Journal for the Theory of Social Behaviour 46:1
DOI: 10.1111/jtsb.12081

Causality in Contemporary American Sociology: An Empirical Assessment and Critique[1]

BRANDON VAIDYANATHAN,
MICHAEL STRAND,
AUSTIN CHOI-FITZPATRICK,
THOMAS BUSCHMAN, MEGHAN DAVIS AND
AMANDA VARELA

ABSTRACT

Using a unique data set of causal usage drawn from research articles published between 2006–2008 in the American Journal of Sociology and American Sociological Review, this article offers an empirical assessment of causality in American sociology. Testing various aspects of what we consider the conventional wisdom on causality in the discipline, we find that (1) "variablistic" or "covering law" models are not the dominant way of making causal claims, (2) research methods affect but do not determine causal usage, and (3) the use of explicit causal language and the concept of "mechanisms" to make causal claims is limited. Instead, we find that metaphors and metaphoric reasoning are fundamental for causal claims-making in the discipline. On this basis, we define three dominant causal types used in sociology today, which we label the Probabilistic, Initiating and Conditioning types. We theorize this outcome as demonstrating the primary role that cognitive models play in providing inference-rich metaphors that allow sociologists to map causal relationships on to empirical processes.

Keywords: American sociology, causality, cognition, epistemology, metaphor

INTRODUCTION

Causality has a checkered history in sociology. Questions like whether sociologists can legitimately make causal claims and whether causality is necessary in order for sociology to be a science have received different and conflicting answers in the history of the discipline (Mullins, 1973; Bernert, 1983; Platt, 1996). Recently,

© 2015 John Wiley & Sons Ltd

leading theorists and methodologists have taken strong positions on the role that causality should or should not play in sociological inquiry (Goldthorpe, 2001; Morgan & Winship, 2007; Porpora, 2007; Abbott, 2007; Gross, 2009; Reed, 2011; Martin, 2011). While these debates have highlighted and reaffirmed the significance of causal arguments for shaping the field (to good or ill effect), little has yet been resolved about how sociologists *should* make causal claims or whether they should be making them at all. Moreover, the presumption underlying many of these critiques is that causal claims are already being made in sociology. However, there has not yet been any attempt to record these claims as they actually occur in the field, which is to say, in published research articles.[2]

In this article, we attempt to fill that gap and offer a *reflexive* contribution to these debates. Our starting point is not whether causality constitutes good or bad sociology, but instead how prominent causal claims actually are in current sociological research, what these claims look like and therefore how fundamental causality is for the sociological field in practice.[3] This reflexive approach to causality has some precedent. Andrew Abbott (2001), for instance, offers the thought experiment of a historian in the distant future poring over sociology journals in order to make sense of the *weltanschauung* of today's "native" practitioners. Using this perspective, Abbott argues that current sociology appears preoccupied with "causal analysis" and that it suffers from glaring inconsistences between theory and method as a result. To his future historian, "variable relationships" are how today's sociologists identify causality, but it isn't what they mean by it or how they make causal arguments in writing. Our methods may commit us to a view of "general linear reality," but our concepts commit us to something else entirely. Thus, Abbott concludes that contemporary sociologists "live within a view of social reality that [they] don't really believe" (2001, p. 98; see also Snijders & Hagenaars, 2001).

Others have raised similar criticisms regarding the treatment of causality in contemporary sociology (Goldthorpe, 2001; Porpora, 2007). Like Abbott, these authors provide reflexive accounts of causality in the field and make recommendations for addressing present problems. However, and also like Abbott, their empirical treatment of causality is minimal, usually drawn from a narrow convenience sample of introductory or methodological textbooks.

This article focuses on an area largely neglected in prior analysis: documenting the nature of causal claims found in published research. Specifically, we ask: *Do contemporary American sociologists make causal claims in their research? If so, how and when do they make these kinds of claims?* To answer these questions we systematically examine usages of causality in focal arguments of all articles published between 2006–2008 in the *American Sociological Review* and the *American Journal of Sociology*. We find that metaphorical language is fundamental for how these articles make their central claims. Cognitive linguistics provides techniques best suited to identifying the nature of these claims, allowing us to classify these metaphors according to how they enable a specific *conceptualization* of causation (Lakoff & Johnson, 1999).

© 2015 John Wiley & Sons Ltd

This process yields three causal types that appear in sociological research articles: the *Probabilistic*, the *Initiating*, and the *Conditioning*. We find that the third type, the Conditioning Causal claim, is the dominant mode through which contemporary sociological articles express their focal arguments and claims.

Our analysis of this unique dataset contributes to the sociology of scientific knowledge, highlighting the role of cognition in shaping how sociologists make causal claims. This also suggests some limits of philosophical and methodological self-criticism regarding best practices. Our analysis shows that causal claims-making in the field is most contingent on concepts that have thus far eluded theoretical critique. These are the inventory of *metaphors*—for example, "produces," "enhances," "triggers," "springs from," "mediates," "accompanies," "creates"—that sociologists draw from with an astonishing level of consistency to make claims about their empirical findings. We claim that these metaphors do not do trivial work. In the causal claims that we find in these articles, objects (neighborhoods, parents, genders) "enable" other objects or events; one process "generates" or "accompanies" another, while still another "impedes" the growth of something else. These metaphors are essentially *where the action is* in the standard sociology research article. It therefore seems clear that they are pivotal for deciphering an article's claims.

In this article, we argue, drawing from cognitive science, that these metaphors do refer to causal relationships, and that these articles therefore make causal claims.[4] Our primary goal is to demonstrate and support how this is true, and in the process empirically map out the nature of causal claims-making in sociology today.

CAUSAL METAPHORS AND COGNITIVE MODELS

We take a *cognitive* approach to explain how sociologists make causal claims and why they do so in patterned ways. Here we draw on the precedent of the strong program in the sociology of science's application of cognition to scientific thought (Bloor, 1976; 1982). We also draw from Fleck's (1981[1935]) seminal work on "thought styles" in science, and Zeruvabel's (1999) updating of this problematic in the form of scientific "thought communities." However, we depart from these prior applications of cognition insofar as we use cognition less as a metaphorical or theoretical placeholder, with little inherent substance, and more as an empirical psychological process as revealed by research in cognitive science (Lakoff & Johnson, 1999; 1980; Giere, 1988; Talmy, 1988; Johnson-Laird, 1980).

