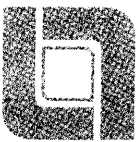


## The Elaboration Model

# The Practice of SOCIAL RESEARCH

FOURTH EDITION



**What You'll Learn in This Chapter**

*This chapter will take you through the fundamental logic of multivariate analysis. Having seen that logic in action in the form of simple percentage tables, you'll then be prepared to see the sense in more complex analytical methods.*

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## INTRODUCTION

Chapter 16 is devoted to a perspective on social scientific analysis that is referred to variously as the elaboration model, the interpretation method, the Columbia school, or the Lazarusfeld method. This varied nomenclature derives from the fact that the method we'll be discussing aims at the *elaboration* on an empirical relationship among variables in order to *interpret* that relationship in the manner developed by Paul Lazarusfeld while he was at Columbia University.

The *elaboration model* is used to understand the relationship between two variables through the simultaneous introduction of additional variables. It was developed primarily through the medium of contingency tables, but later chapters of this book will show how it may be used with other statistical techniques.

It is my firm belief that the elaboration model offers the clearest available picture of the logic of analysis. Especially through the use of contingency tables, this method portrays the logical process of scientific analysis. Moreover, if you are able to comprehend fully the use of the elaboration model using contingency tables, you should be in a far better position to use and understand more sophisticated statistical techniques. The box "Why Do Elaboration?" by one of the elaboration model's creators, Patricia Kendall, provides another powerful justification.

## HISTORY OF THE ELABORATION MODEL

The historical origins of the elaboration model are especially instructive for a realistic appreciation of scientific research in

practice. During World War II, Samuel Stouffer organized and headed a special social research branch within the U.S. Army, already discussed in Chapter 1. Throughout the war, this group conducted a large number and variety of surveys among American servicemen. Although the objectives of these studies varied somewhat, they generally focused on the factors affecting soldiers' combat effectiveness.

Several of the studies examined the issue of morale in the military. Since morale seemed to affect combat effectiveness, improving morale would make the war effort more effective. Stouffer and his research staff sought to uncover some of the variables that affected morale. In part, the group sought to confirm, empirically, some commonly accepted propositions. Among them were the following:

1. Promotions surely affect soldiers' morale, so soldiers serving in units with low promotion rates should have relatively low morale.
2. Given racial segregation and discrimination in the South, black soldiers being trained in northern training camps should have higher morale than those being trained in the South.
3. Soldiers with more education should be more likely to resent being drafted into the army as enlisted men than those with less education.

Each of these propositions made sense logically, and common wisdom held each to be true. Stouffer decided to test each empirically. To his surprise, none of the propositions was confirmed.

First, soldiers serving in the Military Police—where promotions were the slowest in the army—had fewer complaints about the promotion system than those serving in the Army Air Corps—where promotions were the fastest in the army. Second, black

### Why Do Elaboration?

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There are several aspects of a true controlled experiment. The most crucial are: (a) creating experimental and control groups that are *identical* within limits of chance (this is done by assigning individuals to the two groups through processes of randomization: using tables of random numbers, flipping coins, etc.); (b) making sure that it is the *experimenter* who introduces the stimulus, not external events; and (c) waiting to see whether the stimulus has had its presumed effect.

We may have the hypothesis, for example, that attending Ivy League colleges leads to greater success professionally than attending other kinds of colleges and universities. How would we study this through a true experiment? Suppose you said, "Take a group of people in their 40s, find out which ones went to Ivy League colleges, and see whether they are more successful than those who went to other kinds of colleges." If that is your answer, you are wrong.

A true experiment would require the investigator to select several classes of high school seniors, divide each class at random into experimental and control groups, send the experimental groups to Ivy League colleges (regardless of their financial circumstances or academic qualifications and regardless of the desire of the colleges to accept them)

and the control group to other colleges and universities, wait 20 years or so until the two groups have reached professional maturity, and then measure the relative success of the two groups. Certainly a bizarre process.

Sociologists also investigate the hypothesis that coming from a broken home leads to juvenile delinquency. How would we go about studying this experimentally? If you followed the example above, you would see that studying this hypothesis through a true experiment would be totally impossible. Just think of what the experimenter would have to do!

The requirements of true experiments are so unrealistic in sociological research that we are forced to use other, and less ideal, methods in all but the most trivial situations. We *can* study experimentally whether students learn more from one type of lecture than another, or whether a film changes viewers' attitudes. But these are not always the sorts of questions in which we are truly interested.

We therefore resort to approximations—generally surveys—that have their own shortcomings, as we have seen in Chapter 9. However, the elaboration model allows us to examine survey data, take account of their possible shortcomings, and draw rather sophisticated conclusions about important issues.

soldiers serving in northern training camps and those serving in southern training camps seemed to differ little if at all in their general morale. Third, less educated soldiers were more likely to resent being drafted into the army than were those with more education.

As we saw in Chapter 1, rather than trying to hide the findings, or just running tests of statistical significance and publishing the results, Stouffer, instead, asked *why*? He found the answer to this question within the concepts of *reference group* and *relative deprivation*. Put simply, Stouffer suggested that soldiers did not evaluate their positions in life in accord with absolute, objective standards, but on the basis of their relative position vis-à-vis others around them. The people they compared themselves with were in their reference group, and they felt relative deprivation if they did not compare favorably in that regard.

