Predicting the Strength of Preference for Labor Contracts Using Policy Modeling

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This study tests the predictive accuracy of policy models that describe the cognitive strategies used when subjects evaluate labor contracts. Subjects rated labor contracts that varied in wage offered, job security, and profit sharing plans. Profit sharing plans varied in two dimensions: the time when the profit was received and level of stability that was known about the company's ability to maintain a profit. All the subjects appeared to average the subjective values of the contract features; however, subjects differed in the way they weighted the outcomes. One week later, subjects returned to choose between labor contracts and to indicate how much they preferred each choice. The preference orderings that were predicted by the policy model for the majority of the subjects were fairly consistent with the observed preference ratings.

However, in the preference task, the observed preference ratings for the acceptable contracts were stronger than predicted by the policy model. Furthermore, contracts that were rated as least attractive were rated in the preferences task as more similar to each other than predicted. For the majority of subjects, these results indicated that policy modeling would be a useful method of representing information about an individual's point of view to predict how they might compare contracts when asked to trade off the features. One small group of subjects rated the contracts based almost exclusively on wage during the rating task and then used wage, security, and profit sharing when comparing the contracts. The advantages of the policy model as a method of anticipating the value of labor contracts in the preference task are discussed as an approach to studying the resolution of conflict between two parties.

Negotiation is a decision-making process that focuses on the resolution of a conflict between two parties. In a vast literature that spans several disciplines, research has been guided by schema that classify different conflict situations, the surrounding circumstances that lead to conflict,

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the need for negotiation, and the nature of resolutions (e.g., Luce & Raiffa, 1957; Walton & McKersie, 1965; Raiffa, 1982; Bazerman & Lewicki, 1983).

The purpose of the present research is to investigate a particular component of negotiation: identifying and describing the goal structure (Lewicki, 1981) of individuals and determining how well the parameters of the model can describe the rank order of the preference strength for labor contracts that combine different work incentives. Therefore, the current analysis is relevant to any negotiation process that would be facilitated by information about the (1) importance of the negotiable factors from each point-of-view, (2) personal interpretation of the values of the contract features being offered, and (3) method by which gains or losses are traded off by each party. The primary idea of this study is that identifying a preference ordering for the set of possible solutions would facilitate the resolution of conflict by identifying a corresponding set of possible compromises that are defined from both parties' point of view.

Coombs and Avrunin (1988) describe preference as an internal conflict in which an individual must trade off attributes to identify the best alternative from a single point of view. They define negotiation as an extension of preference to the case when two or more points of view attempt to choose the best feature or a single outcome for both (or all).

Using this more general view of conflict, one can develop a procedure for assessing the policy represented by a particular point of view and then test the accuracy of the procedure by predicting how the individual will choose among different labor contracts. If we can successfully predict an individual's preferences among contracts from the policy model, this procedure could be extended to predict the optimal compromise between conflicting parties.

The negotiation literature recognizes the importance of understanding preference structure (e.g., Rubin & Brown, 1975; Lewicki & Litterer, 1985). A study by Greenhalgh, Neslin, and Gilkey (1985) found that preferences determined the outcome of negotiation and were more important than the other variables of personality and power. Their study concluded that the individual's idiosyncratic preference structure was the most important factor in predicting the negotiation outcome.

Competitor's preferences for job and contract attributes are often misunderstood, perhaps due to attributing differences to others that do not exist (Jurgensen, 1947, 1978; Howells & Woodfield, 1970; Howells & Brosnan, 1972). Given the frequent misunderstanding of the preferences of others, a method of evaluating the importance and subjective values of contract attributes should facilitate the negotiation process.

There is some evidence that the importance and value of features in dispute are difficult to obtain directly from the participants in the labora-
tory or in the field (Hammond, Stewart, Brehmer, & Steinmann, 1975; Balke, Hammond, & Meyer, 1973). For example, Balke et al. (1973), in a study at Dow Chemical Company shortly after the settlement of a dispute, found that the former negotiators were unable to directly express the importance that they placed on the disputed contract attributes. The "importance weights" that they provided did not predict the weights that were reflected in their actual assessments of the contracts. Birnbaum and Stegner (1981) argue that when the importance weights are estimated with a model that distinguishes between importance and the subjective values of the attributes, self-reported weights are correlated with importance weights that are estimated in a judgment model.

Greenhalgh and Neslin (1981) pointed out that in realistic situations when there are more than two features, the importance of features as well as the nature of the trade-offs determines contract preferences. They concluded that direct rating methods are not suited for revealing this information. Greenhalgh and Neslin recommended conjoint analysis to identify the utilities of the attributes. Their approach is similar to the current measurement model, except that they assume that the attributes compensate for each other in an additive model and they do not provide a functional analysis of the response scale, whereas the present model tests alternative trade-off strategies and describes the optimal monotonic response function.

Policy capturing is a method of describing the way individuals weight the importance of information that is used to make evaluations (Zedeck, 1977; Feldman & Arnold, 1978; Hobson & Gibson, 1983; Hobson, Mendel, & Gibson, 1981). Policy modeling has the same objective as policy capturing but introduces subjective values for the attributes, assesses a wider variety of trade-off strategies, and tests for the linearity of the judgment scale.

This study uses policy modeling to describe the way people evaluate labor contracts that vary in hourly wage, job security, and profit sharing plans. The policy modeling process provides a way to compare different points of view along several dimensions. First, it provides a method for predicting what contract features are most appealing to each point of view, otherwise known as the "relative importance" of each contract feature. This model also provides a way to scale subjective values of the alternative components offered in the contract. Finally, it is possible to test a number of different trade-off strategies to determine which "policy" most accurately describes the preference structure of each party.

POLICY MODELING

The conceptual structure of the policy model is shown in Fig. 1. The actual values shown in the contract for this study included wages ($\phi_3$), job
security ($\phi_s$), and profit sharing ($\phi_{ps}$). These objective values are scaled, according to the subject's experience and frame of reference, to subjective values ($S_s$, $S_{sec}$, and $S_{ps}$, respectively). While physical values ($\phi$) represent the actual quantity or quality, subjective values ($S$) are an individual's interpretation of the physical values. The perception of various job contracts depends on the judge's perspective or point of view. For example, a manager making financial decisions about his or her company and an employee working to support a family perceive wages differently. For the manager, wages are a loss and for the employee, wages are a gain. Each party evaluates the features of the contract from a different frame of reference and experience. These differences can be described as differences in subjective values.

The weights in the model represent the importance of each feature to the individual and must be assessed independently of the subjective values. If the importance weight is high, changes in that feature will have a greater impact on the value of the contract than if the weight for that feature is low. In other words, the importance weight indicates how much attention will be focused on a feature. In contrast, the subjective values represent the subject's evaluation of a specific offer on a feature. Subjective values indicate whether a particular change in the offer is perceived by the participant as large or small. Both weights and
subjective values determine an individual's overall value of a particular contract.

Schönemann, Cafferty, and Rotton (1973) have shown that importance weights are confounded with the scale values that define the subjective values of the attributes when the features are combined by adding or averaging and the set of values are derived from a factorial design in which the number of attributes is constant. Norman (1976) provided a solution to this problem, showing that importance weights can be discriminated from the subjective scale values by varying the number of attributes presented. This tactic was also employed by Birnbaum (1976) and Birnbaum, Wong, and Wong (1976) to estimate the weights of different sources of information. To provide information in defining the importance weights independently from the scale values, individuals must evaluate the features alone as well as in combination with other features. The importance of a feature is inferred from the differences in the values of contracts that are obtained when a feature is varied with and without the feature of interest. A complete discussion of this methodology can be found in Stevenson, Busemeyer, and Naylor (1990).