While we draw from this research to make our case for the importance of metaphors for causality in sociology, our approach should be considered "cognitive" primarily in the sense that Stephen Turner (2007) understands the term. As Turner notes, many of the problems of sociological theory (from the classical period to today) stem from adopting anti-realist views of the mind and building theories that don't attempt to reference empirical psychology. From this perspective, a cognitive criterion in theory choice is one that tries to ensure that arguments do not presume an unrealistic view of the mental, without "minimizing

© 2015 John Wiley & Sons Ltd

the cognitive." While we do not come armed with brain-scanning technology to make our cognitive-based claims, we analyze our data in such a way that cognition is given a primary place in the explanation. Our focus on causality is determined not by a philosophical standard, but by the standards of cognitive science. In this instance, our empirical approach uses evidence made relevant by theories of cognition.[5]

The difference cognition makes in this regard becomes clear when comparing it with a *rhetorical* analysis, which is the framework that is usually drawn upon to explain the use of metaphor in science (Gross, 1996, pp. 81–82). This perspective implies that metaphors have no conceptual significance and are instead "sophistic" tools used by scientists to establish scientific authority and persuade readers. This means that there is only an aesthetic or stylistic constraint on their usage, and they are *not* essential to the nature of the claims being made in a scientific article. A cognitive perspective, on the other hand, recognizes that metaphors carry a great deal of the conceptual load in a research article—in most cases they are directly involved in reporting the key empirical claim. Moreover, semantic differences alone do not appear able to capture the set of inferences produced by applying the metaphors. Indeed, because of how closely these metaphors are woven into the argument of each article, one type of metaphor cannot be traded for another without serious consequence.

The tendency to view metaphor as rhetoric, and to dismiss these metaphors as the site of causal statements, is ultimately based on the idea that causality has or should have only one true meaning. Because thought (especially scientific thought) is conceived as *literal* from this perspective, relationships not directly stated (i.e. something "causes" something else) are mere obfuscation. However, we find that, given the multiple metaphoric renderings of causation, and the heavy conceptual load that metaphors appear to carry in these articles, this explanation is unconvincing.

Instead, the "imaginative" application of metaphors is a pivotal aspect of the scientific research process. Not only that—and perhaps counter-intuitively—metaphors are fundamental to causal best accounts of empirical findings, and thus are not easily extricable from them without great loss. Here our argument about the conceptual role of metaphors parallels Nancy Cartwright's (2004) claim about the role that "thick causal concepts" (like "sucked," "feeds," "enriches," "clogs") *should* play in causal arguments in science. She frames this as a critique of formal models of causation (that generally only use the term "cause") in the natural sciences.[6] In the same sense, if we rarely found an article that uses the term "cause" this is not evidence that sociologists are reluctant to make causal claims; it is because the term "cause" is so inference-poor that it actually does a shabby job capturing causal relationships. A metaphor—like "triggered"—does much better.

As mentioned, we draw a long list of metaphors out of these articles, each of which appears to be making some type of causal claim. But our analysis also reveals that these metaphors can be classified together into different groups

© 2015 John Wiley & Sons Ltd

according to how they "hang together" and bear a common causal meaning. Drawing from Lakoff and Johnson (1999), we find that the meaning of the metaphors ultimately rests in underlying cognitive models, which is the basis for their common classification.[7] Thus, we argue that the metaphors found in sociologists' causal arguments are animated and rendered meaningful by the richly inferential, *causal-logic structure* of three cognitive models: the Probabilistic (PC), the Initiating (IC) and the Conditioning (CC), with the Conditioning being the most prominent in sociological research.

TESTING THE CONVENTIONAL WISDOM

A number of prior studies have evaluated causality in American sociology and made several distinct, and often highly critical, claims about it. Given the redundancy and persistence of these claims, together they constitute something akin to conventional wisdom. However, as mentioned above, these claims are not grounded by thorough examinations of how causality is (or is not) used in the discipline. We fill this gap by examining all research articles published in *ASR* and *AJS* between 2006–2008. To analyze these data, we first draw a set of research questions from prior arguments in order to test the conventional wisdom and thus establish a clear line of relevancy for current debates about causality in the discipline.

(1) Variables-Language

Jasper and Young (2007, p. 273) identify the existence of "misplaced concreteness" in sociological claims, which they define as "variables inflated into concepts and theories, just as theories are reduced to one or two variables." Porpora (2007) argues that there is a "causal confusion" in American sociology, reflecting the centrality of variables-based analysis in the discipline. He identifies an empiricist bias that results in a tendency to skirt over conceptual considerations and cut to the empirical as quickly as possible, especially when dealing with troublesome concepts like causality. This has created a sharp distinction between causality and interpretation, reducing causality to testable one-liners about associations between variables (Porpora, 2007, p. 201). According to Goldthorpe, "where the ultimate aim of research is not prediction per se but rather causal explanation, an idea of causation that is expressed in terms of predictive power [is] likely to be found wanting" (2001, p. 14). Thus, published research that expresses ideas of causation in terms of "predictive power," or "variables language," would represent an incongruity pointing to a deeper, more fundamental confusion about causality in the discipline. Such concerns lead us to our first research question: *What is the most common view of causality in contemporary American sociology?* Implicitly, we ask: *is it the covering law model, based on "variables-language"?*

© 2015 John Wiley & Sons Ltd

(2) Causality and Methodology

For Bernert (1983), the history of causal usage in sociology is dictated by methodology. Methods are not conceptually innocent, but rather drive much of the thinking behind the causal claims sociologists make. This echoes Abbott's (2001) claim about the disconnect between theory and method (because methods contain their own causal theory), and Collins' (1984) view that methodologies are both descriptive *and* explanatory. From this perspective, we would expect, for instance, the additive view of causality to be dictated by the use of linear modeling methods. Conversely, we might expect research articles based on more qualitative methods to make less associational and more direct causal claims. In order to evaluate whether such claims represent the state of the discipline, we ask: *Do different types of causal claims correlate highly with specific methodologies? In particular, do quantitative studies make unique types of claims?*

(3) Causal Mechanisms

As Gross (2009) suggests, there is a tendency in recent scholarship to identify "mechanisms" in order to overcome the causal "black box" and extract more valid causal claims from relationships between variables. The notion of mechanisms appeals to scholars critical of the covering-law model championed by positivism and its "variabilistic" approach of finding correlations between categories and events. Mechanisms indicate explanations of, rather than merely statements about, the causal connection between variables (Elster, 1989, p. 4). Despite the pervasiveness of the concept and its longstanding use in the sociological lexicon (Hedström & Swedberg, 1998, pp. 4–6), debate continues regarding its meaning and utility. For instance, a recent review finds 24 distinct definitions of the term in current use (Mahoney, 2001, pp. 579–580). This multitude of use suggests mechanisms serve as a "root metaphor"—a taken-for-granted conceptual tool that is used ambiguously (Aro, 1993, p. 91). Our third general research question holds aside theoretical debates about the nature of mechanisms, and asks: *Is appealing to the notion of mechanisms a common way to make causal claims in American sociology today?* And to examine whether the use of this notion is simply an artifact of methodology, we ask, *are quantitative articles less likely to do so than those based on qualitative methodologies?*

DATA AND METHODOLOGY

This study introduces empirical findings drawn from content analysis of articles in the two leading journals in American Sociology: the *American Journal of Sociology (AJS)* and the *American Sociological Review (ASR)*. These journals are central to the

© 2015 John Wiley & Sons Ltd

discipline, both as an outlet for research as well as a venue for empirically driven overviews of larger book projects. Taken together, they represent a window into the mainstream of contemporary professional sociology (Leahey, 2008). The ideas, assumptions and approaches exemplified by articles published in these two flagship journals are widely cited and often emulated, both within sociology (Allen, 2003; Phelan, 1995) and beyond (Giles et al., 1989). We agree with assessments that the double blind review process results in articles that better (and more consistently) represent the state of the field and lead to greater conservatism regarding new approaches and paradigms compared to books (Smilde & May, 2010). While recognizing the tremendous amount of innovative work that emerges from books, this study does not address similarities and differences in causal approaches between books and articles.

