

Theory Development

1. Learning Objectives

After reviewing this chapter readers should be able to:

- Understand basic concepts of causality in terms of 2x2 tables.
- Understand the role of background and theoretical knowledge in social and behavioral research.
- Understand the relation of basic demographic information and other kinds of explanation in social and behavioral research.
- Understand the concept of confounding.
- Understand the role of mechanisms in social and behavioral explanation.
- Understand the problem of the underdetermination of theory by data in social science.



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2. Introduction

Theory construction in the social sciences faces a series of difficulties, or different circumstances, from those faced in the physical sciences, with the result that theories in the social sciences, despite some surface similarities, have significant differences from the natural sciences. Among the differences are the massive causal complexity of the subject matter; the fact that the topics of interest to social scientists and the users of social science are generated from folk, normative, or common sense concerns, and cannot be completely separated from ordinary language; the fact that even the most successful models work only in limited contexts whose boundaries are poorly understood; and the fact that successful prediction often, if not always, results from simplifications known to be false or inadequate as explanations.

This means that social science theories are better understood as models which work, either to predict or explain, in limited settings, rather than laws of science which hold and apply universally.

2. Introduction

Yet the differences are not absolute. Several of these problems are similar to problems of complex model construction in the natural sciences, such as the problem of constructing models of global warming.

Causal complexity is at the historical center of discussions of the problem of social science knowledge.

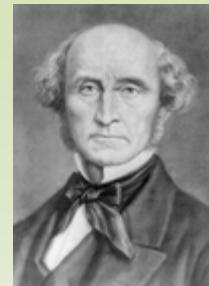
"No great improvements in the lot of mankind are possible until a great change takes place in the fundamental constitution of their modes of thought."

John Stuart Mill

English economist & philosopher (1806 - 1873)

John Stuart Mill, the originator of the major lines of discussion of the problem of social science methodology, considered the problem of the wealth of nations to be insoluble for this reason. There are too many variables, too many interacting causes, and no good way to untangle these causes.

The key problem arises from the addition of causal effects: unless the scientist is in a position to calculate the joint effects of two causes, and to extend the calculations to the addition of other causes, prediction of outcomes involving multiple causes is impossible.



John Stuart Mill (1806-1873)

Mill's discussion of the possibility of finding a scientific explanation of social events has worn equally well; Mill was as unwilling to suppose that the social sciences would become omniscient about human behavior as to suppose that there was no prospect of explaining social affairs at any deeper level than that of common sense.

But the identification and discovery of predictive laws faces the same problem: the actual causal facts or relationships which appear empirically are already compounded of a long list of possible causes, from which laws must be extracted and discovered. In a very simple case, one might be able to hypothesize both the laws and the mathematical nature of the additive relationship and find that one set of laws and one rule for combination of causes actually predicted the outcomes. But such simple cases are never found.

3. Causal Complexity

Experiment vs. Nature

It might seem that the solution to the problem of complexity is to simplify by constructing experiments in which the effects of other causes can be neutralized by random assignments of treatments for levels of the causes in question, so that fundamental relationships can be identified. But this strategy has not proved successful. Not only are there few usable results of this kind even in experimental psychology, once the relationships are taken out of the laboratory and applied to causally complex actual situations, they fail to predict successfully as a result of interferences from other causes.

The primary alternative to this method is the identification of patterns of relationships between variables. Normally this is a matter of identifying a correlation or statistical relationship in the data, though usually with a significant degree of error or unaccounted-for variation. In many science contexts, such as engineering, the same kind of empirically-based modeling of predictive relationships is standard practice, and often for the same reason, there is an absence of theories which allow for prediction. Ordinarily in these cases, which involve physical magnitudes, the relevant causal relationships are reasonably well understood and the relationships are estimated from data collected from experiments designed to isolate the relationships in question.



Exercise 1: Causal Aggression Pathway

Review a brief case study and select which option is the **most likely** causal explanation.

Case Study:

Jim was an active outdoorsy 12 year old but loved to play video games with violent content, and enjoyed action movies. He lived with his parents and younger brother. Jim had just started middle school so he went from being among the oldest in school to being one of the youngest. His family was not well off, but was not poor either. He started sneaking out and smoking with some older friends he met at school. He was recently disciplined for pushing another kid in class and talking back to a teacher. He and his brother (who was still in elementary school) seemed to be fighting more frequently. Jim's guidance counselor met with his parents to discuss the cause of his seemingly increased aggressive behavior.