In Fig. 1, the subjective values ($S$) for each component of a contract are weighted ($w$) and then combined to determine the overall value ($\Psi$) of the job contract. This value is an internal and unstated evaluation, or "gut feeling," about the contract. Each point-of-view may have different weights and trade-off strategies among features, as well as different subjective values that would affect the overall value.

There are many different trade-off strategies that subjects could use to evaluate the labor contract features. An additive model is defined by the equation

$$R = J_r (S_s + S_s + S_{ps}),$$  \hfill (1)

where $R$ is the rating, $J_r$ is a monotonic function, and $S_s$, $S_s$, and $S_{ps}$ are the subjective values of the contract features. The pattern of ratings shown in Fig. 2A represents an additive strategy. The solid lines correspond to the attractiveness ratings of different levels of wage (shown on the abscissa) and security (shown as different lines). The dashed line corresponds to the attractiveness ratings of different wage levels and is parallel to the solid lines. With an additive model each component that is evaluated as a positive feature increases the attractiveness of the labor contract. This is the trade-off model that is typically assumed in policy capturing (i.e., regression) for combining information. If an additive model describes the ratings, the effect of a particular level of job security on the value of the labor contract must be constant across levels of wage. As long as the second feature is viewed as positive (i.e., there is some
Fig. 2. Prototypical patterns of trade-off strategies represented by (A) adding, (B) averaging, (C) converging, and (D) diverging. Wage is represented on the abscissa. Each line is a different level of job security.

security provided), having both wage and security to negotiate is better than having only wage to consider.

An example of an additive model that has been successfully used to predict effort in various settings is the expectancy-valence model (Vroom, 1964; Sheard, 1970; Wanous, 1972; Mitchell, 1974; Stahl & Harrell, 1981, 1983). The expectancy-valence model is based on a model of expected utility that assumes that different outcomes add together. Valence is the value of the outcome. This sum is monotonically related to effort.

An an alternative strategy, the values of the features of a contract could be averaged. The relative weight averaging model is shown by

\[ R = J_t \left( \frac{w_0 S_0 + w_s S_s + w_p S_p}{w_0 + w_s + w_p} \right) \]  

(2)

where \( S_0 \) represents the initial value of the contract and \( w_0 \) is the initial weight. The relative importance associated with wage, security, and profit sharing is represented by \( w_s, \) \( w_p, \) and \( w_p \) respectively, while \( S_s, \)
$S_s$ and $S_{ps}$ represent the subjective values of these features. If one of these features is not negotiable, the weight ($w_s$, $w_{ps}$, or $w_{ps}$) is assumed to be 0 and has no influence on the evaluation process. The policy labeled "Averaging" in Fig. 2B is similar to the adding policy since the solid lines representing the contracts with two features are parallel (i.e., the effect of security is independent of wage). However, with an averaging strategy, including a second feature (security) in the contract may increase or decrease the overall value, depending on the value of wage. For example, if a low wage was presented and the new offer introduces a positive but mediocre security feature, the contract becomes more attractive. However, if a substantially higher wage has been discussed and a mediocre security feature is included, the attractiveness of the contract decreases. This crossover interaction of the ratings of wage alone and wage combined with security means that there is a different rank order for labor contracts described by an averaging policy and an additive policy. This distinction is particularly relevant to negotiation since new features are often added to a contract after the process begins. Averaging models are appropriate for ratings of likableness (Anderson & Birnbaum, 1976), predictions of value (Birnbaum, 1976), and descriptions of attitudes toward a group (Birnbaum, 1974).

A configural weight averaging model (Birnbaum & Stegner, 1979) is another model that may be applicable to the description of labor contracts. The configural weight averaging model makes the same predictions as the averaging model but adds an adjustment for interactions. In the configural weight averaging model

$$R = J_t \left( \frac{w_0 S_0 + w_s S_s + w_{ps} S_{ps}}{w_0 + w_s + w_{ps}} + w_c S_s - S_s \right),$$

the weights and subjective values are defined in the same way as the averaging model and $w_c$ represents the weight associated with a converging or diverging interaction between wages and security. The strategies shown in Figs. 2C and 2D are configural averaging models that vary in the way that security is evaluated, depending on the wage level of the contract. In the converging pattern (Fig. 2C), the impact of different security proposals is largest when the wage is low and diminishes when wage is high. The configural weight is large and positive. For the diverging pattern (Fig. 2D) the different levels of security have a similar impact when wage is too low. However, when the wage level is high, the type of job security affects the value of the labor contract. The configural weight would be large and negative. If the impact of security is the same regardless of the wage offered, the configural weight would be 0.

In the final step of evaluating the contract, the implicit value ($\Psi$) of the
contract must be communicated on the response scale (see Fig. 1). Subjects may respond differently depending on the type of response scale that is provided by the experimenter. The response function \( J(x) \) in policy modeling represents how an individual scales his or her judgments onto the response scale. For a bounded single pole scale, the response function can take on many different forms depending on the stimulus distribution (Birnbaum, 1974). Bounded preference scales and bipolar rating scales are often associated with S-shaped functions (Rose & Birnbaum, 1975; Winsberg & Ramsay, 1981; Stevenson, 1986) in which differences in the center of the scale appear greater than the difference obtained near the extremes. For example, when subjects were rating investments, if the investments were very attractive relative to the alternatives, they used a very positive response. Further increments in attractiveness were diminished. The response function must be identified to describe consistency of the policies accurately across tasks because people scale their responses differently depending on the way we ask the question.

The basic measurement framework used in this study is similar to models applied to different situations and tested by Birnbaum (1974) and Birnbaum and Stegner (1979) to describe the discrepancy between values for cars generated by prospective buyers and sellers. However, the policy modeling approach involves some basic distinctions in the assumptions made about the response function and the methods of obtaining the parameters (e.g., using the basis splines to estimate response scale parameters instead of MONANOVA or exact numerical functions) that describe the form of the function. This approach is also similar to that of Anderson (1982) but differs in the way that the response scales are anchored and the type of assumptions that are used to define the properties of the subjective scales and the combination rules.

Although this study compares different algebraic models as representations of the evaluation process, we do not assume that the subjects consciously use algebra to arrive at their judgments. Simple algebraic models that describe judgments are convenient for summarizing response patterns and making predictions.

The policy model will then be used to predict preferences between familiar (judged in the first part of the study) and new labor contracts. Since the parameters of policy model describes the subjective value functions and weights of the features, it can be used to predict reactions to feature values and combinations that have not been specifically evaluated.

During the first session, subjects were presented with a set of contracts defined by the objective values of wage, security, and profit sharing \( \phi_S, \phi_r, \phi_{ps} \). They were asked to rate the attractiveness of the labor contracts composed of various combinations of these features. The policy model
that was most consistent in describing the observed ratings was used to interpret the points of view in our sample.

In the second phase of this experiment, subjects were asked to rate their degree of preference between pairs of contracts. In this task, the subjects are expected to evaluate each contract using the same policy that they used in the first session, compare their values, and then indicate which of the two contracts is most preferred and to what degree. The policy model derived from the rating task will be used to predict the preferences responses of subjects for labor contracts that are familiar to them and that will be seen for the first time. Therefore, the utility of our processing theory will be determined by its ability to represent the subjects' points of view in the comparison task.