Our primary analysis is focused on the contemporary state of the field, for which we draw on the complete population of 233 articles in all issues of both journals between 2006–2008.[8] Descriptive data gathered from each of these articles included types of funding acknowledged (i.e., internal, external-private, external public), gender of first author, and data/methodologies used (up to three types). Because funding sources and author gender did not, in our analyses, have any bearing on the types of causal claims or methodologies used, we omit them from our presented results. Table 1 presents the methodologies used in the population of articles by journal between 2006–2008.

The principal data we gathered consisted of types of causal statements that were used in articles for making their central or focal claims. We limited these to the sorts of claims which (a) connect the article's title, abstract, and conclusion; (b) are often preceded by language such as "we argue that," "this paper finds that," "our results show," "we conclude that," and so on; and (c) usually have consistency across the article in the *explanans* and *explanandum*. In other words, we looked for the kinds of claims that the authors might make in an "elevator pitch" summarizing their study. We identified these focal statements in the Abstracts and the Discussion/Conclusion sections of articles, recognizing these sections as the most likely venues in which the articles' central claims were made.[9] Having identified these focal statements, we categorized them into three types of causal claims that we discuss below by asking whether each claim could be reworded as an instance of one of these types. We then coded whether the article's focal claims were made using any of these three types (recording up to one instance of each) in the Abstract and the Discussion/Conclusion.

Coding Causality

Coding causal claims in science is a process made doubly difficult by philosophical disagreement over what legitimately counts as a causal relationship. This is probably why it has (to our knowledge) never been systematically done before in

© 2015 John Wiley & Sons Ltd

Table 1. Methodologies used in AJS and ASR articles, 2006–2008

	AJS		ASR		Total	
	N	%	N	%	N	%
Number of articles	106	45%	127	55%	233	100%
Methodology						
Cross-sectional data analysis	25	24%	30	24%	55	24%
Longitudinal / panel data analysis	19	18%	30	24%	49	21%
Time series / cohort analysis	18	17%	25	20%	43	18%
Historical case studies, non-comparative	16	15%	23	18%	39	17%
Multilevel model analysis	14	13%	17	13%	31	13%
Social network analysis	11	10%	16	13%	27	12%
In-depth / focus group interviews	10	9%	15	12%	25	11%
Event history analysis	8	8%	10	8%	18	8%
Historical / comparative case	11	10%	6	5%	17	7%
Content analysis / discourse analysis	6	6%	10	8%	16	7%
Ethnography / participant observation	2	2%	10	8%	12	5%
Mathematical modeling / formal theory	7	7%	2	2%	9	4%
Experiment / audit study	5	5%	1	1%	6	3%
Spatial data analysis / GIS	3	3%	3	2%	6	3%
QCA / fuzzy set analysis	1	1%	2	2%	3	1%
Theoretical	3	3%	0	0%	3	1%

Note: Due to coding for up to three methods used, methodology percentages do not sum to 100%.
All percentages shown for Number of articles, Methodology, and the Total column are percentages of the total sample.

the social sciences. However, as noted above, our task took an unexpected turn once we encountered the widespread use of metaphors in these articles. These quickly (though surprisingly) became the target of our coding efforts, and we realized that causal claims were much less straightforward to us when we allowed theories of what causation is (or should be) to join the party. Terms like "determines," "triggers," "enhances," "conditions," "accompanies" or "predicts" sparked debates among us co-authors over coding them as causal. These debates involved justifications that tested the causal process implied by the term with a *theory* of what causation should be (whether this theory was fully explicated or not).

The inconsistency between what, on the face of it, seemed like a causal claim and what, using theory, contradicted that sense, led us to ask whether it wasn't the *metaphors* themselves that were doing the bulk of the conceptual labor in these passages and thus guiding our coding. But how could that be? While the metaphors appeared to yield causal meanings, we couldn't justify exactly why they did. We found a ready answer in Lakoff and Johnson's argument that "causation is a multivalent radial concept *with inherently metaphorical senses*" (1999, p. 226; emphasis added). Following this line of reasoning—that "the fundamental role of metaphor

© 2015 John Wiley & Sons Ltd

is to project *inference patterns* from the source domain to the target domain—we could also account for the varied, but non-random use of different metaphors (Lakoff & Johnson, 1999, p. 128; emphasis added). Our task now was to boil these metaphors down to *prototypes* that provided the source domain for the causal "inference patterns" of each metaphor as it was applied to a target domain of relationships between empirical objects. In this way, we classified each of the metaphors according to the prototypical causal-logic structure that it best fit.

Initiating causal claim (IC). These are causal claims that adopt the following structure: *Initial state X → forced movement from state X to state Y because of force F in object P → subsequent state Y.* The metaphors they identify for this type share in common a conception of causation as forced movement: "*bring, throw, drive, pull, push, propel, thrust, and move*" (Lakoff & Johnson, 1999, p. 184, emphasis original). Claims using such terms can typically be restated as "the forces found in object P are responsible for causing a shift from condition X to condition Y." The unfolding, temporal structure built into these kinds of claims makes them resemble "billiard ball causation" (Cartwright, 2004).

Conditioning causal claim (CC). These claims evoke a type of figure-ground relationship in which causation is conceptualized as the transfer of a "possessible object" to or from an entity, rather than as forced movement, which is the case in the first type. The figure-ground relationship is such that: *Figure = Effect; Ground = Affected Entity*. Here, the causal force is applied to the effect, rather than to the affected party (i.e. the family context gives a cumulative advantage [Figure] to upper middle-class youth [Ground]). Such claims cannot be simply reformulated as an "X causes Y" statement; instead, they must be stated as "X is the context or condition under which Y is caused." Alternatively, we could characterize the difference between this type of causal claim and the previous one as a concern with ground rather than with figures. Such causal claims are made using terms such as "conditions," "affects," "shapes," "mediates," and "contributes to."