Select from the links below the most likely causal pathway for his aggression.

[Going to a new school](#)

[Smoking](#)

[Video games and TV](#)

[Relative family income](#)

In social science, the data are almost never experimental, though there are some exceptions.

Typically the available data has been collected either for other purposes or as part of a standard package of statistical measures, such as the data collected for the census, or collected in relation to some specific public policy concern, such as the question of the efficacy of early childhood education programs.

4. Prediction vs. Explanation

Not only the data but the interests of social science theorizing and much of its language are generated from normative, practical, policy, or common sense concerns. Topics such as adolescent pregnancy, for example, are both policy and normative interests that require explanations—explanatory theories or models—in order to intervene in the causal process to alter outcomes. This topic is an example of the problem of the difference between prediction and explanation.

There are some good predictors of risk for adolescent pregnancy, such as smoking. Although knowing that smoking is a predictor might be useful as a means of identifying the adolescents who might be made the subject of an intervention, smoking is not a cause of pregnancy, so intervening by preventing smoking is not going to be an effective method of reducing adolescent pregnancy. This requires causal knowledge.

But the underlying causes that produce both smoking and the behavior that leads to adolescent pregnancy are far more complex, heterogeneous, and difficult to either identify or work with than the simple fact of smoking.

Moreover, this particular relationship only holds in those social contexts in which smoking has a particular meaning for the smoker and for others. In a society in which smoking was universal, or uncommon, the relationship would not hold. But it would likely also not hold or work in the same way in a context in which the social meaning of smoking—the message sent and received by the act of smoking—was different. This problem—that the underlying causal mechanisms themselves vary according to context—limits the generalizability or robustness of models and at the same time reminds us of the importance of the complex but unknown underlying causal mechanisms. This adds a complication of a different character.



Exercise 2: Explanatory or Predictive

Determine whether each of the concepts below is **explanatory** or **predictive** for an increased risk of teen pregnancy and drag and drop each into the appropriate box.

Explanatory

Predictive

Race

Has an STD

Feels close to boyfriend

Is sexually active

Friends' attitudes to pregnancy

Smoking

5. Meaning and Background

Considerations of meaning, the way in which agents understand the situations they are in, and more generally the kinds of motives that animate people in particular social groups and settings, are often consigned to the category of background knowledge, and it is indeed the case that local knowledge of various largely uncodifiable kinds is needed to interpret the behavior of individuals and their interactions. This background knowledge is often sufficient to account plausibly for the behavior in question, such as the behavior of adolescents, without reference to any "social science" knowledge at all, at least to those who share this local knowledge.

The limitations of local knowledge— folk or local background knowledge— are nevertheless acute. Often the explanations it provides are very vague, or stretch too easily to cover all cases, or are simply insufficient even on their own terms. Some important behavior, such as suicide, is incomprehensible as a rational act. And theories of suicide often add little to either comprehension or prediction even in those cases close at hand and most amenable to "local knowledge" explanations.

Limits of Local Knowledge

- Very vague (e.g., teenagers lack sufficient knowledge)
- Stretch too easily to cover all cases (e.g., teenagers are hormonal)
- Simply insufficient even on their own terms (e.g., teenage girls have self-esteem problems)
- Not generalizable (e.g., there was a situation at the prom where people got carried away)

When we turn to aggregate patterns, these difficulties become more serious. This kind of knowledge is rarely sufficient to account for, much less predict, the statistical patterns involving adolescent pregnancy. And local knowledge often does not generalize well to other populations and circumstances. Thus, to the extent that the "mechanisms" in questions under consideration involve the meanings attributed to behavior by people, it must be accepted that there is a great deal of variation and complexity beyond anything that might be thought of as a "mechanism." The same correlation may conceal or depend on a wide variety of local and complex behaviors and circumstances, for which any simple model will be inadequate. And some statistical patterns can be given only the most vague "sense."

6. Common Sense

In the face of these daunting difficulties, social scientists have devised a number of strategies. The simplest and most fundamental is to understand behavioral phenomena in terms of "folk psychology" or common sense, as actions with reasons. The problem of complexity overwhelms such explanations: the kinds of decisions and reasoning that go into an event such as an adolescent pregnancy are complex, and even to turn such an event into an action or a series of actions involves a reconstruction. Even if we think of these events as choices, they are difficult to construct as reasoned decisions. Like most actions, there are many considerations, some spur of the moment, some long term, and disentangling them is not easy, even in such simple market decisions as the purchase of a pair of shoes.

