Preface

POSITIVE DESERVING THEORY

Deserving, including equity and fairness, lies at the heart of social–moral cognition. The deserving schema—your deserts should be proportional to your deserving—is age-old. The idea of an algebraic model of proportionality goes back to Aristotle and was much discussed in the latter half of the 20th century in terms of equity theory. But to judge proportionality we must be able to measure how much people deserve. Lacking true measurement, proportionality remained qualitative verbalism.

This measurement problem was resolved with the functional theory of measurement. Moral algebra of deserving has done quite well.

These experiments led into a wider field of deserving. Previous work on positive deserving had been largely concerned with third-party judgments of fairness ideals in two-person groups. Major issues were neglected including first-person judgments, unfairness, and social comparison. These issues require expanded conceptual frameworks.

Cognitive theory is one direction for future work. Deserving theory exhibits the same cognitive processes and algebraic laws that have been found in social attitudes and judgment–decision. The present impoverishing fragmentation of these areas can be replaced by unification.

Social relevance, or outcome validity, is a second direction for future work. Third-party judgments of deserving and equity miss much of everyday life. Some workers have moved in this direction. Their work argues that immersion in everyday life is essential for social relevance.

Chapter 2

POSITIVE DESERVING THEORY

Concepts of deserving pervade social–moral cognition. The principle that people should receive in proportion to their deserving may be universal. But attempts to formalize this proportionality principle were roadblocked without adequate tools to handle two problems—*valuation* and *integration* of stimulus information about deserving.

One foothold on deserving theory is available with Information Integration Theory (IIT). The long-standing conjecture that distributive justice follows algebraic models is shown to have some truth. This experimental work is discussed in the second main section of this chapter under *Equity Theory*. This work on equity also pointed up two more basic concepts: deserving and unfairness.

DESERVING THEORY

Information integration is a key problem for deserving theory: multiple variables typically operate in combination. How much any person deserves may depend on a complex of personal characteristics including ability, social role, need, past and present behavior, and so on. Multiple variables appear everywhere in judgment of deserving.

How are these multiple variables integrated into a unified judgment? Relevant variables have been demonstrated by many investigators but how do these variables co-act? Do they simply add up? If so, can this additive rule be established? Or does the influence of one variable depend configurally on other variables? How can context be handled?

This integration problem is central in deserving theory. Understanding and social progress both depend on capability to deal with this key problem—integration of multiple determinants. This problem can be solved in some cases with laws of moral algebra.

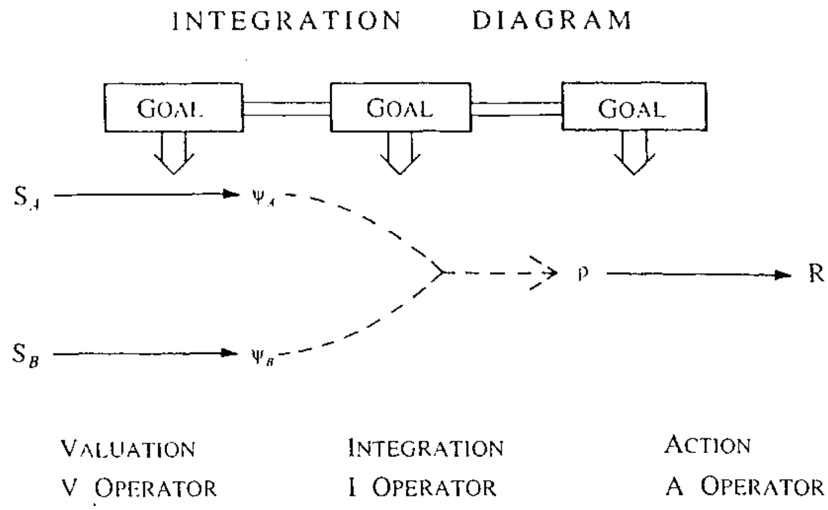

Figure 2.1. Information integration diagram. Chain of three operators, **V–I–A**, leads from observable stimulus field, {S}, to observable response, R. *Valuation operator*, **V**, transmutes stimuli, S, into subjective representations, ψ. *Integration operator*, **I**, transforms subjective field, {ψ}, into implicit response, ρ. *Action operator*, **A**, transforms implicit response, ρ, into observable response, R. (After N. H. Anderson, *Foundations of Information Integration Theory*, 1981a.)

COGNITIVE THEORY OF DESERVING

A conceptual framework for cognitive theory of deserving is given by the Integration Diagram of Chapter 1, repeated here as Figure 2.1. Three problems appear in this diagram:

Valuation: Objective stimulus informers, S, are transmuted into goal-oriented psychological values, ψ.

Integration: Multiple values are integrated into internal response, ρ.

Action: Internal response is externalized, becoming observable R.

The integration problem has obvious importance; thought and action generally depend on joint action of multiple variables. The moral value of helping, to take a common example, depends on various aspects of interpersonal and social obligation and on likely costs and benefits.

The valuation operation is fundamental. Valuation transmutes an objective stimulus, S, into a subjective value, ψ, in relation to the operative GOAL. Such construction of goal-oriented values is the foundation of adaptive thought and action.

This valuation problem might seem an absolute roadblock to solving the problem of multiple variables—it is their unknown personal values for each individual that are integrated. This roadblock of true psychological measurement is prominent in moral cognition, which can exhibit large individual differences and strong dependence on context.

Without capability for true measurement, previous investigators were mostly concerned with directional trends of single variables. Interesting results were obtained but this approach is not much help with the basic problem of integrating multiple variables.

An effective foothold is available. Integration of multiple variables follows algebraic laws in some important cases. These laws do double duty. First, they solve the integration operation, **I**, in the Integration Diagram. Second, they can measure the functional values constructed by the valuation operation, **V** (benefits 1 and 3 of the parallelism theorem).

This integrationist approach has been successful with several issues in deserving theory. Foremost are the first definite tests of the equity model proposed by Aristotle and its modern variants. These tests established the operative model, a relative of Aristotle's.

EQUITY THEORY

What is fair distribution of an outcome produced by people engaged in some mutual activity?

Should all get equal shares?
Should those who contribute more get more?
Should someone who doesn't work very hard get less?
Should someone who tries hard but contributes little get less?
Should an expert or supervisor get more?
Should someone who is less needy get less?
Should someone who is more needy get more?

These and other questions of fair distribution have wide sociopolitical importance. "Equal pay for equal work" and health insurance are two of many examples. Similar problems of fairness pervade society from the family and everyday jobs to taxation. In science, many investigators feel their work does not get the recognition it deserves.

Problems of fair distribution go back to antiquity but a new era began with numerous empirical studies in the latter part of the twentieth century. This work often ran aground, however, from lack of adequate theory and method to deal with multiple variables. An effective foothold is available with the psychological integration laws.

THREE MODELS OF EQUITY

Moral algebra of equity began with Aristotle's equation for distributive justice. Consider two persons, A and B, engaged in some mutual activity. Denote their contributions (inputs) by I_A and I_B, and their rewards (outcomes) by O_A and O_B. Justice, said Aristotle, requires that their rewards be proportional to their contributions:

$$\frac{O_A}{O_B} = \frac{I_A}{I_B}. \qquad \text{(Aristotle)} \qquad (1a)$$

There the matter rested for two millennia.