Probabilistic causal claim (PC). These are claims in which causation is conceptualized, at least implicitly, as correlation—"X varies with Y." For instance, this is present in statements such as: "Pressure goes up *with* an increase in temperature. Homelessness *came with* Reaganomics" (Lakoff & Johnson, 1999, p. 218, emphasis original). In addition to this "correlation is causation" metaphor, also common is the "probability is distribution" metaphor—or the view that "the probability of an event happening to an individual in the future equals the distribution of occurrences of these events happening to a large enough sample of the population in the past" (Lakoff & Johnson, 1999, pp. 219–220). Together, these two metaphors give us the notion of probabilistic causation: *Variable Y is highly correlated with Difference D in the Distribution of Variable X; thus, Y causes Difference D in the probability of Occurrence of Variable X.*

© 2015 John Wiley & Sons Ltd

At this point, the objection might be raised that "correlation does not equal causation" and that the kinds of claims that use the terms "accompanies," "is associated with," "varies with," or "predicts" should not be coded as causal. Such correlations are, at best, *indicative* of causes, and that making causal claims using these terms requires additional effort to rule out confounding factors. However, not all uses of probabilistic causal claims carry this *caveat emptor*. The much larger point that the "correlation is not causation" problem raises is that all instances of causal usage are fundamentally about processes of *forced movement* (Talmy, 1988). On the one hand, this explains why correlational claims are often treated or understood (mistakenly or not) as causal; on the other hand, it reveals that correlational arguments, drawing from the probabilistic prototype of causality, are *not* fundamentally dissimilar from other kinds of causal arguments, they just involve a different process of forced movement. Indeed, only when there is an insufficient resemblance to this prototype of causation do we cease to characterize what happens as causal.

Thus, the essential difference between the different types of causal claims involves the "determining factor" (or force) driving the causal process. If for IC claims this is found in a key *object* that starts a causal process, then in CC claims, force is located in an *environment* to which affected entities are exposed. For PC claims, force is also found in a key object, but its effect is not initiating but *associative*: it simply leads another object to manifest itself in a certain way. On this basis, metaphors are rendered more or less appropriate relative to the kind of determining factor (object, environment or association) that is detected in a target domain.[10]

While additional (or even competing) claims may be made in the body of an article, our focus on the Abstract and Discussion/Conclusion sections reflects a sense that these are the sections where the most attention is paid to specifying the article's main claims (including central causal relationships). Since we conducted thorough textual analysis and not simply word counts, we were able to discern those arguments originating from the article's author(s) and those originating elsewhere. That is to say, we read the usage of the term to discern its purpose in the framework of the article. Thus, we did not code causal claims that were made by others whom the article's authors were merely citing (i.e., claims that were not incorporated into the article's focal arguments).

These causal claims were recorded in a spreadsheet by two independent coders, each of whom coded the entire sample. We coded for the presence or absence of such claims in the Abstract and Discussion/Conclusion, recording up to one instance of each of the three claim types in each of the two article sections. The coding yielded an inter-coder reliability statistic of Cohen's Kappa = 0.70 and average percent agreement of 88.9%. Subsequently, all instances of disagreement between coders were discussed to arrive at a consensus.

We propose this coding scheme as an initial effort to advance a typology of *naturally occurring* causal claims in sociology. It is our hope such a resource might

© 2015 John Wiley & Sons Ltd

add conceptual clarity to future discussions of this issue. This typology is by no means an attempt to resolve ongoing debates over causality in the philosophy of science. We record practical logic and use, rather than broad philosophical implications or authorial intent.[11]

Literal causal language. We also coded for the presence or absence (1, 0) of instances of terms such as "cause," "causal" and/or "causality" in the Abstract and Discussion/Conclusion. In addition to our categorization of the types of causal claims discussed above, recording instances of literal causal language allowed us to assess the extent to which contemporary sociologists are willing to explicitly reference causality. We recorded causal language in two variables. The first variable captured instances in which the language of causality was used in order to make the article's central claims—for example, "colonial policy was overdetermined by an array of causal processes" (Steinmetz, 2008, p. 15) and "racial territoriality and animus induced by social change are a direct cause of antiblack hate crimes" (Lyons, 2007, p. 848). Some authors, however, used such causal language in reference to their central claims and arguments, but did not make a causal claim. For example: "further work is needed to clarify these causal relations" (Schneiberg et al., 2008, p. 656). Such usages were recorded in a second binary variable.

Mechanism language. We coded for the presence or absence (1, 0) of the use of the term "mechanism" in the Abstract and Discussion/Conclusion. Similar to our coding of causal language above, we used two separate variables to record instances in which mechanism language was used in making the article's focal questions or claims, or when such language was used in other ways.

FINDINGS

In what follows, we first discuss the types of causal claims we found, and subsequently present statistical analyses of some of our results in order to address our three research questions. Table 2 (above) presents key terms that resulted from our coding. While we anticipated greater mutual exclusivity among the three categories of causal claims, we found that some of the indicative terms could fall into different categories. For example, metaphors such as "increases," "decreases," or "accompanies" are in some cases used in a probabilistic sense (PC), such as statistical correlations, whereas in other cases they were used to indicate conditioning effects (CC). We strove to remain consistent with our coding decisions in categorizing even these ambiguous terms according to which family of metaphors the particular usage best fit with—that is, whether the term could be rephrased as "X is a cause of Y" (IC), "X conditions or provides the context for Y" (CC) or "X varies with Y" (PC).

© 2015 John Wiley & Sons Ltd

Table 2. Examples of causal metaphors in *AJS* and *ASR*, 2006–2008

Initiating Causal (IC) Claim	Conditioning Causal (CC) Claim	Probabilistic Causal (PC) Claim
Because	Affects	Accounts for (percentage of variance)
Causes	Amplifies	Associated with
Creates	Conditions	Correlated with
Determines	Constrains	Increases / Decreases with
Due to	Depends on	Predicts
Generates	Empowers	Related to
Give rise to	Enables	Varies with
Is a consequence of	Encourages	
Is a major proximate cause behind	Enhances	
Is responsible for	Impedes	
Necessitated	Increases / Decreases	
Produces	Influences	
Required	Is a function of	
Resulted from	Is contingent on	
Springs from	Makes it difficult for	
Tipped	Mediates	
Triggered	Moderates	
Ultimate causal forces are	Narrows	
Was the driver for	Obstructs	
	Rests on	
	Sets the context for	
	Shapes	
	Stimulates	
	Structures	

Types of Causal Claims

Table 3 summarizes the prevalence of these three types of causal claims we found in our sample, as well as the some of the language used to make such claims. Fully 76 percent of the articles in our sample make their focal claims using IC or CC claims either in their Abstracts or Discussion/Conclusion sections. If we consider articles that made such claims in *both* their Abstracts as well as Discussion/Conclusion sections, the number falls to 51 percent of the sample. The most prevalent causal claim used to make the article's focal claims is the CC type, which is prevalent in 57 percent of the articles in our sample. These findings differ little between the two journals.