The diagram below demonstrates the point that statistically linked data may not make rational sense when ignoring other factors in the process. In social science all the factors and their relationship to one another must be taken into account.



Adapted from Krantz, D and Kunreuther H. "Goals and plans in decision making." Judgment and Decision Making, Vol. 2, No. 3, June 2007.

6. Common Sense

More complex social behaviors, such as a decision to commit suicide, or the background to and events leading to an adolescent pregnancy, can be made to conform to the model of decisions based on preferences only by reconstructing them as an abstraction and attributing the reasons, preferences, and "decisions" to this abstract model. The model of the decision-maker in turn is constructed to conform to the statistical data by varying the reasons or preferences. One might conclude, for example, that girls with more limited opportunities are more likely to become pregnant because their losses in future earnings would be less than those with greater opportunities, and one would indeed find statistical patterns that confirmed that poor families are more likely to produce such pregnancies. In this case, no claim is made that teenagers in the heat of passion calculate future income probabilities. The claim is that they behave as if they did so, and that this "as if" is what explains their conduct.

This is the strategy of economic theory and rational choice approaches to theory construction. In practice, these models rely on generic knowledge about what sorts of preferences in general drive human action. The construction of such models employs a large set of known corrections, such as discounting future returns, which are used to enable these models to fit the data. At each step, of course, the model becomes farther removed from the kinds of facts that folk interpretations and common sense descriptions of these events rely on. But this kind of abstraction does provide a kind of solution to the problem of complexity.



Exercise 3: Rational Causal Explanation

Below is a list of concepts, each with a potentially linked causal explanation. Read each and select the one that is most likely a rational causal explanation.

Long term receipt of welfare by a household is associated with low self-esteem for adolescents. An explanation of this is that the low-self esteem of the child is the product of the low self-esteem of the parents, not of receipt of welfare itself.

Among the variables associated with early adolescent sexual activity is parental demandingness (rather than responsiveness). One explanation is that demandingness leads to substance use which leads to early sex.

Job training programs designed to improve skills and train the unemployed in work habits and professional demeanor report success rates in placing students. Successful placement is evidence that the programs are effective.

There is a strong inverse relationship between family income and childhood smoking. So, improving the economic status of a family should lead to a decline in smoking.

7. Who Believes What?

If we think of our problem of understanding the phenomena as one of seeking the real causes of the outcome in question, and perhaps we also would like a means of predicting behavior or even intervening so as to change the outcomes, this kind of abstraction is potentially valuable, but only if one can manipulate the situation in such a way that behavior changes. Changing a teenager's future earnings prospects is not feasible. Nor is this a very good predictor: in the case of adolescent pregnancy, such non-explanatory facts as whether the adolescent smokes turns out to predict better.

This kind of problem, in which prediction, rational decisions, and the kind of information available in the thick description (Geertz, 1973) of actual events pull us in different directions, is normal for behavioral science subjects. And they lead to different approaches to the problem of complexity.

One of the standard methods solves the problem in a different way, which compromises between fidelity to the actual thinking and beliefs of the people who are acting and the larger picture of social differences within a society. The method also begins, as the rational choice model does, with some typical, well-proven starting points, but the starting points are "standard demographics" rather than an abstract economic model.

Rates, for example, of smoking, political affiliations, suicide, or adolescent pregnancy, vary between demographic groupings, often dramatically.

At the same time, demographic (and geographic) groupings correspond, loosely, to different social worlds. The analyst's knowledge of the specifics of the social life of these social worlds may supply other informative categorizations, for example between informal social groupings that can be identified on the basis of members' knowledge of these social worlds, such as membership in cliques. But there is also a mass of additional concepts, such as "network," that also enable the analyst to search for categorical distinctions that are possibly relevant to the outcomes of interest, and to test this relevance by comparing rates or degrees of the outcome in question.

7. Who Believes What?

The method of dividing the social world into smaller and smaller categories to identify differential outcomes does not itself produce an explanation or theory.