Within the concepts of reference group and relative deprivation, Stouffer found an answer to each of the anomalies in his empirical data. Regarding promotion, he suggested that soldiers judged the fairness of the promotion system based on their own experiences relative to others around them. In the Military Police, where promotions were few and slow, few soldiers knew of a less qualified buddy who had been promoted faster than they had. In the Army Air Corps, however, the rapid promotion rate meant that many soldiers knew of less qualified buddies who had been promoted faster than seemed appropriate. Thus, ironically, the MPs said the promotion system was generally fair while the air corpsmen said it was not.

A similar analysis seemed to explain the case of the black soldiers. Rather than comparing conditions in the North with those in the South, black soldiers compared their own status with the status of the black civilians around them. In the South, where discrimination was at its worst, they found that being a soldier insulated them somewhat

from adverse cultural norms in the surrounding community. Whereas southern black civilians were grossly discriminated against and denied self-esteem, good jobs, and so forth, black soldiers had a slightly better status. In the North, however, many of the black civilians they encountered held well-paying defense jobs. And with discrimination less severe, being a soldier did not help one's status in the community.

Finally, the concepts of reference group and relative deprivation seemed to explain the anomaly of highly educated draftees accepting their induction more willingly than those with less education. Stouffer reasoned as follows:

1. A person's friends, on the whole, have about the same educational status as that person does.
2. Draft-age men with less education are more likely to engage in semi-skilled production-line occupations and farming than more educated men.
3. During wartime, many production-line industries and farming are vital to the national interest; workers in those industries and farmers are exempted from the draft.
4. A man with little education is more likely to have friends in draft-exempt occupations than a man with more education.
5. When each compares himself with his friends, a less educated draftee is more likely to feel discriminated against than a draftee with more education.

(1949:122-27)

Stouffer's explanations unlocked the mystery of the three anomalous findings. Because they were not part of a preplanned study design, he lacked empirical data for testing them, however. Nevertheless, Stouffer's logical exposition provided the basis for the later development of the elaboration model: understanding the relationship between two variables through the controlled introduction of other variables.

The formal development of the elaboration model was the work of Paul Lazarsfeld and his associates at Columbia University in 1946. In a methodological review of Stouffer's army studies, Lazarsfeld and Patricia Kendall used the logic of the elaboration model to present hypothetical tables that would have proved Stouffer's contention regarding education and acceptance of induction had the empirical data been available (Kendall and Lazarsfeld 1930).

Kendall and Lazarsfeld began with Stouffer's data showing the positive association between education and acceptance of induction (see Table 16-1). Following Stouffer's explanation, they created a hypothetical table, compatible with the empirical data, to show that education was related to whether one had friends who were deferred. In Table 16-2, we note that 19 percent of those with high education reported having friends who were deferred, as compared with 79 percent among those with less education.

Stouffer's explanation next assumed that soldiers with friends who had been deferred would be more likely to resent their own induction than would those who had no

deferred friends. Table 16-3 presents the hypothetical data that would have supported that assumption.

The hypothetical data in Tables 16-2 and 16-3 confirm linkages that Stouffer had specified in his explanation. First, soldiers with low education were more likely to have friends who were deferred than soldiers with more education. And, second, having friends who were deferred made a soldier more likely to think he should have been deferred. Stouffer had suggested that these two relationships would clarify the original relationship between education and acceptance of induction. Kendall and Lazarsfeld created a hypothetical table that would confirm Stouffer's explanation (see Table 16-4).

Recall that the original finding was that draftees with high education were more likely to accept their induction into the army as

Table 16-2 Hypothetical Relationship between Education and Deferral of Friends

Friends deferred?	High Ed.	Low Ed.
Yes	19%	79%
No	81	21
	100%	100%
	(1,761)	(1,876)

Table 16-1 Summary of Stouffer's Data on Education and Acceptance of Induction

	High Ed.	Low Ed.
Should not have been deferred	88%	70%
Should have been deferred	12	30
	100%	100%
	(1,761)	(1,896)

Table 16-3 Hypothetical Relationship between Deferral of Friends and Acceptance of One's Own Induction

	Friends Deferred?
Should not have been deferred	Yes No
	63% 94%
Should have been deferred	37 6
	100% 100%
	(1,819) (1,818)

Source: Tables 16-1, 16-2, 16-3, and 16-4 are modified with permission of Macmillan Publishing Co., Inc., from *Continuities in Social Research: Studies in the Scope and Method of "The American Soldier"* by Robert K. Merton and Paul F. Lazarsfeld (eds.). Copyright 1950 by The Free Press, a Corporation, renewed 1978 by Robert K. Merton.

Table 16-4 Hypothetical Data Relating Education to Acceptance of Induction through the Factor of Having Friends Who Were Deferred

	Friends Deferred		No Friends Deferred	
	High Ed.	Low Ed.	High Ed.	Low Ed.
Should not have been deferred	63%	63%	94%	95%
Should have been deferred	37	37	6	5
	100% (335)	100% (1,484)	100% (1,426)	100% (392)

fair than those with less education. In Table 16-4, however, we note that level of education has no effect on the acceptance of induction among those who report having friends deferred: 63 percent among *both* educational groups say they should not have been deferred. Similarly, educational level has no significant effect on acceptance of induction among those who reported having no friends deferred: 94 and 95 percent say they should not have been deferred.

