.

Diminishment

As opposed to contextualizing a finding, sequence elaboration can also diminish an initial causal relationship (see 1c, 2a, 3b, and 4d in Table 1). For this to happen, the new factor must be the same kind of cause as the original factor but a more important one. If the new factor is antecedent, and if the original factor is diminished, it is appropriate to say that the initial relationship is “spurious” (as in 1c, 3b).

A good example can be found in a debate about the causes of the end of the Cold War between Robert English (2002) and Stephen G. Brooks and William C. Wohlforth (2000-2001, 2002). English argues that ideational factors such as “New Thinking” were a necessary cause of Soviet retrenchment and the end of the Cold War. Brooks and Wohlforth do not disagree that they were necessary but contend that these ideational factors were trivial. They argue that materialist causes, especially long-term economic decline in the Soviet Union, were much more important. To show that English’s claims are spurious, they make the following argument (type 1c):

$$\begin{array}{c} Z_1 -s \rightarrow X_1 -n \rightarrow Y_1 \\ \parallel \text{-----} n \text{-----} \uparrow \end{array}$$

where Z_1 = Soviet economic decline, X_1 = New Thinking, and Y_1 = Soviet retrenchment. Brooks and Wohlforth use sequence elaboration to make the apparent causal connection between New Thinking and retrenchment

appear spurious. Thus, although both economic decline and New Thinking are necessary causes of Soviet retrenchment, economic decline is the more important one. This is true because the set for economic decline is closer to also being a sufficient cause of the outcome. Economic decline comes before New Thinking, and it generates New Thinking. It then follows that New Thinking is reduced to a simple by-product of economic decline, merely one of multiple (insufficient) mechanisms through which economic decline exerts its necessary causal effect. In short, the antecedent factor is revealed as the real driving cause.

When the new factor is intervening, and the original factor is diminished, one has identified the causal mechanism that gives the original factor its efficacy (2a, 4d). In this case, the original relationship is not spurious; instead, one discovers the reason why the original causal factor exerts its effect. Indeed, unlike the discovery of a partial mechanism with contextualization (discussed above), the mechanism here offers a more complete explanation for the outcome than the original causal factor itself. As an example, consider Waldner's argument about the failure of economic development in Syria and Turkey, which is one part of his broader comparative analysis in *State Building and Late Development* (Waldner, 1999). Waldner argues that historically high levels of elite conflict were sufficient for developmental failure. He then elaborates the argument by considering a key intervening cause: the absence of a "developmental state." High levels of elite conflict were sufficient for the absence of a developmental state, which in turn was sufficient for a developmental failure in Syria and Turkey. Thus, this overall argument assumes the form of type 4d:

$$\begin{array}{ccccc} X_1 & -s-> & Z_1 & -s-> & Y_1 \\ || & \text{-----} & s & \text{-----} & \uparrow \end{array}$$

where X_1 = high levels of elite conflict, Z_1 = nondevelopmental state, and Y_1 = failed development. Here, the original causal factor (high levels of elite conflict) remains a key source of developmental failure, but it works through the nondevelopmental state, which is an even more important sufficient cause. The implication is that the sufficiency effect of elite conflict on failed development derives from its prior sufficiency effect on the absence of a developmental state. High levels of elite conflict run through this causal mechanism.

The Waldner example is also useful for illustrating how historical explanations work with multiple causal steps. Waldner is quite explicit that there are further intervening factors mediating his argument. One of them is the

“Kaldorian collective dilemma,” which he defines as a set of collective action problems that bring on a failure to upgrade productivity, lower costs, and improve goods for existing industries. This factor (K_1) intervenes between nondevelopmental state and developmental failure in the following way:

$$\begin{array}{ccccccc} X_1 & \xrightarrow{-s} & Z_1 & \xrightarrow{-s} & K_1 & \xrightarrow{-s} & Y_1 \\ \parallel & & & & & \xrightarrow{s} & \uparrow \end{array}$$

where X_1 = high levels of elite conflict, Z_1 = nondevelopmental state, K_1 = Kaldorian collective dilemma, and Y_1 = failed development. The Kaldorian dilemma now becomes a very important causal mechanism—the sufficiency effects of both high levels of elite conflict and a nondevelopmental state ultimately run through this new intervening factor. Although one does not wish to dismiss the importance of the more antecedent factors, they do their causal work because of the Kaldorian dilemma factor.