New interest in equity algebra began around 1960, notably with Adams' (1965) insightful discussion of industrial psychology. Adams postulated a different model:

$$\frac{O_A}{I_A} = \frac{O_B}{I_B}. \qquad \text{(Adams)} \qquad (1b)$$

These ratios can be seen as piece rate pay on an industrial assembly line, which reflected Adams' substantive interests.

Adams' main contribution was to point up the many variables that could influence judgments of I and O in business and industry. Seniority, for example, is widely considered a determinant of deserving so new hires may get less for equal work. Again, one's title is often considered an outcome separate from pay. Later discussions of equity theory are indebted to Adams' wide-ranging discussion.

This work called attention to numerous social situations that involve distributive justice, including various status variables. However, the basic processes of valuation and integration were submerged in piecemeal studies of one or another variable. Validity tests of the two cited equity models were notably lacking.

One more equity model needs consideration. Averaging theory implies fair division should follow the decision averaging law. Outcome should be proportional to relative input:

$$O_A = \frac{I_A}{I_A + I_B}. \qquad \text{(Averaging)} \qquad (1c)$$

SOCIAL COMPARISON IN EQUITY THEORY

Equity judgments are social comparisons. Two loci of comparison are involved: within person and between person. These comparisons occur in opposite order in Adams and Aristotle. Adams' model begins with two within person comparisons—of outcome to input for A and for B. These are followed by between person comparison of these two ratios.

The opposite comparison structure appears in Aristotle's model. It begins with two between person comparisons—of O_A to O_B and I_A to I_B. Averaging theory shows somewhat similar comparison structure.

ARE EQUITY MODELS TESTABLE?

Despite popularity, equity models were seldom tested experimentally. That the ratios of Equations 1ab were instead differences, for example, could not be tested without true measurement. Again, input (I) was commonly assumed to be a sum of relevant variables, an assumption that failed its first experimental test (Equations 3 and 4 below).

Measurement Crux. The crux for testing equity models is psychological measurement. To test Aristotle's model involves true measurement of the subjective, psychological values of all four terms in Equation 1a; the same holds for Adams' model of Equation 1b. Nearly every investigator tried to pass by this measurement problem.

The most common passby was to show that some variable has a directional effect on judgments of equity. This approach has uncovered interesting results but it misses the heart of the matter. It is little help with integration. Or with valuation. Some workers used objective physical values for I and O, usually a mistake (*Measurement Pitfalls*, below).

Functional Measurement. The measurement crux in equity theory was resolved with the functional theory of measurement. Experimental participants were told how much persons A and B had contributed to their common job. They were instructed to divide a fixed sum, T, between A and B in a fair way. All three models imply

$$O_A = \frac{I_A}{I_A + I_B} T. \qquad (2)$$

This equation predicts a slanted barrel pattern for the integration graph. This prediction was supported in the study of Figure 2.2 (Note 1).

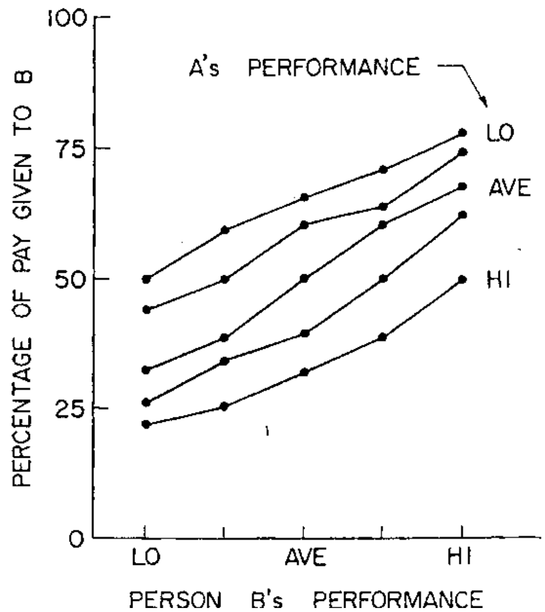

Figure 2.2. Fair division of total pay between two workers, A and B, each varied over five nominal levels of performance on a common job. The theoretical barrel shape is indicated by the vertical spread between the top and bottom curves: 28%, 33%, 34%, 31%, and 28%, from left to right. These values are statsig different and of the size predicted from the equity models. (After Anderson, 1976.)

This functional measurement analysis combines quantitative power with simplicity. Prior measurement of I_A and I_B in Equation 2 is not necessary. The integration rule is diagnosed from the pattern in the integration graph of the response alone. The functional values of I_A and I_B, if desired, can be determined from this integration graph.

This result was promising. It does not, however, distinguish between Aristotle and Adams. Algebraically, their models are equivalent. Multiplying both sides of Aristotle's model by O_B/I_A yields Adams' model. They cannot be distinguished using judgments of fairness. Nor can the decision averaging model of Equation 1c.

This equivalence is troubling because the models involve different social comparisons noted above. Such comparisons have general importance in social information processing.

The three models can be distinguished, however, by broadening the field to study *unfairness* (see below). First, however, the question of how multiple inputs are processed needs consideration.

TESTING THREE FAIRNESS THEORIES: INPUT INTEGRATION? FAIRNESS INTEGRATION?

Beside actual work performance, many other variables can influence judgments of fair division. Equality is one, with equal shares for all who contribute. Equality is frequent in business; those doing similar work often get equal pay despite unequal efficiency. Ability and need are also among the variables considered in the literature. But how such separate variables are integrated had eluded analysis.

Further comparison problems are raised by this fact of multiple input variables. How can a one-dimensional outcome be proportional to a multidimensional input (Anderson, 1976; Farkas & Anderson, 1979; Leventhal, 1980)?

Two answers have been put forward: *input integration* and *fairness integration*. To illustrate, suppose actual work performance, W, and effort, E, are varied for persons A and B. Participants judge A's share of some fixed total outcome, T.

Input Integration Versus Fairness Integration: Theory. The hypothesis of *input integration* assumes that the multiple determinants are first weighted and summed to obtain a one-dimensional value of input. This unitary input may then be used in any of the fairness models. Input integration, taken for granted by most writers, may be written

$$O_A = \frac{I_A}{I_A + I_B} T = \frac{W_A + E_A}{(W_A + E_A) + (W_B + E_B)} T. \qquad (3)$$

An alternative hypothesis is also plausible—*fairness integration*. Make a fairness judgment separately for each input variable; the final judgment is a weighted sum of these partial fairness values. This hypothesis is attractive because it avoids any problem of adding inputs that are qualitatively different such as work performance and effort, W and E. This hypothesis of fairness integration may be written

$$O_A = \frac{W_A}{W_A + W_B} T + \frac{E_A}{E_A + E_B} T. \qquad (4)$$

Different comparison processes appear in these two hypotheses, but both make similar directional predictions. To distinguish between them requires analysis of integration patterns.

Input Integration Versus Fairness Integration: Experiment. An easy test between these two hypotheses is available. Vary actual work performance, W, and effort, E, for persons A and B. Each hypothesis makes specific predictions about the patterns of the integration graphs.