Causal Claims and Methodology

To assess the relationship between methodology and type of causal claim made, we conducted logistic regression analysis of type of causal claim (in either Abstract

© 2015 John Wiley & Sons Ltd

Table 3. Coding Causality: Summary of findings

	AJS		ASR		Total	
	N	%	N	%	N	%
Number of articles	106	45%	127	55%	233	100%
Causal Claims						
Initiating Causal (IC) Claims						
Abstract	31	29%	29	23%	60	26%
Discussion/Conclusion	27	25%	36	28%	63	27%
Abstract or Discussion/Conclusion	40	38%	48	38%	88	38%
Abstract and Discussion/Conclusion	18	17%	17	13%	35	15%
Conditioning Causal (CC) Claims						
Abstract	45	42%	56	44%	101	43%
Discussion / Conclusion	48	45%	53	42%	101	43%
Abstract or Discussion/Conclusion	59	56%	74	58%	133	57%
Abstract and Discussion/Conclusion	34	32%	35	28%	69	30%
Probabilistic Causal (PC) Claims						
Abstract	12	11%	20	16%	32	14%
Discussion/Conclusion	11	10%	16	13%	27	12%
Abstract or Discussion/Conclusion	14	13%	30	24%	44	19%
Abstract and Discussion/Conclusion	9	8%	6	5%	15	6%
IC or CC in Abstract or Discussion/ Conclusion	77	73%	100	79%	177	76%
IC or CC in Abstract and Discussion/ Conclusion	60	57%	59	46%	119	51%
No causal claim in any section	23	22%	20	16%	43	18%
Language-use						
Causal Language in any section	28	26%	29	23%	57	24%
Causal Language in focal claim	14	13%	13	10%	27	12%
Mechanism Language in any section	62	58%	63	50%	125	54%
Mechanism Language in focal claim	31	29%	29	23%	60	26%

Note: Due to rounding, not all values sum to 100%.
Percentages shown for "Number of Articles" and for the "Total" column are percentages of the total sample. Other percentages shown are within-journal.

or Discussion/Conclusion) on different methodologies.[12] Although we recorded up to three different types of methodologies, our analysis restricts us only to discussing net effects, which obscure the effects of mixed methods. Further, because of the relatively small number of articles in some of our methodology categories, we had to combine categories in order for the analysis to be viable. Several patterns emerged from our analysis.

IC claims were most likely to be made in articles that use either network analysis or historical-comparative / historical-case methods. In comparison to our reference category—cross-sectional data analysis, which was the dominant method used in the sample—the use of either historical or network analysis

© 2015 John Wiley & Sons Ltd

increased an article's odds of making an IC claim by more than 50 percent. In contrast, articles relying on ethnographic or interview data, content/discourse analysis, or multi-level model analysis were substantially less likely to make IC claims than articles based on cross-sectional data analysis.

Examining CC claims revealed a different pattern. In comparison to articles relying on cross-sectional data analysis, the odds of CC claims being found in the article's focal claims were considerably less in articles that are primarily theoretical or that rely on formal/mathematical modeling. Otherwise, however, there were negligible differences among the other methodology types in their likelihood of making CC claims.

The use of PC claims in making the article's focal claims is more likely to be found in articles using longitudinal/time-series or multi-level modeling in comparison to those relying on cross-sectional analysis. Not surprisingly, PC claims are significantly less likely to be made in articles relying on ethnographic, interview, discourse / content analysis, or historical-comparative or historical-case methodologies.

Finally, some articles were more likely than others to make no causal claims in their focal claims in either their Abstract or Discussion/Conclusion sections. Here, the odds of articles relying on ethnographic, interview, discourse/content analysis methodologies were more than 2.5 times greater than those for articles relying only on cross-sectional data analysis. The odds were even greater (more than 8 times as much) for theoretical or formal modeling-based articles.

Claims and Language

Table 3 (above) demonstrates that the use of literal causal language—"causes," "causal," "causality"—is uncommon, with only 12 percent of focal claims containing such language. (In 24 percent of the articles, such language appears elsewhere than in the article's main claims). The use of the word "mechanism" is much more common, with 26 percent of articles using the word in their central claims. Causal and mechanism language is present in far more articles than use them in central claims. Usually the concept of "mechanism" is used to refer to the processes identified in the focal claims of the article, but not in these claims themselves. At times, articles that use these terms in places other than their central claims express that they are unable to establish causality or specify causal mechanisms (thus signaling an interest in, but inability to make, such causal claims).

Is there a relationship between methodology and mechanisms-language? We conducted further logistic regression analysis of mechanisms-language on methodology.[13] We found that on average, articles based on cross-sectional data analysis or on network analysis have the highest odds of referring to "mechanisms" in making the article's focal claims. Articles based on either longitudinal /time series analysis, multilevel model analysis, or historical-comparative / historical-case

© 2015 John Wiley & Sons Ltd

analysis have relatively lower odds of using this term in their central claims (all at around 0.6 times that of articles based on cross-sectional data). In comparison, articles based on ethnographic and interview data are the least likely to use this term in their central claims.[14]

Overall, however, it is relatively uncommon for the causal claims themselves to actually contain the language of causality or mechanisms. Instead, such articles more often than not make causal claims using the variety of metaphors that we presented earlier (Table 2).

ASSESSING THE CONVENTIONAL WISDOM ON CAUSALITY

With regard to the first research question guiding our study—*What is the most common view of causality in contemporary American sociology?*—we found that it is the Conditioning type of causal claim. Contrary to what reading some critics might lead one to assume, the additive view of causality, which attempts to explain away a dependent variable by accounting for the effects of the independent variables that produce it and which is clearly expressed in PC claims, is the least common way in which contemporary sociologists make causal claims. More prevalent, rather, are claims that express stronger conceptions of causality—claims about factors that either shape conditions under which outcomes are caused, or that are themselves causes of outcomes. Indeed, the vast majority of articles made at least one IC or CC claim in their focal arguments. We also found that it is rare for *ASR* and *AJS* articles to make causal claims in the form of if-then statements or "one-liners" akin to positivistic laws (e.g. the sorts of claims that Porpora [2007] notes characterize the approach of "rational choice" theorists).

Our second research question asked *whether different types of causal claims correlate highly with specific methodologies*. We found that there are differences in the likelihood of articles relying on certain methodologies to make certain types of causal claims (or not to make causal claims at all) in their focal arguments. Some of these findings may be unsurprising: articles relying on ethnographic / interview data or discourse/content analysis are significantly less likely than large-N studies to make PC claims. However, there are also findings that are difficult to explain: these very same ethnography / interview-based articles are *less* likely than large-N studies to make either IC or CC claims, and much more likely to make *no* causal claim in their focal claims.

The patterns we see in the relationship between methodology and causal claim are not straightforward. For instance, causal claims of the CC type do not always come out of comparative / historical research, as one might expect, and PC claims are not always found in cross-sectional data-based articles. Such patterns may indicate conventions that govern sociological analysis based on certain methodologies: articles based on qualitative observational, interview, or content analysis tend to avoid IC or PC claims; articles based on historical-comparative or -case

© 2015 John Wiley & Sons Ltd

analysis are relatively prone to using IC metaphors. Multi-level model analysis and longitudinal / time series data-based articles have a relatively high likelihood of using PC metaphors, even though one might think they have more warrant to make "stronger" causal claims than articles based on cross-sectional analysis. But our concern was not to assess whether the types of causal claims made were warranted by the methodologies used, but primarily to map out the types of claims made. Furthermore, with the dominant type of causal claim made (CC), we see considerably less methodology-driven variation than with other types. Thus, while our findings reveal some patterns indicating relationships between causal metaphors and methodology, they challenge the argument that models of causality are simply a function of methodology.[15]