Logical Impossibilities

As Table 1 suggests, logical impossibilities can emerge in various ways (types 1b, 2d, 3c, and 4a). One commonality of each of the illogical types is that the original factor and the new factor are different kinds of causes (logical impossibilities will not arise so long as all factors are the same type of cause). For instance, let us return briefly to Mahoney's (2001) argument that radical liberalism during the 19th century was sufficient for subsequent harsh authoritarianism in Guatemala and El Salvador. One might counter with the suggestion that an intervening necessary cause, namely the failed mid-20th-century social reform episode, was also a critical event. Imagine, for example, the following alternative explanation:

$$\begin{array}{ccccc} X_1 & \xrightarrow{-n} & Z_1 & \xrightarrow{-n} & Y_1 \\ \parallel & & & & \uparrow \\ & \xrightarrow{\quad s \quad} & & & \end{array}$$

where X_1 = radical liberalism of the 19th century, Z_1 = failed social reform episode of the late 1940s and early 1950s, and Y_1 = military authoritarianism. The problem here is that this explanation follows type 4a, which is a logical impossibility. Radical liberalism (X_1) cannot be sufficient for military authoritarianism (Y_1) unless it is sufficient for all subsequent necessary causes. Yet in this formulation, radical liberalism is only necessary for the failed social reform episode (Z_1). The implication is that one or more of the relationships in this model must be incorrectly specified.

In fact, given the debate over the causes of authoritarianism in Central America between Mahoney (2001) and Yashar (1997), we believe that the real relationship (at least for Guatemala) may look like this:

$$\begin{array}{c} X_1 -s-\> Z_1 -n-\> Y_1 \\ \parallel \quad \quad \quad s \quad \quad \quad \uparrow \end{array}$$

where X_1 = radical liberalism of the 19th century, Z_1 = failed social reform episode of the late 1940s and early 1950s, and Y_1 = military authoritarianism. The liberal reform period was sufficient for both the subsequent social reform episode and the final regime outcome. The failed social reform episode was thus a partial mechanism through which the effects of the earlier critical juncture were transmitted.

Logical incoherence thus stands as another way in which historical researchers can eliminate a rival explanation. When sequence elaboration exposes logical incoherence, the method becomes not only a tool for evaluating the relative importance of causes but also a means of rejecting causal claims outright.

Conclusion

Drawing on set-theoretic logic, this article has provided an inventory of causes used in historical explanation in the social sciences. Five kinds of causes are employed in this mode of explanation: necessary causes, sufficient causes, necessary and sufficient causes, INUS causes, and SUIN causes. When an investigator asserts that X_1 is a cause of Y_1 , he or she normally means that X_1 is one of these five kinds. Through an extension of the elaboration model to the study of these causes, moreover, the article developed a new methodology—sequence elaboration—that evaluates the relative importance of individual causes. Sequence elaboration offers clear answers to questions about whether an antecedent cause makes an initial relationship spurious or whether an intervening factor is the full or partial mechanism through which an initial cause exerts its effect.

We conclude with some observations about the limitations and the larger implications of this argument. Three limitations are especially worthy of mention. First, building on Braumoeller and Goertz (2000), the approach evaluates causal importance using logical/empirical criteria. It assumes that a cause becomes more important as it approaches the gold standard of being both necessary and sufficient for an outcome. However, this is not the only

possible approach for assessing importance. For example, scholars may regard a cause that has immediate practical or policy relevance as of special importance. Likewise, causes that are linked to influential normative or theoretical frameworks may be treated as more important than those that are not. Our approach does not provide leverage for assessments of these alternative kinds of causal importance.

Second, the method of sequence elaboration evaluates the relative importance of causes located at different points in time. The method does not, however, provide a basis for assessing the importance of causes that occur at exactly the same time.⁸ Nor does it allow one to assess the relative importance of two or more causes that occur at different times but that are not themselves causally related. Instead, the method of sequence elaboration is designed to evaluate factors that are causally linked and located at different points in a temporal sequence (as is common in historical explanations). To assess the importance of causes that occur at the same time or that are not part of a causal sequence, one may need to work with a population of cases and use techniques such as those described by Goertz (2006) and Ragin (2006).

Third, sequence elaboration depends on the prior ability of the analyst to specify whether a given factor is a particular kind of cause. As stressed above, a large methodological literature already describes the various small-N methods that can be used to make these inferences (e.g., process tracing, counterfactual analysis, critical case analysis). Nevertheless, insofar as these methods generate incorrect results, the subsequent findings of sequence elaboration may be jeopardized.