On the other hand, among those with high education the acceptance of induction is strongly related to whether or not one's friends were deferred: 63 percent versus 94 percent. And the same is true among those with less education. The hypothetical data in Table 16-4, then, support Stouffer's contention that education affected acceptance of induction only through the medium of having friends deferred. Highly educated draftees were less likely to have friends deferred and, by virtue of that fact, were more likely to accept their own induction. Those with less education were more likely to have friends deferred and, by virtue of that fact, were less likely to accept their own induction.

It is important to recognize that neither Stouffer's explanation nor the hypothetical data demystified the reality of the original relationship. As educational level increased, acceptance of one's own induction also increased. The nature of this empirical relationship, however, was interpreted through

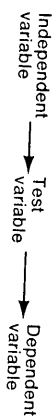
the introduction of a third variable. The variable, deferment of friends, did not deny the original relationship; it merely clarified the mechanism through which the original relationship occurred. This, then, is the heart of the elaboration model and of multivariate analysis.

Having observed an empirical relationship between two variables, we seek to understand the nature of that relationship through the effects produced by introducing other variables. Mechanically, we accomplish this by first dividing our sample into subsets on the basis of the control or test variable. For example, having friends deferred or not is the control variable in our present example, and the sample is divided into those who have deferred friends and those who do not. The relationship between the original two variables is then recomputed separately for each of the subsamples. The tables produced in this manner are called the *partial tables*, and the relationships found in the partial tables are called the *partial relationships*. The partial relationships are then compared with the initial relationship discovered in the total sample.

### THE ELABORATION PARADIGM

This section presents guidelines for the reader to follow in the understanding of an elab-

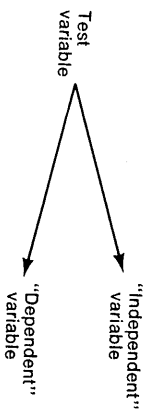
Figure 16-1 Intervening Test Variable



oration analysis. To begin, we must know whether the test variable is *antecedent* (prior in time) to the other two variables or whether it is *intervening* between them, because these positions suggest different logical relationships in the multivariate model. If the test variable is intervening, as in the case of education, deferment of friends, and acceptance of induction, then the analysis is based on the model shown in Figure 16-1. The logic of this multivariate relationship is that the independent variable (educational level) affects the intervening test variable (having friends deferred or not), which in turn affects the dependent variable (accepting induction).

If the test variable is antecedent to both the independent and dependent variables, a very different model must be used (see Figure 16-2). Here the test variable affects both the "independent" and "dependent" variables. Realize, of course, that the terms *independent variable* and *dependent variable* are, strictly speaking, used incorrectly in the diagram. In fact, we have one independent variable (the test variable) and two dependent variables. The incorrect terminology has been used only to provide continuity with the preceding example. Because of their individual relationships to the test variable, the "independent" and "dependent" variables are empirically related to

Figure 16-2 Antecedent Test Variable



each other, but there is no causal link between them. Their empirical relationship is merely a product of their coincidental relationships to the test variable. (Subsequent examples will further clarify this relationship.)

Table 16-5 is a guide to the understanding of an elaboration analysis. The two columns in the table indicate whether the test variable is antecedent or intervening in the sense described above. The left side of the table shows the nature of the partial relationships as compared with the original relationship between the independent and dependent variables. The body of the table gives the technical notations—replication, explanation, interpretation, and specification—assigned to each case. We will discuss each in turn.

#### Replication

Whenever the partial relationships are essentially the same as the original relationship, the term *replication* is assigned to the result, regardless of whether the test variable is antecedent or intervening. This means that the original relationship has been replicated under test conditions. If, in our previous example, education still affected acceptance of induction both among those who had friends deferred and those who did not, then we would say the original relationship had been replicated. Note, however, that this finding would not confirm Stouffer's explanation of the original relationship. Having friends deferred or not would not be the mechanism through which education affected the acceptance of induction.

To see what a replication looks like, turn back to Tables 16-3 and 16-4 for a minute. Imagine that our initial discovery was that having friends deferred strongly influenced how soldiers felt about being drafted, as

Table 16-5 The Elaboration Paradigm

Partial Relationships Compared with Original	Test Variable	
	Anecedent	Intervening
Same relationship	Replication	Explanation
Less or none	Explanation	Interpretation
Split**	Specification	

\* One partial the same or greater, while the other is less or none.

shown in Table 16-3. Had we first discovered this relationship, we might have wanted to see whether it was equally true for soldiers of different educational backgrounds. To find out, we would have made education our control or test variable.

Table 16-4 contains the results of such an examination, though it is constructed somewhat differently from what we would have done had we used education as the control variable. Nevertheless, we see in the table that having friends deferred or not still influences attitudes toward being drafted among those soldiers with high education and those with low education. (Compare columns 1 and 3, then 2 and 4.) This result represents a replication of the relationship between having friends deferred and attitude toward being drafted.

Researchers frequently use the elaboration model rather routinely in the hope of replicating their findings among subsets of the sample. If we discovered a relationship between education and prejudice, for example, we might introduce such test variables as age, region of the country, race, religion, and so forth, to test the stability of the original relationship. If the relationship were replicated among young and old, among persons from different parts of the country, and so forth, that would be grounds for concluding that the original relationship was a genuine and general one.

In the box "Attending an Ivy League College and Success in Later Professional

Life," Patricia Kendall recalls a study in which the researcher suspected an explanation but found a replication.

