Formal Theory

GUILLERMINA JASSO

INTRODUCTION

We do theory because we want to understand human behavior. The objective of sociology, as of the other human sciences, is to accumulate reliable knowledge about human behavioral and social phenomena. We do theory because of the conviction that theoretical analysis enables swift progress to the goal of understanding human behavior. And we do formal theory because of the conviction that *formal* theory enables *swifter* progress to *deeper* understanding of human behavior.

In this chapter we discuss formal theory. We begin by surveying briefly the entire landscape of sociological analysis in order to locate theory and then formal theory within it. Sociological analysis consists of three kinds of activities: developing a framework, constructing theories, and carrying out empirical work. The framework collects the central questions of the field and the basic building blocks for addressing them. The framework and the theories are linked because the theories address questions posed in the framework and because some of the building blocks in the framework become the assumptions of theories (and others later appear among the predictions of theories).

To characterize formal theory, we address the objective and structure of formal theory, as well as criteria for judging particular formal theories. As will be seen, we discuss two main types of formal theory, plus a hybrid form that combines the two types. The two types are deductive theory and hierarchical theory. Deductive theory, however, is of the first importance, and much of the discussion will pertain to deductive theory only (plus the deductive component of hybrid theories). Indeed, the term "theory" when used alone will always refer to deductive theory, as will the criteria for judging a theory.

Both deductive and hierarchical theory have two-part structures. The first part contains the postulates of the theory; the second part contains the predictions, in the case of deductive theory, and in the case of hierarchical theory, the constructed propositions.

A theory is judged in two ways. First it is judged in terms of theoretical criteria. Theories

GUILLERMINA JASSO • Department of Sociology, New York University, New York, New York 10003.

that survive theoretical scrutiny are then judged by empirical tests of their predictions. The theoretical criteria are simple: The postulates should be mutually logically consistent; there should be a minimum of postulates and a maximum of predictions; and the predictions should include novel predictions, that is, predictions for phenomena or relations not yet observed. Of course, a theory can satisfy all the theoretical criteria and yet be false; empirical evidence is the final arbiter.

Beyond satisfying the criteria by which a theory is judged—and in particular, raising new questions via its novel predictions—a good theory displays one or more of several useful features: the prediction mix includes both intuitive and counterintuitive predictions; the predictions span all levels of analysis; the theory provides a foundation for measurement; and the theory yields a framework for interpretation of rare or nonrecurring events.

To illustrate our discussion of sociological analysis and of formal theory, we draw on the study of the sense of justice. We examine the framework for justice analysis and discuss five theories from the portfolio of theoretical justice analysis. The five theories include deductive, hierarchical, and hybrid theories, and they illustrate somewhat different approaches and tools within the formal theory tradition. As well, they are at different stages of development, ranging from fledgling theories with few predictions to the justice version of comparison theory (hereafter simply "justice-comparison theory"), which is sufficiently well developed that it and its parent theory are described in a separate chapter of this book. The diversity of the theories in the justice portfolio makes them ideally suited for illustrating formal theory. It is likely that a broad range of theories encountered or constructed in social science will resemble in approach, form, content, fruitfulness, or stage of development one or another of these five specimens. Moreover, the five include theories related to each other in ways that exemplify general relations among theories.

This chapter is organized as follows: the second section considers the three main activities of sociological analysis: developing a framework, constructing theories, and carrying out empirical work. In the third section we discuss theory and formal theory. Illustration via the five specimen theories is provided in the fourth section. The chapter concludes with a set of frequently asked questions (FAQs) about formal theory.

THE TRIPTYCH
OF SOCIOLOGICAL ANALYSIS

Sociological analysis consists of everything that sociologists do in order to describe and understand human behavioral and social phenomena.[1] The subject matter of sociological analysis may be any aspect or part of the large set of behavioral and social phenomena, and this topical domain gives its name to the particular analysis that is undertaken. For example, class analysis examines the workings of class-related phenomena; gender analysis investigates gender-related phenomena; justice analysis addresses the operation of the human sense of justice; conversation analysis focuses on conversation-related phenomena; and so on. Indeed, every substantive area in sociology—and every chapter in Part III of this volume—can be thought of as [•] analysis, where [•] is a placeholder for the topical domain. In the same way that the objective of sociological analysis is to describe and understand the whole of human behavioral and social phenomena, the objective of [•] analysis is to describe and understand the [•] subset of human behavioral and social phenomena.

Until recently I held the view that the enterprise of sociological analysis could be usefully

---

[1]Generations of graduate students have begun their doctoral work with a required course titled, "Sociological Analysis." The history of these courses and their content is yet to be written.

subdivided into two main parts—theoretical work and empirical work—and so, too, the enterprise in any domain-specific analysis. That is indeed the inherited and time-tested view. But a newer and perhaps more useful view is that sociological analysis consists of three kinds of activities: not only *theoretical analysis* and *empirical analysis* but also, and even more basic, developing a *framework*.

In the framework, sociologists pose the central questions in a field or subfield and develop the basic building blocks that will be used in both theoretical and empirical work. Theoretical analysis begins with an assumption, and empirical analysis begins with a testable proposition. But these—assumption and testable proposition—have to come from somewhere. That somewhere, I submit, is ultimately and fundamentally the framework. To be sure, as we will discuss below, in the most wonderful kind of theory—deductive theory—the theory yields implications that become the testable propositions of empirical analysis. Yet, in any scholarly adventure, there always are empirical tests of propositions that do not come from theory; that is, there are always inductive explorations. And these tests, these explorations, draw their life from the framework.

Thus, the framework provides building blocks which become the starting assumptions of theories and which also lead immediately to empirical work. It may also happen that relations which arise in the framework later emerge as theoretical predictions. Our emphasis, however, is on the framework as the source of building blocks, and hence we highlight elements of the framework which become the assumptions of theories rather than elements which subsequently appear as theoretical predictions.

Developing a Framework—Justice Analysis

Typically, the building blocks in the framework are formulated by analyzing the basic questions in the field. An example will provide concreteness. In *justice analysis*, whose objective is to describe and understand the operation of the human sense of justice, the framework begins with four questions, which are thought to cover the core issues in the field (Jasso & Wegener, 1997):

1. What do individuals and collectivities think is just, and why?
2. How do ideas of justice shape determination of actual situations?
3. What is the magnitude of the perceived injustice associated with given departures from perfect justice?
4. What are the behavioral and social consequences of perceived injustice?

In the course of thinking about each of these questions, of considering how to address them, the building blocks emerge.

Building Blocks from the First Question

Thinking about the first question—What do individuals and collectivities think is just, and why?—it quickly becomes clear that there is always one fundamental actor: the person who forms ideas of justice and makes judgments about justice and injustice; this actor is called the *observer*. Indeed, the terms "just" and "justice" are always shorthand for "just in the eyes of the observer" and "justice in the eyes of the observer." It also quickly becomes clear that in the distributive-retributive realm there is a second fundamental actor: the recipient of the benefits and burdens that awaken the sense of justice; this actor is called the *rewardee*. The observer forms ideas about the *just reward*, in a particular distributive or retributive domain,

TABLE 3.1. The Just Reward Matrix for N Observers and R Rewardees

$$C = \begin{bmatrix} c_{11} & c_{12} & c_{13} & \cdots & c_{1R} \\ c_{21} & c_{22} & c_{23} & \cdots & c_{2R} \\ c_{31} & c_{32} & c_{33} & \cdots & c_{3R} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ c_{N1} & c_{N2} & c_{N3} & \cdots & c_{NR} \end{bmatrix}$$

NOTE: In the matrix above, c_{ir} denotes the observer-specific/rewardee-specific just reward, where c denotes the just reward, observers are indexed by i (= 1, ..., N), and rewardees are indexed by r (r = 1, ..., R).

for a set of rewardees (including perhaps him- or herself).[2] The ensuing set of just rewards is called the *observer-specific just reward distribution*; its parameters, such as the mean and inequality, reflect the observer's *principles of macrojustice*. Similarly, the principles that guide each observer's ideas of the just reward for specific rewardees are embodied in the *observer-specific just reward function*, which relates the just reward to characteristics of the rewardees; and the parameters of the just reward function reflect the observer's *principles of microjustice*.

If other observers also form ideas about the just rewards in this domain, all of the *observer-specific/rewardee-specific just rewards* together can be arrayed in a *just reward matrix*. Corresponding to each observer, there is an observer-specific just reward function, just reward distribution, and principles of microjustice and macrojustice. All these are visible in or estimable from the just reward matrix. Table 3.1 presents the just reward matrix, where c denotes the just reward, observers are indexed by i (i = 1, ..., N), and rewardees are indexed by r (r = 1, ..., R). The observer-specific/rewardee-specific just reward is thus denoted c_{ir}.

Of course, individuals form ideas of justice about many things, not only about individuals' rewards, and these produce their own new building blocks. For example, individuals form ideas about the *just mean* and the *just inequality* in a distribution.

In the example of justice analysis, it is the activity of posing the central questions and then thinking about how to address them that quickly leads to a large set of building blocks, of which the ones discussed in the preceding paragraph are a small subset. Note that the building blocks in the framework are ready for use in two ways. First, they are ready for use to construct theories. Second, they are ready for use in empirical work; quantities like the just reward can be measured, and relationships like the just reward function can be estimated.

Two of the five specimen theories used as examples in this chapter—allocation theory and Anselmian theory—use building blocks formulated in addressing the first central question. These building blocks include the just reward and the just inequality.

Building Blocks from the Second Question

In addressing the second question—How do ideas of justice shape determination of actual situations?—a new building block arises immediately, and this is the *actual reward* received by the rewardee, denoted $a_{.r}$. Along with it, there arise an *actual reward function*, an *actual reward distribution*, and, if observers misperceive the actual rewards, an *actual reward matrix*. When misperception occurs, each actual reward is observer-specific as well as rewardee-specific, and the placeholder dot in the subscript becomes the index for the observer, as in a_{ir}. The actual reward function is well known in social stratification, where it appears in various forms, including an earnings function, an occupational attainment function, and an

---

[2]The term "reward" is used as a convenient shorthand for both goods and bads, benefits and burdens.

educational attainment function. In justice analysis, however, there is an added twist, as the determinants may include, besides the usual factors in these functions, and sometimes instead of them, allocators' ideas of justice.

In some situations, actual rewards are determined by committees or boards whose members in turn rely on their ideas of justice. Of course, the members of such committees or boards may differ in their influence on the actual rewards or on the actual rewards of particular rewardees, producing the *observer-specific/rewardee-specific weight*, denoted w_{ir}. As with the just rewards and actual rewards, the weights can be arrayed in a matrix, called the *weight matrix*.[3] Each rewardee's actual reward is a weighted mean of the just rewards assigned to him or her by all the members of the society.[4] That is, it is a function of the just rewards and the weights attached to all the members in deciding this particular person's actual reward:

$$a_{.r} = \sum_{i=1}^{N} c_{ir} w_{ir} \tag{1}$$

It follows that the actual reward distribution, denoted A, is a linear combination of the N C_i weight distributions:

$$A = \sum_{i=1}^{N} C_i W_i \tag{2}$$

Again, note that these new building blocks are ready for use both to construct theories and in empirical work. We shall see their use in three of the specimen theories: allocation theory, Anselmian theory, and just society theory.