**POLICIES AND PREFERENCE**

Research in decision making sometimes shows that ratings and preference decisions do not give completely converging results. The phenomenon of preference reversal has been reported in experimental studies with several types of stimuli (see Slovic & Lichtenstein, 1983). Preference reversals occur when subjects rate Contract R higher than Contract N but choose Contract N over Contract R in a direct comparison. Although few preference reversals may actually occur (see Goldstein & Einhorn, 1987), preference reversals are most likely to occur with stimuli that are similar in value, the type of contract options that are discussed and offered near the end of the negotiation process. The mechanisms underlying preference reversals could become very important for negotiation if they occur because of shifting points of view (Coombs & Avrunin, 1988).

The optimal subjective values for the contracts were estimated from the pattern of preference ratings \((\Psi_R, \Psi_N)\) using the model

\[
P_{RN} = J_p (\Psi_R - \Psi_N)
\]

where \(P_{RN}\) is the observed preference rating, \(J_p\) is the response function for the preference task, and \(\Psi_R\) and \(\Psi_N\) are estimated scale values for the labor contracts derived from the observed preference ratings. The preference model is a subtractive comparison model of the subjective value of Contract R minus the subjective value of Contract N (e.g., Rose & Birnbaum, 1975; Winsberg & Ramsay, 1981; Stevenson, 1986). In other words, the preference ratings for the sets of labor contracts were assumed to be monotonically related to the difference in their subjective values.

The accuracy of the policy model in predicting preference strength is tested by using the weights, scale value functions for the features, and trade-off strategy of each point-of-view from the rating task to generate the predicted values of the contracts (e.g., \(\Psi_R^* - \Psi_N^*\)). The difference of
these values is compared with the observed preference strength ($P_{RN}$), as follows:

$$P_{RN} = J_P[\Psi_R^* - \Psi_N^*].$$

(5)

In this case, $P_{RN}$ is the observed preference rating, $J_P$ is the response-function for the preference task, and the subjective values of the contracts, $\Psi_R^*$ and $\Psi_N^*$, were estimated from the policy model. Using this procedure, a "policy reversal" involves a comparison of the preference ordering predicted from the policy model with the preference ordering that is observed. A policy reversal occurs when $\Psi_R^* > \Psi_N^*$ (or $\Psi_N^* > \Psi_R^*$) but the observed preference rating favors N (or favors R). Therefore, the accuracy of the policy model can be evaluated by the pattern in deviations and by the identification of the indifference point (i.e., the pattern of policy reversals), recalling that the preference evaluations are similar to the processing that occurs during negotiations.

An alternate measure of preference, response time, was also measured. Choice times can be used to discriminate theories of judgment (Busemeyer, Forsyth, & Nozawa, 1988). Previous research indicates that extreme probabilities (near 0 and 1) are correlated with lower mean response time (Petrusic & Jamieson, 1978; Jamieson & Petrusic, 1977). These experiments found that consistent choices were made quickly. Birnbaum & Jou (1990) demonstrated that the same subjective value parameters can be used to predict preference judgments and reaction times providing evidence that reaction times to stimuli provide an alternative measure of preference that can be used to provide converging evidence for judgment models.

In this experiment, the preference response times were used to determine whether the characteristics of responding in real time to complex stimuli had characteristics similar to the types of response times obtained with simple stimuli.

**Labor Contract Features**

The labor contracts in this study were defined by three attributes: wages, job security, and profit sharing. These specific attributes were chosen because of their prominence in previous research, their current involvement in labor contracts, and their temporal qualities.

**Wage.** The most obvious labor negotiation component is wage. Wage is a short-term consequence, and is immediately rewarding, as contrasted to the long-term values of job security and profit sharing (Wilkens, 1949, 1950). For this reason, wage is expected to carry the greatest weight in evaluating the attractiveness of a labor contract. Dudycha and Naylor (1966) found that pay is considered the single most important attribute to new entrants of the job market. In ranking job characteristics, students
preferred pay over opportunity for growth and advancement, security, fellow employees, working conditions, and supervisor employee relations. However, contrary to the assumed global importance of wage, some findings disagree. For example, female health professionals gave wage and security a low rank relative to the intrinsic values of skill development and accomplishing worthwhile activity (Nordholm & Westbrook, 1982). In an economic analysis of wage and nonwage benefits, Woodbury (1983) concludes that wages and benefits can be easily substituted for each other.

**Job security.** Another key issue in contract negotiations is job security. According to the Wall Street Journal (Wages Follow Profits, 1987), contract priorities are shifting from wages and working conditions to job security. Unions and the work force are pushing for guaranteed job security through job guarantees, job retraining, or job relocation. A number of companies have responded to these demands with substantial job security packages.

The likelihood of future employment by a company has concerned several decades of industrialized employees and researchers. In an early study (Jurgensen, 1947) job applicants ranked their preferences for 10 job factors. They indicated that security was the most important job attribute compared to advancement, type of work, company, co-workers, pay, supervisor, hours, working conditions, and benefits. Stagner (1950) found that 36.1% of the workers in his study rated job security as the most important quality in a job. Job security was in the top 5 responses of 10 possible factors in 61.9% of the workers. Powell (1984) found that security rated more important to graduating college students than salary, while others (Brief, Rose, & Aldag, 1977; Lacy, Bokemeir, & Shepard, 1983) have found that workers rank security lower than the attributes of meaningfulness, pay, and advancement. When it comes to predicting students’ perceptions (Posner, 1981), faculty and recruiters tend to overestimate the relative importance of wage to college students and underestimate the importance of security. In some cases the methods used to compare compensation variables might confound importance with the subjective values of the features.

**Profit sharing.** Profit sharing is a historical component in contract negotiations and has been implemented in many forms. Proponents of profit sharing emphasize its motivational impact as a vital link between company profit and performance of employees.

Profit sharing can be employed in three different ways. First, cash plans that provide money at the end of a certain time period are available. A second type is the deferred plan, which involves money held until later, perhaps for a specified vesting period or, most commonly, until retirement. Third, the combination plan offers a mixture of deferred and cash
plans. A combination plan could involve different investment options for the employee. The Wall Street Journal (Lekfelot, 1984) estimated that 15% of 430,000 programs are straight cash, 70% are strictly deferred, and 15% are combination plans.

Profit sharing has been studied in case studies and correlational survey arguments that link profit sharing to performance. How employees evaluate profit sharing as a contract feature is uncertain. Given the attributes of profit sharing, namely the delay factor and risk factor, it appears that if profit sharing is only a monetary incentive, it will have to be quite large to influence the value of the contract. Present and future time trade-offs are especially vital for profit sharing because the greatest number of profit sharing plans are deferred. Delayed profit sharing should have less weight than immediate profit sharing due to temporal discounting (e.g., Koopmans, 1960; Meyer, 1976; Stevenson, 1986).

METHOD

Each subject completed two sessions, 1 week apart. The first session involved rating the attractiveness of a set of labor contract features. In the second session subjects were asked to choose between pairs of contracts and to indicate their degree of preference for the chosen contract, and contracts evaluated during the first session were compared with contracts that had not been rated before.