Finally, our argument has implications for statistical researchers who work with large numbers of cases and who do not normally seek to explain particular outcomes in specific cases. As various analysts have argued, necessary and sufficient conditions can be analyzed probabilistically across medium and large numbers of cases (e.g., Braumoeller & Goertz, 2000; Dion, 1998; Eliason & Stryker, *in press*; Goertz, 2006; Ragin, 2000). One could thus explore how sequence elaboration works when causes are treated as probabilistically necessary and/or probabilistically sufficient for outcomes in larger populations. For example, imagine a chain of causes that are each at least 90% necessary for a subsequent cause and for the outcome of interest. Can we still assume that the most temporally proximate cause in this chain is the most important (as sequence elaboration suggests)? And what happens when different thresholds of probabilistic necessity (e.g., 80%) are used for one or more causes? In short, how do probabilistic considerations affect the findings we have presented about the relative importance of necessary and/or sufficient causes in sequences?

Discussing potential connections between the method of sequence elaboration and large-N research raises more questions than can be answered here. Adequately addressing these questions requires the combined efforts of statistical methodologists and qualitative methodologists with expertise in set-theoretic logic. Independently of this methodological research agenda, however, we believe that sequence elaboration stands as a fundamental tool for causal inference in small-N and case-study research. Insofar as the method is used self-consciously in the future, scholars will have a more solid foundation for making valid and logically defensible inferences about which historical periods and which causal factors are the most important determinants of the outcomes that they seek to explain.

Notes

1. For a treatment of this topic, see Mahoney (2008).
2. We notate a causal factor in historical explanation as X_i rather than X to underscore that the factor is a particular value (or a particular range of values) on a variable. Thus, X_i is one particular value (or one particular range of values) that the variable X can assume.
3. For a cause to be sufficient but not necessary in a single case, a given outcome must be overdetermined by the presence of multiple sufficient causes (otherwise, the sufficient cause would also be necessary). Although there are potential examples of individually sufficient causes, it is far more common for historical explanations to invoke multiple causes that are jointly sufficient (not individually sufficient) for the outcome of interest.
4. In Mackie's (1980) formulation, combinations of causes are analyzed in relationship to an outcome; individual causes are analyzed in terms of their relationship to these combinations. An individual cause could be a necessary, sufficient, or necessary and sufficient component of the combination. Likewise, the combination itself could be necessary, sufficient, or necessary and sufficient for the outcome. We can thus code any individual cause first according to its causal status as a component of the combination, and second according to the causal status of the combination of which it is a part. This generates nine types (where the first code is the factor's causal status for the combination and the second is the combination's causal status for the outcome): (1) Necessary|Necessary, (2) Necessary|Sufficient, (3) Necessary|Necessary and Sufficient, (4) Sufficient|Necessary, (5) Sufficient|Sufficient, (6) Sufficient|Necessary and Sufficient, (7) Necessary and Sufficient|Necessary, (8) Necessary and Sufficient|Sufficient, and (9) Necessary and Sufficient|Necessary and Sufficient. Of these nine, an INUS cause corresponds with type (2), whereas a SUIN cause corresponds with type (4). The other seven possibilities, however, can be reduced to individually necessary and/or sufficient causes. Types (1), (3), and (7) are logically the same thing as a necessary cause. Types (5), (6), and (8) are logically the same thing as a sufficient cause. Type (9) is the same thing as a necessary and sufficient cause. For a proof using Venn diagrams, please contact the authors.
5. However, we have worked out the results that pertain to these causes. Interested readers may contact the authors.
6. Given that we continue to illustrate points with Venn diagrams, one might ask about the "meaning" of the size of the circles when only one case is analyzed. The answer is that the size of the circle reflects the actual case analyzed and other hypothetical and/or counterfactual

cases to which the researcher is at least implicitly referring. It bears emphasizing that in set theory, the concept of *set* itself remains the subject of different interpretations (Potter, 2004).

7. We do not focus on INUS and SUIN causes in the following discussion, because with the method of sequence elaboration, these causes must be treated as parts of larger sequences that are either sufficient (with INUS causes) or necessary (with SUIN causes) for the outcome of interest. In some of the examples below, however, we analyze INUS causes as sufficient causes when the analyst suggests that the INUS cause generated the outcome of interest within a given historical context (i.e., in the presence of relatively trivial additional causes). Indeed, historical explanations frequently treat one INUS cause as standing for what is really a larger sufficiency combination that also includes many trivial causes.