Building Blocks from the Third Question

Thinking about the third central question—What is the magnitude of the perceived injustice associated with given departures from perfect justice?—leads to a new variable, the *justice evaluation*, and a new function, the *justice evaluation function*. The justice evaluation expresses the observer's judgment and sentiment that the rewardee (possibly him- or herself) is justly or unjustly treated, and if unjustly treated, whether overrewarded or underrewarded and to what degree. The justice evaluation is represented by the full set of real numbers, with zero representing the point of perfect justice, negative numbers representing unjust under-reward, and positive numbers representing unjust overreward (panel A, Table 3.2). Thus, a justice evaluation of zero indicates that the observer judges the rewardee to be perfectly justly rewarded. A justice evaluation of -3 and a justice evaluation of -5 both indicate that the observer judges the rewardee to be unjustly underrewarded, with the rewardee associated with the -5 judged to be more underrewarded than the rewardee associated with the -3. Similarly, a justice evaluation of 3 and a justice evaluation of 5 both indicate that the observer judges the rewardee to be unjustly overrewarded, with the rewardee accorded the 5 judged to be more overrewarded than the rewardee accorded the 3.

By the time we reach the third central question, we already have in the set of building blocks the just reward (from analyzing the first question) and the actual reward (from analyzing the second question), and it is thus natural to think of the justice evaluation as arising from the comparison of the actual reward to the just reward. This comparison may be stated as

---

[3]Sometimes the weight matrix is called the power matrix, as each observer's weights in determining the actual rewards may reflect his or her power.

[4]Of course, in the case in which actual rewards are decided by special committees or boards, the weights of most members of society will be zero.

TABLE 3.2. The Justice Evaluation and the Justice Evaluation Function

A. Mathematical Representation of the Justice Evaluation

Underbenefit   Overbenefit

$$\vdash\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\!+\!\!\dashv$$

0

Overburden   Perfect   Underburden
                                              Justice

B. The Justice Evaluation Function: General Form

Version 1	Version 2
$J^G = J^G(A,C)$, $\partial J^G/\partial A > 0$, $\partial J^G/\partial C < 0$,	$J = \theta[J(A,C)]$,
$J^B = J^B(A,C)$, $\partial J^B/\partial A < 0$, $\partial J^B/\partial C > 0$,	$\partial J/\partial A > 0$, $\partial J/\partial C < 0$,
	$\theta > 0$ for a good, $\theta < 0$ for a bad,
$J(a_0 = c_0) = 0$,	$J(a_0 = c_0) = 0$,

where J denotes the justice evaluation, A denote the actual reward, C denotes the just reward, the superscripts G and B denote good and bad, respectively, and θ denotes the signature constant; the sign of θ is called the framing coefficient and the absolute value of θ is called the expressiveness coefficient.

C. The Justice Evaluation Function: Logarithmic-Ratio Form

Version 1	Version 2
$J \propto \begin{cases} \ln\left(\dfrac{A}{C}\right), \text{ for a good} \\ \ln\left(\dfrac{C}{A}\right), \text{ for a bad} \end{cases}$	$J = \theta \ln\left(\dfrac{A}{C}\right)$

a general function: The justice evaluation is a function of the actual reward and the just reward, such that, in the case of a good, for example, the justice evaluation increases with the actual reward and decreases with the just reward and such that when the actual reward equals the just reward, the justice evaluation equals zero, the point of perfect justice (panel B, Table 3.2).

Further reasoning about the justice evaluation function, in particular, reasoning about the properties of a desirable functional form, leads to a new specific form, the *logarithmic-ratio specification of the justice evaluation function*.[5] In this form, the justice evaluation varies as the natural logarithm of the ratio of the actual reward to the just reward, in the case of a good, and, in the case of a bad, as the logarithm of the ratio of the just reward to the actual reward (as shown in version 1, panel C, Table 3.2). The logarithmic specification imparts several good properties to the justice evaluation function, including the property that it quantifies the common human experience that deficiency is felt more keenly than comparable excess.

Additionally, there is a parameter called the *signature constant*, which plays two parts. Its sign, called the *framing coefficient*, indicates whether the observer regards the reward under consideration as a good or as a bad (positive for a good, negative for a bad). Its absolute value, called the *expressiveness coefficient*, indicates the observer's style of expression.

The framework distinguishes between the observer's experience of the justice evaluation and his or her expression of the justice evaluation. The *experienced justice evaluation* is written as in version 1 (panel C, Table 3.2), or more simply if the context unambiguously refers to only a good or only a bad. For example, in the case of a good, the experienced justice evaluation is written:

---

[5] I am here following a logical sequence from general to specific function. In point of fact, the logarithmic-ratio specification of the justice evaluation function was discovered before the general justice evaluation function was formulated.

$$J^* = \ln\left(\frac{A}{C}\right) \tag{3}$$

where A denotes the actual reward, C denotes the just reward, and J^* denotes the experienced justice evaluation.

The observer's style of expression transforms the experienced justice evaluation into the *expressed justice evaluation*. The expressed justice evaluation is thus written as the product of the experienced justice evaluation [as in Eq. (3)] and the expressiveness coefficient (the absolute value of the signature constant). More generally and more simply, for both goods and bads, the expressed justice evaluation is written

$$J = \theta \ln\left(\frac{A}{C}\right) \tag{4}$$

where J denotes the expressed justice evaluation and θ denotes the signature constant.

Like the just rewards, the justice evaluations are both observer-specific and rewardee-specific. They, too, are often arrayed in a matrix, called the *justice evaluation matrix* and denoted J. The justice evaluation matrix is exactly like the just reward matrix in Table 3.1, except that the cell entries are justice evaluations instead of just rewards.

Of course, individuals experience the justice evaluation about other things besides individuals' rewards, and these may include the mean and inequality in a distribution. For example, comparison of an actual inequality with a just inequality yields a justice evaluation about inequality.

It also is useful to have a summary measure of overall injustice in a group or society, and two measures, called *justice indexes*, have been developed for this purpose. The first justice index, *JI1*, is the arithmetic mean of the experienced justice evaluations, and the second justice index, *JI2*, is the mean of the absolute values of the experienced justice evaluations.

More generally, by aggregating the justice evaluation across goods and bads, over time and across persons, many new representations and quantities are obtained, for example: (1) instantaneous J produced by the joint consideration of several goods (bads), (2) the individual's time series of J and its parameters, and (3) the collectivity's instantaneous distribution of J, its parameters, and their time series.

As with the building blocks that emerged from analysis of the first and second central questions, the new building blocks are ready for use in both theoretical work and empirical work. The experienced justice evaluation function can be used immediately as the starting assumption for theories, as can the framing coefficient and the expressiveness coefficient. The expressed justice evaluation function can be used immediately in empirical work.[6] Framing theory and justice-comparison theory, discussed below, begin with the framing coefficient and the experienced justice evaluation function, respectively.

Building Blocks from the Fourth Question

The fourth central question—What are the behavioral and social consequences of perceived injustice?—both plays a prominent part in the predictions of justice-comparison theory and also yields a basic expression, the *justice consequences function*, which can be used immediately in empirical work. The justice consequences function assesses the behavioral and social effects of a large set of terms based on the justice evaluation function, including the

---

[6]Given current measurement technology, empirical work that observes or measures the justice evaluation always must use the expressed justice evaluation; to estimate the experienced justice evaluation, it is necessary to estimate the signature constant and then convert the expressed justice evaluation into the experienced justice evaluation.

individual's justice evaluation, parameters of the individual's set of justice evaluations, parameters of the social distribution of justice evaluations, and so on.

The Framework Collects a Large Set of Building Blocks

Reasoning in this way about all four central questions yields a large set of building blocks, which are now ready for use in both theoretical justice analysis and empirical justice analysis. (Moreover, as already noted, some of the elements in the framework will later appear as the predictions of theories.) The experienced justice evaluation function, for example, is the starting assumption in several justice theories (including justice-comparison theory, one of the specimen theories in this chapter whose generalized version is more fully discussed in Part III of this volume). It proves itself exceedingly fruitful, yielding an abundance of implications for behavioral and social phenomena in far-flung domains, from crime to war to monasteries. The expressed justice evaluation function is a building block in empirical justice analysis. Estimation of the justice evaluation function immediately yields estimates of the signature constant; estimation of a form of the expressed justice evaluation function in which the just reward is unobserved yields, besides the signature constant, estimates of the equation R^2, which in a specified subset of cases has a substantive interpretation (whether actual inequality is greater or lesser than just inequality), and, surprisingly, estimates of the observer-specific/rewardee-specific just rewards, together with estimates of the experienced justice evaluation and the justice indexes. Note that the empirical work just described does not pass through the theoretical work; it does not depend on derivation of theoretical implications.

The Triptych of Justice Analysis

As the foregoing discussion suggests, it has become useful to think of justice analysis as encompassing three branches: framework for justice analysis, theoretical justice analysis, and empirical justice analysis. Justice analysis thus can be represented by a triptych, as illustrated in Figure 3.1. The center panel summarizes the framework, highlighting the four central questions and the set of building blocks. The left panel depicts theoretical work. The right panel depicts empirical work. We have superimposed five arrows to link the panels. Note that, consistent with our discussion so far, three arrows originate in the framework and end in the theoretical and empirical panels. Two of these go to the theoretical panel and one to the empirical panel. In our discussion thus far, we have not yet differentiated between kinds of theories, and thus we leave for a later section further discussion of the two arrows that go from the framework to the theoretical panel (as well as of the two arrows that go directly from the theoretical panel to the empirical panel). The arrow that goes from the framework to the empirical panel, on the other hand, refers precisely to the sorts of empirical work described in the previous paragraph, such as estimation of the just reward function for every observer, estimation of the signature constant for every observer, and so on.

The Triptych of Sociological Analysis and of Other Subfields

In the same way that justice analysis is best represented by a triptych, other subfields of sociology similarly can be represented by a triptych, as can the whole of sociological analysis. For example, the study of inequality—inequality analysis—can be thought of as the triptych of framework, theoretical inequality analysis, and empirical inequality analysis. So, too, can

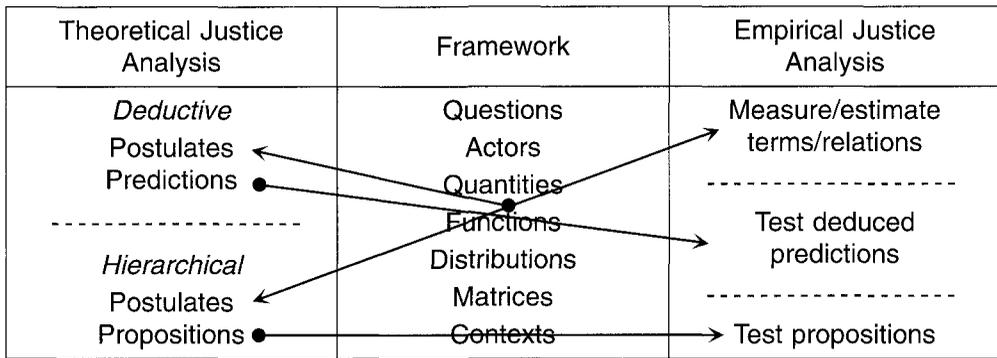| Theoretical Justice Analysis	Framework	Empirical Justice Analysis
Deductive Postulates Predictions - - - - - - - - - - - - - - - - - - *Hierarchical* Postulates Propositions	Questions Actors Quantities Functions Distributions Matrices Contexts	Measure/estimate terms/relations - - - - - - - - - - - - - - - - - - Test deduced predictions - - - - - - - - - - - - - - - - - - Test propositions

FIGURE 3.1. The triptych of justice analysis.

the study of migration—migration analysis—and the study of race—race analysis. In all these cases, the framework begins with the central questions of the field; as the questions are addressed, the building blocks emerge. Then both theoretical and empirical analysis use the building blocks as the foundation for constructing theories and carrying out empirical work.