Session One: Rating Task

During the first session, subjects were instructed to evaluate the attractiveness labor contracts. The experimenter verbally instructed the subject about the rating task including descriptions of the contract features, an explanation of the rating scale, and information on how to respond on the computer during the experiment. The subjects rated the desirability of the contracts on a graphic scale. The 60-point response scale was anchored with the terms "very unattractive" and "very attractive," with "neutral" in the center. Subjects could move the cursor along the rating scale with the arrow keys. When the position of the cursor indicated the perceived attractiveness, subjects pressed the "/" key to finalize their judgment and pushed it again to initiate the next trial. Subjects could thus move the cursor to adjust or correct the final response on each stimulus before continuing to the next stimulus.

Stimuli. The contracts included three features: wage, job security, and profit sharing. There were three wage levels: $3.55, $6.75, and $9.95 per hour.

The three levels of job security were slightly ambiguous and similar to actual information the subjects would receive if they were deciding about
job offers. Contracts stated that the company would provide (1) No retraining or job replacement, (2) Some retraining or placement, or (3) Guaranteed retraining or placement.

Nine possible profit sharing plans were generated from a factorial combination of company stability (Stable, Unstable, or Unestablished Company) and three times when profits are shared with employees (Each Paycheck, Yearly, or Retirement). All of the possible contract values were posted near the computer to provide contextual information for these judgments.

**Design.** To provide enough data to estimate both the subjective value functions and the importance weights of these features, three types of contracts were presented. The first type of contract \((A \times B \times C)\) included all three features (wages \(\times\) security \(\times\) profit sharing). The second type of contract featured three combinations of two factors, specifically, \(A \times B\) (wage \(\times\) security), \(A \times C\) (wage \(\times\) profit sharing), and \(B \times C\) (security \(\times\) profit sharing). For example, subjects were asked to rate the desirability of \(B \times C\) (security \(\times\) profit sharing) without any explicit wage information. The subjects were instructed that for these contracts the missing feature was not negotiable. Finally, each level of each feature was evaluated alone to determine how attractive it was to the subjects.

**Procedure.** Prior to the start of the rating task, each subject was presented with 10 practice trials on the computer. During this time, subjects were encouraged to ask for clarification or further explanation of the task. After the practice trials, the subject completed 159 ratings. All combinations of the stimuli were presented in a different pseudo-random sequence for each subject. When finished, a brief questionnaire was administered to each subject to obtain a direct rating of the relative importance of the contract attributes. Subjects completed this task in approximately 1 hr.

**Session Two: Contract Preference**

During the second session, subjects rated their degree of preference between two labor contracts presented on the computer. All of the contracts included three components: wage, security, and a profit sharing plan. First, subjects compared two contracts and indicated which contract was preferred. The response time to make that choice was recorded. A continuous scale then appeared on the screen, and subjects indicated their strength of preference for the chosen contract over the other one. Moving toward an endpoint indicated a strong preference, while the center of the scale represented indifference (where Contract R and Contract N are seen as equal). As in the rating task, the possible values for each feature were posted to help the subjects remember the range of possible values.
Stimuli and design. Each pair of contracts used in this session included one contract composed of feature values that were rated in the first session (Set R) and a second contract composed of new feature values (Set N). Set R included contracts with all of the levels of the wage and security features from session one and profit sharing plans with the three time delays offered by a Stable company. Therefore, Set R was generated from a $3 \times 3 \times 3$ factorial combination of wages, security, and profit sharing conditions. Set N was a $2 \times 2 \times 2$ combination of wages, security, and profit sharing plans that had values intermediate among the levels used in the rating task. None of the features in Set N had been used in the first session. All possible pairs (216 trials) of Contract Set R and Contract Set N were used.

Procedure. The experimenter instructed the subject individually about the preference task. As in the rating task, each subject was given a different sequence of contracts to evaluate. Contracts from Sets R and N were presented randomly on different sides of the screen. Ten practice trials were given on the computer to assure familiarity with the task and to provide time for questions.

At the beginning of each trial, the cursor was positioned in the center of the screen. The response clock started when the stimulus was presented, and it was terminated when the subject moved the cursor to the left or right or hit the slash key to stay in the middle of the screen. When the cursor was moved left or right, a graphic rating scale appeared and the subject could indicate his or her degree of preference for the contract that was chosen. The scale was labeled “Prefer R very much” on the far left for Contract R and “Prefer N very much” on the far right for Contract N. Therefore, the farther the subject moved the cursor from the choice point, the stronger the strength of preference rating.

All subjects completed this session within 1 h. The subject was then asked about his/her decision rule, the importance of the features, and general demographic questions. Subjects were debriefed following this interview.

Subjects. Fifty subjects in an introductory psychology course at Purdue University volunteered in partial fulfillment of a class requirement. One subject failed to follow instructions and was dropped from further analyses.

RESULTS

Policy Classification

First, a factor analysis was used to assess the similarity among ratings from session one across subjects. By correlating the subjects' responses across stimuli, the factor loadings were used to identify "outliers." All of
the subjects loaded on one factor, except for one subject who was dropped.\(^1\) Factor analysis is generally not sensitive to specific policy differences; therefore, subjects' data were examined individually.

A small subset of responses from the rating task was used to categorize subjects according to their data patterns. In Fig. 2, wage and security are used to illustrate the classification method. In each example, wage level is plotted on the \(x\) axis while hypothetical ratings are plotted on the \(y\) axis. The dashed line represents ratings for the desirability of wages when presented alone. Solid lines represent ratings for job contracts that included both wage and security as negotiable features. Each level of security is represented by a different line. Plots were made for each subject corresponding to the highest and lowest values of wage and security. These plots were compared to the prototypes in order to classify the policy used by each subject in rating the contracts. Therefore, the categories represent a qualitatively different pattern of responding or a difference in the rank order of the ratings for the small set of stimuli.

None of the subjects had patterns that matched the additive model (Fig. 2A). All of the subjects matched the averaging prototype (Figs. 2B–2D). There were some differences in the range of the ratings across wage levels. The majority of the subjects (39 of 48) matched a simple relative weight averaging model similar to Fig. 2B. Most of these subjects, Group WSP (31 of 39), used all three features to evaluate the contracts. The ratings made by these subjects were averaged and the relative weight averaging model was fit to their mean responses (see Eq. (2)). Some subjects (8 of 39) had a large range of ratings across the levels of wage (Group W). The ratings made by this group were averaged and also fit by a relative weight averaging model (Eq. (2)).

Another group (7 of 48) matched the converging prototype (Group WSP +). An analysis of variance was computed on all of the responses to contracts that included a combination of wage and security for this subset of subjects to determine if this pattern was reliable. There was a significant wage \(\times\) security interaction \((F(4,24) = 12.89, p < .0001)\). This interaction suggests that the subjects responded differently to security when wage was low but were less sensitive to security when wage was high. The ratings for this group were averaged and fit by a configural weight averaging model (see Eq. (3)). The last two subjects (2 of 48) could not be classified based on these points and were dropped from further analysis.

\(^1\) Two other subjects were dropped from the analyses. One subject failed to follow instructions and the other subject was from a foreign country and represented a different population.
Labor Contract Policy Models

The relative weight averaging model was fit to the mean ratings obtained for Group WSP and Group W (see Eq. (2)). The model was fit with a computer program that selected parameters using the Marquardt Compromise algorithm (Draper and Smith, 1981, pp. 471) to minimize the sum of the squared deviations between the mean judgments and the predictions of the model. This program estimated 23 parameters from 159 data values and was fit separately to each group of data. Spline functions were used to estimate the optimal response function for the averaging model tested (deBoor, 1978; Winsberg & Ramsay, 1981; Stevenson, 1986). Five parameters and an intercept were used to define this function. The 23 parameters included 3 for the subjective values of wages, 1 for the subjective value of security (2 values were fixed to define the scale unit), 9 for the subjective values of the profit sharing plans, 3 importance weights for wage, security, and profit sharing, and for the response function, an initial scale value ($S_0$). The initial weight ($w_0$) was fixed.