**Explanation**

*Explanation* is the term used to describe a *spurious relationship*; an original relationship that is explained away through the introduction of a test variable. Two conditions are required for that to occur. The test variable must be antecedent to both the independent and dependent variables, and the partial relationships must be zero or significantly less than those found in the original. Three examples will illustrate this situation.

There is an empirical relationship between the number of storks in different areas and the birthrates for those areas. The more storks in an area, the higher the birthrate. This empirical relationship might lead one to assume that the number of storks affects the birthrate. An antecedent test explains away this relationship, however. Rural areas have both more storks and higher birthrates than urban areas. Within rural areas, there is no relationship between the number of storks and the birthrate; nor is there a relationship within urban areas.

Figure 16-3 illustrates how the rural/urban variable causes the apparent relationship between storks and birthrates. Part I of the

The Elaboration Paradigm

Figure 16-3 The Facts of Life about Storks and Babies

- BIRTHRATES OF TOWNS AND CITIES HAVING FEW OR MANY STORKS  
 H = Town or city with high birthrate  
 L = Town or city with low birthrate

NUMBER OF STORKS		NUMBER OF STORKS	
Few	Many	Few	Many
L L L L L L L L L L L H L L L L L L	H H H H H H H L H H H H H H H H H H	L L L L L L L L L L L L L L L L L L	H H H H H H H L H H H H H H H H H H

II. CONTROLLING FOR RURAL (Towns) AND URBAN (Cities)

NUMBER OF STORKS		NUMBER OF STORKS	
Few	Many	Few	Many
Rural L L L L L L L L L L L L L L L L L L	H H H H H H H H H H H H H H H H H H	Urban L L L L L L L L L L L L L L L L L L	L L L L L L L L L L L L L L L L L L

figure shows the original relationship. Notice how all but one of the entries in the box for towns and cities with few storks have high birthrates; with one exception, all those in the box for towns and cities with few storks have low birthrates. In percentage form, we say that 93 percent of the towns and cities with many storks also had high birthrates, as contrasted with 7 percent of those with few storks. That's a very large percentage point difference and represents a strong association between the two variables.

Part II of the figure separates the towns from the cities, the rural from urban areas, and examines storks and babies in each type of place separately. Now we can see that all

the rural places have high birthrates, and all the urban places have low birthrates. Also notice that only one rural place had few storks and only one urban place had lots of storks.

Here's a similar example. There is a positive relationship between the number of fire trucks responding to a fire and the amount of damage done. If more trucks respond, more damage is done. One might assume from this fact that the fire trucks themselves cause the damage. However, an antecedent test variable, the size of the fire, explains away the original relationship. Large fires do more damage than small ones, and more fire trucks respond to large fires than to small ones. Looking only at large fires,

### Attending an Ivy League College and Success in Later Professional Life

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Probably the main danger for survey analysts is that a relationship they hope is causal will turn out to be spurious. That is, the original relationship between X and Y is explained by an antecedent test factor. More specifically, the partial relationships between X and Y reduce to 0 when that antecedent test factor is held constant.

This was a distinct possibility in a major finding from a study carried out nearly 35 years ago. One of my fellow graduate students at Columbia University, Patricia Salter West, based her dissertation on questionnaires obtained by *Time Magazine* from 10,000 of its male subscribers. Among many of the hypotheses developed by West was that male graduates of Ivy League schools (Columbia, Cornell, Dartmouth, Harvard, University of Pennsylvania, Princeton, and Yale) were more successful in their later professional careers, as defined by their annual earnings, than

those who graduated from other colleges and universities.

The initial four-fold table supported West's expectation.

Although I made up the figures, they conform closely to what West actually found in her study. Having attended an Ivy League school seems to lead to considerably greater professional success than being a graduate of some other kind of college or university.

But wait a minute. Isn't this a relationship that typically could be spurious? Who can afford to send their sons to Ivy League schools? Wealthy families, of course.† And who can provide †Since she had no direct data on family socioeconomic status, West defined as wealthy or having high socioeconomic status those who supported their sons completely during all four years of college. She defined as less wealthy or having low socioeconomic status those whose sons worked their way through college, in part or totally.

Table 1\*

	College Attended (X)	
Later Professional Success (Y)	Ivy League College	Other College or University
Successful	1,300 (65%)	2,000 (25%)
Unsuccessful	700 (35%)	6,000 (75%)
Total	2,000 (100%)	8,000 (100%)

\*I have had to invent relevant figures because the only published version of West's study contained no totals. See Ernest Havemann and Patricia Salter West, *They Went to College* (New York: Harcourt, Brace, 1952).

the business and professional connections that could help sons become successful in their careers? Again, wealthy or well-to-do families.

In other words, the socioeconomic status of the student's family may explain away the apparent causal relationship. In fact, some of West's findings suggest that this might indeed be the case.

A third of those coming from families defined as wealthy, compared with 1 in 11 coming from less well-to-do backgrounds, attended Ivy League colleges. Thus there is a very high correlation between the two variables, X and T. (There is a similarly high correlation between family socioeconomic status [T] and later professional success [Y].)

The magnitude of these so-called marginal correlations suggest that West's hypothesis regarding the causal nature of having attended an Ivy League college might be incorrect; it suggests instead that the socioeconomic status of the students' families accounted for the original relationship she observed. We are not done yet, however. The

crucial question is what happens to the *partial relationships* once the test factor is controlled. These are shown in Table 3.