As new theoretical and empirical work accumulates and is codified, each domain-specific triptych would grow. Many would be similar to the justice analysis triptych (Fig. 3.1). Examination of the triptych would yield clues as to which fields might be understudied and what may be major gaps in knowledge. A succinct way to summarize the entire discipline is by collapsing the headings of the major triptychs onto a single chart, as in Fig. 3.2.

Before leaving the large landscape of sociological analysis to focus on theory, we pause to notice that the building blocks developed in the framework for justice analysis were born already "formalized." We did not "formalize" them; they simply appeared that way. The justice evaluation variable seemed inherently representable by the real-number line. The set of observer-specific/rewardee-specific just rewards seemed inherently representable by a matrix. The set of rewardee-specific just rewards in the eyes of a single observer seemed inherently representable by a distribution. The relationship between the actual reward, just reward, and justice evaluation seemed inherently representable by a function, as did the relationship between the just reward and the rewardee characteristics.

It is an open question how formal the frameworks will be, initially, in other domains, that is, how much additional work may be required to formalize the basic building blocks. Was justice analysis peculiar in its immediate formalization? Do topical domains vary in the ease with which their central questions yield already-formalized building blocks? My impression is that some domains are almost inherently already formal or already almost-formal. These domains would include inequality analysis, migration analysis, network analysis, and choice analysis. Further thought, however, of the sociology-of-science kind, is required in order to address this question more fully and deeply.

THEORY AND FORMAL THEORY

Preliminaries

A theory begins with an assumption. This assumption, alone or with companion assumptions, illuminates the topical domain. It does so by yielding implications that become, variously, new answers to old questions or unexpected new questions. It yields results that make

Theoretical Justice Analysis	Framework for Justice Analysis	Empirical Justice Analysis
Theoretical Inequality Analysis	Framework for Inequality Analysis	Empirical Inequality Analysis
Theoretical Migration Analysis	Framework for Migration Analysis	Empirical Migration Analysis
Theoretical Norms Analysis	Framework for Norms Analysis	Empirical Norms Analysis
Theoretical Status Analysis	Framework for Status Analysis	Empirical Status Analysis
Theoretical Network Analysis	Framework for Network Analysis	Empirical Network Analysis
Theoretical Emotion Analysis	Framework for Emotion Analysis	Empirical Emotion Analysis
Theoretical Power Analysis	Framework for Power Analysis	Empirical Power Analysis
Theoretical Race Analysis	Framework for Race Analysis	Empirical Race Analysis
Theoretical Class Analysis	Framework for Class Analysis	Empirical Class Analysis
Theoretical Gender Analysis	Framework for Gender Analysis	Empirical Gender Analysis
. .	. .	. .

FIGURE 3.2. The triptychs of sociological analysis.

some relationships necessary and others impossible; it requires some things and forbids others. Theory is like a tree, with all the branches (implications) springing from the same trunk (assumptions). Vast areas of the human experience are linked to a simple and parsimonious set of starting principles.

A theory may be thought of as a list of sentences, including both statements (sentences that can be true or false) and other sentences like definitions and identities. In doing or judging theory, the most fundamental and important habit of thought is to characterize each sentence according to the part it plays in the theory. Is it an assumption or an implication? or something else? The student or theorist who always knows which sentences are assumptions and which are implications has the most formidable defense against confusion, ambiguity, and error. And the theorist who labels the sentences by the part they are playing is doing a service of inestimable value to the discipline; besides guarding against error, he or she is saving others precious time.

It is sometimes said that a theory is general and abstract. What this means, properly understood, is that the *assumptions* of the theory are general and abstract: A theory *begins* at

a general and abstract level, but the theory *ends* at the most particular and concrete levels. Of course, it is the generality and abstractness of the assumptions that enable derivation of implications for wide fields of phenomena. The full theory, however, cannot correctly be said to be general and abstract, for if it is a good theory, its implications include observable, particular phenomena and relationships. Part of the great adventure of doing theory is precisely this: great empirical surprises follow from theoretical derivation.

It is sometimes said that a theory is an interrelated set of propositions. Of course, the statements in a theory are "interrelated," but this characterization blurs the great and essential distinction between assumptions and implications and the special way in which assumptions and implications are related to each other.

To achieve precise understanding of the character of the interrelationship among the sentences of a theory, we introduce a distinction between two kinds of theories and as well sharpen our vocabulary. Earlier in the chapter we referred to deductive theory as the most wonderful kind of theory, and our discussion in the previous section about assumptions and implications implicitly took deductive theory as the standard. We turn now to discuss explicitly two main theoretical forms, plus a third, which is a combination of the two main forms.

Types of Theories

There are two main kinds of theories. The first is classical *deductive theory*, which traces its origins to Newton (Toulmin, 1978). In deductive theory, the assumptions are clearly stated, and testable implications are deduced from the assumptions; the usefulness and validity of the assumptions is established by testing the implications. In this first kind of theory, there are two kinds of propositions: propositions in the assumption set and propositions in the prediction set, and the relation between them is one of strict deduction. The second main kind of theory is *hierarchical theory* [in Toulmin's (1953) terminology]. In hierarchical theory, the assumptions are clearly stated, and testable propositions are constructed by linking observable terms with terms in, or produced by, the assumptions. In this second kind of theory, there are two kinds of propositions: propositions in the assumption set and the constructed testable propositions.

In both deductive and hierarchical theory, two things are made explicit: what kind of proposition each proposition is, and the precise nature of the interrelationship among the propositions. Both deductive and hierarchical theory have bipartite structures. Both begin with a set of assumptions.

However, the second part differs radically between deductive theory and hierarchical theory. While in deductive theory the statements in the second part are deduced from the first part, in hierarchical theory the statements in the second part are constructed in a somewhat ad hoc way. That is, while in deductive theory the operation for obtaining the statements in the second part is deduction, in hierarchical theory the operation is a conjecture that one or more observables are related to one or more terms that appear in the assumptions or are produced by the assumptions. Below we shall look at examples, but first it is necessary to sharpen our vocabulary, in particular, to restrict, for clarity, use of the term "proposition."

ASSUMPTION, AXIOM, POSTULATE.   To this point, we have used the term "assumption" for the statements that are assumed in a theory. Assumption is a very general term, however; for example, it is used in empirical work (as in assumptions about the error term in a regression equation) as well as in theoretical work. Other terms that are sometimes used include "axiom," an assumption with the connotation of "self-evident," and "postulate," a term that appears perfectly suited for theoretical work, as it is not often used in empirical work and as

well does not carry the "self-evident" connotation of "axiom." In the remainder of this chapter, we will use "postulate" and "assumption" interchangeably.[7]

IMPLICATION, PREDICTION, CONSEQUENCE. The words "implication," "prediction," and "consequence" are often used as synonyms for each other, referring to the propositions deduced from the assumptions in a deductive theory. For clarity, we will use only two of these words, "implication" and "prediction," using them interchangeably.

PROPOSITION. For the rest of this chapter, we reserve use of the term "proposition" for a special kind of proposition, namely, one that is used exclusively in hierarchical theories and exclusively for the statements constructed by linking observables with terms in, or produced by, postulates. We do this only in this chapter and only to simplify the exposition and avoid ambiguity.[8]

Accordingly, the bipartite structure of the two kinds of theories can now be precisely characterized:

DEDUCTIVE THEORY. A deductive theory is a list of sentences that may be divided into two parts, the first part containing the postulates and the second containing testable predictions deduced from the postulates.

HIERARCHICAL THEORY. A hierarchical theory is a list of sentences that may be divided into two parts, the first part containing the postulates and the second containing testable propositions constructed by linking observable terms with terms that appear in, or are produced by, the postulates.

There is a third, mixed form of theory, in which the same postulates are used both to deduce predictions and to construct propositions:

HYBRID DEDUCTIVE-HIERARCHICAL THEORY. A hybrid deductive-hierarchical theory may be divided into two parts, the first part containing the postulates and the second part further subdivided into two parts, one containing predictions deduced from the postulates and the other containing propositions constructed by linking observable terms with terms that appear in, or are produced by, the postulates.

Figure 3.3 depicts the three kinds of theories. Sometimes there is an added twist to the constructed propositions, one not visible in Fig. 3.3. It is this: In a hybrid theory, the propositions may be constructed by linking observable terms with terms that, while certainly produced by the postulates, in fact arrive via the predictions.

Deductive theory is more powerful than hierarchical theory, for it makes explicit the mechanisms by which the observables in the predictions are linked to the postulates. Indeed, one may think of hierarchical theory as a step along the way, perhaps a composite of hunches and empirical evidence lying in wait for a deduction to lay bare the mechanism.

Both deductive and hierarchical theory are as one, however, with respect to two desiderata. The first is that the postulate set should be as small as possible (see Fig. 3.3). The second is that the prediction-proposition set should be as large as possible; that is why the diagrams in Fig. 3.3 have no border at the bottom. A further desideratum is that the prediction-

---

[7]Note again that the assumption set or postulate set of a theory typically includes, besides statements (sentences which can be true or false), other sentences such as definitions and mathematical identities.

[8]Of course, it should be kept in mind that in the larger world outside this chapter, postulates and predictions are themselves propositions, albeit special kinds of propositions with special tasks.

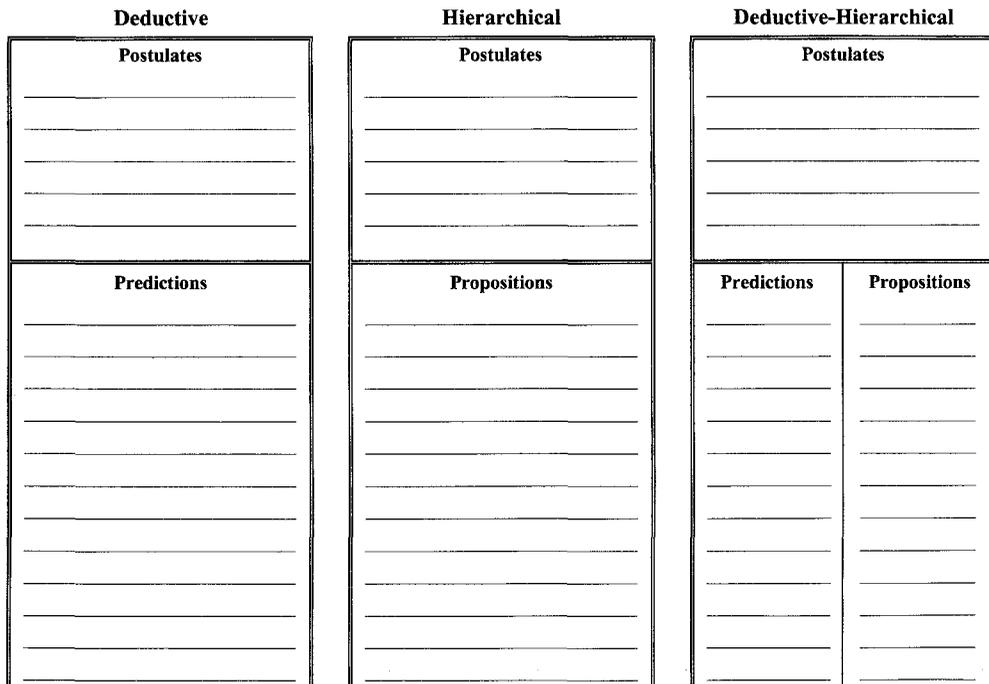| Deductive	Hierarchical	Deductive-Hierarchical	
Postulates	**Postulates**	**Postulates**	
Predictions	**Propositions**	**Predictions**	**Propositions**

FIGURE 3.3. Three kinds of theories.

proposition set span wide topical domains and in the case of deductive theory that the prediction set include novel predictions.