8. This why sequence elaboration focuses on the full combination of INUS causes that are jointly sufficient for an outcome rather than the individual INUS causes of the combination. Unless INUS causes occur at different times, sequence elaboration cannot tell us which one is the most important. The same is true of SUIN causes

References

- Abbott, A. (2001). *Time matters: On theory and method*. Chicago: University of Chicago Press.
- Adams, J., Clemens, E. S., & Orloff, A. S. (Eds.). (2005). *Remaking modernity: Politics, history, and sociology*. Durham, NC: Duke University Press.
- Bennett, A., & Elman, C. (2007). Case study methods in the international relations subfield. *Comparative Political Studies*, 40(2), 170-195.
- Brady, H. (2008). Causation and explanation in social science. In J. M. Box-Steffensmeier, H. Brady, & D. Collier (Eds.), *Oxford handbook of political methodology* (pp. 217-270). Oxford, UK: Oxford University Press.
- Brady, H. E., & Collier, D. (Eds.). (2004). *Rethinking social inquiry: Diverse tools, shared standards*. Lanham, MD: Rowman & Littlefield.
- Braumoeller, B. F. (2003). Causal complexity and the study of politics. *Political Analysis*, 11(3), 209-233.
- Braumoeller, B. F., & Goertz, G. (2000). The methodology of necessary conditions. *American Journal of Political Science*, 44(4), 844-858.
- Brooks, S. G., & Wohlforth, W. C. (2000-2001). Power, globalization, and the end of the cold war: Reevaluating a landmark case for ideas. *International Security*, 25(3), 5-53.
- Brooks, S. G., & Wohlforth, W. C. (2002). From old thinking to new thinking in qualitative research. *International Security*, 26(4), 93-111.
- Clark, W. R., Gilligan, M. J., & Golder, M. (2006). A simple multivariate test for asymmetric hypotheses. *Political Analysis*, 14(3), 311-331.
- Deyo, F. (Ed.). (1987). *The political economy of the new Asian industrialism*. Ithaca, NY: Cornell University Press.
- Dion, D. (1998). Evidence and inference in the comparative case study. *Comparative Politics*, 30(2), 127-145.
- Downing, B. M. (1992). *The military revolution and political change: Origins of democracy and autocracy in early modern Europe*. Princeton, NJ: Princeton University Press.
- Downs, G. (1989). The rational deterrence debate. *World Politics*, 41(2), 225-237.
- Eliason, S., & Stryker, R. (in press). Goodness-of-fit tests and descriptive measures in fuzzy-set analysis. *Sociological Methods and Research*.