Our third general research question asked whether *"mechanisms" are a common way to make causal claims, and whether their use is contingent on methodology*. We found that the language of mechanisms was used to make causal claims only about one quarter of the time, even though mechanisms language was fairly prevalent in these articles otherwise. We also found that articles based on some kinds of quantitative methods (such as cross-sectional data analysis and network analysis) were more likely than others to use this term, and articles based on some kinds of qualitative methods (ethnography, interview, and discourse/content analysis) were relatively less likely, with other methodologies falling in between. In at least some cases, it seemed to us as though the use of the notion was employed to add a causal flavor to an otherwise "variabilistic" argument, but this was not a general trend. We have not attempted to evaluate the lack of conceptual clarity that others have insisted characterizes the notion of mechanism. Yet its pervasiveness in articles bolsters Aro's (1993) contention about its status as a "root metaphor" in the discipline. In terms of causal language generally, we found the literal use of causal terms ("causes," "because," "cause of") to be rare when making causal claims. Much more common is the use of other metaphors ("drives," "produces," "mediates," "conditions") to express causal relationships. In particular, we have found that it is metaphors expressing Conditioning Causal arguments that are most prominent contemporary American sociology.

METAPHOR AND TRUTH

It might be objected at this point that with our reflexive focus on cognition, we remove any chance for causal claims to also be *truth* claims and for sociology to produce knowledge of the social world. If the world consists of objects, that we access through experience, that we understand through categories and concepts that are "true" if they correspond to the properties in those objects, shouldn't the language we use to express these concepts and categories and their relationship to those objects be stated as clearly and precisely as possible? Doesn't the meaning of a scientific statement ultimately rest in the objective conditions that make it true

© 2015 John Wiley & Sons Ltd

or false? How are metaphors and cognitive models not an obstruction of scientific knowledge in this regard?

Our main objection to these points is that they fail to consider sociologists as cognitive agents and scientific arguments as a special type of cognitive representation. For a cognitive approach, it is because we already "understand *situations* in terms of concepts that we can understand causal *statements* using metaphors as *true*" (Lakoff & Johnson, 1980, p. 172). In the same manner, we understand a scientific argument as true by fitting our understanding of it to our understanding of its target-domain. Thus, the truth of metaphors rests not on their connection with the inherent properties of objects but on their fit with a preexisting understanding of those objects as part of a target-domain.

While this may seem to run counter to most epistemologies of causation, it is not so unusual. As Hitchcock (2003) argues, even Hume's influential empiricist formulation couched causality in metaphor: consisting here of the "links" or "connexions" that are "really to us the *cement* of the universe." In this regard, the truth of Hume's metaphors about causal "links" and "connexions" is determined relative to his metaphoric representation of the universe as a target-domain that consists of a kind of "cement." More recent philosophical theories of causation (by David Lewis, Wesley Salmon, J.L. Mackie, among others) which focus on causal "connections," "chains," or "processes" are metaphoric in a similar way, even if their metaphors have acquired technical meanings that make them seem "dead."[16] In a similar manner, what the causal relationship actually *is* is determined relative to what it *can be* on the basis of a preexisting understanding of the target-domain where it applies. Given the cognitive importance of metaphors for representing both causal relationships and the target-domains, truth therefore becomes "a function of our conceptual system" (Lakoff & Johnson, 1980, p. 179).

Yet, far from being subjectivist or merely "transitive," this conceptual system rests on a natural foundation. The preexisting understandings are derived both experientially, from successful functioning in a physical and cultural environment, and scientifically, or from participation in a scientific field. For scientific fields, the preexisting understanding involves the "active preconditions" or "background" assumptions and practices that, as a product of the history of a field, provide the basis for making coherent knowledge claims (Fleck, 1981[1935], p. 40; Bourdieu, 1975; Abend et al., 2013). There are many influences that shape and determine these preconditions (including, we would argue, the experiential domain itself), however none of them negate the importance of metaphor for making causal claims.

For our purposes, the main point is that the truth of causal statements, from a cognitive standpoint, is largely a function of *understanding* in this respect, and therefore involves a "passive" form of cognition that builds on the scaffolding provided by the "active linkages" of background assumptions.[17] The appeal of a causal argument lies in ascertaining the relationship between its metaphors and

© 2015 John Wiley & Sons Ltd

this field-level understanding of its target-domain.[18] Mapping our understanding of the one onto our understanding of the other becomes, in this regard, an essential precondition for cognitively making a judgment of truth. Applying this to our sample, then, the relative prominence of the CC prototype and its metaphors indicates a *logic of fit* between its entailments and a preconception of the social world that currently resonates in the sociological field.[19]

CONCLUSION

Drawing from all articles published in *AJS* and *ASR* between 2006–2008, this article has provided an empirical and descriptive picture of causal usage in contemporary American sociology and an initial typology of naturally occurring causal claims in sociology. Additionally, our data allowed us to test what we refer to as the conventional wisdom about causality in sociology: whether it is used, how it is used, and the kinds of factors that influence its usage in the field.

Our findings reveal the predominance of the Conditioning type of claim in the metaphors used to make causal claims in the key arguments of research articles. This finding challenges the expectation that the dominant mode of causality would be "variabilistic" (although whether the types of causal claims made are warranted by the methodologies used—and hence whether there is indeed a "causal confusion" as Porpora [2007] claims—we have not attempted to ascertain). Further, while we found some patterns in the relationship between methodology and type of causal claim, the link between the two is not straightforward. The dominant type of causal claim (CC) is just as likely to be made in articles using varied kinds of qualitative and quantitative methodologies. While there are certainly patterns indicating the likelihood of being associated with some methodologies rather than others, on the whole the metaphors used in causal claims cannot simply be reducible to methodology. Finally, we found that the use of various ordinary metaphors (as identified in Table 2) was much more prevalent than the previously identified root metaphor "mechanism" in making causal claims.

Our theoretical approach and coding efforts were determined by our effort *not* to "minimize the cognitive" (Turner, 2007), and thus we define our approach in this article as "cognitive" insofar as it remains consistent with the consensus view on how causation works in human reasoning. From this perspective, causation is a process of forced movement that is conceptualized with the aid of metaphors. These metaphors are inference-rich, and their meaning is reflective of relationships in underlying cognitive models. When mapped on to empirical target-domains, they meaningfully structure the relationships detected there as *causal relationships*.

The initial puzzle that pushed us toward cognition was the surprising role that metaphors play in causal claims-making and the patterning we found there, with many of the same metaphors used again and again to report empirical findings.

© 2015 John Wiley & Sons Ltd

Adding to this is the fact that we didn't find theories or other justifications that might lend conceptual support for this usage. In this sense, the metaphors appeared to be ordered and naturally occurring. Moreover, as mentioned above, our own coding efforts confirmed this point. Disagreements over the causal meaning of metaphors were almost always initiated as way of second-guessing what otherwise appeared to each coder as a metaphor with a causal meaning.