Now that deductive theory and hierarchical theory have received precise characterization, we can return to Fig. 3.1. Notice that the theoretical panel is divided by a dashed line into two sections, for deductive and hierarchical theory, respectively. Look at the two arrows that travel leftward from the framework panel to the theoretical panel of the triptych. One arrow goes to deductive theory, the other to hierarchical theory, indicating that building blocks in the framework become the postulates of both kinds of theories.

Now look at the empirical panel. It is divided into three sections, two of which are linked to the theoretical panel. Two arrows originate in the theoretical panel of the triptych and end in the empirical panel. One is an arrow going from deductive theory to theoretical predictions. The second is an arrow traveling from hierarchical theory to propositions in the empirical panel.[9]

Empirical tests are always on the predictions, in the case of deductive theories, and the predictions/propositions, in the case of hierarchical theories. Empirical tests of the predictions/propositions enable assessment of the validity and usefulness of the postulates, leading researchers to revise, refute, or discard one or more of the postulates or to impose boundaries on their scope of operation.

[9]As discussed earlier, the top section of the empirical panel is reached by an arrow that originates in the framework. That is, some empirical work does not pass through the theoretical panel, but is carried out based directly on the framework. To illustrate: Estimation of the just reward or the just reward function requires only the building blocks in the framework; it does not require any theory. On the other hand, a hierarchical theory may test the proposition that the reflexive justice index is related to a country's level of political development.

The big adventure of theoretical analysis is the journey from postulates to predictions and from postulates to propositions. The first, thought of as a theoretical enterprise, leads to what may be called theoretical discovery. The second leads to what may be called empirical discovery. Both bring great surprises. Both also require a modicum of special tools.

In describing the framework for justice analysis, we noted that little of a formal nature had to be explicitly undertaken; the quantities and relations seemed to appear already formalized. Of course, that will not always be the case. But whatever the formalization history of the building blocks that become the postulates of theories, when the time comes to deduce predictions from the postulates, formal things will almost always be done. Formal tools are power tools for extracting from the postulates all the information and insights they contain about wide areas of the human experience.

We now illustrate with five theories from the study of justice.

ILLUSTRATION:
THEORIES FROM THE PORTFOLIO OF
THEORETICAL JUSTICE ANALYSIS

The many building blocks developed in the framework for justice analysis can be used, alone or in combination, as the postulates of theories. Sometimes additional postulates are required before predictions can be deduced. In this section, we briefly describe five theories based on building blocks in the framework for justice analysis. One of these, the justice version of comparison theory is a special case of the larger comparison theory, which receives fuller treatment in chapter 30 in this book. Together, these five theories illustrate all three theoretical structures—deductive, hierarchical, and hybrid—and illustrate as well techniques for deducing predictions and, finally, the great variability across theories in scope and fruitfulness, at least as discernible in theoretical work to date.

Allocation Theory

Allocation theory addresses the process by which ideas of justice shape actual rewards; it thus is a theory addressing the second central question in the study of justice. Allocation theory begins with three building blocks from the framework for justice analysis—the just reward matrix, the weight matrix, and the actual reward.[10]

POSTULATE.   The building blocks are combined into a postulate that states:

- *Postulate (Just Rewards Determine Actual Rewards)*: Actually or metaphorically, actual rewards are produced by aggregation of the observer-specific/rewardee-specific just rewards; the observers, however, may differ in their influence over each rewardee's actual reward.

Formal expressions for all the terms and relations were introduced earlier. To aid in the exposition, we report in Table 3.3 all the basic formulas and matrices used in allocation theory.[11]

---

[10]For an early version of allocation theory, see Jasso (unpublished).

[11]We follow the usual notational conventions. Lowercase letters are used to denote elements of a matrix and uppercase letters to denote the matrix; similarly, lowercase letters are used to denote the values of a variate and uppercase letters to denote the variate or distribution.

TOOLS FOR DEDUCING PREDICTIONS IN ALLOCATION THEORY. Allocation theory is a young theory in justice analysis. New methods are being developed for deducing predictions from postulates which begin with full matrices; these methods are collectively called the *matrixmodel*. Predictions obtained to date are of two kinds: predictions about the inequality in the actual reward distribution and predictions about the distributional shape of the actual reward distribution. The matrixmodel tools include theorems on weights (Kotz, Johnson, & Read, 1988) and theorems from the study of probability distributions, including theorems on the variance and central limit theorems (Stuart & Ord, 1987), in particular, a version of the central limit theorem owed to Liapunov (1900, 1901), as strengthened by Lindeberg and Feller (Wolfson, 1985).

PREDICTIONS OF ALLOCATION THEORY. Predictions obtained to date include the following:

1. The larger the number of independent actors involved in an allocation decision, the lower the inequality in the actual reward distribution.
2. The larger the number of independent factions (where each faction exhibits internal consensus on the allocation decision), the lower the inequality in the actual reward distribution.
3. Power concentrations are under certain conditions indistinguishable from consensus processes; a dictatorship is equivalent to a society characterized by complete agreement, a triumvirate is equivalent to a three-faction society, etc.
4. Under certain specified conditions, lack of power has the same effects on inequality in the actual reward distribution as lack of independence of mind.
5. A democracy—defined as a set of equally empowered decision makers—can increase or decrease inequality, depending on the citizens' independence of mind.
6. Dissensus has the effect of reducing inequality.
7. When presidents of democratic nations seek to forge a consensus, they are unwittingly inducing greater inequality.
8. As the number of independent decision makers or of independent decision making factions grows large, the shape of the actual reward distribution tends to normality.
9. If decision making occurs in separate groups, the within-group actual reward distributions may be normal and the overall actual reward distribution nonnormal.

REMARKS ABOUT ALLOCATION THEORY. Allocation theory is a deductive theory that could become a hybrid theory. It has a single postulate: that just rewards determine actual rewards; this postulate is based on building blocks from the framework for justice analysis. Predictions are deduced by using mathematical tools. The postulate does not describe a feature of human nature but rather a feature of a societal arrangement. Thus, the predictions hold for any situation to which the postulate applies. Accordingly, the predictions may be exciting, perhaps novel, certainly observable, but they are not testable in the usual sense. Indeed, the predictions have more the character of mathematical theorems. What the predictions contribute, however, is a new perspective on the signal importance of two factors (1) societal arrangements and (2) independence of mind. This sets the stage for both inductive exploration of the conditions under which arrangements such as that described in the postulate are instituted, the determinants of variability in the weights of decision makers, and the determinants of independence of mind. Concomitantly, terms in the postulate, such as the weights of decision makers, and new terms produced by the postulate via the predictions, such as independence of mind, can be used to construct propositions for a new hierarchical-theory component. Allocation theory could soon become a hybrid theory.

TABLE 3.3. Basic Formulas and Matrices in Allocation Theory

A. The Just Reward Matrix

$$C = \begin{bmatrix} c_{11} & c_{12} & c_{13} & \cdots & c_{1R} \\ c_{21} & c_{22} & c_{23} & \cdots & c_{2R} \\ c_{31} & c_{32} & c_{33} & \cdots & c_{3R} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ c_{N1} & c_{N2} & c_{N3} & \cdots & c_{NR} \end{bmatrix}$$

B. The Weight Matrix

$$W = \begin{bmatrix} w_{11} & w_{12} & c_{13} & \cdots & c_{1R} \\ w_{21} & w_{22} & w_{23} & \cdots & w_{2R} \\ w_{31} & w_{32} & w_{33} & \cdots & w_{3R} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ w_{N1} & w_{N2} & w_{N3} & \cdots & w_{NR} \end{bmatrix}$$

C. The Actual Reward and the Actual Reward Vector

$$a_{.r} = \sum_{i=1}^{N} c_{ir} w_{ir} \qquad\qquad\qquad a_{.r} = [a_{.1} a_{.2} a_{.3} \cdots a_{.R}]$$

D. The Actual Reward Distribution

$$A = \sum_{i=1}^{N} C_i W_i$$

Anselmian Theory

Like allocation theory, Anselmian theory also addresses the second central question in the study of justice—How do ideas of justice shape the actual rewards? Its basic postulate is an idea proposed by St. Anselm of Canterbury, with immediate application to some of the building blocks in the framework for justice analysis, including ideas of justice, the just inequality, the actual reward, and the actual reward distribution. Anselmian theory is a hybrid theory, including both deductive and hierarchical components.[12]

POSTULATE. The basic postulate is stated:

- *St. Anselm's Postulate (Two Inclinations of the Will)*: Let the will have two inclinations, as proposed by St. Anselm, the *affectio commodi* and the *affectio justitiae*. The *affectio commodi* directs toward the individual's own good, and the *affectio justitiae* directs toward justice, toward the good of society.

TOOLS FOR DEDUCING PREDICTIONS FROM ANSELMIAN THEORY. The first tool consists of representational devices, including preference orderings and their configuration. For example, to represent the situation in which the two preference orderings are exactly opposite, the tool used is that of conjugate rankings (Kotz, Johnson, & Read, 1982, p. 145). In the application of Anselmian theory to choosing an actual reward distribution, tools are drawn from the study of probability distributions (Stuart & Ord, 1987; Johnson & Kotz, 1970a,b).

PREDICTIONS DEDUCED FROM ANSELMIAN THEORY. Predictions of Anselmian theory include the following predictions, of which the first five are general and the remainder are from an application of Anselmian theory to choosing an actual reward distribution:

1. In examining behavioral alternatives in a decision-making situation, the individual rank-orders the alternatives according to the Anselmian inclinations, producing two preference orderings.
2. The two preference orderings may be identical, or exactly the reverse of each other,

---

[12]Early work on Anselmian theory is reported in Jasso (1989b).

or neither identical nor exactly opposite. If the two preference orderings are identical, the individual is said to be in the state of harmony; if the two preference orderings are exactly opposite, the individual is said to be in the state of conflict; and if the two preference orderings are neither identical nor exactly opposite, the individual is said to be in the state of ambiguity.

3. If the number of alternatives is two, then the individual is in either the state of harmony or the state of conflict; if the number of alternatives is greater than two, then the individual may be in the state of harmony, conflict, or ambiguity.