Fairness integration implies that W_A and E_B have additive effects, for they are separated by a + sign in Equation 4. Hence the $W_A \times E_B$ integration graph should be parallel. *Input integration*, in contrast, implies nonparallelism since W_A and E_B are separated by division in Equation 3.

All four input variables were varied in the experimental test. The six two-variable integration graphs are shown in Figure 2.3.

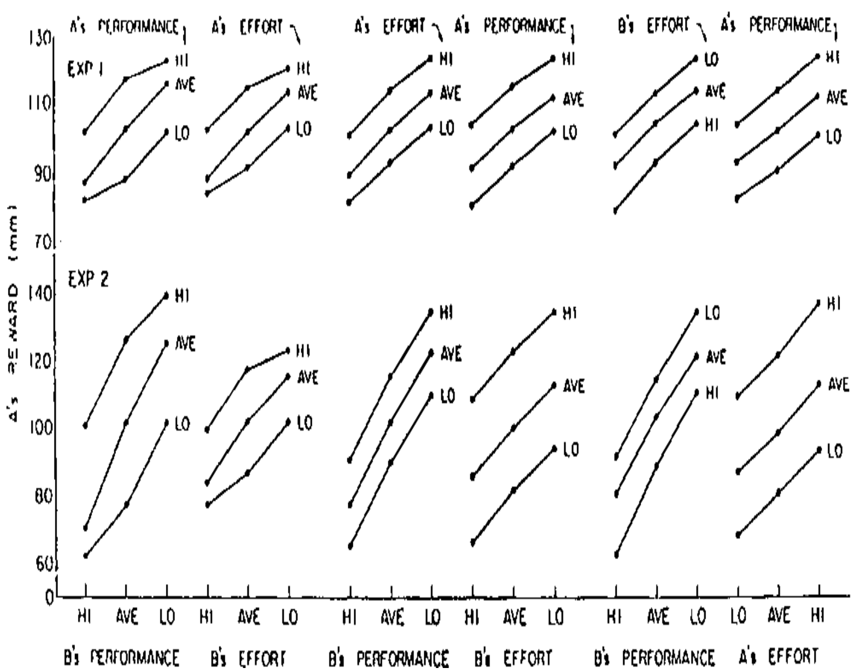

Figure 2.3. Social comparison for fair reward obeys cognitive algebra. Integration graphs support fairness integration (Equation 4), with separate calculation of fair reward for each of two input dimensions, Work performance and Effort. In each of the two experiments, barrel shapes of the two left panels and parallelism of four right panels agree exactly with theoretical prediction from fairness integration. (After Farkas & Anderson, 1974, 1979.)

Fairness integration is solidly supported. Fairness integration predicts parallelism in the four panels that show parallelism. And it predicts a slanted barrel pattern in the other two panels, exactly as shown in Figure 2.3. Similar results were reported from India by Singh (1985).

The input integration hypothesis did poorly; Equation 3 predicts all six graphs will be nonparallel. Input integration was supported, however, for the special case in which the two input variables were work contribution on two separate occasions. In this case, both variables are qualitatively similar and readily integrated into a one-dimensional input (Notes 2a and 2b).

UNFAIRNESS THEORY

Unfairness is a basic social motivation. Fairness is only a single point on a continuum of unfairness. Fairness is too narrow to get far on moral science, especially in social reality.

Unfairness should be a primary concern of deserving theory. Unfairness has been submerged, however, under the dominant concern with fairness ideals in equity theory. This concern glances by an important domain of everyday life.

THREE MODELS OF UNFAIRNESS

Each fairness model of Equations 1abc may be extended to a model of unfairness by taking the difference between the outcome and input ratios. Let U_A denote unfairness to A. Then

$$U_A = \frac{O_A}{O_B} - \frac{I_A}{I_B}. \qquad \text{(Aristotle)} \qquad (5a)$$

$$U_A = \frac{O_A}{I_A} - \frac{O_B}{I_B}. \qquad \text{(Adams)} \qquad (5b)$$

$$U_A = \frac{O_A}{O_A + O_B} - \frac{I_A}{I_A + I_B}. \qquad \text{(Averaging)} \qquad (5c)$$

As written, a negative difference represents unfairness to A; a positive difference represents unfairness to B. Whether the subtraction operation in these models is justified must of course be determined through experimental analysis.

One simple test between these three models can be obtained with an integration experiment that varies O_A and O_B. The three models predict different integration graphs.

In Adams' model, O_A and O_B are additive since they are separated by a minus sign in Equation 5b. Hence the $O_A \times O_B$ integration graph should be parallel. In Aristotle's model, O_A and O_B are separated by a division sign in Equation 5a. The integration graph should thus be a linear fan. And in averaging theory, the relative ratio of the decision averaging model implies a slanted barrel for the $O_A \times O_B$ integration graph.

Results of the first experiment, shown in Figure 2.4, gave clear support to averaging theory. All four variables were manipulated, yielding six two-variable integration graphs. Each model predicts the shape of all six graphs.

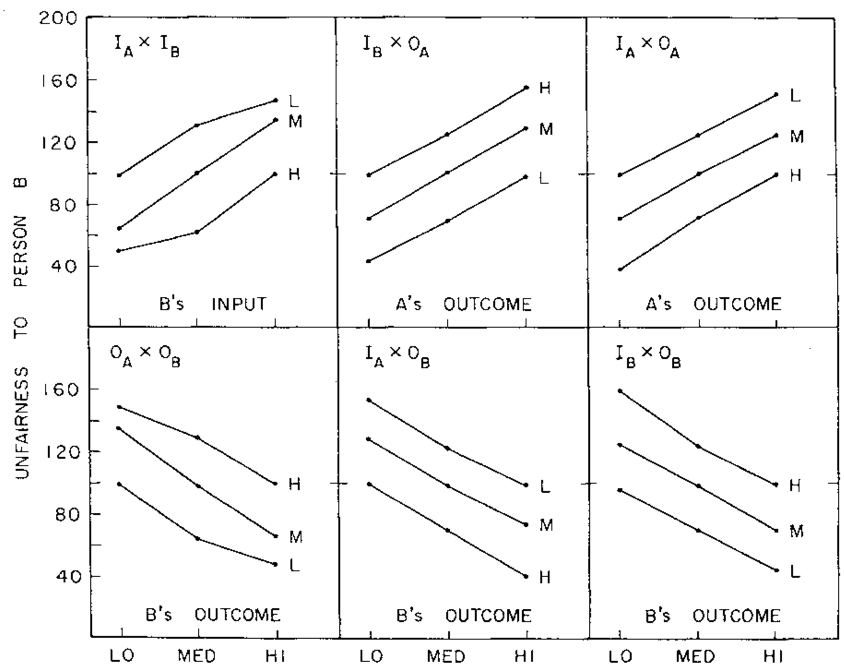

Figure 2.4. Judgments of unfairness obey cognitive algebra. These six integration patterns support decision averaging law of IIT, disagree with models proposed by Aristotle and by Adams. (After Anderson & Farkas, 1975.)

Adams' Model. Adams' model did poorly. It predicts the two left graphs should be parallel. Instead, both are nonparallel. Adams model also predicts linear fans for the two right panels, $I_A \times O_A$ and $I_B \times O_B$. Instead, both are parallel. At bottom, Adams' model is qualitatively incorrect; it has wrong comparison structure.

