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THE VALUE OF CONJOINT ANALYSIS IN ENHANCING EXPERIENTIAL LEARNING

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ABSTRACT

The designer of experiential learning simulations faces a dilemma. The simpler the simulation, the easier it is for participants unfamiliar with the simulated situation to grasp the basic issues involved. The more complex the simulation, the more generalizable is the learning experience to real-world situations. Conjoint analysis is a research technique which helps participants assimilate and structure complex issues. Used in conjunction with an experiential learning simulation, the conjoint analysis exercise permits the designer to retain much of the richness of real-life situations, while enabling participants to understand the complex trade-offs which often characterize such situations.

INTRODUCTION

Learning from the experience of real life situations is inefficient. It is time-consuming and usually involves only negative feedback which is nondirective. Simulation of real life experiences can raise the efficiency of the learning process. The learning experience is compressed, supervised, and is amenable to positive as well as negative feedback.

The potential shortcoming of simulation as a learning device is its external validity; that is, the degree to which what is learned in the simulated situation is generalizable to real world situations. Simulations inevitably simplify the real world situations they model. A certain amount of simplification is beneficial because it eliminates extraneous factors that contribute little to the learning experience. However, further simplification is often necessary to adjust the experience to limitations in participants' abilities to assimilate complicated issues in a short period of time. This is especially true when participants are only superficially familiar with the phenomenon being simulated. For example, few participants in a collective bargaining simulation (which is the case situation reported in this paper) are likely to be familiar with making complex tradeoffs between wage increases, skill differentials in wages, benefits packages, work rules, and union security provisions. In such situations, the simulation designer is usually forced to simplify the experiential exercise to make it more comprehensible to participants. In doing so, the richness of the real life experience is lost and the external validity of the learning is impaired.

This paper describes the use of a methodology which can help participants understand the complex decisions they will have to make in the course of a business simulation. In particular, this methodology, called "conjoint analysis", helps participants to understand tradeoffs among the important issues that must be addressed by the participant in arriving at business decisions. This methodology thus assists the participant in sorting out his/her priorities and facilitates assimilation of the important issues in a short period of tine. As a result, the instructor need not oversimplify the experiential exercise.

The purpose of this paper is to describe the use of conjoint analysis in a simulated union-management contract negotiation. Participants were given an actual expiring contract, plus some history and an explanation of the bargaining stances taken by the two parties. The conjoint analysis procedure helped participants to understand and organize a very complicated set of background materials and to assess their own relative preferences for alternative outcomes.

Conjoint analysis requires the subject to rank order a set of possible outcomes in terms of relative desirability. The outcomes differ in terms of the specific issues comprising them. For example, participants in the union-management simulation were asked to rank order outcomes that differed in terms of the wage increase granted, provision of union shop, etc. An Immediate learning experience results from this rank ordering exercise. It forces the individual to organize his/her priorities.

METHOD

Twenty-six graduate students enrolled in a bargaining course were randomly assigned to union and management roles. Each individual was supplied with a copy of the actual 1975-1977 plant-level agreement between a Fortune 500 manufacturing company and a large AFL-CIO union, plus a statement of the union's initial demands and management's initial response to them. Once these materials had been carefully studied, each participant independently rank-ordered a set of possible outcomes (described below) in the context of the assumed role of the union or management bargaining representative. The rank-ordered cards were returned to the instructor prior to each individual's being randomly assigned to a team of four or five members. Each member of the bargaining team had a somewhat idiosyncratic preference structure. Differences in preferences within the team needed to be reconciled before opposing teams (i.e., union and management) began negotiating. To structure and streamline the preference reconciliation phase (which is roughly equivalent to what Walton and McKersie, 1965, call "intra-organizational bargaining") , teams met to jointly rank order the set of outcomes. Next, union and management teams were randomly paired, and bargaining was conducted over a one- week period against a real-time contract expiration deadline. At the conclusion of the simulated bargaining, each participant filled out a brief questionnaire designed to assess the helpfulness of the conjoint analysis exercise.