As drawn from our data, the metaphors sociologists use to make empirical claims are grouped together under cognitive models that, we argue, explain why that usage is so consistent and structured. These cognitive models feature a unique causal-logic, which credits different "determining factors" as responsible for the *forced movement* observed in an empirical setting. We locate three models of this kind in causal usage: the *Initiating*, which credits a forceful *object* that starts an unfolding causal process; the *Conditioning*, in which force is located in an *environment* to which affected entities are exposed; and the *Probabilistic*, which also credits a forceful object, but with an *associative* instead of initiating effect.

Based on this analysis, we derive three primary implications for understanding causality in sociology. The first pertains to the neglect of the cognitive source of causal claims-making in debates over causality. Philosophical argumentation about causation in sociological research appears to miss what we have highlighted as a key factor: the role of *metaphors*. Because of the similarity in the types of causal claims made by researchers, it appears that their writing in these journals is only loosely coupled with—if not altogether independent of—their own philosophical commitments (if any) about causality.

Second, although methodology does seem to have some relationship with whether or not an article makes a causal claim at all, it does not completely determine the type of causal usage. In other words, having accounted for the role of both theory and method, a kind of excess of causal claims-making remains. We argue that this excess is *cognitive* and that theoretical and methodological debates about causation in sociology have thus far neglected it.

Finally, our approach reveals the problem of trying to determine "one true theory (or method) of causation" when causation (as *cognition*) is radial and multiply realizable. This suggests that tying causal claims to theory or method might not impact causal claims-making in the discipline in the way theorists would like, specifically by unifying its meaning and standardizing its usage (perhaps with the literal "X causes Y"). In fact, we would argue that even if the field could be influenced so that causal claims would typically be structured in this way, it would likely not eliminate the problems theorists often find with causation (inconsistent usage, strange ontological presumptions, basic illogic), nor would it necessarily lead these claims to be any stronger. On the contrary, the sociological approach to causality could be amended instead through careful scrutiny and critique of the metaphors that sociologists use and with what justification.[20] If sociologists are in fact cognitive agents, this reveals an additional set of conditions under which they produce social knowledge.

© 2015 John Wiley & Sons Ltd

Brandon Vaidyanathan
Department of Sociology
Rice University
Houston, TX 77005
USA
brv1@rice.edu

Michael Strand
Department of Sociology
Bowling Green State University
1001 E. Wooster Street
Bowling Green, OH
434003-0222
USA
mstrand@basu.edu

Austin Choi-Fitzpatrick
School of Public Policy
Central European University
Nador u. 9
Budapest, 1051
Hungary
choifitza@ceu.hu

Thomas Buschman
Independent Scholar
805 Higgins Avenue
Neenah, WI 54956-3346
USA
thom.buschman@gmail.com

Meghan Davis
Georgetown University School of Medicine
1718 37th St NW
Washington, DC 20007
USA
meghandavis24@gmail.com

Amanda Varela
315 Main Building
University of Notre Dame
Notre Dame, IN 46556
USA
avarela1@nd.edu

© 2015 John Wiley & Sons Ltd

Acknowledgements. Many thanks to Christian Smith, Omar Lizardo, Lyn Spillman, Erika Summers-Effler, Doug Porpora, Heather Price, Gabriel Abend, Athanasios Karafillidis, Fuyuki Kurasawa, Isaac Reed, Neil Gross, and anonymous reviewers for their comments on versions of this paper. An earlier version of this paper was presented at the annual meeting of the American Sociological Association in 2010.

NOTES

[1] The first two co-authors share authorship equally. Please direct correspondence to Brandon Vaidyanathan (brandonv@rice.edu) or Michael Strand (mstrand@bgsu.edu).

[2] The one exception is Abend et al. (2013), which empirically examines "styles of causal thought" in ethnographic articles.

[3] Here we follow the programmatic view of reflexivity that it involves "[taking] as one's *topic* one's target's *resource*" (Zammito, 2004, p. 2; emphasis original).

[4] Indeed, our coding (described below) was remarkably consistent in identifying these metaphors as bearing a causal meaning in the sites where they were used In fact, it was only when we *subsequently* enlisted a theory about what causation is or should be (like critical realism or empiricism) that our coding efforts, which we will describe further below, became most equivocal.

[5] The larger point to make, especially for sociology, is that retaining an anti-realist view of the mind by remaining tied to discourse, particularly as the conceptual basis for reflexive analysis in the sociology of science and knowledge, has diminishing returns given the collapse of behaviorism in psychology and the corresponding rise of the "cognitive revolution" (Gardner, 1985).

[6] However, Cartwright doesn't try to boil these "thick" terms down to any more basic meaning, making it difficult to see why, from her perspective, metaphors in science aren't simply just good writing.

[7] In this sense, we classify the metaphors as gestalt: the complex of properties occurring together is more basic to their meaning than their separate occurrences.

[8] We have coded articles included in special issues as we would any other article, on the assumption that these issues are evenly distributed and the articles that comprise them are representative of the sort of articles that tend to appear in regular issues of each journal. We did not, however, include as articles Commentary and Reply, Editors' Comments, Presidential Addresses, Book Reviews, or Review Essays. The editorship of *AJS* did not change hands during this timeframe while the *ASR* editorial position changed hands once, in 2006/2007. Our analysis suggests this transition had no discernible effect on the articles within *ASR*. Indeed, when one considers review time and a reasonable backlog, any potential impact would not emerge for at least two years.

[9] In initial rounds of coding, we gathered data from Introduction sections, but such sections varied considerably in their styles across articles, and did not consistently present the article's main objectives or research questions. For similar reasons, we did not code the "results" or "findings" sections of articles.

[10] It bears mentioning that the IC, CC, and PC types are the metaphors boiled down to *prototypes*. They might strike some as overly broad and encompassing "umbrella categories" that allow little conceptual leverage, particularly for comparisons. But they allow us to elucidate the conceptual meaning of the broadest range of metaphors that fall within their orbit. Further research might the boil the metaphors down even further and discover patterning at a lower conceptual level.

© 2015 John Wiley & Sons Ltd

[11] The utility of such a typology can be seen in its absence. Smilde and May (2010) coded for causality in a recent review of the literature on the sociology of religion. Their approach captured every instance in which a "causal logic" was employed. But this term is not defined by the authors. Their findings—that 90 percent of the articles utilize a causal logic—suggests they simply coded all clearly specified independent variable-dependent variable relationships as exhibiting a "causal logic." While we applaud the effort to code for causal relationships, we suggest our typology provides considerably more leverage.

[12] Tables are available from the authors upon request.

[13] Supplemental tables are available from the authors upon request.

[14] This finding is also corroborated by Abend et al. [2013, p. 16n12], who found ethnographic articles in their sample to seldom use the term "mechanism"—even though they might actually be describing these in other words—in comparison to quantitative articles, which were more likely to use the term.

[15] Whether models of causality employed *ought* to be strongly related to methodology is a separate question that we will not address here.

[16] While the metaphoric significance of these concepts may appear weak, consider the different entailments involved in rendering a "chain of causation" versus a "*rope* of causation" (Hitchcock, 2003, p. 2).