The relative weight averaging model fit the mean ratings of Group WSP (98.75% of the variance) and Group W (98.37% of the variance); however, these groups had different importance weight parameters associated with their responses. To evaluate the fit of these models, we searched for any systematic deviations in the residuals. To see the difference in accuracy obtained between the fit of the adding model and the averaging model for Group WSP, see Fig. 3. In Fig. 3B, the estimated values of the job contracts using the additive model are represented on the abscissa, while the mean ratings observed are given on the ordinate. Different symbols indicate the number of features included in each contract. The line shows the predicted values with the optimal monotonic response function. The ver-

![Fig. 3. Observed points and predicted values (line) for mean ratings of Group WSP when fit with an averaging model (A) and an adding model (B).](image-url)
tical dividing lines indicate knots in the spline function. Deviations in Fig. 3B show that the additive model makes systematic errors for the contracts with different numbers of features. The fit of the averaging model for this group is shown in Fig. 3A. The averaging model provides a more accurate representation of this group’s judgments of the labor contracts. The fit of the averaging model for Group W is shown in Fig. 4A. The deviations do not appear to be systematic.

A configural weight averaging model (Eq. (4)) was fit to the mean ratings of Group WSP+. This was the group with a significant converging interaction for job security across wage levels. In this case, as wage increases, security has less impact on the overall value. The configural averaging model accounted for 96.25% of the variance in the ratings for this group. The observed and predicted values are shown in Fig. 4B. No systematic deviations in the fit were observed; however, the fit was not as accurate as the models fit to the other groups.

Group WSP and Group W were classified differently because the observed ratings for the individual subjects differed in range across the levels of wage. This difference could be due to the relative importance weight associated with wage or because their subjective values for the wage levels differed. Figures 5A–5C show the subjective value functions associated with wage, security, and profit sharing. The estimated subjective scale values are unique up to a linear transformation. For wage, the slope of the functions for Group WSP and Group WSP+ is quite similar, whereas the slope for Group W is steeper, indicating that the subjective values for wage were more distinctive for the latter group. The subjective value functions for profit sharing indicated that the effect of the time delay was small and sometimes favored short-term gains (Group WSP+), long-term gains (Group W), or neither (Group WSP).

![Graph](image)

Fig. 4. Observed points and predicted values for the mean ratings of (A) Group W and (B) Group WSP+ when fit with averaging models.
Table 1 shows the relative (normalized) importance weights for all three groups. The relative importance weight for wage were nearly identical for Groups WSP and WSP +, but the importance weights for Group W differed from these groups. These policy differences would lead to different predictions about which labor contracts would be preferred by each group. Group W would be much less willing to accept a lower wage if the job is secure than Group WSP or Group WSP+. The relative importance weight for security and profit sharing was smaller for Group W than for Groups WSP and WSP +.

It was assumed that subjects placed no weight on features that were not presented. In other words, if a feature is omitted from a contract, the weight for that feature is set to 0. If subjects were inferring some value for the missing feature, then systematic deviations would be present in Figs. 3A and 4A-4B. Another way to assess the potential impact of missing information is to plot how observed ratings change when additional components are included in the contract. If you compare the ratings for a single feature with the rating for that feature combined with another con-

<table>
<thead>
<tr>
<th>Relative weights</th>
<th>Group WSP (n = 31)</th>
<th>Group WSP+ (n = 7)</th>
<th>Group W (n = 8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$W_w$</td>
<td>.15 (.26)</td>
<td>.14 (.18)</td>
<td>.23 (.12)</td>
</tr>
<tr>
<td>$W_{wage}$</td>
<td>.45 (.44)</td>
<td>.45 (.56)</td>
<td>.59 (.42)</td>
</tr>
<tr>
<td>$W_{sec}$</td>
<td>.19 (.18)</td>
<td>.20 (.26)</td>
<td>.09 (.14)</td>
</tr>
<tr>
<td>$W_{ps}$</td>
<td>.21 (.12)</td>
<td>.21 (0.0)</td>
<td>.09 (.32)</td>
</tr>
</tbody>
</table>

*Note. Preference weights are in parentheses.*
tract component that is less in value, different patterns are obtained if the subject assumes information when the second component is not present. By looking at the impact of the lowest value of the additional features, the patterns will be most distinctive. In Fig. 6, the observed ratings are plotted (1) when the feature was presented alone, (2) with the second feature specified at its lowest value, (3) with the third feature specified at its lowest value, and (4) with both the second and third features at their lowest values. The base feature is defined on the abscissa and each line represents a different combination of attributes. Figure 6 shows these patterns for the Group WSP. The left panel shows wage as the base feature, while the security and profit sharing features are represented in the middle and right panels, respectively. Figures 7 and 8 are the same as Fig. 6 except that the data are from Group W and Group WSP+, respectively.

All of these figures show that the effect (or slope) of a feature is inversely related to the number of features presented, consistent with one implication of averaging models (Eqs. (3) and (4)). This means that subjects did not fill in missing information with a 0. When less attractive features are combined with a better base feature, ratings decrease. If subjects were using a zero value when a feature was omitted, the rating of the single features would be lower and parallel to the multiple component contracts. The results in Figs. 6–8 are not consistent with additive models or the estimation of values for missing information. If the subjects were evaluating job contracts with one or two features by filling in the missing features with average values, the slopes in these figures would be parallel.

The subjective scale functions for profit sharing are shown in Fig. 9A for the Group WSP, Fig. 9B for the Group W, and Fig. 9C for Group WSP+. All of the groups indicated that the stability of the company was

![Fig. 6. Mean ratings for Averaging Group WSP from the policy task for each (A) wage level alone (W) and combined with the lowest levels of security (S) and profit sharing (P), (B) security level alone with the lowest levels of wage and profit sharing, and (C) profit sharing level alone and combined with the lowest levels of wage and security.](image-url)
more important than the time when the profit would be received. The Unstable and Unestablished organizations were rated as similar and much less attractive than Stable companies. Delayed profits were less desirable for Group WSP and Group W but time was not used by Group WSP+ in evaluating profit sharing plans.

Response Function

The response functions for all three groups were approximately linear (see Figs. 3A and 4A–4B). Although negatively accelerated response functions have been obtained with bounded single pole rating scales (Stevenson, 1986), linear response functions may simply indicate that these labor contracts were not viewed as extremely good or extremely undesirable. The combination of components produced labor contracts that were viewed by these subjects as adequate or inadequate but not extreme.
**Labor Contract Preferences**

For the preference task subjects rated their degree of preference for sets of labor contracts. The three features evaluated in the first session (i.e., wage, job security, and profit sharing) appeared in each contract. To assess the accuracy of the policy models in accounting for the preferences that subjects had for various labor contracts, the importance weights and subjective value functions of the models for each group were used to generate a subjective value for each labor contract. With 35 contract values fixed according to the policy information from the rating task, fitting the preference model required only five response function parameters and an intercept parameter.