Aristotle's Model. Aristotle's model does rather well. It predicts parallelism for the four parallel graphs. It also predicts nonparallelism for the two nonparallel graphs, although linear fans rather than the slanted barrels. It is qualitatively correct, however, for it shows the correct comparison structure.

Averaging Model. The averaging model correctly predicts the pattern of all six integration graphs of Figure 2.4. Thus, it reveals the operative social comparisons. Later work has corroborated these results, good support for cognitive algebra of distributive justice.

Moral Algebra. This experiment is striking evidence for exact mathematical law of moral cognition. The simplicity of this analysis deserves notice. The experimental design itself is a factorial design, familiar from first-year graduate statistics. The data analysis requires hardly more than visual inspection.

Social Comparison. Simple comparison structure in moral cognition is also revealed in these results. This insight into cognitive processing could hardly have been obtained in any other way. Further results about social comparison theory have also been obtained with justice algebra. One is in the next section for multiple dimensions of outcome.

Unfairness. Unfairness has obvious importance in moral theory but it has been neglected in traditional concerns with fairness ideals. Fairness theory misses significant aspects of social reality. Unfairness deserves systematic study in its own right.

MULTIDIMENSIONAL OUTCOME: OUTCOME INTEGRATION? UNFAIRNESS INTEGRATION?

Outcome usually has multiple dimensions. Job satisfaction, for example, may depend on work interest and working conditions as well as pay. The hypothesis of *outcome integration* states that all such variables are integrated to obtain a net value of job satisfaction. Such one-dimensional mediators have generally been taken for granted although they were not testable without measurement capability.

Unfairness theory, however, suggests the alternative hypothesis of *unfairness integration*. A value of unfairness is calculated for each separate outcome variable; these partial unfairness values are integrated to obtain a net value of unfairness. Whereas outcome integration requires integration of variables of different quality, this difficulty is avoided with unfairness integration.

Multidimensional outcome was among the many issues studied in the landmark program of research on equity theory by Arthur Farkas (1977, 1991; Farkas & Anderson, 1974, 1979). The two hypotheses imply different patterns in the outcome integration graphs, analogous to those just discussed for multiple input variables. These graphs showed good support for unfairness integration (Farkas, 1991, Figure 3, p. 61). This one experiment deserves follow-up to assess its generality.

Multidimensional outcome is important in everyday life. Outcome integration is implicit in utilitarian theory of "greatest good." It has also been standard in modern judgment–decision theory. But Farkas' experiment suggests that outcome integration may be false (see also *Input-Outcome Linkage* below).

IMPORTANCE WEIGHTS

Different variables may have different importance weights in judgments of deserving and fairness. In Equations 3 and 4, for example, Work may be weighted more heavily than Effort.

Functional Measurement Theory. Functional measurement theory automatically allows different weights for different input variables in many cases. With Work and Effort in Equations 3 and 4, the importance weight of each variable is implicitly included in its functional value. Hence the integration graphs will show similar patterns regardless of the weights. All predictions for multidimensional input or outcome hold, regardless of weights (Farkas, 1991, Equations 3 and 4).

This capability to finesse the weighting problem allows simple analyses of some complex questions. Some situations, however, require explicit weights, as in the next two subsections.

Salience Weights. Unfairness comparisons are expected to be weighted more heavily when they are more salient. Farkas (1977, 1991) extended the basic unfairness model to include salience essentially as follows:

$$U_A = \omega[1/2 - I_A/(I_A + I_B)]. \tag{6}$$

If $I_A > I_B$, the quantity in brackets is negative, that is, unfair to A. This is multiplied by ω, B's salience weight in A's judgment.

In Farkas' experimental scenario, A and B were college students working on summer jobs as construction laborers. The three levels of A's hourly wage were all less than those of B. A and B did equal work, however, so A was always relatively underpaid (thereby avoiding complications from comparing under- and overpayment). Salience was manipulated by whether A and B worked for the same employer (high salience weight) or different employers (low salience weight). Participants judged unfairness to A, U_A.

Farkas' model implies that the 3 x 3 integration graph, A's wage × B's wage, should converge as B's wage increases. Also, the curves for A's wage should be farther apart for higher salience. These predictions were well supported (Farkas, 1977, Figure 10, p. 139).

Are Underpayment and Overpayment Psychologically Equivalent? Some writers have thought that overpayment and underpayment should have equivalent effects. Hence overpayment on one dimension should cancel equal underpayment on another. Such assertions about overpayment inequity were made by Homans (1961) and Walster, Walster, and Berscheid (1978); see *Psychology and the legal system*, Wrightsman, et al. (2002, p. 65). But these assertions were free-floating, lacking experimental evidence.

Farkas studied this issue by using unequal salience weights to represent under- and overpayment in Equation 6. His model showed promise with the half of the participants who considered overpayment unfair (although these may have been reacting to the underpaid person).

Half the participants, however, did not consider the overpayment unfair. This result deserves further study.

Underpayment/overpayment has high social relevance. Underpayment generates displeasure and resentment. Overpayment to some persons may generate negative feelings in others. Here again, standard third-party experiments miss important phenomena of social life. This issue deserves systematic study using conjoint experimental–field investigation (Notes 3 and 4).

INTRAPERSONAL UNFAIRNESS

*Intra*personal unfairness has also been overlooked in equity theories. Whereas these theories involve comparisons between different persons, feelings of fairness/unfairness may be entirely personal, without comparison to specific other persons. Some adults feel their career or their spouse did not live up to their expectations. Feeling of unfairness then rests on comparison of actuality with expectation, without specific comparison to another person's outcomes (Note 5).

Intrapersonal unfairness is important in everyday life. How can it be studied experimentally? The subtraction rule,

$$\text{Unfairness} = \text{Deserving} - \text{Outcome}, \qquad (7)$$

offers a simple beginning. All three terms in this equation, it should be emphasized, are considered personal feelings of the individual.

This model could be studied using simple integration designs for deserving and outcome. Distressed marriages could provide realistic settings using personal design (Chapter 6). "Count your blessings" therapy might be experimentally grounded. This approach might also be useful for associated qualities besides unfairness, such as feelings of resentment or defeat by assistant professors who fail to get tenure.

RELATED ISSUES OF DESERVING

Moral algebra may be a foundation for general theory of distributive justice. If the foregoing results hold up, they will provide an effective base for this major branch of moral theory. Many issues remain unexplored, however, and the cited studies require replication and extension. Some related results are noted in following sections.

UNFAIRNESS PARADOX

Hope for a social system in which feelings of fair treatment are reasonably general may be unrealistic. One obstacle is noted in the following unfairness paradox (Anderson, 1976; Thompson & Loewenstein, 1992).

Two persons who contribute equally to a joint project may both feel unfairly treated with equal outcome. This follows from any of the unfairness models. Each person's own effort will be more salient than that of the other; it will thus get higher weight and/or value in their own mind. Equal division will not seem fully just to either person.

Psychologically, of course, this unfairness paradox is not a genuine paradox. It rests on assumption that the third-party judgments commonly studied in equity theory should somehow hold for first-person judgments. This unfairness paradox points up the need to shift focus of equity theory to the first-person framework of so much of life.