[17] Our argument here is pure Fleckian: "Cognition therefore means, primarily, to ascertain those results which must follow, given certain preconditions. The preconditions correspond to active linkages and constitute the portion of cognition belonging to the collective. The constrained results correspond to passive linkages and constitute that which is experienced as an objective reality. The act of ascertaining is the contribution of the individual" (Fleck, 1981[1935], p. 40).

[18] For example, the truth-claim "class *mediates* the effect of race on income" maps onto a target-domain according to which class (as a discrete entity) is possible to categorize as having the kind of effect that the metaphor "mediates" entails.

[19] In ancillary analyses (available from the authors upon request), we examined a sample of articles from 1960–1990. These findings suggest that an influential set of background assumptions about sociology's target-domain can be traced to the "New Causal Theorists" (NCT) and their entry into the American sociological field at a pivotal time during the 1960s (Mullins, 1973; Bernert, 1983; Turner & Turner, 1990). While it is beyond the scope of this paper to fully develop these points, we find a systematic correspondence between the CC prototype and metaphors of the kind "conditions," "affects," "shapes," "mediates," and "contributes to" and the NCT view that the social world consists of "fixed entities with variable attributes" (Abbott, 1988, p. 169).

[20] See Lizardo (2013) for an example of a metaphor critique, regarding the "structure" metaphor.

REFERENCES

Abbott, A. (1988). Transcending general linear reality. *Sociological Theory*, *6*, 169–186.

Abbott, A. (2001). *Time matters: On theory and method*. Chicago: University of Chicago Press.

Abbott, A. (2007). Against narrative: A preface to lyrical sociology. *Sociological Theory*, *25*, 67–99.

Abend, G., Petre, C., & Sauder, M. (2013). Styles of causal thought: An empirical investigation. *American Journal of Sociology*, *119*, 1–53.

Allen, M. (2003). The "Core Influence" of journals in sociology revisited. *Footnotes*, December 2003.

Aro, J. (1993). Sosiologinen modernisaatioteoria ja narratiivisuus. *Sosiologia*, *30*, 88–96.

© 2015 John Wiley & Sons Ltd

Bernert, C. (1983). The career of causal analysis in American sociology. *British Journal of Sociology*, *34*, 230–254.
Bloor, D. (1976). *Knowledge and social imagery*. Chicago: University of Chicago Press.
Bloor, D. (1982). Polyhedra and the abominations of Leviticus: Cognitive styles in mathematics. In M. Douglas (Ed.), *Essays in the sociology of perception* (pp. 191–219). London: Routledge.
Bourdieu, P. (1975). The specificity of the scientific field and the social conditions of the progress of reason. *Social Science Information*, *14*, 19–47.
Cartwright, N. (2004). Causation: One word, many things. *Philosophy of Science*, *71*, 805–820.
Collins, R. (1984). Statistics versus words. *Sociology Theory*, *2*, 329–362.
Elster, J. (1989). *Nuts and bolts for the social sciences*. Cambridge: Cambridge University Press.
Fleck, L. (1981[1935]). *Genesis and development of a scientific fact*. Chicago: University of Chicago Press.
Gardner, H. (1985). *The mind's new science: A history of the cognitive revolution*. New York: Basic Books.
Goldthorpe, J. (2001). Causation, statistics, and sociology. *European Sociological Review*, *17*, 1–20.
Giere, R. (1988). *Explaining science: A cognitive approach*. Chicago: University of Chicago Press.
Giles, M., Mizell, F., & Patterson, D. (1989). Political scientists' journal evaluations revisited. *Political Science and Politics*, *22*, 613–617.
Gross, A. (1996). *The rhetoric of science*. Cambridge: Harvard University Press.
Gross, N. (2009). A pragmatist theory of social mechanisms. *American Sociological Review*, *74*, 358–379
Hedström, P., & Swedberg, R. (1998). *Social mechanisms: An analytical approach to social theory*. Cambridge: Cambridge University Press.
Hitchcock, C. (2003). Of humean bondage. *British Journal of the Philosophy of Science*, *54*, 1–25.
Jasper, J., & Young, M. (2007). The rhetoric of sociological facts. *Sociological Forum*, *22*, 270–299.
Johnson-Laird, P. (1980). Mental models in cognitive science. *Cognitive Science*, *4*, 71–115.
Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.
Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to Western thought*. New York: Basic Books.
Leahey, E. (2008). Methodological memes and mores: Toward a sociology of social research. *Annual Review of Sociology*, *34*, 35–55.
Lizardo, O. (2013). Reconceptualizing abstract conceptualization in social theory: The case of the structure concept. *Journal for the Theory of Social Behaviour*, *43*, 155–180.
Lyons, C. (2007). Community (dis)organization and racially motivated crime. *American Journal of Sociology*, *113*, 815–863.
Mahoney, J. (2001). Beyond correlational analysis: Recent innovations in theory and method. *Sociological Forum*, *16*, 575–593.
Martin, J. (2011). *The explanation of social action*. Oxford: Oxford University Press.
Morgan, S., & Winship, C. (2007). *Counterfactuals and causal inference: Methods and principles for social research*. New York: Cambridge University Press.
Mullins, N. (1973). *Theories and theory groups in contemporary American sociology*. New York: Harper and Row.
Phelan, T. (1995). Measures of success in American sociology. *Sociological Forum*, *10*, 481–491.
Platt, J. (1996). *A history of sociological research methods in America, 1960–1920*. New York: Columbia UP.

© 2015 John Wiley & Sons Ltd

Porpora, D. (2007). Sociology's causal confusion. In R. Groff (Ed.), *Revitalizing causality: Realism about causality in philosophy and social science* (pp. 196–204). New York: Routledge.

Reed, I. (2011). *Interpretation and social knowledge: On the use of theory in the human sciences*. Chicago: University of Chicago Press.

Schneiberg, M., King, M., & Smith, T. (2008). Social movements and organizational form: cooperative alternatives to corporations in the American insurance, dairy and grain industries. *American Sociological Review*, *73*, 635–667.

Smilde, D., & May, M. (2010). The emerging strong program in the sociology of religion. Working Paper: Social Science Research Council.

Snijders, T., & Hagenaars, J. (2001). Guest editors' introduction to the special issue on causality at work. *Sociological Methods and Research*, *30*, 3–10.

Steinmetz, G. (2008). The colonial state as a social field ethnographic capital and native policy in the German overseas empire before 1914. *American Journal of Sociology*, *73*, 589–612.

Talmy, L. (1988). Force dynamics in language and cognition. *Cognitive Science*, *12*, 49–100.

Turner, S. (2007). Social theory as cognitive neuroscience. *European Journal of Social Theory*, *10*, 357–374.

Turner, S., & Turner, J. (1990). *The impossible discipline: An institutional analysis of American sociology*. Beverly Hills: Sage.

Zammito, J. (2004). *A nice derangement of epistemes: Post-positivism in the study of science from Quine to Latour*. Chicago: University of Chicago Press.

Zeruvabel, E. (1999). *Social mindscapes: An invitation to cognitive sociology*. Cambridge: Harvard University Press.

© 2015 John Wiley & Sons Ltd