These partial relationships show that, even when family socioeconomic status is held constant, there is still a marked relationship between having attended an Ivy League college and success in later professional life. As a result, West's initial hypothesis receives support from the analysis she carried out.

Despite this, West has in no way *proved* her hypothesis. There are almost always additional antecedent factors that might explain the original relationship. Consider, for example, the *intelligence* of the students (as measured by IQ tests or SAT scores). Ivy League colleges pride themselves on the excellence of their student bodies. They may therefore be willing to award merit scholarships to students with exceptional qualifications but not enough money to pay tuition and board. Once admitted to these prestigious colleges, bright students may develop the skills—and connections—that will lead to later professional suc-

Table 2 Attendance at Ivy League Colleges According to Family Socioeconomic Status (SES)

College Attended (X)	Family SES (Y)	
	High SES	Low SES
Ivy League colleges	1,500 (33%)	500 (9%)
Other colleges and universities	3,000 (67%)	5,000 (91%)
Total	4,500 (100%)	5,500 (100%)

**Table 3** Partial Relationships between X and Y with T Held Constant

Later success (Y)	High Family SES (T)		Low Family SES (T)	
	Ivy League College (X)	Other College (X)	Ivy League College (X)	Other College (X)
Successful	1,000 (67%)	1,000 (33%)	300 (60%)	1,000 (20%)
Not successful	500 (33%)	2,000 (67%)	200 (40%)	4,000 (80%)
Total	1,500 (100%)	3,000 (100%)	500 (100%)	5,000 (100%)

cess. Since West had no data on the intelligence of the men she studied, she was unable to study whether the partial relationships disappeared once this test factor was introduced.

In sum, the elaboration paradigm permits the investigator to rule out certain possibilities and to gain support for others. It does *not* permit us to *prove* anything.

we would see that the original relationship vanishes (or perhaps reverses itself); and the same would be true looking only at small fires.

Finally, let's take a real research example. There is an empirical relationship between the region of the country in which medical school faculty members attended medical school and their attitudes toward Medicare (Babbie 1970). To simplify matters, only the East and the South will be examined. Of faculty members attending eastern medical schools, 78 percent said they approved of Medicare, compared with 59 percent of those attending southern medical schools. This finding makes sense in view of the fact that the South seems generally more resistant to such programs than the East, and medical school training should presumably affect a doctor's medical attitudes. However, this relationship is explained away when we introduce an antecedent test variable: the region of the country in which the faculty member was raised. Of faculty members raised in the East, 89 percent

attended medical school in the East, and 11 percent in the South. Of those raised in the South, 53 percent attended medical school in the East and 47 percent in the South.

Moreover, the areas in which faculty members were raised related to attitudes toward Medicare. Of those raised in the East, 84 percent approved of Medicare, as compared with 49 percent of those raised in the South.

Table 16-6 presents the three-variable relationship among region in which raised, region of medical school training, and attitude toward Medicare. Faculty members raised in the East are quite likely to approve of Medicare, regardless of where they attended medical school. Those raised in the South are relatively less likely to approve of Medicare, but, again, the region of their medical school training has little or no effect. These data indicate, therefore, that the original relationship between region of medical training and attitude toward Medicare was spurious; it was due only to the coincidental effect of region of origin on both region of medical training and on atti-

tude toward Medicare. When region of origin is held constant, as we have done in Table 16-6, the original relationship disappears in the partials.

**Interpretation**

Interpretation is similar to explanation, except for the time placement of the test variable and the implications that follow from that difference. The earlier example of education, friends deterred, and acceptance of induction is an excellent illustration of interpretation. In terms of the elaboration model, the effect of education on acceptance of induction is not explained away; it is still a genuine relationship. In a real sense, educational differences *cause* differential acceptance of induction. The intervening variable, deferment of friends, merely helps to interpret the mechanism through which the relationship occurs.

Here's another example of interpretation. Researchers have observed that children from homes with working mothers are more likely to become delinquent than those whose mothers do not work. This relationship may be interpreted, however, through the introduction of supervision as a test var-

iable. Among children who are supervised, delinquency rates are not affected by whether or not their mothers work. The same is true among those who are not supervised. It is the relationship between working mothers and the lack of supervision that produced the original relationship.

**Specification**

Sometimes the elaboration model produces partial relationships that differ significantly from each other. For example, one partial relationship is the same as/or stronger than the original two-variable relationship, while the second partial relationship is less than the original and may be reduced to zero. This situation is referred to as **specification** in the elaboration paradigm. We have specified the conditions under which the original relationship occurs.

In a study of the sources of religious involvement, Glock and his associates (1967:92) discovered that among Episcopal church members, involvement decreased as social class increased. This finding is reported in Table 16-7, which examines mean levels of church involvement among women parishioners at different levels of social class.

**Table 16-6** Region of Origin, Region of Schooling, and Attitude toward Medicare

Region of Medical School Training	Percentage Who Approve of Medicare	
	Region in Which Raised	
	East	South
East	84	50
South	80	47

Source: Earl R. Babbie, *Science and Morality in Medicine* (Berkeley: University of California Press, 1970) p. 181.

Table 16-7 Social Class and Mean Church Involvement among Episcopal Women

	Social Class Levels			
	Low 0	1	2	High 3 4
Mean Involvement	.63	.58	.49	.48 .45

Source: Tables 16-7, 16-8, and 16-9 are from Charles Y. Glock, Benjamin B. Ringer, and Earl R. Babbe, *Comfort and to Challenge* (Berkeley: University of California Press, 1967). Used with permission of The Regents of the University of California.