But it is highly relevant to the construction of theory, and to understanding the less-theoretical statistical approach to the same kinds of questions. One abstract possibility is this: dividing the population into smaller and smaller categories results in a set of rates of outcomes, such as presidential voting preferences, in which the relation between the outcome and the categorization is more or less self-explanatory, or can be explained on the basis of background knowledge that is widely shared, such as the fact that a particular candidate advocates policies favorable to the group in question. In these cases, little in the way of "theory" would be needed. The puzzle is the overall outcome, in this case likely votes for president.

The bulk of the explanation of the outcome is statistical: counting and adding up the size of the categories determines the outcome. In this case, the candidates' policies are an intervention which is targeted to specific categories in order to influence the total vote. "Theory" plays little role, though some generic background knowledge about what makes people vote is necessary. As we will see in the final section, this is also how other statistical approaches to causal model building proceed.



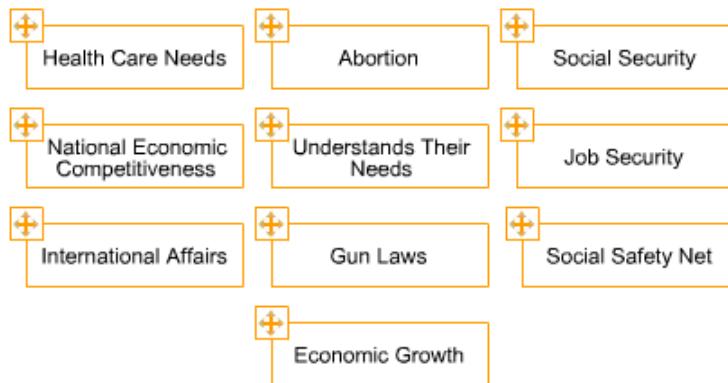
Exercise 4: Demographic Categories

Narrow down the following demographic categories to find the one that overwhelmingly supported the Clintons in their respective presidential bids:

MALE

FEMALE

Sorting the voting population into smaller and smaller groups can offer insight into patterns which may indicate voting preferences. **Based on their demographic, select which five of the following might be the primary concerns for this voting bloc?**



Primary Concerns

8. Understanding and Interpretation

In many of the cases of interest to social and behavioral science, however, background knowledge does not suffice.

The differences that appear when populations are categorized point to beliefs, interests, values, and so forth that are themselves puzzling and in need of explanation.

A standard approach to these problems of explanation is to use the categories to point to the different communities and social networks that the individuals in the categories are part of, because different beliefs, values, and experiences are sustained and transmitted in groups and networks. The focus of this kind of analysis shifts from the individual to the social world in which the attitudes, interests, experiences, and beliefs are sustained and developed, and often leads to explanations that terminate in conceptual constructions such as "culture" and "world view." These are themselves abstractions, but they are developed on a different basis, for example by the analysis of open-ended interview material or through ethnographies that supply the material for attributing attitudes, beliefs, and motivations, reasons for acting, different perceptions of the meanings of choices and outcomes, and thus different behavior to composite or idealized members of the group or category in question.

In these cases the attitudes and beliefs themselves may require interpretation, in the sense of making the background knowledge and beliefs of the agents—often contained in uncodified practices—intelligible to the outsider. But even with interpretation and reconstruction into intelligible world views, the behavior may still be puzzling. In the case of the abortion dispute, for example, it is evident that there are social categories, such as working women and mothers, that are more strongly represented on opposite sides of the controversy, and that there are differences in world view and membership in social groups that sustain these views. But these considerations do not seem to explain the passion with which the sides engage in the struggle.

8. Understanding and Interpretation

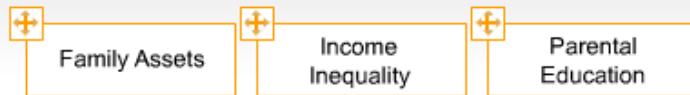
An influential interpretation of this conflict explains the passion in terms of identity: women against abortion are often stay-at-home moms who react to the implicit devaluation of babies as threats to their own value (Luker, 1984). This is a theoretical explanation, in two senses.

1. It appeals implicitly to a more general idea, namely that people will react to threats to their identify or ideas that devalue this identity.
2. It is also a mechanism, that is to say a model of a causal process that links two apparently unconnected facts: the demographic category of the women opposed to abortion, and their attitudes.



Exercise 5: Hypothesized Mechanisms

Below is a series of hypothesized mechanisms that can be tested by using additional demographic categorizations. Drag and drop each categorization to match with the appropriate mechanism.