**Comparing the Policy Model and Preference Fits**

For Group WSP, 92.66% of the variance in preference strength was predicted with the simple preference model, (Eq. 5)) using estimates of the contract values based on the policy model estimated from the rating task. For Group WSP+, 87.84% of the variance of the preference ratings was predicted by the preference model with fixed values from the policy model. The preference ratings are shown in Figs. 10–12 as points and the predicted values are shown as lines. The response functions for Group WSP and Group WSP+ are shown in Figs. 10A and 11A. There is more dispersion around the predicted values for Group WSP+ than was obtained for Group WSP. The parameters from the rating task provided a fairly accurate estimation of the preference strength between contracts for these two groups. For Group W, 87.52% of the variance in preference evaluations was predicted by the preference model with fixed contract values estimated with the policy model from the rating task. Unlike the other two groups, the irregularity in the response function (see Fig. 12A)
and the dispersion of the points indicated that the policy model was not a good representation of the processing strategy of these subjects.

The preference model described in Eq. (4) was used to solve for the optimal subjective values for the contracts. This time the subjective values of the labor contracts were estimated from the preference ratings to maximize the fit of the preference model. This analysis provides the best fit for the preference evaluations and subjective values for each contract. The 35 subjective values for the labor contracts that were fixed in the first preference model were estimated in this model to arrive at the best fit. Figures 10B, 11B, and 12B show the results of this analysis for Group WSP, Group WSP+, and Group W, respectively. Compared to the previous fits, improvement was achieved with these contract value parame-
Fig. 12. The relationship between policy contract values and preference contract values for each level of wage for Averaging Group WSP (A), the wage focused group (B), and the configural averaging group (C).

ters. For Group WSP 96.83% of the variance in preference ratings was described by this version of the model. The fit of this model for Group WSP+ using Eq. (4) accounted for 94.19% of the variance in preference ratings (see Fig. 11B). The preference model with contract parameters accounted for 96.23% of the variance for Group W (Fig. 12B). The anticipated S-shaped response functions for a bipolar scale was obtained. The S-shaped response function is similar in form to the response function obtained in other studies with other stimuli (Rose & Birnbaum, 1975; Winsberg & Ramsey, 1981; Stevenson, 1986).

Predicted Choice

Another way to evaluate the policy model predictions is to classify the predicted and the observed responses according to the choice of contract. Policy reversal matrices describe the relationship between the predicted choice based on the policy models (Eq. (5)) and the actual choice observed during the preference task. This matrix is shown for all three groups in the left panel of Table 2. The choices between the labor contracts predicted from the policy model are classified in the columns and the observed choices between the labor contracts are classified in the rows. The diagonal cells include all of the observed choices that agree with the preference order predicted by the policy model. The off-diagonal cells indicate the number of inconsistencies or instances when the contract predicted to be less attractive is actually chosen.

Policy reversals can occur when the subjects use a processing strategy during the preference task that is inconsistent with the policy they used during the rating task. Policy reversals can also occur near the point of indifference due to systematic or random error. If the frequencies repre-
TABLE 2
PREFERENCE REVERSALS BY MODEL FOR CONTRACTS R AND N FOR EACH GROUP

<table>
<thead>
<tr>
<th>Observed preference</th>
<th>Policy model</th>
<th>Preference model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>N</td>
</tr>
<tr>
<td>Group WSP (n = 31)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>104</td>
<td>5</td>
</tr>
<tr>
<td>N</td>
<td>9</td>
<td>98</td>
</tr>
<tr>
<td>Reversals (%)</td>
<td>6.5</td>
<td>2</td>
</tr>
<tr>
<td>Group WSP + (n = 7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>100</td>
<td>11</td>
</tr>
<tr>
<td>N</td>
<td>10</td>
<td>95</td>
</tr>
<tr>
<td>Reversals (%)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Group W (n = 8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>104</td>
<td>12</td>
</tr>
<tr>
<td>N</td>
<td>6</td>
<td>94</td>
</tr>
<tr>
<td>Reversals (%)</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

senting errors in the off-diagonals are asymmetrical, preference reversals (based on observed ratings and observed choices) are attributed to bias (Goldstein & Einhorn, 1987). The patterns of policy reversals that were obtained for all the groups in this study were not consistently asymmetrical and were low in frequency (14/216) for Group WSP, (21/216) for Group WSP +, and (18/216) for Group W. All of these "reversals" occurred for contract differences that were very close to indifference; however, these contracts are most likely to be those that would be critical to predict during a negotiation. In other words, the more distinctive the contracts are, the easier it is to predict preference.

The policy reversal tables were also compiled for the preference model (Eq. 4) that estimated the subjective values of the labor contracts. The choices predicted by the preference model that included parameters for each labor contract were compared with the choices made during the preference task. In this case, inconsistencies would represent error in the data since any policy changes would be represented in the contract values that were estimated from the preference ratings. As shown in the right panel of Table 2, only 5/216 choices for Group WSP, 7/216 choices for Group WSP +, and 6/216 choices for Group W were not predicted by the preference model. These values represent the minimum number of errors one could obtain when eliminating inconsistencies between the policy predictions and the choices.

Comparing the Contract Values

To determine how the policy changed from the rating task to the preference task, the subjective values of the labor contracts derived from the preference ratings (Ψ from Eq. (4)) were compared to the subjective values of the contracts computed from the policy model (Ψ* Eq. (2) or
These values are plotted in Fig. 13A for Group WSP, in Fig. 13B for Group W, and in Fig. 13C for Group WSP+. The subjective values of the contracts estimated from the preference task are an exponential function of the policy values estimated from the rating task for all of these groups. Near the low end of the scale, undesirable contracts look more similar in the preference task (i.e., they are all relatively unacceptable) than predicted from the policy model. At the most attractive end, the subjective values of the contracts derived from the preference task appear to be more distinct than those represented by the policy model. However, for Group W, unlike Group WSP and Group WSP+, the ordering is less consistent across tasks, indicating that a change in policy might have occurred for this group. The questions are How does the comparison process make the best contracts look better and the less desirable contracts less distinctive? and Has there been a change in strategy for Group W?

To answer the first question, the preference ratings were fit using an adjusted preference model. First, the trials for each group were classified according to the most important dimension: wage. Previous research on preference reversals has demonstrated that in some cases, when subjects are asked to compare two stimuli, the most important attribute carries more weight than it does for an evaluation of single stimuli (Tversky, Sattath, & Slovic, 1988). This effect is referred to as the prominence effect and has been shown to occur with strength of preference (Fischer & Hawkins, 1989).

We hypothesized that prominence theory, using wage as the dominant attribute of the contracts, could explain the nonlinear relationship between the scale values. An adjusted preference model with an additional component that could increase or decrease the distance between the scale values by adding "value" to the contract with the highest wage was tested. If subjects focused more attention on the dominant dimension,
wage, the adjustment would improve the fit by allowing the stimulus with the higher wage to increase in value. The contract values in the preference model were fixed according to the values predicted from the policy model and an adjustment was made by adding some proportion \((w_R \text{ or } w_N)\) of the scale value \((\Psi^*_R \text{ or } \Psi^*_N)\) of the contract that had the highest level of wage using the equation

\[
P_{RN} = J_p \left[ (\Psi^*_R - \Psi^*_N) + w_R \Psi^*_R \right]
\]

if \((\phi_w \text{ for Contract R}) > (\phi_w \text{ for Contract N})\)

\[
P_{RN} = J_p \left[ (\Psi^*_R - \Psi^*_N) + w_N \Psi^*_N \right]
\]

if \((\phi_w \text{ for Contract N}) > (\phi_w \text{ for Contract R})\) \hspace{1cm} (6)

where \(J_p\) is a monotonic function, \((\Psi^*_R - \Psi^*_N)\) is the simple preference model, and \(w_R\) and \(w_N\) are weights that are associated with the alternatives from Set R or Set N. Recall that Set R has the largest range of wages and Set N has an intermediate range. If the adjustment depends on the relative values of the contracts, different weights may be required for these stimuli.