Note: Mean scores rather than percentages have been used here.

Glock interpreted this finding in the context of others in the analysis and concluded that church involvement provides an alternative form of gratification for people who are denied gratification in the secular society. This conclusion explained why women were more religious than men, why old people were more religious than young people, and so forth. Glock reasoned that people of lower social class (measured by income and education) had fewer chances to gain self-esteem from the secular society than did people of higher social class. To illustrate this idea, he noted that social class was strongly related to the likelihood that a woman had ever held an office in a secular organization (see Table 16-8).

Glock then reasoned that if social class were related to church involvement only by virtue of the fact that lower-class women would be denied opportunities for gratification in the secular society, the original relationship should not hold among women who were getting gratification. As a rough indicator of the receipt of gratification from the secular society, he used as a variable the holding of secular office. In this test, social class should be unrelated to church involvement among those who had held such office.

Table 16-8 Social Class and the Holding of Office in Secular Organizations

	Social Class Levels			
	Low 0	1	2	High 3 4
Percentage who have held office in a secular organization	46	47	54	60 83

Note: Percentages are used in this table.

Table 16-9 presents an example of a specification. Among women who have held office in secular organizations, there is essentially no relationship between social class and church involvement. In effect, the table specifies the conditions under which the original relationship holds: among those women lacking gratification in the secular society.

The term *specification* is used in the elaboration paradigm regardless of whether the test variable is antecedent or intervening. In either case, the meaning is the same. We have specified the particular conditions under which the original relationship holds.

**Refinements to the Paradigm**

The preceding sections have presented the primary logic of the elaboration model as

Table 16-9 Church Involvement by Social Class and Holding Secular Office

	Mean Church Involvement for Social Class Levels			
	Low 0	1	2	High 3 4
Have held office	.46	.53	.46	.46 .46
Have not held office	.62	.55	.47	.46 .40

developed by Lazarsfeld and his colleagues. Morris Rosenberg (1968) has offered an excellent presentation of the paradigm described above, and he goes beyond it to suggest additional variations.

Rather than reviewing Rosenberg's comments, let's consider the logically possible variations. Some of these points are found in Rosenberg's book; others were suggested by it.

First, the basic paradigm assumes an initial relationship between two variables. It might be useful, however, in a more comprehensive model to differentiate between positive and negative relationships. Moreover, Rosenberg suggests using the elaboration model even with an original relationship of zero. He cites as an example a study of union membership and attitudes toward having Jews on the union staff (see Table 16-10). The initial analysis indicated that length of union membership did not relate to the attitude: those who had

belonged to the union less than four years were just as willing to accept Jews on the staff as were those who had belonged for more than four years. The age of union members, however, was found to suppress the relationship between length of union membership and attitude toward Jews. Overall, younger members were more favorable to Jews than were older members. At the same time, of course, younger members were not likely to have been in the union as long as the old members. Within specific age groups, however, those in the union longest were the most supportive of having Jews on the staff. Age, in this case, was a *suppressor variable*, concealing the relationship between length of membership and attitude toward Jews.

Second, the basic paradigm focuses on partials being the same or weaker than the original relationship, but does not provide guidelines for specifying what constitutes a significant difference between the original

Table 16-10 Example of a Suppressor Variable

I: No Apparent Relationship between Attitudes toward Jews and Length of Time in the Union	Length of Time in Union	
	Less than 4 Years	4 Years or Longer
Jews on Union Staff	In Union	Less than 4 Years
Don't care either way	49.2% (126)	50.4% (256)

II: In Each Age Group, Length of Time in Union Increases Willingness to Have Jews on Union Staff	Distribution of Answers by Percentage, According to Age and Longevity		
	29 Years and Under	30-49 Years	50 Years and Older
Jews on Union Staff	Less than 4 4 or More	Less than 4 4 or More	Less than 4 4 or More
Don't care either way	56.4 (78)	62.7 (51)	37.1 (35)
			48.3 (116)
			38.4 (13)
			56.1 (89)

Source: Morris Rosenberg, *The Logic of Survey Analysis* (New York: Basic Books, 1968), pp. 88-89. Used by permission.



and the partials. When you use the elaboration model, you will frequently find yourself making an arbitrary decision as to whether a given partial is significantly weaker than the original. This, then, suggests another dimension that could be added to the paradigm.

Third, the limitation of the basic paradigm to partials that are the same as or weaker than the original neglects two other possibilities. A partial relationship might be *stronger* than the original. Or, on the other hand, a partial relationship might be the reverse of the original—negative where the original was positive.

Rosenberg provides a hypothetical example of that by first suggesting that a researcher might find working-class respondents in his study more supportive of the civil rights movement than middle-class

respondents (see Table 16-11). He further suggests that *race* might be a *distorter variable* in this instance, distorting the true relationship between class and attitudes. Presumably, black respondents would be more supportive of the movement than whites, but blacks would also be overrepresented among working-class respondents and underrepresented among the middle class. Middle-class black respondents might be more supportive of the movement than working-class blacks, however; and the same relationship might be found among whites. *Holding race constant*, then, the researcher would conclude that support for the civil rights movement was greater among the middle class than among the working class.