Mechanism	Categorization
Link between supporting Clinton and Marital Status	
There is a predictive link between race and school suspensions	
There is no consistent predictive link between the average family income in a zip code and its preference for redistributionist policies.	

9. Two Approaches

Two Approaches to Confounding or Underdetermination

The idea of mechanism (Hedström and Swedberg, 1996) has recently been suggested as an alternative account of what social scientist **do** and **should do** when they explain to the model of theory that was popularized in the middle part of the twentieth century. But the differences between the two strategies are not always apparent, and the two overlap in many cases. Nevertheless, there are some important differences, and these are also important in relation to minimally-theoretical statistical modeling, to be discussed in the next section. To understand the differences we need to return to the basic problems posed by complexity.

As we have seen, one problem, apparent at the level of individual action explanations, is underdetermination. Many possible reasons and explanations may apply to a given case of action. The same problem arises for theoretical explanations generally. More than one theory may fit with the facts. If the goal is to find, out of all the possible theories, the real causes, there are a variety of options. The standard option available to the physical sciences, to measure more precisely and to see which theory predicts more successfully, is available in some contexts, such as randomized experiments. But for the cases of concern to the rest of social science, which involves at best natural experiments or data collected in non-random settings, where causes are confounded with one another, the normal situation is this:

A variety of theories with different advantages fit the data reasonably well, and there is no single means of decisively settling the question of which is correct.

The theoretical and the mechanism strategies take somewhat different approaches to this fundamental difficulty. The simplest case is this: two variables are correlated in the data, and there are a variety of possible interpretations of the relationship. The “theory” approach is to argue for the interpretation that generalizes most successfully, and which can be made to fit with other generalizations. The mechanism approach is to further specify the causal details of the hypothesized explanation of the connection, which in turn allows for the introduction of new forms of evidence about these details.

10. Mechanisms

The mechanisms approach can be understood by taking an epidemiological case as a point of comparison, consider cholera. There were, in the 1850's, strong correlations in London between altitude of residence and incidence of disease. This suggested "miasma" as a mechanism. The real mechanism, however, was water contaminated with the cholera bacillus. Establishing this required a different kind of study, which eventually showed that the correlation was an artifact of pumping methods, not miasma. Applying this kind of reasoning in the social sciences is more difficult, as the mechanisms in question typically involve the mind. But hypotheses about the motivations of individuals may be supported with various kinds of additional evidence, and tests may be devised of some of these hypotheses.

Table 1: Elevation and Cholera Deaths			
Elevation of Districts in Feet	Number of Terraces from Boston	Deaths from Cholera in 10,000 Inhabitants	Calculated Series
Under 20	1	102	$102/1 = 102$
20-40	2	65	$102/2 = 51$
40-60	3	54	$102/3 = 34$
60-80	4	27	$102/4 = 26$
80-100	5	22	$102/5 = 20$
100-120	6	17	$102/6 = 17$
140-60	18	7	$102/18 = 6$

(Humphreys, N.A. (Editor): *Vital Statistics: A Memorial Volume of Selections from the Reports and Writings of William Farr*. London , Sanitary Institute, 1885, p. 254-5.)

10. Mechanisms

The notion of mechanism, however, is not well-defined. Some economists, for example, consider that they have a mechanism when they have an equation. In many cases, mechanism accounts rely on rational choice models as discussed earlier (Elster, 1998).



Exercise 6: Smoking and Teen Pregnancy

Use your background knowledge to help find mechanisms. For instance, you discover that smoking is a good predictor of likelihood of adolescent pregnancy. What might the mechanism be? Several things associated with smoking might also be mechanisms that link to adolescent pregnancy. What might some of them be?

In this exercise consider smoking as a good predictor of adolescent pregnancy – in the list of possible mechanisms identify which are good choices for explaining the relationship and which are poor choices.