4. Individuals in harmony cannot be characterized as being either altruistic or egoistic.

5. Individuals in conflict demonstrate by their decision whether they are altruistic or egoistic.

The remaining predictions are from the application to choosing an income distribution. In this application, persons in harmony are those for whom as own income increases, income inequality decreases; for persons in conflict, own income is an increasing function of income inequality; and for persons in ambiguity, own income is a nonmonotonic function of income inequality. In the special case of an electoral contest between two candidates whose policies would produce particular income distributions, the outcome can sometimes be predicted from the proportions in harmony, conflict, and ambiguity.

6. The proportion of the population in harmony (own income increases as income inequality decreases) can vary greatly; in five distributional families analyzed, it varies from 0.37 to 0.63%.

7. The persons in the state of harmony are the poorest persons in the distribution.

8. While all societies have a segment of their population in harmony (the segment containing the poorest persons), the states of conflict and ambiguity need not both be represented.

9. If the actual reward is Pareto distributed, about 63% of the population are in a state of harmony, and the remaining 37% are in the state of ambiguity; no one is in the state of conflict.

10. If the actual reward is lognormally distributed, half the population is in harmony and half in ambiguity; no one is in the state of conflict.

11. If the actual reward is distributed as a power-function variate, 37% of the population is in the state of harmony, and 63% is in the state of ambiguity; no one is in conflict.

12. If the actual reward is distributed as an exponential variate, 63% of the population is in harmony and 37% in conflict; no one is in ambiguity.

13. If the actual reward is distributed as a quadratic variate, half the population is in harmony and half in conflict; no one is in ambiguity.

14. In an electoral contest between two candidates whose policies would produce Pareto distributions, the candidate associated with the less unequal distribution always wins.

15. In an electoral contest between two candidates whose policies would produce exponential distributions, the candidate associated with the less unequal distribution always wins.

16. In an electoral contest between two candidates whose policies would produce power-function distributions, the outcome can go either way.

17. In an electoral contest between two candidates whose policies would produce income distributions approximated by the lognormal distribution, the outcome is either a draw or otherwise the less unequal wins.

18. In an electoral contest between two candidates whose policies would produce income distributions approximated by the quadratic distribution, the outcome is either a draw or otherwise the less unequal wins.

PROPOSITIONS CONSTRUCTED IN ANSELMIAN THEORY.   Anselmian theory is a hybrid theory, and besides having a deductive component, it also has a hierarchical component. A large number of propositions can be constructed ad hoc by linking observables to the terms produced by the postulate, including terms produced via the predictions. These terms include harmony, conflict, ambiguity, the proportion of the population in each state, the configuration of states, the individual's proportion of time spent in each state, and the society's proportion of time spent in each state or configuration. Obviously, the number of possible ad hoc propositions is virtually limitless. A few such propositions are:

1. Basic personality traits develop in response to the proportion of time an individual spends in each of the three states.
2. The character of civil discourse is determined by the society's history of the population configuration in each of the three states.
3. Saints and heroes are drawn from among individuals in conflict.
4. The literature of *angst* arises among individuals and groups who spend much time in ambiguity.
5. Adam Smith was in the state of conflict when he wrote *The Theory of Moral Sentiments* (1759/1974), but he was in the state of harmony when he wrote *The Wealth of Nations* (1776/1976).
6. The "internal conversation" posited by Peirce and Mead and investigated by Wiley (1994) differs systematically across the states of harmony, conflict, and ambiguity.
7. The propensity to wage war differs systematically by the proportion of the population in the state of harmony.
8. The prevalent ideologies, as well as artistic and cultural products, differ according to the proportions in harmony, conflict, and ambiguity.

REMARKS ABOUT ANSELMIAN THEORY.   Anselmian theory is a hybrid theory, with both deductive and hierarchical components. Its single postulate was proposed by Anselm of Canterbury. Both the postulate and its application to choosing an actual reward distribution use building blocks from the framework for justice analysis. Predictions are deduced using mathematical tools and tools from the study of probability distributions. The postulate is behavioral, and thus the predictions shed light on its validity. The predictions may be rejected empirically, and hence the postulate falsified. Empirical test of the constructed propositions would produce new empirical information.[13]

Framing Theory

The justice evaluation function, which addresses the third central question in the study of justice—What is the magnitude of the perceived injustice associated with given departures from perfect justice?—includes a framing coefficient that represents the observer's idea about whether the thing under consideration is a good or a bad. For example, not all observers regard earnings as a good, and similarly not all observers regard time in prison as a bad. The question thus arises how an individual decides whether to frame a thing as a good or bad.[14] The point of

---

[13]Note that allocation theory could emulate Anselmian theory and establish a new hierarchical component. In the same way that Anselmian theory includes constructed propositions using terms from the predictions, terms like "proportion in conflict" and "proportion in ambiguity," allocation theory could grow to include propositions using terms from its predictions, terms like "proportion characterized by independence of mind" and "number of factions."

[14]For an early version of framing theory, see Jasso (unpublished).

departure for framing theory is the idea that, whatever may be the ultimate truth about ontological goodness or badness, humans have a basic impulse to judge the goodness or badness of things.[15] The objective of framing theory is to discover the rules by which humans judge the goodness or badness of things, rules that may require or forbid certain combinations of judgments.[16]

POSTULATE. Framing theory takes for its postulate one of the basic building blocks, the justice evaluation function introduced earlier:

- *Postulate (Justice Evaluation Function)*:

$$J = \theta \ln \left(\frac{A}{C}\right) \tag{5}$$

where, as before, J denotes the expressed justice evaluation, A denotes the actual reward, C denotes the just reward, and θ denotes the signature constant, which embodies both the framing coefficient, signum(θ), and the expressiveness coefficient, $|\theta|$.

TOOLS FOR DEDUCING PREDICTIONS FROM FRAMING THEORY. The only tools used are simple algebra and Atkinson's (1970, 1975) measure of inequality. Algebraic manipulation of the justice evaluation function and inspection of the justice index JI1, together with the decomposition of JI1 into a justice evaluation about the mean and a justice evaluation about the inequality (as measured by Atkinson's measure), yield a special relationship between the observer's framing of the reward in the original justice evaluation and the observer's framing of the mean and inequality in the reward's distribution.[17]

PREDICTIONS DEDUCED FROM FRAMING THEORY. Framing theory, as developed to date, yields four main predictions:

1. If an observer regards a thing as a good, then that observer implicitly regards the mean of the thing as a good.
2. If an observer regards a thing as a good, then that observer implicitly regards inequality in the distribution of that thing as a bad.
3. If an observer regards a thing as a bad, then that observer implicitly regards the mean of the thing as a bad.
4. If an observer regards a thing as a bad, then that observer implicitly regards inequality in the distribution of that thing as a good.

The two inequality predictions are sometimes combined into a new statement that is succinct but less rigorous (as it omits the observer): Inequality in the distribution of a good is a bad, and inequality in the distribution of a bad is a good.

REMARKS ABOUT FRAMING THEORY. Framing theory is a young, deductive theory. As developed to date, its scope is limited to individuals who experience the sense of justice. Thus framing theory currently provides only a partial answer in the search for the rules by which humans judge the goodness or badness of things. Moreover, the predictions are based on a particular measure of inequality. It would be desirable to find a more general way to link

---

[15]As Hamlet put it, "There is nothing either good or bad, but thinking makes it so" (Act II, Scene 2).

[16]As with "justice" and its cognates, the term "good" is always understood as "good in the eyes of the observer," and the term "bad" as "bad in the eyes of the observer."

[17]Atkinson (1970, 1975) proposed a family of measures of inequality, of which one—the measure defined as one minus the ratio of the geometric mean to the arithmetic mean—appears in the decomposition of JI1 (Jasso, 1999).

framing of original things and framing of the mean and inequality in their distribution. Still, this is a useful step in advancing our understanding of framing processes.[18]

Just Society Theory

The first central question asks, What do individuals and collectivities regard as just, and why? This fundamental question has proven itself strongly resistant to formulation of a behavioral postulate. There have been important advances in the empirical estimation of what individuals think is just. However, there is as yet no warrant for postulating a priori what individuals think is just.

Against this backdrop of stubborn resistance, it is remarkable that theories designed to address other justice questions—allocation theory and framing theory—yield results that can be used to construct a theory that predicts what individuals think is just in the domain of institutional distributional arrangements. This new theory is called just society theory.[19]

POSTULATES.   Just society theory has two postulates, one each from the predictions of allocation theory and framing theory:

- *Postulate 1 (Inequality and the Number of Decision Makers)*: Inequality in the distribution of a good or bad is a decreasing function of the number of equally weighted, independent-minded decision making units.
- *Postulate 2 (Framing of Inequality)*: If an observer regards a thing as a good, then that observer implicitly regards inequality in the distribution of that thing as a bad; and if an observer regards a thing as a bad, then that observer implicitly regards inequality in the distribution of that thing as a good.

TOOLS FOR DEDUCING PREDICTIONS FROM JUST SOCIETY THEORY.   In the work to date, the derivation has not required any special tools. The results follow immediately from the combination of the postulates.

PREDICTIONS DEDUCED IN JUST SOCIETY THEORY.   The main predictions deduced to date link the just society with the number of decision makers and whether the decision is about a good or a bad:

1. An observer will regard as just a society in which distribution of benefits is by the many (democracy).
2. An observer will regard as just a society in which distribution of burdens is by the few (oligarchy).
3. The just society has a mixed government.

REMARKS ABOUT JUST SOCIETY THEORY.   Just society theory is a fledgling deductive theory. It exemplifies three noteworthy features: First, the predictions follow immediately; there is no need for algebra, or calculus, or probability distributions. Second, the postulates of just society theory are the predictions of other theories (about which, more later). Third, the last prediction echoes the insights of Machiavelli (1532/1950), who saw, but for different reasons, that the just society would have a mixed government.

---

[18]Of course, these results are also a useful step in advancing our understanding of the precise links between inequality and justice.

[19]For an early version of just society theory, see Jasso (unpublished).

Justice Version of Comparison Theory

The justice version of comparison theory addresses the fourth central question in the study of justice, What are the behavioral and social consequences of perceived injustice? Its postulate set begins with an important building block from the framework—the justice evaluation function—supplemented by two individual-level postulates and two postulates based on aggregations of the justice evaluation, one of which—the justice index—also appears in the framework. Justice-comparison theory (as we call it, for simplicity) is a hybrid theory, including both deductive and hierarchical components.[20]

POSTULATES. As noted, justice-comparison theory has five postulates, which are presented in Table 3.4. Here, in the text, we provide brief description of the postulates.

POSTULATE OF THE LOGARITHMIC SPECIFICATION OF THE JUSTICE EVALUATION FUNC-TION. The first postulate, the reflexive justice evaluation function, provides a mathematical description of the process whereby individuals, reflecting on their holdings of the goods and bads they value (such as beauty, intelligence, or wealth), compare their levels of attributes and amounts of possessions to the amounts or levels they regard as just for themselves, experiencing a fundamental instantaneous magnitude of the justice evaluation J, which captures their sense of being fairly or unfairly treated in the distributions of the natural and social goods. As in the classical literature, this instantaneous experience of being fairly or unfairly treated in the distributions of the natural and social goods is regarded as having the most wide-ranging and diverse consequences for virtually every sphere of human individual and social behavior.[21]

MEASUREMENT RULE FOR HOLDINGS. The logarithmic specification was initially proposed for cardinal goods; it is easy to measure the actual and just rewards in terms of, say, money or hectares of land. But the literature suggested that goods and bads not susceptible of cardinal measurement (beauty, intelligence, athletic skill) also play important parts in the operation of the sense of justice. Therefore, the second postulate proposes a measurement rule (Jasso, 1980), which states that cardinal things are measured in their own units (the amount denoted by x), while ordinal things are measured by the individual's relative rank $[i/(N+1)]$ within a specially selected comparison group, where i denotes the rank-order statistic in ascending order and N denotes the size of the group or population.