A further implication of this unfairness paradox is the importance of social mechanisms that may ameliorate such feelings of unfairness. Superior– subordinate relations is one. Other such mechanisms include status, seniority, and group belonging. Systematic study of such mechanisms could have beneficial social–moral effects.

Biosocial adaptation may be most important; people often adapt and are not troubled by ostensible inequity, as with wives in many marriages. Multidimensional outcome offers opportunities to adapt importance weights of some outcomes, a common adjustment process (Note 6).

INPUT–OUTCOME LINKAGE

The multidimensional nature of input and outcome means they deserve conjoint study. The foregoing experiments were devoted to one or the other but the two may interact.

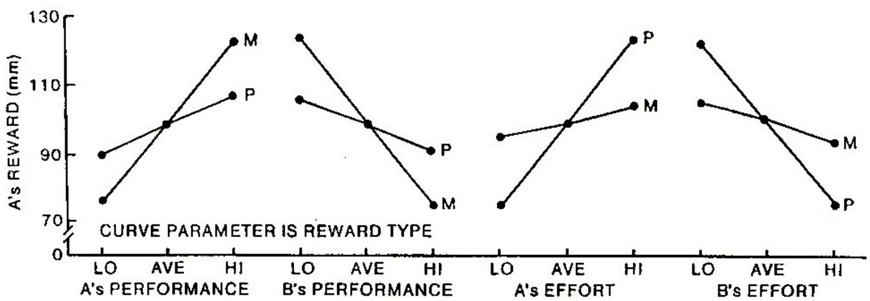

Figure 2.5. Input–outcome linkage in fair shares judgment. Reward is either money (curves labeled M) or praise (curves labeled P). Left panel shows work performance is rewarded more with money than praise; right panel shows effort is rewarded more with praise than money. (After Farkas, 1991.)

This issue of input–outcome linkage was studied in Farkas' experiment of Figure 2.5. Persons A and B were characterized by performance (how much each had accomplished) and effort (how hard each had tried) on a mutual task. Participants judged fair division of two outcomes—money and praise.

The slopes of the curves in Figure 2.5 show that accomplishment was more important than effort in the division of money (left panel), effort more important in division of praise (right panel). (These slopes provide a proportional scale of importance.)

A general issue of method is illustrated in this experiment. Single measures may yield an inadequate picture of moral cognition (see *Profile Measures*, Chapter 6).

NEGATIVE INPUT

The problem of negative input caused a small commotion in the 1970s when it was realized that Adams' equity model fell apart in such cases. A cashier who sneaks €10 from the till has $I_A/O_A = -€10/+€10 = -1$; the employer has $I_B/O_B = +€10/-€10 = -1$; equity is satisfied!

Several variant models were published, each claiming to resolve this difficulty. All were disprovable with simple thought experiments (see Anderson, 1976, Note 1, p. 298; Farkas, 1991, Note 1, pp. 88ff). These thought experiments illustrate how mathematical models can help qualitative understanding, here by affirming that negative acts are largely outside equity theory.

Negative performance may of course occur in cooperative groups. Team effort may suffer from error or ineptness of one member. This member may nevertheless share in the team's outcome. Effective input may include an equality component that derives from team membership. Net deserving of this member may thus be positive.

HARMDOING

Some writers have sought to apply equity theory to harmdoer behavior. As one example, Walster, Walster, and Berscheid (1978) assert that harmdoers denigrate their victims because this denigration reduces their feeling of overpayment inequity.

This fanciful argument arose with an attempt to include deliberate negative input in the equity model. This argument implies that a burglar or bank robber will feel greater guilt with a larger haul! Instead, denigration of victim can ease the harmdoer's conscience and serve as excuse.

Equity theory refers to distributive justice. This presupposes some cooperative framework, which largely excludes deliberate harm doing. The justice rule that punishment should fit the crime is not distributive justice, which is the concern of equity theory.

NEGATIVE OUTCOME

Some group ventures come to grief. If the group outcome is negative, how can it be equitably divided among the group members?

Adams' model would require that persons who contributed more bear greater shares of the loss. This hardly seems equitable, especially if they have already lost their larger input contributions. On the other hand, equal sharing of the loss could be disastrous for persons who had contributed the little they had.

Harris (1983) seems almost alone in trying to deal with this interesting conundrum. His *linear formula*, however, allows negative input which seems dubious as just noted (see also below).

I suggest that this moral dilemma is not sufficiently specified to allow meaningful analysis. Social context is essential. In particular, it seems necessary to know how the group members had planned to share a positive outcome. Equal sharing and proportionate sharing would entail different distribution of the loss. Relative ability of the members to bear the loss could also be relevant.

SUBTRACTION MODEL

Although the decision averaging law was well supported in the foregoing experiments, subtraction models have sometimes been observed (Anderson, 1976). In Farkas and Anderson (1974, 1979), a subtraction rule was found when both input dimensions were the same.

This subtraction rule was interpreted to result from task simplification to apply the general-purpose adding-type rule. This interpretation was supported by Singh (1985), who reported a subtraction rule for students but a ratio rule for professional managers in India. The subtraction model reported by Mellers (1982) may have resulted from running participants in groups (see *One Person at a Time*, Chapter 6).

MULTIPLE COMPARISON PERSONS

Equity research has been largely limited to two-person groups. Social groups, however, often involve more than two persons. Two hypotheses about unfairness in work groups of three persons, all of whom had equal accomplishment but received unequal wages, were studied by Farkas (1977, 1991, pp. 79f). Participants judged unfairness of A's wage relative to wages of B and C.

The *group comparison hypothesis* assumes that A is compared to B and C considered together as a group. The *individual comparison hypothesis* assumes that separate unfairness values are calculated for A relative to B and for A relative to C. These partial unfairness values are then integrated to determine an overall unfairness value. This is much like the foregoing hypothesis of unfairness integration and a similar result was expected. The data, however, supported the group comparison hypothesis.

This unexpected simplicity may help with analysis of real groups. The group comparison hypothesis implies that all comparison members of the group would reduce to a single cognitive unit. More generally, individuals may compare themselves to one or two specific persons together with a generalized referent that represents the entire group.

UNFAIRNESS THEORY

Unfairness is a basic social motivation. Feelings of and reactions to unfairness are basic social issues. Equity theory has fixated on ideals of fair division, glancing by the greater social problem. This peripherality is underscored by the concomitant focus on other–other comparisons, neglecting the self–other comparisons so important in everyday life.

Three advantages of studying unfairness may be seen in the experiment of Figure 2.4. It exhibited a cognitive algebra of unfairness, promising for further study of this basic motivation. It distinguished among the three models of Equations 1abc—which could not be distinguished with fairness judgments. And it revealed a fundamental social process, namely, the operative comparison structure.

The foregoing unfairness studies, it should be recognized, were third-person judgments. They lack the emotional content of first-person unfairness of everyday life. First-person unfairness is difficult to study because of difficulty with experimental control.

Three approaches to first-person unfairness deserve consideration. *Case studies* can be invaluable for initial exploration of phenomena. *Personal design* could use some actual unfairness situation of a given person and embed it in an integration design with hypothetical but realistic levels of chosen variables (see *Personal Design*, Chapter 6). *Role-play* methods could also be informative. In family or job conflict, for example, each member could role-play other members as well as self.