Mechanism: Age Discrepancy in Relationships

Good

Poor

Mechanism: Bad Grades in School

Good

Poor

Mechanism: Drug Use

Good

Poor

Mechanism: Social Awkwardness

Good

Poor

Mechanism: Race

Good

Poor

Mechanism: Peer Pressure

Good

Poor

Mechanism: Lack of Parental Supervision

Good

Poor

Mechanism: Poverty

Good

Poor

11. Theories and Systematization

The theoretical approach involves generalizations, and as there are few if any true generalizations in the social sciences, this means generalizations which are approximations of some kind. The difficulties, and attractions, of this approach can best be seen in a classic example provided in the most influential exposition of this approach, Hans Zetterberg's Theory and Verification in Sociology (1965: 23). The construction of the theory begins with two studies: a social psychology experiment and a study of student voting at Bennington College. In the experiment, students in different groups were given a task of writing a story connecting pictures. Some groups were told that they were "model groups," while other groups were not told this. Those who were told that they were model groups were more likely to agree in the writing of the story (Newcomb, 1943). In the study of student voting, it was found that the students who were voted to represent the college in an intercollegiate meeting were likely to be more affected by the liberal values of their teachers and fellow students than those not selected (Back, 1951).

The theorist seeks some more general formula relating the determinants, i.e. elected by popular vote and told they were a model group, and the outcomes, i.e. being more affected by predominant liberal values and agreeing more in the writing of the story. To generalize the determinants, Zetterberg suggests the following: they received more favorable evaluations. For the outcomes, he suggests: their ideas converged more with other group members. This yields a theoretical formula: "The more favorable evaluations rank and file members receive in a group, the more their ideas converge with those of other group members" (Zetterberg, 1965: 24).

Question: Rethink the Bennington study, but this time come up with a more abstract generalization that fits the findings. Would one be able to find confirmation for this generalization in a different setting as well? Give some possible examples.

12. Determining Real Causes

The value of more general theory lies in its ability to hold in many circumstances. But it is also understood to be approximate, and thus is not to be discarded if it fails on occasion. There are many conditions for their holding in similar circumstances, some known or hypothesized, and many unknown. Its claim to represent the real causes in a given situation— that is to say to be, among the various causes that might reasonably be cited to account for the outcome of a student election, the one that actually operated to produce the outcome— rests on its generalizability, but also on the fact that it can be connected to other general theoretical ideas which were supported in other empirical settings, thus making a system of generalizations. In this case it could be connected to cognitive dissonance theory, which involved other similar general formulae which were also approximations.

The connections between the theoretical statements are thus only supportive, in the sense that they increase the expectation that the related statements are true, rather than provide deductive guarantees that the statements are true (Turner, 2007, 2008). This approach to producing theory was associated with post-war Columbia sociology, especially with Robert Merton and Paul Lazarsfeld, and popularized under the name “grounded theory” (Glaser and Strauss, 1967; Glaser, 1978) and, with a stronger emphasis on mathematicization, by a movement of theory construction thinkers (Berger et al., 1962).

Cognitive Dissonance Theory

Cognitive dissonance is an uncomfortable feeling or stress caused by holding two contradictory ideas simultaneously. The theory of cognitive dissonance proposes that people have a fundamental cognitive drive to reduce this dissonance by modifying an existing belief, or rejecting one of the contradictory ideas.

13. Confounding

Confounding and the Alternative of Causal Modeling

A large portion of the social science and policy-related literature uses a different approach to the problems of underdetermination or confounding. The basic logic of these methods can be seen in Abram Harris's classic study of the role of bank failures in the history of African-American capitalist enterprise (1936). Harris asked whether the banks failed because they were owned and run by African-Americans, or for prosaic financial reasons. He reasoned that if the ratios of real estate to business loans and bank size (a known confounder) were the cause, and race was a causally irrelevant confounder, it should be possible to divide bank failures into two groups by race, and see if the relation between financial causes and bank failure held up within each group. If race was causally irrelevant, the relationship between the ratios and bank size and bank failure should continue to hold in both groups. If race were the cause and size and loan ratios were irrelevant, that relation should disappear in both groups.

This is the basic logic of statistical approaches to confounding. In this case there is background knowledge, knowledge about the kinds of financial variables that might be relevant to bank failure, and background knowledge about race. But little depends on the general validity of theoretical formulae. The statistical test of partialing or dividing the cases into groups determines which was the cause and which was the confounder.

Question: Which way does the causal relationship go in Table 2a? Table 2b?