This model accounted for 96.48% of the variance for Group WSP and 95.81% of the variance in preferences ratings for Group WSP +; the fits to preferences ratings are shown in Figs. 14A and 14B, respectively. These results indicate that the policy model can be used to predict preference strength with an adjustment. Comparing these fits with Figs. 10A and 11A, the deviations have been reduced. This adjustment implies that the best contract values become more acceptable in the context of the less attractive alternatives than when they are evaluated alone. The adjustment for Group WSP required an increase in the distance \((.38 \Psi^*_R)\) when the wage level for Contract R was greater and \((.13 \Psi^*_N)\) when the wage level for Contract N was larger. The adjustment for Group WSP + required an increase in the distance \((1.604 \Psi^*_R)\) when the wage level for

![Fig. 14. The observed points and predicted values for Group W preference tasks for (A) policy model predictions and (B) the preference model.](image-url)
Contract R was greater and a decrease (−.2015 Ψ_N) when the wage level for Contract N was greater. This pattern indicates that the adjustment occurs for the preferred contract and varies in intensity with the characteristics of the comparison set. This adjustment is needed because the context changes from the rating task when the contracts are evaluated alone and from the comparison task when they are evaluated relative to another contract.

When the preference ratings were evaluated using the adjusted preference model (Eq. (6)) described for the other two groups, no improvement in the fit was obtained for Group W.

Since Group W primarily focused on wage during the policy rating task, an obvious hypothesis regarding the change in policy might be that during the preference task other features would become more important. For example, when the wage level appears to be acceptable for both contracts, the subjects might pay more attention to the alternative features than would be expected from their policy model.

To test this hypothesis, each contract was coded for security levels and profit sharing levels and a new adjustment was defined to allow more variability in the contract values from the features that were not used during the policy rating task, using the equation

\[ P_{RN} = J_p [(Ψ_R - Ψ_N) + (w_sS_s) + (w_pS_p)], \]

where \( J \) is a monotonic response function, \((Ψ_R - Ψ_N)\) is the classic preference model, \((w_sS_s)\) is the adjustment for security that depends on the value of security, and \((w_pS_p)\) is the adjustment for profit sharing depending on the value of the plan. This new model accounted for 94.25% of the variance (see Fig. 14C) in preference ratings and the pattern of weights indicated that the higher the level of security offered the greater the adjustment required to fit the preference ratings (.745, .485, .287 for Ψ_R; −1.355, and −.971 for Ψ_N). The adjustment required for variations in the profit sharing plan slightly reduced the difference in the contract values (−.076, −.014, and −.327 for Ψ_R; .193 and .513 for Ψ_N). According to these results, the change in policy was an increase in the impact of security when contracts were compared.

**Policy Parameter Analysis**

To determine if this shift in contract values could be represented by the new weights or the new subjective value parameters of the policy model, two analyses were completed using the subjective values of the labor contracts estimated from the preference task. First, the subjective values for the wages, security levels, and the profit sharing plans were fixed according to the values obtained with the policy model. The importance
weights that best described the contract values obtained with the preference task were estimated. If the prominence effect holds, a larger weight for wage would be obtained. Using the relative weight averaging model for Group WSP, 85.02% of the variance in contract values could be described with the subjective values of the policy model with the new weights. Using the configural averaging model for Group WSP+, 77.37% of the variance in contract values could be described with the subjective values of the policy model with the new weights. Although there is a slight increase in the weight associated with wage for Group WSP+, the general pattern of weights does not support the prominence theory. The preference weights for both of these groups appear in Table 1 in parentheses. The general pattern of weights appears to be quite similar to the original policy. Contrary to the prediction of the prominence theory, allowing the weight for the dominant feature to increase did not seem to account for the change in subjective values obtained from the preference ratings.

The contract values estimated from the preference task (ΨR and ΨN) for Group W were analyzed using the policy model parameters in the same way as the other groups to see if this policy change could be represented with the parameters of the policy model. When the subjective values for the wages, security levels, and profit sharing plans were fixed and the weights that best described the contract values obtained with the preference task were estimated, 86.01% of the variance in the contract values estimated from the preference task could be described with the averaging model, the subjective values of the policy model, and these new weights. The preference weights appear in Table 1 in parentheses. Unlike the previous groups, the pattern of weights appears to change so that the security and profit sharing have relatively more impact on the value of the contract.

In the second analysis of the change in contract values, the weights were fixed and the subjective values for wage, security, and profit sharing were estimated from the subjective values of the labor contracts estimated from the preference task (ΨR and ΨN). The relative weight averaging model with the weights from the policy model and these new subjective values accounted for 93.32% of the variance in the contract values for Group WSP. The scale values for wage appear to be more spread out, and the range of scale values for security decreased compared to the previously estimated scales. The configural policy model with the original weights and these new subjective values accounted for 86.75% of the variance in preference ratings for Group WSP+. The pattern of residuals from both of these analyses indicate that some contracts are better represented with these new models than other contracts. The contextual change that occurred across tasks seems to affect the perceived values of the attributes rather than the weights associated with the features.
The weights were fixed for Group W and the subjective values that best described the labor contract values derived from the preference task were obtained. The relative weight averaging model with the weights from the policy model and these new subjective values accounted for 94.46% of the variance in the contract values. The scale values for wage appear to be less spread out, the range of scale values for security increased, and the profit sharing scale values were most similar to the policy values. The result for this group corresponds with the adjusted preference model. The policy that subjects used during the preference task indicated that the level of wage looked more similar (this is the dominant feature) and the levels of security looked more distinctive. This result is inconsistent with the theory described as the prominence effect (Tversky et al., 1988; Fischer & Hawkins, 1989) and demonstrates that there are individual differences in the way subjects respond to these tasks. The group that focused primarily on one component during the evaluation task paid more attention to a secondary feature during the preference task.

In summary, these analyses indicate that the majority of subjects used a holistic strategy when comparing labor contracts. In other words, the pattern of responses could be represented with a model that used subjective values for the contracts as opposed to an attribute by attribute preference model. The value of the contracts appeared to shift when being compared, such that the most attractive contracts were judged as more distinctive from each other and the least attractive contracts were judged to be more similar to each other.

Choice Reaction Times

The time required for each subject to choose between the two contracts is plotted against strength of preference for the chosen contract in Fig. 15A. The relationship between the time to respond and degree of preference has an inverted U-shaped relationship, similar to that observed with simple stimuli (e.g., Vickers, 1979) and complex stimuli (Birnbaum & Jou, 1990). It takes longer to choose between similar than very different contracts.