MEASUREMENT PITFALLS

The equity models involve personal values of input, outcome, and of their determinants such as performance and effort. Nonuse of capability for true measurement of personal values has undercut a lot of research in deserving theory. Some of these pitfalls are noted here.

Objective Measures. Some investigators have relied on objective measures of input and outcome. This is nearly always a mistake as illustrated in the next subsection on ordinal equity. Reliance on objective measures has this more serious consequence: focus on narrow, artificial situations. Need, ability, status, obligation, appreciation, and many other variables generally lack objective metrics. Such variables are common in deserving but tend to be neglected from neglect of true psychological measures obtainable with functional measurement (Note 7).

Ordinal Equity. A rule of *ordinal equity* was proclaimed by Hook and Cook (1979; Hook, 1983): children make divisions away from equality in the direction of equity but fall short of exact proportionality. In support, they cite a finding that 5-6–year-olds who had completed 15 units to their co-workers 5 units kept an average of 12.7 of 20 rewards. Hook and Cook thought that equity required them to keep 15 of the 20 rewards, in proportion to their actual work. Since the actual responses fell short, they were called ordinal. Hook and Cook went further to argue that true proportionality could not appear before Piaget's stage of formal operations, around 10-12 years of age.

The measurement pitfall in this interpretation is the arbitrary assumption that the objective measure of work was a true measure of the child's value of deserving. As one alternative, children's judgments of deserving may have been an average of actual work and equality that derives from co-worker status (see further Anderson, 1991i, pp. 169f).

Ironically, true proportionality had been shown in 5^{+}–year-old children by Anderson and Butzin (1978; see Figure 5.3). Hook and Cook misinterpreted this experiment as ordinal equity. To do this, they had to assign arbitrary values to the inputs because physical values did not exist. They failed to recognize that the functional measurement analysis had provided true psychological values. Functional measurement showed true proportionality—clear disproof of their ordinal hypothesis.

Linear Formula. Harris (1983, 1993) has pursued a *linear formula*: persons' outcomes should be a linear function of their input contributions. Harris is almost alone in considering the important problem of multiperson groups. However, his linear formula has shortcomings.

One shortcoming is that Harris' linear formula has so many free parameters that it is useless with the two-person groups so common in equity experiments (Farkas & Anderson, 1979, p. 895; Harris, 1983, p. 230; Mellers, 1982, p. 244). In particular, therefore, Harris could not test the equity models proposed by Aristotle and Adams.

The experiment of Figure 2.2 demonstrated a nonlinear relation between input contribution and outcome. Harris incorrectly asserted that this functional measurement analysis simply assumed Adams' model true by definition. Quite the contrary, functional measurement provided an exact test of Adams' model. Indeed, functional measurement showed that Adams' model was incorrect.

Another shortcoming is that Harris typically assumes objective values of input and outcome. His theory cannot handle variables such as need or effort that lack objective metrics.

Equality Rule. Messick (1993) argued for equality as a general principle of social deserving. He asserted (p. 29) that "It is hard to imagine a more pervasively justifiable principle of making allocation decisions than the principle of equality."

The ethical principle that reward should be proportional to contribution is ill-recognized by Messick's equality argument. Persons who make greater contributions are generally considered more deserving. So also for people who put in more effort. Messick's equalitarian stance ignores the meritarian principle which is basic in social morality.

Messick's equality principle was tested in each of the experiments described above. It was contrary to the data in every one.

Equality is a great ethical principle. Equal justice under law is a clarion modern ideal. So is equal opportunity. But these ideals should be coordinated with ethical principles of merit and need.

Subtraction Model. Functional measurement theory was applied by Mellers (1982), who found a subtraction model and made strong claims that it was universal. But subtraction implies parallel integration graphs, contrary to the many barrel-shape patterns of the decision averaging law in the foregoing studies (see also *Subtraction Model* above).

In response to a critique, Mellers (1985) sought to force the data of the experiment of Figure 2.4 to be parallel with a monotone transformation and claimed success. But the data of this experiment contained large cross-over interactions. To make these crossovers parallel by monotone transformation is mathematically impossible (Anderson, 1983, 1991e, Figure 8 and Table 2, pp. 90ff; Farkas, 1991, p. 74). Mellers' analysis cannot be correct.

Doubt about the subtraction model arises from comparing inputs of 12 and 11 for person A and B to inputs of 2 and 1. A subtraction model implies that both cases will yield the same judgment of outcome, which seems counterintuitive. This doubt could be avoided by including such examples as part of the instructions. This important problem of instructions is discussed further in *Mental Schemas* (Chapter 6).

Unit Problem. A seeming confusion between equality and proportional equity appears in Bar-Hillel and Yaari (1993). In a representative condition, participants divided 12 grapefruit between persons Jones and Smith, who desired grapefruit solely for its content of vitamin F. Both needed equal amounts of vitamin F, but whereas Jones got 100 mg from each grapefruit, Smith got only 20 mg.

Over 80% of participants chose the 2:10 distribution as fair, which equalizes vitamin F for Jones and Smith. This was interpreted as showing the proportionality principle of distribution in proportion to need. Instead, it may be said that these participants followed the equality principle: they distributed equal amounts of the focal good, vitamin F. The proportionality rule applies only to the number of grapefruit, which is irrelevant by the statement of the problem.

More effective analysis is possible with the psychological laws. These laws would go further to allow exact analysis of nonobjective variables such as need and merit, variables outside the purview of Bar-Hillel and Yaari.

Small Groups. Distributive justice in small groups is an important, neglected issue addressed by Jasso (1983). Her formula for equity includes inequity, or unfairness, one of the few attempts to do so. Of special interest is her attempt to deal with wife–husband groups.

Jasso's theory, however, has problems with measurement. Nonmetric, *quality* goods, affection, for example, are measured by rank within group. Wife–husband groups can only have rank of 1 or 2 (barring equality). This fails to recognize that amount of affection can make a big difference. And quality of affection, a basic aspect of marriage satisfaction, may be rather different for wife and husband, not amenable to ranking. In work groups and teams, quality goods can be critical for individual satisfaction and for group performance. Among these quality goods are job satisfaction and team spirit.

Jasso's concern with small groups focuses on a fundamental domain of social deserving. Small groups deserve systematic study, especially in real-life situations of work groups and family. The averaging law may be useful as with studying marriage satisfaction (see *Family Life and Personal Design*, Chapter 6 in Anderson, 1991c). The laws of information integration may help unify psychological theory with the sociological approach followed by Jasso (see *Group Dynamics*, Chapter 8 in Anderson, 2008; see also Friedkin & Johnsen, 1999).

COMPARISON ALGEBRA

Comparison processes are the heart of deserving theory. The difference between Aristotle and Adams in Equations 1a,b was a difference in comparison processes. To test between them depended on developing effective analysis of comparison processes (Figure 2.4).

Many other comparison issues deserve consideration. Three of these concern multiple dimensions of input, multiple dimensions of outcome, and multiple comparison persons. Although only a single experiment has been done on each of these issues, the results showed promise for general algebra of comparison.