Table 2a: Bank Failures in Per Cent

	White Owned	African American Owned
Low Capitalization High Real Estate Loan %	20	80
High Capitalization Low Real Estate Loan %	20	80



Table 2b: Bank Failures in Per Cent

	White Owned	African American Owned
Low Capitalization High Real Estate Loan %	80	80
High Capitalization Low Real Estate Loan %	20	20

Note: These are *not* real data. Reality is never so simple

14. Problems with Casual Models

Outside of textbook examples matters are rarely so neat (Freedman, 2006), and there is a large literature on these issues and on the question of the extent to which questions of causal interpretation can be resolved on statistical grounds alone, or on the basis of very small and unproblematic kinds of prior causal knowledge, such as the knowledge that certain variables cannot be the cause of others.

One can see the issues in the Abrams case: he knew what to partial for out of more general knowledge of banking and economics and about the effects of race. The question is whether the role of this kind of knowledge can be minimized and replaced by purely statistical considerations, or whether the statistical assumptions necessary to employ these considerations smuggle in causal considerations (Freedman, 1997).

To put it differently, the logic of these methods is eliminative. The issue is whether one can eliminate enough to arrive at causal conclusions without significant non-statistical information.

Judea Pearl has argued that the attempt to use statistical methods alone to deal with confounding comes close to success, but fails. He proposes a solution for the problem that employs statistical considerations, but adds a non-statistical one, that of considering the most stable causes, those whose correlations persist, regardless of the other variables in the setting, to be the genuine causes in cases of confounding (Pearl, 2000: 268).

15. Summary

A recent medical study found an association among teenagers between having no breakfast and sexual activity. Did they discover a new causal fact? Or is this a case where the fact predicts but does not explain? How do you make sense of it? In this chapter we have described two ways.

One is to think of a more abstract connection between things associated with the two variables sex and breakfast that could explain it: it might be that teenagers with less parental supervision are more likely to have sex and that having breakfast is a proxy for such things as parents getting up early and sending the kids off to school, and this is a proxy for parental interest and concern. Parental interest and concern might influence teenagers choices, including those involving sex. We can test this more abstract relationship, which makes more sense than the no breakfast/sex connection, but may not in fact be true, by seeing if it applies to other choices and other measures of parental interest and concern. If it worked in these other cases, we would have some reassurance that this is what is going on in this case. If we had a lot of connected relationships that worked in a way that fit this basic idea, we would be even more reassured.

The second approach would be to break down this relationship between no breakfast and sex, using data and our background knowledge. We more or less know that breakfast doesn't have any direct causal link to sexual activity. The relation doesn't exist for older people. So what is going on here? Just by breaking the relation down to smaller subsets, using the kinds of categories that allow us to apply our background knowledge (such as income level of family, ethnicity, etc.) we are probably going to see changes in the relationship. We may be able to get data on things that our background knowledge would suggest might have to do with the relationship—such as the answers the teenager gives to the question "is your mother annoying?" It might be that the data show that facts about family relations more or less correspond with the relationship, and that breakfast is just a confounder. Or it might be that the practice of family breakfast is associated with ethnicity, and facts about the culture of a particular high-risk group explain both skipping breakfast and sexual activity. The data will enable you to choose— and you can keep breaking down the categories until you have results that fit with your background knowledge and make sense.

Is this an airtight, mechanical process? No. The results of statistical research are often puzzling. It is often hard to get the kind of data that clearly distinguish between alternative hypotheses. Confounders and hidden causes are everywhere. Welcome to the world of social research!

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17. Author Biography

Stephen Turner, PhD is Graduate Research Professor at the University of South Florida. His Ph.D. is from the University of Missouri. He is the author of a number of books on the history and philosophy of social science and statistics, including *The Search for a Methodology of Social Science: Durkheim, Weber, and the Nineteenth Century Problem of Cause, Probability, and Action*. (1986). He is the co-author of the standard one-volume history of *American Sociology*, *The Impossible Science* (1990). He co-edited *Causality in Crisis?: Statistical Methods and the Search for Causal Knowledge in the Social Sciences* (1997). Among his current interests are the implications of cognitive neuroscience for social theory. He published *Brains/Practices/Relativism: Social Theory after Cognitive Science* in 2002, and a new book, *Explaining the Normative*, is in press. He was also co-editor of *The SAGE Handbook of Social Science Methodology and Philosophy of Anthropology and Sociology* in the *Handbook of the Philosophy of Science* series, both of which appeared in 2007. He has edited a four volume collection of classic papers on statistical approaches to causality, *Causality*, which is also in press. He has had fellowships from the National Endowment for the Humanities and the Swedish Collegium for Advanced Studies in the Social Sciences.