The reaction time patterns provide support for one class of choice probability models and pose difficulties for others. For the subjects in Group WSP, the trials were divided into two categories, depending on the choice for Contract R or Contract N. The average reaction time and preference strength for each trial and outcome were then computed. Figure 15B shows the relationship between the mean preference rating and the mean response time for Group WSP when the subjects chose the contract from Set R. Figure 15C shows the relationship between the mean preference rating and the mean response time for Group WSP when they chose a contract from Set N. If overlaid, Figs. 15B and 15C would create
an X-shaped graph. According to Busemeyer et al. (1988), this pattern would be consistent with Restle’s suppression of aspects model, the accumulator model and an asymmetry model. An X-shaped function indicates that when subjects prefer something that is not consistent with the mean ratings, the choice takes longer. For choices closer to indifference, the response time is somewhat faster. Finally, for consistent choices, the response time is the fastest. This finding is similar to results found by Petrusic and Jamieson using choice probability (1978). Processing models that describe processing with an elimination by aspects (EBA) Model, a simple random walk model, or a symmetry model would all have difficulty explaining this result. This group of models would predict an inverted U-shaped function. An inverted U-shaped function would occur if choices inconsistent and consistent with mean ratings were both made quickly and choices closer to indifference are made more slowly. These results generally support the idea that choice response times may provide an additional measure of preference strength that may be used to confirm or reject various policy models.

An EBA model predicts that individuals make preference comparisons on the basis of one major dimension. Alternatives without satisfactory levels of this dimension are eliminated in a noncompensatory fashion (Tversky, 1972). The present data are consistent with a more holistic (i.e., comparing the contracts as opposed to comparing each attribute) interpretation of preferences, in which more than one dimension is used to evaluate the alternative contracts.

DISCUSSION

This study was designed to examine whether policy modeling could be used to adequately describe the preference structure of labor contracts
from different points of view. It was assumed that to obtain the information needed to facilitate a negotiation process, the policy model would have to represent the (1) subjective value function for the components, (2) the relative importance of the features, and (3) the trade-off strategy used to combine the benefits offered in the contract.

Three groups of subjects were formed based on the patterns of a subset of their ratings that indicated that they represented three different points of view. Basically, an averaging process was most accurate in describing the trade-off strategy used by all three groups to assess the values of the labor contracts. The additive (expected utility and policy capturing) model was rejected as less accurate in representing the trade-off strategy for the features in these labor contracts. The subjective value function derived for the individual components were quite similar for the three groups. All subjects weighted wage as the most important factor; however, differences among the groups were obtained in the way that security and profit sharing plans were weighted.

Previous research has found that wage is an important incentive (Wilkens, 1950; Dudycha & Naylor, 1966; Jurgensen, 1978), but it is not the only important factor in evaluating a job. Group WSP (67.4% of the subjects) considered all three variables when using a relative weight averaging model. No interactions were obtained. Group W (17.4% of the subjects) focused almost exclusively on wage by weighting it substantially higher than security and profit sharing. Group WSP+ (15.2% of the subjects) used a configural averaging strategy; that is, security enhanced the value of the contract more if it was offered with a lower wage than if it was offered with a high wage.

To determine whether the policy models used to describe the ratings could be used to predict these subjects' preferences when they were given labor contracts to compare, a complete assessment of the relationship between the predictions of the policy model and the preference ratings was completed. To provide a fair test, familiar and unfamiliar feature combinations were used during the preference task. The preference task was viewed as a conflict paradigm that assesses an individual's effort to choose the optimal set of attributes from his or her own point of view (Coombs & Avrunin, 1988). Negotiation is the extension of the need to find the optimal trade-off for two points of view. If the policy model can be used to predict how much one contract would be preferred over another, it could be used to describe the utilities of contracts that are negotiable. These utilities could be used to anticipate the value of offers during the negotiation from each point of view.

The policy models representing each of the three groups accounted for most of the variance in the preference ratings. Groups WSP and WSP+ appeared to use the same trade-off strategy and weights represented by
the policy model during the preference task. Group W used the same trade-off strategy during the preference task but weighted security and profit sharing more when comparing the contracts than when evaluating them alone. There is some evidence that if one feature dominates in the policy model, the other features are more likely to be used when assessing the value of a contract relative to another contract.

By comparing the subjective values of the labor contracts generated from the policy models with the subjective values of the contract estimated from the preference ratings, it was found that the comparison process produced some systematic changes in the way the subjects viewed the contracts. These same adjustments might occur when parties evaluate contract features during negotiations. If so, contracts that are unattractive might be viewed as more similar to each other than was predicted from the policy model based on the ratings. The more attractive the contracts, the more distinctive they looked when compared with other contracts. For the majority of subjects, the preference ordering was consistent across tasks, providing a strong empirical basis for predicting preference from the policy model. However, the strength of the preference shifted from the comparison processes.

At this point it is important to identify and summarize the information that the policy model could provide for the resolution of a two-party conflict. First, we assume that the parameters of the policy model are the most relevant dimensions for representing the preference structures of the opposing points of view. Utility functions cannot be compared directly across points of view because the scale units may not be comparable (Suppes & Zinnes, 1963). However, one can use the subjective scale functions for each component to anticipate the relative value of various offers to the individual. For example, consider the functions in Fig. 5. In this case, a change in wage between the values of $4 and $6 is larger than an equal change in values between $8 and $10. Although these utility scales cannot be compared across points of view, they do offer the opportunity to see the offers through the perspective of the negotiators.

The relative values of the importance weights can be compared across points of view, because they are unique up to a multiplicative constant. The values of the weights can be converted to the relative values by

\[ w^*_s = \frac{w_S}{w_0 + w_S + w_s + w_{ps}}. \]  

(8)

where \( w^*_s \) is the relative importance weight, \( w_S, w_s, \) and \( w_{ps} \) are the weight parameters for wage, security, and profit sharing, and \( w_0 \) is the initial weight. The weights are then comparable across individuals. The ratio of
one weight to another \( (w_g/w_s) \) can also be compared across individuals. This part of the model provides information about the relative importance of the features to each participant or the features most likely to influence the perceived value of the contract.

The policy model can be used to generate preference orderings among any combination of the features. Once the trade-off strategy, subjective values, and weights are defined, the contract values of new combinations can be specified. The rank order of the distances between the labor contracts can be generated from the policy model. The policy modeling approach may be useful in defining the appropriate parameters of the preference structures.

The number of preference reversals is reduced when (1) time pressure and information load is low and (2) when multicategory choices are made (Billings & Scherer, 1988). Our stimuli and design minimized the opportunity for these biases. However, a systematic change in contract values was replicated for two groups using slightly different policies. This shift in view could not be attributed to a simple shift in importance weights, but seemed to represent a contrast effect across contract values that depended on the attractiveness of the contracts.

Several interpretations of preference reversals have been proposed. For example, Lichtenstein and Slovic (1971) and Fischhoff, Slovic, and Lichtenstein (1980) have proposed that people use different processing strategies when rating the value of a complex stimulus than when comparing those stimuli. However, it is unlikely that such a high proportion of the variance in preference rating could have been predicted if subject shifted strategies. Some have argued (e.g., Rosen & Rosenkoetter, 1976) that judgment tasks are most likely to predict holistic strategies used in combining attributes while choice or preference might induce a dimensional strategy such as elimination by aspects (Tversky, 1972). One might argue that such a strategy shift may affect importance weights so that the most important dimension is compared first and then the next most important dimension. This shift in strategies has been used to “explain” preference reversal. However, our reaction time patterns and analyses of preference strength seem inconsistent with these explanations.

In summary, this research program is exploring the use of measurement theory as a method of assessing opinions toward the components of labor contracts. These preliminary results were quite promising. The relative weight averaging model provided a good fit to the pattern of ratings and the information needed to predict most of the preference evaluation variability. Since the negotiation process is likely to involve contracts that are similar in value, understanding the nature of these preference reversals is critical to the development of a model of the negotiation process (Coombs and Avrunin, 1988).
REFERENCES


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