MULTIPLE INPUTS

Deserving may be influenced by multiple variables, as many investigators have shown. A natural assumption is that these variables are integrated into a unitary value that is then used in the equity division. The sole experimental test, however, showed instead that an equity division was made separately for each input variable (Figure 2.3).

Multiple input variables can liberate equity theory from the common zero sum restriction and increase social happiness. Work groups generally include less and more important positions. A common tactic of coaches and other group leaders is to increase satisfaction of those in less valued positions by emphasizing the value of *team spirit* and also importance *weight* of their contribution. As one theater director said, "there are no small parts in Shakespeare."

MULTIPLE OUTCOMES

Multiple outcome variables also deserve systematic study. The hypothesis of *outcome integration*, that outcomes for each separate variable are integrated into a unitary value, appears not only in traditional equity theory, but more generally in the "greatest good" of utilitarian theory and in much of modern judgment–decision theory.

Under the alternative hypothesis of *unfairness integration*, a separate unfairness value is calculated for each outcome variable and these are integrated into a unitary unfairness value. This unfairness algebra was supported in the sole experimental test to date (Figure 2.4 above).

These two hypotheses treat overpayment differently. Under outcome integration, over/underpayment are treated symmetrically. Hence overpayment on one variable will act to cancel underpayment on another.

Unfairness integration in contrast, allows that overpayment may have small effect or none at all. An exact algebra of unfairness integration is supported by Farkas' results cited above.

MULTIPLE COMPARISON PERSONS

Multiple comparison persons are common in daily life. The standard two-person equity experiments have limited relevance to larger groups. One limitation is that different comparison persons may have different importance weights, an issue about which other equity theories have little to say. This issue of multiple comparison persons is important in any attempt to apply deserving theory in real life (see also *Groups* below).

OVERPAYMENT AND UNDERPAYMENT

Overpayment and underpayment issues are ubiquitous in deserving theory. These issues also arise in first-person judgments, as shown by the unfairness paradox. These issues are important in social life, but present difficulties for empirical analysis.

Farkas' work indicates possible extensions of the basic integration models to study these issues, most notably with input-outcome linkage (Figure 2.5). Conjoint experimental–field studies seem desirable to achieve social relevance.

COMPARING IMPORTANCE

Comparing importance of two variables is often done but not often correctly done. What seems like a straightforward empirical issue turns out to be theoretically subtle and difficult. Multiple regression, for example, confounds the importance weight of each variable with its psychologically arbitrary unit. Use of correlations as measures of importance is extremely treacherous (e.g., Anderson, 1982, pp. 158-166, 188f, 201, 274, 306, 319-324; see also *Empirical Direction*).

Correct analysis is possible with the averaging law. With suitable design, importance weight can be measured separately from polarity value (see *Measuring Importance*, Chapter 6).

COGNITIVE UNITIZATION

Complex stimulus fields, which are common in judgments of deserving and fairness, can be exactly measured with functional measurement theory (see index entries for *Cognitive Unitization* in Anderson, 1981a). Such unitization has been denied by some writers, who have despaired of exact laws, not only in moral psychology (e.g., Ellsworth & Mauro, 1998), but throughout the psychological field (see contributors to *Contextualism and understanding in behavioral science*, edited by Rosnow & Georgoudi, 1986).

An effective foothold on complex stimulus fields is available with the psychological laws. Exact analysis is possible by virtue of *Cognitive Unitization*. Valuation of any stimulus field is undoubtedly complex and may be largely unknowable. However, the value of this field can be exactly measured as a functional unit when an integration law holds (benefit 5 of parallelism theorem, Chapter 1) as illustrated in Figure 6.1.

GENERAL COMPARISON THEORY

The foregoing issues are far more general than fairness/unfairness. Comparison processes arise generally in person science. Comparison processes also appear in other fields of psychology, as in language processing and in classical perception. The valuation operation in the Integration Diagram usually involves comparison. Cognitive algebra offers a foothold for general comparison theory.

GENERAL THEORY OF DESERVING

Deserving is a fundamental concept that appears in many situations, both personal and societal. The results of this chapter show promise for general theory of deserving based on mathematical law.

LAWS OF DESERVING

The concept of an algebraic law of deserving goes back to Aristotle and has been much discussed in modern equity theory. Establishing such a law faced two problems represented in the Integration Diagram of Figure 1.1—multiple determination and measurement of subjective values. Much work employed makeshift solutions to the measurement problem, which often vitiated the results (see *Measurement Pitfalls* above).

Both problems were solved in Information Integration Theory by using the postulated integration law itself as the base and frame for measurement. This logic is simple, both theoretically and experimentally, as shown with the parallelism theorem. In this functional measurement logic, the laws themselves provide the solution to both problems.

By an inestimable blessing of Nature, this logic has enjoyed empirical success, illustrated in the foregoing experimental studies.

The evidence base is still limited, of course, and many issues remain open. Only a single experiment has been done with multiple inputs, multiple outcomes, and multiple comparison persons. Deserving in marriage, family, and work groups present important social problems, especially first-person judgments. Comments on a few of these deserving problems are given in the following sections.

SINGLE PERSON DESERVING

Numerous concepts of deserving appear in everyday judgments of single persons. Equity judgments themselves rely on preliminary single person judgments. Single-person deserving thus requires study in its own right.

Deserving of single persons is part of general person cognition. These judgments are expected to follow the integration theory of person cognition (Anderson, 1981a). In particular, deserving is expected to obey the averaging law. For two stimulus variables, S_1 and S_2, with values ψ_1 and ψ_2, weights ω_1 and ω_2, and with prior state neglected:

$$\text{Deserving} = D = \frac{\omega_1 \psi_1 + \omega_2 \psi_2}{\omega_1 + \omega_2}. \qquad (8)$$

Analysis is simple. Parallelism in the $S_1 \times S_2$ integration graph supports an adding-type integration rule. Marginal means of the integration design then estimate true psychological values of the variables.

Integration studies of positive deserving of single persons are rare. However, the averaging law was supported in Lane and Anderson (1976), who found that judgments of gratitude for assistance were an average of intent and amount of assistance (see *Gratitude and Ingratitude*, Chapter 7). Similarly, Anderson and Butzin (1978) found that children aged 4 to 8 years averaged need and deed to determine number of toys that a story child deserved (see Figure 5.3).

Besides its social importance, deserving of single persons is interesting because it has many dimensions, both of input and outcome. A few of these appeared in the foregoing equity studies with performance, effort, and need as inputs and with money and praise as outcomes. With the person cognition task of Chapter 1, the trait adjectives were the input whereas the outcome was the judgment of the person's likableness or sociability, which may be considered dimensions of personal deserving.

Status, need, merit, respect and disrespect, gratitude and ingratitude are among the many other qualities that deserve study. Negative deserving of single persons is discussed in Chapters 3 and 4.

SELF-DESERVING

Self-deserving may be the most important issue in deserving theory. Feelings of self-deserving on job performance, for example, or in family life, are no less important than the third-person judgments commonly studied in equity theory. Standard laboratory tasks can hardly hope to elicit the emotions common in everyday deserving (Notes 8, 9). But self-deserving has been little studied, in good part, no doubt, because of difficulties in developing experimental tasks.