IDENTITY REPRESENTATION OF THE JUST REWARD. To this point the theory contained a rather large problem: while the actual reward is easily observed, the just reward is not. The very feature that made the theory potentially fruitful—its dynamical character, the same individual capable of manipulating many just rewards for the same good or bad in a short period of time—made it also close to intractable. To deal with this problem, the third postulate proposes an identity representation of the just reward. This new representation, based on the fact that any value in the reward's domain, and hence any just reward, can be expressed as a transformation of the reward's arithmetic mean, expresses the just reward as the product of the mean and an individual-specific parameter ϕ, where ϕ captures everything that is unknown about an individual's just reward. This representation of the just reward possesses the addi-

---

[20]In this chapter, "comparison theory" always refers to the justice version of comparison theory. Chapter 30 provides exposition of the general comparison theory of which the justice version is a special case.

[21]The justice evaluation function in the first postulate of justice-comparison theory is the reflexive justice evaluation function, referring to the individual him- or herself. In contrast, the justice evaluation function in the postulate of framing theory is the general justice evaluation function, describing justice evaluations of others as well as self.

TABLE 3.4. Fundamental Postulates of the Justice Version of Comparison Theory

A. Individual-Level Postulates

    1. Postulate of Logarithmic Specification of the Justice Evaluation Function

$$J = \theta \ln \left(\frac{A}{C} \right)$$

    2. Measurement Rule for Holdings

$$A,C \begin{cases} x, & \text{cardinal good/bad} \\ \dfrac{i}{N+1}, & \text{ordinal good/bad} \end{cases}$$

    3. Identity Representation of Just Reward

$$C = \phi E(A)$$

B. Social-Level Postulates

    4. Social Welfare

$$SW = E(J)$$

    5. Social Cohesiveness

$$\text{Social Cohesiveness} = -GMD(J)$$

NOTES: As described in the text, J denotes the justice evaluation, A the actual reward, and C the just reward. The signature constant θ is positive for goods and negative for bads. For both actual and just rewards, x denotes the amount of a cardinal good or bad, i denotes the rank-order statistics arranged in ascending order, and N denotes the population size. ϕ denotes the individual-specific parameter, $E(\cdot)$ the expected value, and $GMD(\cdot)$ the Gini's mean difference.

tional virtue of enabling theoretical prediction of the effects of the mean's constituent factors, which in the case of a quantity-good are the sum S of the good and the population size N. This postulate, proposed in Jasso (1986), can be traced to early work by Merton and Rossi (1950) and Merton (1957), as discussed in Jasso (2000).

SOCIAL WELFARE POSTULATE. Social welfare is defined as the arithmetic mean of the instantaneous distribution of justice evaluations in a collectivity.

SOCIAL COHESIVENESS POSTULATE. Social cohesiveness is defined as the negative of the Gini's mean difference of the distribution of justice evaluations.

TOOLS FOR DEDUCING PREDICTIONS IN JUSTICE-COMPARISON THEORY. There are two main tools, known as the *micromodel* and the *macromodel*. The micromodel begins with the individual-level justice evaluation and its change across two points in time and uses calculus to deduce predictions. The macromodel begins with the distribution of justice evaluations and uses tools from the study of probability distributions to deduce predictions. Fuller description of these tools appears in Chapter 30 on comparison theory.

PREDICTIONS DEDUCED IN JUSTICE-COMPARISON THEORY. Justice-comparison theory has been unusually fruitful. Here we present only a small sampling of the predictions obtained to date. For more examples and associated references, see Chapter 30 on comparison theory.

    1. A gift is more valuable to the receiver when the giver is present.
    2. In wartime, the favorite leisure-time activity of soldiers is playing games of chance.
    3. Posttraumatic stress is greater among veterans of wars fought away from home than among veterans of wars fought on home soil.

4. Vocations to the religious life are an increasing function of income inequality.
5. Thieves prefer to steal from fellow group members rather than from outsiders.
6. Informants arise only in cross-group theft, in which case they are members of the thief's group.
7. An immigrant's propensity to learn the language of the host country is an increasing function of the ratio of the origin-country's per capita GNP to the host-country's per capita GNP.
8. In historical periods when wives tend to predecease their husbands (e.g., due to death in childbirth), mothers are mourned more than fathers; but in historical periods when husbands tend to predecease their wives (e.g., due to war), fathers are mourned more than mothers.
9. Parents of nontwin children will spend more of their toy budget at an annual gift-giving occasion rather than at the children's birthdays.
10. If both spouses work full-time, marital cohesiveness increases with the ratio of the smaller to the larger earnings.
11. In a society in which the two-worker couple is the prevailing form of marriage and all husbands earn more than their wives, the societal divorce rate increases with the dispersion in the wives' earnings distribution and with the arithmetic mean of the husbands' earnings distribution and decreases with the dispersion in the husbands' earnings distribution and with the arithmetic mean of the wives' earnings distribution.
12. A society becomes more vulnerable to deficit spending as its wealth increases.
13. Society loses when rich steal from poor.
14. Inequality-reducing schemes arise in societies that value wealth but not in societies that value birth and lineage.
15. In all societies there will arise devices that promote variability in individuals' notions of what is just for themselves.
16. The problem for new groups is to choose the valued goods.
17. Newcomers are more likely to be welcomed by groups that value cardinal goods than by groups that value ordinal goods and more likely to be welcomed by groups that play games of chance than by groups that play games of skill.
18. Among groups whose valued goods are N ordinal goods, the group's longevity is a decreasing function of group size.
19. In a dispute over revealing salary information, the exact preference structure depends on the distributional pattern of the salaries; if this pattern follows the familiar lognormal or Pareto, then the lowest-paid and the highest-paid persons prefer to have the information revealed, forming a coalition against the middle-paid persons.
20. In a materialistic society, the greater the economic inequality, the greater the emigration rate, the more severe the conflict between warring subgroups, and the greater the public benefit conferred by the cloister.
21. In a materialistic society, the overall amount of injustice experienced by the population is an increasing function of economic inequality.

PROPOSITIONS CONSTRUCTED IN JUSTICE-COMPARISON THEORY. Justice-comparison theory is a hybrid theory, and besides having a deductive component, it also has a hierarchical component. A large number of propositions can be constructed ad hoc by linking observables to the terms produced by the postulates. The constructed propositions include:

1. Physical health is a function of the justice evaluation and of properties of the individual's time series of justice evaluations.

2. Mental health is a function of the justice evaluation and of properties of the individual's time series of justice evaluations.

3. Special features of the individual's time series of justice evaluations, for example, the range, the gaps between temporally adjacent justice evaluations, the proportion of time in underrewarded and overrewarded states, govern particular aspects of the individual's emotional and psychological life.

4. The maximum and minimum of the individual's justice evaluations become attenuated over time.

5. Expressiveness varies over the lifecourse.

6. Framing varies over the lifecourse.

7. The proportion of time during which an individual reflects on justice matters is an important marker of his or her personality.

8. The proportions devoted to reflexive and nonreflexive justice evaluations are important markers for political participation.

9. The individual's time series of justice evaluations for any unit of time exhibit self-similarity. This is the individual's signature justice profile.

10. A necessary condition for revolutionary collective movements is the combination of negative reflexive justice evaluations and positive nonreflexive justice evaluations, that is, the twin judgments that self is unjustly underrewarded and others are unjustly overrewarded.

11. The propensity to violent revolutionary conflict varies directly with the absolute magnitude of the lower extreme value of the distribution of justice evaluations.

12. Crime occurs only when the collectivity contains both underrewarded and overrewarded persons and when the absolute magnitude of the lower extreme value is greater than the upper extreme value of the distribution.

13. The crime rate varies directly with the proportion found in that leftmost segment whose upper endpoint is of identical absolute magnitude as the overall distribution's upper extreme value. Such a segment is called a distressed segment.

14. The mean seriousness of all crimes varies directly with the absolute magnitude of the mean of the distressed segment.

15. The mean seriousness of crimes against persons varies directly with the absolute distance between the overall mean and the mean of the distressed segment.

16. The rate of mental illness varies directly with the proportion of negative justice evaluation scores, but excluding the distressed segment, if any.

17. The mean severity of mental illness varies directly with the absolute magnitude of the mean of the unjustly underrewarded segment, again excluding the distressed segment, if any.

REMARKS ABOUT JUSTICE-COMPARISON THEORY.   Justice-comparison theory is a hybrid theory, with both deductive and hierarchical components. Its basic postulate, the justice evaluation function, is a behavioral postulate. Predictions are deduced using mathematical tools and tools from the study of probability distributions. The postulate is behavioral, and thus the predictions shed light on its validity. The predictions may be rejected empirically, and hence the postulate falsified. Empirical test of the constructed propositions would produce new empirical information.

Table 3.5 summarizes the five specimen theories used for illustration in this chapter. It provides a convenient way to compare the five theories and to refer to them when they are mentioned in the frequently asked questions in the next section.

TABLE 3.5. Five Theories in the Portfolio of Theoretical Justice Analysis[a]

Theory	Theory type	Postulate(s)	Postulate type	Deduced predictions	Constructed propositions
		Characterization			
Allocation	Deductive	Actual reward is a weighted mean of decision makers' just rewards	Societal	Yes	No
Anselmian	Hybrid	The will is subject to two inclinations, to the own good and to the common good	Behavioral	Yes	Yes
Framing	Deductive	1. Justice evaluation function 2. Justice index	Behavioral	Yes	No
Just society	Deductive	1. Inequality is a decreasing function of the number of independent-minded decision makers 2. Inequality in the distribution of a good is a bad, and inequality in the distribution of a bad is a good	Behavioral Societal	Yes	No
Justice-comparison	Hybrid	1. Justice evaluation function 2. Measurement rule 3. Identity representation of just reward 4. Social welfare function 5. Social cohesivenss function	Behavioral	Yes	Yes

[a]As discussed in the text, a hybrid theory has both deductive and hierarchical components. See also Fig. 3.3.

FREQUENTLY ASKED QUESTIONS

FAQ 1. What Does a Theory Look Like?

A theory is a set of sentences that can be divided into two parts, the first part containing the assumptions, and the second part containing the derived implications, in a deductive theory, or, in a hierarchical theory, the constructed propositions. Thus, a theory has a two-part structure, and looks like the forms in Figure 3.3.

FAQ 2. What Is a Theory About?

A theory is about two things. First, it is about the behavior or process described in the assumptions. Second, it is about the behaviors or processes described in the predictions or in the propositions.

To illustrate, consider justice-comparison theory. The assumptions of justice-comparison theory are about the workings of the sense of justice, in particular, how comparison of an actual reward to one's idea of the just reward produces the justice evaluation. The derived implications and the constructed propositions are about all the things in which justice evaluations play a part, from health and family behavior to religious institutions and international relations. The more basic the behavior or process described in the assumption part of a theory, the more widely-ranging will be the behaviors and processes described in the implication-proposition part.