All these new dimensions further complicate the notion of specification. If one

Table 16-11 Example of a Distorter Variable (Hypothetical)

I: Working-Class Subjects Appear More Liberal on Civil Rights than Middle-Class Subjects		Working-Class Subjects	
Civil Rights Score	Middle Class	Working Class	Working Class
High	37%	63	45%
Low	100%	100%	100%
	(120)	(120)	(120)

II: Controlling for Race Shows the Middle Class to Be More Liberal than the Working Class		Social Class	
Civil Rights Score	Blacks		Whites
	Middle Class	Working Class	Working
High	70%	50%	20%
	30	50	80
Low	100%	100%	100%
	(20)	(100)	(20)

Source: Morris Rosenberg, *The Logic of Survey Analysis* (New York: Basic Books, 1968), pp. 94–95. Used by permission.

partial is the same as the original, while the other partial is even stronger, how should you react to that situation? You have specified one condition under which the original relationship holds up, but you have also specified another condition under which it holds even more clearly.

Finally, the basic paradigm focuses primarily on dichotomous test variables. In fact, the elaboration model is not so limited—either in theory or in use—but the basic paradigm becomes more complicated when the test variable divides the sample into three or more subsamples. And the paradigm becomes more complicated yet when more than one test variable is used simultaneously.

These comments are not made with the intention of faulting the basic elaboration paradigm. To the contrary, my intention is to impress upon you that the elaboration model is not a simple algorithm—a set of procedures through which to analyze research. Rather, it is primarily a logical device for assisting the researcher in understanding his or her data. A firm understanding of the elaboration model will make a sophisticated analysis easier. It does not suggest which variables should be introduced as controls, however, nor does it suggest definitive conclusions about the nature of elaboration results. For all these things, you must look to your own ingenuity. Such ingenuity, moreover, will come only through extensive experience. By pointing to oversimplifications in the basic elaboration paradigm, I have sought to bring home the point that the model provides only a logical framework. Sophisticated analysis will be far more complicated than the examples used to illustrate the basic paradigm.

At the same time, the elaboration paradigm is a very powerful logical framework. If you fully understand the basic model, you will be in a far better position for understanding other techniques such as correlations, regressions, factor analyses, and so

forth. The next chapter will attempt to place such techniques as partial correlations and partial regressions in the context of the elaboration model.

## ELABORATION AND EX POST FACTO HYPOTHEZING

Before we leave the discussion of the elaboration model, one further word is in order regarding its power in connection with *ex post facto hypothesizing*, a form of fallacious reasoning. The reader of methodological literature will find countless references warning against it. But although the intentions of such injunctions are correct, inexperienced researchers can sometimes be confused about its implications.

When you observe an empirical relationship between two variables and then simply suggest a reason for that relationship, that is sometimes called *ex post facto hypothesizing*. You have generated a hypothesis linking two variables after their relationship is already known. You will recall, from an early discussion in this book, that all hypotheses must be subject to disconfirmation. Unless you can specify empirical findings that would disprove your hypothesis, the hypothesis is essentially useless. You might reason, therefore, that once you have *observed* a relationship between two variables, any hypothesis regarding that relationship cannot be disproved.

That is a fair assessment if you are doing nothing more than dressing up your empirical observations with deceptive hypotheses after the fact. Having observed that women are more religious than men, you should not simply assert that women will be more religious than men because of some general dynamic of social behavior and then rest your case on the initial observation.

The unfortunate spin-off of the injunction against ex post facto hypothesizing is in its inhibition of good, honest hypothesizing after the fact. Inexperienced researchers are often led to believe that they must make all their hypotheses before examining their data—even if that process means making a lot of poorly reasoned ones. Furthermore, they are led to ignore any empirically observed relationships that do not confirm some prior hypothesis.

Surely, few researchers would now wish that Sam Stouffer had hushed up his anomalous findings regarding morale among soldiers in the army. Stouffer noted peculiar empirical observations and set about hypothesizing the reasons for those findings. And his reasoning has proved invaluable to researchers ever since.

There is another, more sophisticated, point to be made here, however. Anyone can generate hypotheses to explain observed empirical relationships in a body of data, but the elaboration model provides the logical tools for *testing* those hypotheses within the same body of data. A good example of this testing may be found in the earlier discussion of social class and church involvement. Glock explained the original relationship in terms of social deprivation theory. If he had stopped at that point, his comments would have been interesting but hardly persuasive. He went beyond that point, however. He noted that if the hypothesis was correct, then the relationship between social class and church involvement should disappear among those women who were receiving gratification from the secular society—those who had held office in a secular organization. This hypothesis was then subjected to an empirical test. Had the new hypothesis not been confirmed by the data, he would have been forced to reconsider.

These additional comments should further illustrate the point that data analysis is a continuing process, demanding all the ingenuity and perseverance you can muster.

The image of a researcher carefully laying out hypotheses and then testing them in a ritualistic fashion results only in ritualistic research.

In case you are concerned that the strength of ex post facto proofs seems to be less than that of the traditional kinds, let me repeat the earlier assertion that “scientific proof” is a contradiction in terms. Nothing is ever *proved* scientifically. Hypotheses, explanations, theories, or hunches can all escape a stream of attempts at disproof, but none can be proved in any absolute sense. The acceptance of a hypothesis, then, is really a function of the extent to which it has been tested and not disconfirmed. No hypothesis, therefore, should be considered sound on the basis of one test—whether the hypothesis was generated before or after the observation of empirical data. With that in mind, you should not deny yourself some of the most fruitful avenues available to you in data analysis. You should always try to reach an honest understanding of your data, develop meaningful theories for more general understanding, and not worry about the manner of reaching that understanding.