Personal design may help study judgments of self-deserving. An integration design dealing with, for example, marriage satisfaction, could be embedded in each person's experiential life space. Variables and their levels may be chosen from preliminary mapping of the person's knowledge systems. Personal design showed promise with marriage satisfaction (Anderson, 1991f; Anderson & Armstrong, 1989), but is undeveloped (see *Personal Design*, Chapter 6).

GROUPS

Social groups are important for deserving theory. Work groups and teams bring problems largely passed by with the abstract two-person groups commonly used in equity theory. Identification with the group can be a major motivation and value, especially for less important members (Levine & Moreland, 1998). Also important are formation and functioning of subgroups (Friedkin & Johnsen, 1999; Graesser, 1991).

Group belonging may be an outcome in more ways than one, as various writers have pointed out. This issue needs consideration in deserving theory. Indeed, this issue emphasizes that outcome in groups is not zero-sum, as is commonly assumed in equity theory (see also *Group Dynamics*, Chapter 8 in Anderson, 2008).

Negotiation among interested parties has fundamental importance in all social groups, from the family to business and government. Incisive work by Cheryl Graesser (1991) showed that social averaging theory of IIT was notably superior to the social decision schemes of Davis (1973; Stasser, Kerr, & Davis, 1989); see Anderson (2008, pp. 238ff).

PHENOMENAL QUALITY

Phenomenal quality is central in everyday deserving. Limiting measurement to fairness/unfairness will miss important aspects of people's phenomenal fields (see *Profile Analysis*, Chapter 6). Fair treatment may generate feelings of satisfaction or gratitude. Unfair treatment may give rise to feelings of disappointment and resentment. Unfair treatment caused by another person may arouse desire for retribution or revenge.

Algebraic psychology can help with phenomenal analysis. One help is its idiographic capability for measuring subjective variables such as merit and need. Similarly for unfairness, which is important in everyday life (see further *Science of Phenomenology,* Chapter 7).

NEGATIVE DESERVING

Negative deserving is hardly less prominent in society than positive deserving. The same algebraic laws operate, however, as shown for blame in Chapter 3 and for several issues of legal judgment in Chapter 4.

FIELD SCIENCE

"Local justice" is an instructive model for field science, studied by Elster and others (e.g., Elster, 1992). This work has concentrated on equitable allocation of scarce resources, such as immigration permits, college admissions, and organ transplants. Such case studies illuminate the complexity of coacting variables, including pressure groups, that trouble search for equity when different persons have different claims and some must be denied. Aside from their intrinsic importance, such case studies can make experimental research more relevant to everyday life.

These studies of local justice also point up the need for measurement theory. Local justice depends on valuation/integration of multiple variables. Valuation, however, is left to common sense measurement that can suffer serious inadequacies, some illustrated under *Measurement Pitfalls* above (see also *Psychological Measurement Theory*, Chapter 6).

Joint experimental–field science can be pursued with IIT. Valuation/integration is central to the weighing and balancing of competing claims that is characteristic of local justice. Contributors to Shanteau and Harris (1990) on organ transplants take up such problems.

DESERVING OF STUDENTS

Adaptive transfer is what students deserve to be taught—knowledge that will help them in the problems they will face in later life. But although the issue of transfer was forcefully brought to attention by Thorndike over a century ago, it remains in a primitive state. Indeed, adaptive transfer is systematically ignored in our colleagues and universities (see *Education* in Chapter 7).

NOTES

Note 1. The slanted barrel shape for fairness judgments, as in Figure 2.2, assumes that I_A and I_B are both varied from low to high. This initial application of IIT to equity was troubled by two other results. One was the subtraction rule discussed later. The other was a distortion of the linear fan pattern predicted for judgments of O_B, given O_A, I_A, and I_B: $O_B = O_A\ I_B\ /\ I_A$. Such direct ratio models have generally done poorly, especially in psychophysics, in which they would seem simplest (Anderson, 1974a). In contrast, relative ratio models like the decision averaging law of Equation 1c have done well, not only in the later equity experiments cited in the text, but also as a cognitive generalization of Bayesian statistical theory in judgment–decision.

An interesting result by Hofmans (2012) found that although most persons from three levels in actual organizations followed the decision averaging model for integrating performance input, a minority ignored performance and assigned equal shares. These people seemed to have more agreeable personalities.

Note 2a. One interesting complication was a configural effect in the fairness integration study of Figure 2.3. When persons A and B were equal on W or on E, that variable received lower weight in Equation 4. Inclusion of this configural weight gave an excellent fit to the three-variable integration graphs (see Figure 7.5, p. 229, in Anderson, 1996a). Similar configural effects have been conjectured by writers in several different areas but definite evidence has been scarce.

Note 2b. Quite different results that supported input integration were reported by Quereshi and Massman (1988) for fair division of $5000 raise between two teachers, each characterized by sex, physical appearance, and three sets of teacher-relevant adjectives. Understanding this paper is difficult, however, because no actual data whatever were presented, only the Anova table. Sex had much the largest main effect but whether males were assigned a larger fair share is not reported. Surprisingly, physical appearance ("above average, below average") not only had a substantial main affect but also large interactions with each of the three sets of teacher-relevant adjectives (and also for all six of its three-way interactions).

Note 3. The hypothesis that overpayment and underpayment should have equal and opposite effects leads to ignoral of qualitative variables such as need and merit. Moreover, this hypothesis neglects differences in quality of reaction. The overpaid feel their greater deserving is recognized; the underpaid feel double resentment. Focus on these phenomena would have been more productive (see also *Achievement*, pp. 365-371, in Anderson, 2008).

Note 4. This resentment of overpayment is dramatically illustrated by public reaction to the multimillion dollar bonuses currently [2009] being paid executives of big financial companies and auto industries whose blundering caused the financial crises that now require huge bailout dollars from the taxpayers.

Note 5. As U. S. President John F. Kennedy said, "Life is unfair," a bitter truth bitterly realized in his assassination.

Note 6. Importance deweighting seems a common adjustment process in everyday life, especially for dimensions on which one is less well treated. Perhaps Aesop's fox actually decided he really wanted meat, not grapes, changing their importance weight rather than their polarity value.

Note 7. Feather's (1999) attempt to apply Heider's (1958) balance theory to judgments of deserving suffers because balance theory says only that unbalanced triads tend toward balance, nothing about what will change or why. And for balanced triads, Heider's theory says nothing at all.

A new experimental version of Heider's triad (Anderson, 1968) provided analytic power not possible with balance theory or with Feather's adaptation thereof. This integration triad did well in Lindner's (1970, 1971) PhD thesis (see Anderson, 1971a, 1974b, 2008, pp. 173-175).

Note 8. The conceptual framework of equity theory seems of limited use in marriage. In a study of divorced persons, "To virtually every male, the idea of fairness–unfairness seemed foreign to marriage. The same was true of many of the females. . .There was plenty dissatisfaction with obtained outcomes in many marriages, but the phenomenal qualities of these negative feelings seem mostly different from unfairness" (Anderson, 1991f, p. 210).

Note 9. The editor of a prominent social psychology journal, notable for his caring, sympathetic rejection letters, once told me that "nine of ten articles we publish, if we did not, no one would care but the author."