Justice processes and comparison processes are basic in the sense that they engender behavioral and social phenomena in large topical domains. But they probably are not truly

fundamental. Thus, theories whose assumptions describe justice and comparison processes yield implications about large areas of the sociobehavioral life, but not about all areas of the sociobehavioral life. They are not theories about the truly fundamental forces that govern all observed behavioral and social phenomena. It is likely that the starting processes for justice and comparison theories are themselves the product of the joint operation of truly fundamental forces, the kind of forces Newton had in mind for physical nature. Thus, justice and comparison theories lie in the Mertonian middle range.

The Holy Grail in social science is the threefold challenge:

To discover the fundamental forces.
To describe their operation.
To derive their implications.

Social science theories of the future will describe a fundamental force in the postulate part and derive its implications in the prediction part. A special ingredient in understanding observed behavioral and social phenomena will be to examine the clashes in the effects of different forces.

FAQ 3. What Does the Name of a Theory Indicate?

There is no agreed-upon usage; some theories are named for the behavior or process in the assumption part, others for a behavior or process in the prediction part. When a theory is named for the behavior or process in the assumption part, chances are good that it is, or aspires to be, a quite general theory with implications for a variety of topical domains. Examples include rational choice theory and comparison theory.

When a theory is named for a behavior or process in the prediction part, the name provides less information. The theory could be an application of a general theory to one topical domain, or it could be a restricted exploration of the topical domain. Becker's (1973, 1974) theory of marriage is an example of the former; it is an application of the more general economic theory to the topical domain of marriage.

Sometimes the word "theory" is used to refer to a set of theories, and its name refers to a behavior or process that appears in the postulate part of some of the theories and in the prediction part of others. "Justice theory" is an example; justice theory, as has been discussed in this chapter, refers to a set of theories (of which five members were discussed in this chapter). Justice elements may appear in the postulate part, in the prediction part, or in both parts.

FAQ 4. How Is Interpretation of Predictions Related to Types of Assumptions?

An assumption may posit some feature of human nature. Alternatively, it may posit some feature of a societal arrangement or some particular organizational or institutional principle. For example, the justice evaluation function, which is the first postulate of justice-comparison theory, posits that humans make justice evaluations and experience injustice by a process that can be faithfully represented by the logarithm of the ratio of the actual reward to the just reward. Thus, the justice evaluation function posits a feature of human nature. In contrast, the single postulate of allocation theory—that just rewards determine actual rewards—posits a societal arrangement in which the actual rewards are produced by aggregating the members' ideas of the just reward.

In the first case, when a postulate refers to a feature of human nature—we may call these "behavioral" postulates—the empirical fate of the predictions sheds light on human nature. The predictions are logically necessary consequences of the behavioral postulate. If the

behavioral postulate correctly describes humans, then the predictions will be observed. If, on the other hand, the predictions are rejected, we learn that human nature does not operate in the way described by the assumption.

In the second case, however, the predictions are logically necessary implications, not of human nature, but rather of a societal arrangement; we may call these "societal" postulates. Whenever that societal arrangement is in place, the predictions will be observed. What is of interest here is not so much testing the predictions as investigating real-world societies to see whether, and how, they may satisfy the assumption. For example, in allocation theory interest centers on societies in which just rewards determine actual rewards and on assessing the extent to which independence of mind is displayed in such societies, together with more general inquiry into the determinants of this type of societal arrangement and of independence of mind.

FAQ 5. How Does Theory Grow?

To answer this question precisely, it is necessary to distinguish between *growth of a theory* and *growth of a theory set*. There are two ways in which a theory can grow: Its postulate set can grow and its prediction set can grow. With respect to the postulate part, in the early phase of a theory's development, the number of postulates may grow until it reaches a size sufficient to facilitate abundant prediction. But, as understanding grows, it may become clear that some of the postulates are unnecessary (for example, being themselves implied by other postulates). And, thus, we may say that the *growth curve of the postulate part of a theory is nonmonotonic, at first increasing, subsequently decreasing*.

In contrast, the prediction part of the theory must increase without limit. Moreover, not only is quantitative growth required but so also is qualitative growth, in particular, the continual derivation of novel predictions, predictions for phenomena and relationships not yet observed. Thus, we may say that the *growth curve of the prediction part of a theory is increasing and so also is the growth curve of the subset containing novel predictions*.

Consider, for example, justice-comparison theory. In the beginning, this theory had a single postulate—the justice evaluation function—and no implications; it was correctly not yet called a theory (Jasso, 1978). Early attempts at derivation indicated that in order to include within the purview of the theory ordinal goods, it would be necessary to introduce a second postulate to describe the measurement rule for cardinal and ordinal things. The first published version of the theory (Jasso, 1980) contains two postulates and includes both derived predictions and constructed propositions. While some of the derived predictions and constructed propositions could have been based on the first postulate alone (those that did not involve ordinal goods), the prediction set was substantially enlarged by incorporation of the second postulate. Similarly, introduction of the third postulate (Jasso, 1986), the identity representation of the comparison holding, produced an explosion of new predictions.

As discussed in the section entitled "Justice Version of Comparison Theory," justice-comparison theory currently has a set of five postulates. Ongoing work is scrutinizing the fifth postulate (social cohesiveness), to see whether it may itself be implied by the other four and to see whether the few predictions that have used it can be derived from the other four. If so, the postulate part of justice-comparison theory would decline from five to four postulates. Meanwhile, the prediction set continues to grow dramatically.

How about growth in a theory set? Growth in a theory set occurs with the introduction of new theories. In the case of the justice theory set, new theories include allocation theory and Anselmian theory, briefly discussed earlier in the chapter. In this case, it is useful to examine how the theories are related and to see whether they can be consolidated, as discussed in the next frequently asked question.

FAQ 6. How Are Theories Related?

Here, we focus on the relations between two deductive theories; in general, it is useful to examine the pairwise relations among all theories in a theory set or, more generally, in a topical or disciplinary domain.

Two theories may be related in one of three ways. First, their postulate sets may share postulates; that is, a postulate may appear as a postulate in both theories. Second, their prediction sets may share predictions; that is, a prediction may appear as a prediction in both theories. Third, a sentence may be a postulate in one theory and a prediction in the other. Fig. 3.4 depicts these relations.

When two theories share a postulate, it is useful to examine whether the two postulate sets can be merged (that is, whether they are fully consistent). If so, the new theory will have fewer postulates than the sum of the two earlier theories, while the new prediction set will equal in size the sum of the two constituent prediction sets. This situation produces a gain in what Heckathorn (1984) calls "theoretical payoff."

When two theories share a prediction, it may mean that, consistent with a multifactor view of empirical reality, the two processes described in the postulate parts of the two theories both play parts in producing the behavior or process described in the prediction. This is very important information for use in empirical estimation and in the interpretation of empirical results.

When a statement appears in the postulate set of one theory and in the prediction set of another, it is useful to investigate whether consolidation may be appropriate. The just society theory summarized earlier in this chapter provides an example of this activity; here the postulate set contains predictions from two theories (allocation theory and framing theory). Current research is assessing whether allocation theory and framing theory can be consoli-
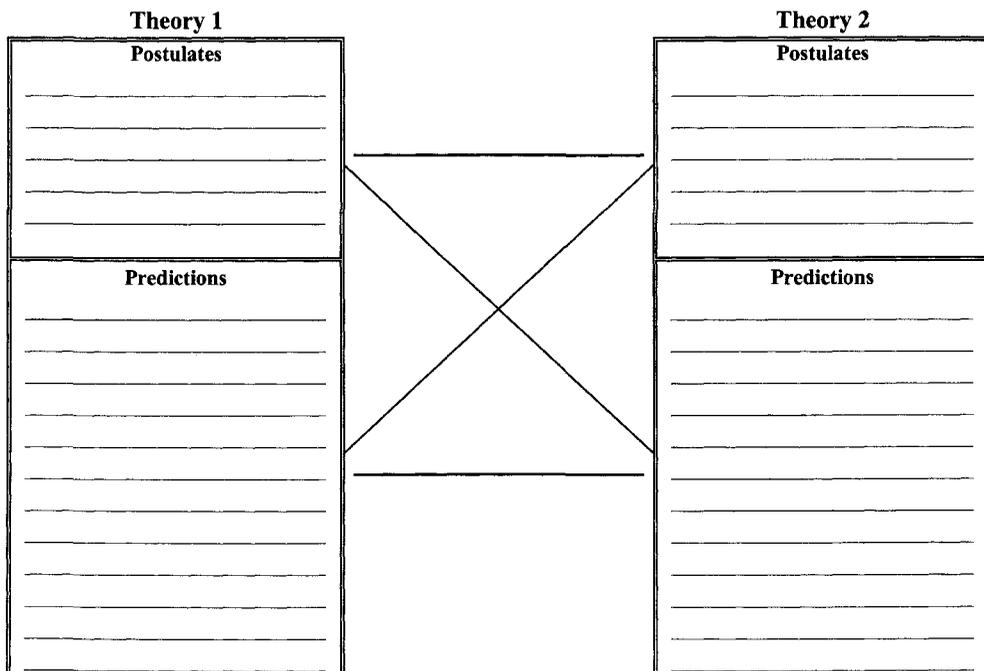

FIGURE 3.4. Relations between theories.

dated, and if so whether, given that framing theory and justice-comparison theory share a postulate (the justice evaluation function), the new theory can be further consolidated with justice-comparison theory. It is not obvious what the results of this assessment will be, in part because the justice evaluation function appears only in reflexive form in justice-comparison theory while it appears in full observer-rewardee form in framing theory.

FAQ 7. How Do We Report the Results of Theoretical Derivation?

A useful way to report the results of theoretical derivation is by means of the Merton chart of theoretical derivation (Table 3.6). The Merton chart is organized as a spreadsheet, with "postulates" as the column designator and "predictions" as the row designator, so that for each prediction one may mark which postulates were used in its derivation. The Merton chart, if fully filled out (as of a given date), would tell at a glance which postulates are "productive" and which not, and which predictions are "expensive" and which not; that is, a postulate's productivity can be gauged by the number of predictions in whose derivation it plays a part. Conversely, a prediction's cost can be gauged by the number of postulates required to derive it. The Merton chart of theoretical derivation was named for Merton who has urged the codification of theoretical results, for example, in Merton (1945).

It is scrutiny of Merton charts for justice-comparison theory that has prompted assessment of the fifth postulate, which, as discussed in the FAQ 5, is a candidate for elimination from the postulate set.

FAQ 8. What Is Theory-Driven Research?

The phrase "theory-driven research" usually refers to two activities: (1) theoretical analysis, and (2) empirical analysis of either (a) predictions derived in deductive theories, or (b) propositions constructed in hierarchical theories. For example, in justice analysis, theory-driven research would encompass derivation of new predictions, empirical testing of predictions derived in deductive theories, and empirical testing of propositions constructed in hierarchical theories. In Fig. 3.1, theory-driven research would include all research in the theoretical panel, and it would include research in the empirical panel which is linked by arrows to the theoretical panel.

There are two other kinds of research represented in Fig. 3.1, both of which are critically important not only for the advancement of a field but also specifically for theoretical development. Yet they cannot be called "theory-driven research" except by a considerable linguistic stretch or by the hope that they will lead to theoretical work.