#### MAIN POINTS

- The elaboration model is a method of multivariate analysis appropriate to social research.
- The elaboration model is primarily a logical model that can illustrate the basic logic of other multivariate methods.
- The basic steps in elaboration are as follows: (a) a relationship is observed to exist between two variables; (b) a third variable is held constant in the sense that the cases under study are subdivided according to the attributes of that third variable; (c) the original two-variable relationship is recomputed within each of the subgroups; and

#### Elaboration and Ex Post Facto Hypothesizing

- (d) the comparison of the original relationship with the relationships found within each subgroup provides a fuller understanding of the original relationship itself.
- An intervening control variable is one that occurs in time between the occurrence of the independent variable and the occurrence of the dependent variable.
  - An antecedent control variable is one that occurs earlier in time than either the independent or the dependent variable.
  - A zero-order relationship is the observed relationship between two variables *without* a third variable being held constant or controlled.
  - A partial relationship is the observed relationship between two variables—within a subgroup of cases based on some attribute of the control variable. Thus, the relationship between age and prejudice among men only (that is, controlling for sex) would be a partial relationship.
  - If a set of partial relationships is essentially the same as the corresponding zero-order relationship, this outcome is called a replication, regardless of whether the control variable is intervening or antecedent. This means, simply, that the originally observed relationship has been replicated within smaller subgroups, and that the control variable has no influence on that original relationship.
  - If a set of partial relationships is reduced essentially to zero when an antecedent variable is held constant, this outcome is called an explanation, meaning that the originally observed “relationship” was a spurious or ungenue one. This outcome suggests that each of the variables examined in the zero-order relationship, thus resulting in a statistical relationship between those two that does not represent a causal relationship in itself.
  - If a set of partial relationships is reduced essentially to zero when an intervening variable is held constant, this outcome is called an interpretation, meaning that we have interpreted the manner in which the independent variable has its influence on the dependent variable: the independent variable influences the intervening variable, which, in turn, influences the dependent variable. In this instance, we conclude that the original relationship was a genuine causal relationship; we have shed further light on how that causal process operates.
  - If one partial relationship is reduced (ideally to zero) while the other remains about the same as the original relationship (or is stronger), this outcome is called a specification, regardless of whether the control variable was intervening or antecedent. This means, simply, that we have specified the conditions under which the originally observed relationship occurs.
  - A suppressor variable is one that conceals the relationship between two other variables.
  - A distorter variable is one that causes an apparent reversal in the relationship between two other variables: from negative to positive or positive to negative.
  - Ex post facto hypothesizing refers to the development of hypotheses “predicting” relationships that have already been observed. This is invalid in science, since it is impossible to disconfirm such hypotheses. Of course, nothing prevents us from suggesting reasons that observed relationships may be the way they are; we simply should not frame those reasons in the form of “hypotheses.” More important, one observed relationship and possible reasons for it may suggest hypotheses about other relationships that have not been examined. The elaboration model is an excellent logical device for this kind of unfolding analysis of data.

## REVIEW QUESTIONS AND EXERCISES

1. In your own words describe the elaboration logic of
  - a. Replication
  - b. Interpretation
  - c. Explanation
  - d. Specification
2. Review the Stouffer-Lazarusfeld example of education, friends deferred, and attitudes toward being drafted. Suppose they had begun with an association between friends deferred and attitudes toward being drafted, and then they controlled for education. What conclusion would they have reached?

## ADDITIONAL READINGS

Glock, Charles (ed.), *Survey Research in the Social Sciences* (New York: Russell Sage Foundation, 1967), Chapter 1. An excellent discussion of the logic of elaboration. Glock's own chapter in this book presents the elaboration model, providing concrete illustrations.

Hirschi, Travis, and Selvin, Hanan, *Delinquency Research: An Appraisal of Analytic Methods* (New York: Free Press, 1967). Excellent logical discussions and concrete examples. This book examines the empirical research in the field of delinquency from a rigorously logical perspective. Critiques of specific research examples

often set the stage for important and insightful general discussions of elaboration and other aspects of the logic of scientific inquiry.

Hyman, Herbert, *Survey Design and Analysis* (New York: Free Press, 1955). A somewhat dated but milestone statement of the elaboration model. The fundamental paradigm is discussed and illustrated through a number of real surveys. Lazarusfeld's foreword is the most available classic statement of the logic of elaboration. This was and still is an important book. Later sections of the book illustrate the relationship between the logical model and the nitty-gritty details of analyzing data by counter-sorter, an excellent method of developing hand-brain coordination in social research.

Lazarusfeld, Paul; Pasanella, Ann; and Rosenberg, Morris (eds.), *Continuities in the Language of Social Research* (New York: Free Press, 1972). An excellent and classic collection of conceptual discussions and empirical illustrations. Section II is especially relevant, though the logic of elaboration runs throughout most of the volume.

Rosenberg, Morris, *The Logic of Survey Analysis* (New York: Basic Books, 1968). The most comprehensive statement of elaboration available. Rosenberg presents the basic paradigm and goes on to suggest logical extensions of it. It is difficult to decide what is most important, this aspect of the book or the voluminous illustrations. Both are simply excellent, and this book serves an important instructional purpose.