- Elman, C. (2005). Explanatory typologies in qualitative studies of international politics. *International Organization*, 59(2), 293-326.
- English, R. (2002). Power, ideas, and new evidence on the cold war's end: A reply to Brooks and Wohlforth. *International Security*, 26(4), 70-92.
- Geddes, B. (2003). *Paradigms and sandcastles: Theory building and research design in comparative politics*. Ann Arbor, MI: University of Michigan Press.
- Gerring, J. (2005). Causation: A unified framework for the social sciences. *Journal of Theoretical Politics*, 17, 163-198.
- Gerring, J. (2007). The mechanistic worldview: Thinking inside the box. *British Journal of Political Science*, 38(1), 161-179.
- George, A. L., & Bennett, A. (2005). *Case studies and theory development in the social sciences*. Cambridge, MA: MIT Press.
- Goertz, G. (2003a). The substantive importance of necessary condition hypotheses. In G. Goertz & H. Starr (Eds.), *Necessary conditions: Theory, methodology, and applications* (pp. 65-94). Lanham, MD: Rowman & Littlefield.
- Goertz, G. (2003b). Cause, correlation, and necessary conditions. In G. Goertz & H. Starr (Eds.), *Necessary conditions: Theory, methodology, and applications* (pp. 47-64). Lanham, MD: Rowman & Littlefield.
- Goertz, G. (2006). Assessing the trivialness, relevance, and relative importance of necessary or sufficient conditions in social science. *Studies in Comparative International Development*, 41(2), 88-109.
- Goertz, G., & Levy, J. (Eds.). (2007). *Explaining war and peace: Case studies and necessary condition counterfactuals*. London: Routledge.
- Goertz, G., & Starr, H. (Eds.). (2003). *Necessary conditions: Theory, methodology, and applications*. Lanham, MD: Rowman & Littlefield.
- Goldhagen, D. J. (1996). *Hitler's willing executioners: Ordinary Germans and the holocaust*. New York: Knopf.
- Haggard, S. (1990). *Pathways from the periphery: The politics of growth in newly industrializing countries*. Ithaca, NY: Cornell University Press.
- Honoré, T., and Hart, H. L. A. (1985). *Causation in the law* (2nd ed.). Oxford, UK: Oxford University Press.
- Kendall, P. L. (Ed.). (1982). *The varied sociology of Paul F. Lazarsfeld*. New York: Columbia University Press.
- Lebow, R. N. (2000). Contingency, catalysts, and international system change. *Political Science Quarterly*, 115(4), 591-616.
- Levy, J. S. (1990). Preferences, constraints, and choices in July 1914. *International Security*, 15(3), 151-186.
- Luebbert, G. M. (1991). *Liberalism, fascism, or social democracy: Social classes and the political origins of regimes in interwar Europe*. New York: Oxford University Press.
- Mackie, J. L. (1965). Causes and conditions. *American Philosophical Quarterly*, 2, 245-264.
- Mackie, J. L. (1980). *Cement of the universe: A study of causation*. Oxford, UK: Clarendon.
- Mahoney, J. (1999). Nominal, ordinal, and narrative appraisal in macrocausal analysis. *American Journal of Sociology*, 104(4), 1154-1196.
- Mahoney, J. (2001). *The legacies of liberalism: Path dependence and political regimes in Central America*. Baltimore: Johns Hopkins University Press.
- Mahoney, J. (2008). Toward a unified theory of causality. *Comparative Political Studies*, 41(4/5), 412-436.

- Mahoney, J., & Goertz, G. (2006). A tale of two cultures: Contrasting quantitative and qualitative research. *Political Analysis*, 14(3), 227-249.
- Mahoney, J., & Rueschemeyer, D. (Eds.). (2003). *Comparative historical analysis in the social sciences*. Cambridge, UK: Cambridge University Press.
- Mahoney, J., & Terrie, P. L. (2008). Comparative-historical analysis in contemporary political science. In J. M. Box-Steffensmeier, H. Brady, & D. Collier (Eds.), *Oxford handbook of political methodology* (pp. 737-755). Oxford, UK: Oxford University Press.
- Moore, B., Jr. (1966). *Social origins of dictatorship and democracy: Lord and peasant in the making of the modern world*. Boston: Beacon.
- Pierson, P. (2004). *Politics in time: History, institutions, and social analysis*. Princeton, NJ: Princeton University Press.
- Pierson, P. (2007). The costs of marginalization: Qualitative methods in the study of American politics. *Comparative Political Studies*, 40(2), 146-169.
- Potter, M. (2004). *Set theory and its philosophy: A critical introduction*. Oxford, UK: Oxford University Press.
- Ragin, C. C. (1987). *The comparative method: Moving beyond qualitative and quantitative strategies*. Berkeley: University of California Press.
- Ragin, C. C. (2000). *Fuzzy-set social science*. Chicago: University of Chicago Press.
- Ragin, C. C. (2006). Set relations in social research: Evaluating their consistency and coverage. *Political Analysis*, 14(3), 291-310.
- Roberts, C. (1996). *The logic of historical explanation*. University Park: Pennsylvania State University Press.
- Russett, B. (1993). *Grasping the democratic peace: Principles for a post-cold war world*. Princeton, NJ: Princeton University Press.
- Skocpol, T. (1992). *Protecting soldiers and mothers: The political origins of social policy in the United States*. Cambridge, MA: Belknap Press of Harvard University Press.
- Thelen, K. (2004). *How institutions evolve: The political economy of skills in Germany, Britain, the United States, and Japan*. Cambridge, UK: Cambridge University Press.
- Waldner, D. (1999). *State building and late development*. Ithaca, NY: Cornell University Press.
- Woodward, J. (2003). *Making things happen: A theory of causal explanation*. Oxford, UK: Oxford University Press.
- Yashar, D. J. (1997). *Demanding democracy: Reform and reaction in Costa Rica and Guatemala, 1870s-1950s*. Stanford, CA: Stanford University Press.

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