The first of these two other kinds of research is basic work on the framework for the study of a particular field of phenomena. If we call work on the framework "theory-driven," it is because of the hope that work on the framework will lead to new building blocks for new theories.

What about purely inductive work? Consider, for example, work in the top section of the empirical panel of Fig. 3.1, which is not linked to the theoretical panel, but is linked by an arrow to the framework. Such work cannot truly be said to be "theory-driven," and yet it plays a critically important role in suggesting new ideas for theories. Indeed, the justice evaluation function was discovered via inductive empirical work, and subsequently became the cornerstone of several theories. Put differently, such work is not driven by a theory, yet it can drive a theory. Thus, as with work on the framework, if we call inductive empirical work theory-driven, it is because of the hope that it will lead to new building blocks for new theories.

TABLE 3.6. Merton Chart of Theoretical Derivation

Theory: _____   Date: _____

                                                        Page: _____

Predictions	Postulates				

Notes:

FAQ 9. What Do We Test When We Test a Theory?

We carry out tests on the predictions of deductive theories and the propositions of hierarchical theories. These tests shed light on the validity and usefulness of the assumptions in the theories.[22]

FAQ 10. Does Formal Theory Really Enable Swifter Progress to Deeper Understanding of Human Behavior?

You be the judge. Take the postulate or postulates from any of the five specimen theories discussed in the theory section. Think hard about what light the postulate sheds on human behavioral and social phenomena. Think hard about how the postulate may be connected to other areas of the human experience. The key question is: Can thinking hard—by itself—produce the abundance of predictions that formal derivation has produced?

For example, can thinking hard about how individuals experience themselves as unfairly treated if their actual reward differs from what they see as the just reward for themselves yield the predictions listed in the section entitled "Justice Version of Comparison Theory," such predictions as the prediction that whether conflict is more severe when a disadvantaged group constitutes 10% of the population or when a disadvantaged group constitutes 90% of the population depends on the shape of the income distribution?

Similarly, can thinking hard about St. Anselm's idea that the will has two inclinations yield the predictions listed in the section entitled "Aselmian Theory," such predictions as the

---

[22]For analysis of the testing process, see Popper (1935/1959, 1963), Kuhn (1962/1970), and Lakatos (1970), and for brief discussion, Reynolds (1971) and Jasso (1988:3–5, 1989a:139–141, 1993:258–263).

prediction that the proportions of the population in the states of harmony, conflict, and ambiguity depend on the shape of the income distribution?

Can thinking hard about how people form ideas of justice and how they experience injustice lead to predictions about the exact relations between justice and inequality, such predictions as the prediction that when people value wealth, the greater the wealth inequality, the greater the overall amount of perceived injustice?

Look at the postulates. Review in your head how many years the postulates were known. Think about the Anselmian postulate, which captivated Duns Scotus, among others.[23] Think about the basic idea underlying justice-comparison theory, known to the ancients, known to Marx, Durkheim, James. Look at the predictions. And you be the judge.

FAQ 11. How Do I Get Started Doing Formal Theory?

There are two kinds of preparation, remote and proximate. Remote preparation involves building, over a long period of time, a set of habits of mind and a generous toolbox. Proximate preparation involves acquiring a tool that emerges as important in addressing a burning question. Of the two, remote preparation is the more important. It is remote preparation that generates surprises. And theoretical advancement, in the end, is about surprises.

For remote preparation, there are two ingredients. The first is voracious reading in everything connected to human behavior, not only social science but also philosophy, literature, poetry, supplemented by plays, films, television. The second is mathematics. Mathematics is an important tool for reasoning, both directly and indirectly. The direct applications of mathematical tools are obvious. Less obvious, however, is the fact that practice with mathematics improves the ability to think abstractly. It is thinking abstractly that makes it possible for one to see the connections between seemingly unrelated things. Mathematics builds the habits of thought that lead to theoretical surprises.

Proximate preparation has its place. Learning one special tool to address one question gets a job done. But it is no substitute for the lifelong practice of mathematics.

For the young student, there is perhaps no better remote preparation for social science than entering the two worlds—one of mathematics, the other of the literary imagination—now one, now the other. Treat them as ends in themselves, not as means; enter them for the gladness and magic they bring. They will surprise you by setting up links in your mind and creating an entirely new world, a world that seamlessly integrates mathematical and literary insights. It is from this new world in your mind that you will make theories.

REFERENCES

Anselm of Canterbury, Saint. (1070–1109). (1946–1961). *Opera omnia*. F. S. Schmitt (Ed.). O.S.B. Edinburgh: Thomas Nelson and Sons.

Anselm of Canterbury, Saint. (1080–1090) (1967). *Truth, freedom, and evil: Three philosophical dialogues*. J. Hopkins & H. Richardson (Eds. & Trans.). New York: Harper Torchbooks.

Atkinson, A. B. (1970). On the measurement of inequality. *Journal of Economic Theory, 2*, 244–263.

Atkinson, A. B. (1975). *The economics of inequality*. London: Oxford.

Becker, G. S. (1973). A theory of marriage: Part I. *Journal of Political Economy, 81*, 813–846.

Becker, G. S. (1974). A theory of marriage, Part II. *Journal of Political Economy, 82*, S11–S26.

Heckathorn, D. D. (1984). Mathematical theory construction in sociology: Analytic power, scope, and descriptive accuracy as trade-offs. *Journal of Mathematical Sociology, 10*, 77–105.

Jasso, G. (1978). On the justice of earnings: A new specification of the justice evaluation function. *American Journal of Sociology, 83*, 1398–1419.

[23]Duns Scotus (*c*. 1266–1308) found Anselm's idea compelling and used it to develop a new understanding of morality and of the freedom of the will. See Jasso (1989b).

Jasso, G. (1980). A new theory of distributive justice. *American Sociological Review, 45*, 3–32.

Jasso, G. (1986). A new representation of the just term in distributive-justice theory: Its properties and operation in theoretical derivation and empirical estimation. *Journal of Mathematical Sociology, 12*, 251–274.

Jasso, G. (1987). The just society: Three theorems on inequality, justice, and democracy. Revised version of paper presented at the Conference to Honor James S. Coleman, Werner-Reimers Stiftung, Bad Homburg, Germany, October–November 1996.

Jasso, G. (1988). Principles of theoretical analysis. *Sociological Theory, 6*, 1–20.

Jasso, G. (1989a). Notes on the advancement of theoretical sociology (reply to Turner). *Sociological Theory, 7*, 135–144.

Jasso, G. (1989b). Self-interest, distributive justice, and the income distribution: A theoretical fragment based on St. Anselm's postulate. *Social Justice Research, 3*, 251–276.

Jasso, G. (1993). Building the theory of comparison processes: Construction of postulates and derivation of predictions. In J. Berger & M. Zelditch, Jr. (Eds.), *Theoretical research programs: Studies in the growth of theory* (pp. 212–264; references pp. 474–478). Stanford, CA: Stanford University Press.

Jasso, G. (1999). How much injustice is there in the world? Two new justice indexes. *American Sociological Review, 64*, 133–168.

Jasso, G. (2000). Some of Robert K. Merton's contributions to justice theory. *Sociological Theory, 18*, 329–337.

Jasso, G. (unpublished). The just society: Theorems on justice, inequality, and democracy. Paper presented at the Conference in Honor of James. S. Coleman, Reimers Stiftung, Bad Homburg, 31 October–1 November 1996.

Jasso, G., & Wegener, B. (1997). Methods for empirical justice analysis: Part I. Framework, models, and quantities. *Social Justice Research, 10*, 393–430.

Johnson, N. L., & Kotz, S. (1970a). *Distributions in statistics: Continuous univariate distributions—1.* Boston: Houghton Mifflin.

Johnson, N. L., & Kotz, S. (1970b). *Distributions in statistics: Continuous univariate distributions—2.* Boston: Houghton Mifflin.

Kotz, S., Johnson, N. L., & Read, C. B. (1982). Conjugate ranking. In S. Kotz, N. L. Johnson, & C. B. Read (Eds.), *Encyclopedia of statistical sciences*, Vol. 2 (p. 145). New York: Wiley.

Kotz, S., Johnson, N. L., & Read, C. B. (1988). Tukey's inequality for optimal weights. In S. Kotz, N. L. Johnson, & C. B. Read (Eds.), *Encyclopedia of statistical sciences*, Vol. 9 (pp. 361–362). New York: Wiley.

Kuhn, T. S. (1962/1970). *The structure of scientific revolutions*, 2nd ed., enlarged. Chicago: University of Chicago Press.

Lakatos, I. (1970). Falsification and the methodology of scientific research programmes. In I. Lakatos & A. Musgrave (Eds.), *Criticism and the growth of knowledge* (pp. 91–195). Cambridge: Cambridge University Press.

Liapunov, A. M. (1900). Sur une proposition de la théorie des probabilités. *Bulletin Academie Imperiale Sciences St. Petersburg, 13*, 359.

Liapunov, A. M. (1901). Nouvelle forme du théorème sur la limite de probabilité. *Memoire Academie Imperiale Sciences St. Petersburg, 12*, 1.

Machiavelli, N. (1532/1950). *Discourses.* With an introduction and notes by L. J. Walker. Two volumes. New Haven, CT: Yale University Press.

Merton, R. K. (1945). Sociological theory. *American Journal of Sociology, 50*, 462–473.

Merton, R. K. (1949, 1957/1968). *Social theory and social structure.* New York: Free Press.

Merton, R. K. (1957). Continuities in the theory of reference groups and social structure. In R. K. Merton *Social theory and social structure*, 2nd ed., rev. and enlarged (pp. 281–386). New York: Free Press.

Merton, R. K., & Rossi, A. S. (1950). Contributions to the theory of reference group behavior. In R. K. Merton & P. Lazarsfeld (Eds.), *Continuities in social research: Studies in the scope and method of "The American Soldier"* (pp. 40–105). New York: Free Press.

Popper, K. R. (1935/1959). *The logic of scientific discovery.* New York: Basic Books.

Popper, K. R. (1963). *Conjectures and refutations: The growth of scientific knowledge.* New York: Basic Books.

Reynolds, P. D. (1971). *A primer in theory construction.* New York: Macmillan.

Smith, A. (1759/1974). *The theory of moral sentiments.* A. L. Macfie & D. D. Raphael (Eds.). Oxford: Clarendon Press.

Smith, A. (1776/1976). *An inquiry into the nature and causes of the wealth of nations.* R. H. Campbell, A. S. Skinner, & W. B. Todd (Eds.). Oxford: Clarendon Press.

Stuart, A., & Ord, J. K. (1987). *Kendall's advanced theory of statistics. Vol. 1: Distribution theory*, 5th ed. New York: Oxford University Press.

Toulmin, S. (1953). *The philosophy of science: An introduction.* London: Hutchinson.

Toulmin, S. (1978). Science, philosophy of. In *The New Encyclopaedia Britannica, Macropaedia 16*, 15th ed. (pp. 375–393). Chicago: Britannica.

Wiley, N. (1994). *The semiotic self.* Cambridge, England: Polity.

Wolfson, D. (1985). Lindeberg–Feller theorem. In S. Kotz, N. L. Johnson, & C. B. Read (Eds.), *Encyclopedia of statistical sciences*, Vol. 5 (pp. 1–2). New York: Wiley.