Conjoint Analysis

There is, of course, a large number of complex issues that comprise any labor contract. However, in the particular bargaining situation used for the simulation, five issues could be singled out as being the most crucial. These issues were specified as the attributes of the contract to be analyzed using the conjoint methodology. Table 1 shows that five attributes were defined, each at two "levels". Two levels were selected for each attribute because it was decided that the fundamental question regarding each issue could be stated as a dichotomous choice. For example, pay is a

continuous variable, therefore there is an infinite number of possible wage settlements. However, a basic question involved whether or not the union would obtain an increase in real wages.

TABLE 1
CONTRACT ATTRIBUTES AND LEVEL DEFINITIONS

1. Pay Differential

   a. Workers receive similar wages even for jobs requiring different skills (pay compression).

   b. Widen the pay differential between skilled and unskilled workers (skilled- unskilled pay differential).

2. Work Rules

   a. Work assignments restricted to worker's primary skills (tight work rules).

   b. Creation of multi-skill job title (liberal work rules).

3. Benefits

   a. Additional fringe benefits, including Sunday double-time, more holidays, more generous shift differentials, longer vacations, and improved health care insurance (fringe benefit improvements).

   b. No additional fringe benefits (no change in fringes).

4. Union Shop

   a. Require all employees to join union within 30 days (union shop).

   b. Do not require union membership (no union shop).

5. Wages

   a. Yearly increase of $1/hour in wages, in addition to cost of living adjustments (increase in real wages).

   b. Cost of living adjustments only (COLA only)

Simulation participants were randomly assigned to take a management or union role in contract negotiations. It was next determined which hypothetical bargaining outcomes would be evaluated by which subjects. Since the outcomes would involve five attributes, each having two levels, a total of 2x2x2x2x2 32 possible outcomes could emerge. This was deemed to be too many for one subject to evaluate. Accordingly, the possible outcomes were divided into two blocks of 16 each. The blocks were constructed using rules described in several publications on conjoint analysis (for example, see Green, Carroll and Carmone 1978). Cards were then constructed, each listing a different bargaining outcome. (See Exhibit 1 for an example.) Each participant rank-ordered 16 outcomes using these cards. The actual rank ordering instructions are shown in Exhibit 2.

EXHIBIT 1
EXAMPLE OF BARGAINING OUTCOME CARD

Possible Bargaining Outcome
1. Pay compression
2. Liberal work rules
3. No change in fringes
4. No union shop
5. Increase in real wages

EXHIBIT 2
INSTRUCTIONS FOR RANK ORDERING
BARGAINING OUTCOMES

Enclosed in the "Possible Outcomes" envelope are 20 possible bargaining outcomes, each printed on a separate piece of paper. The best way to rank order these outcomes is as follows:

1.) Make a first pass through the outcomes, separating them into "more highly preferred" and 'less highly preferred" piles.* Roughly equal numbers of outcomes should be placed in each pile.

2.) Rank order bargaining outcomes within each of the two piles.

3.) Combine both piles into one deck so that the outcomes are ordered according to decreasing preference.

4.) Make a second pass through the entire deck, possibly changing the order of some outcomes.

5.) Number the deck from 1 to 20 with "1" signifying your most preferred outcome,...,' 20" signifying your least preferred outcome.

6.) Place the ordered deck back in the "Possible Outcomes" envelope, and return it to me.

*Your perspective will be from the standpoint of the union or management.

One important output of conjoint analysis is a set of 'part-worths" Part-worths reflect the relative values

each participant places on each issue, as reflected in his/her rank orderings. For example, the part-worths would reveal whether a union negotiator cares more about getting a union shop or a wage increase that exceeds the rate of inflation. Part-worths are derived using a computer algorithm called MONANOVA (Kruskal 1965, Kruskal and Carmone 1968; see for example, Greenhalgh and Neslin, 1981, for the rationale behind the algorithm).

The descriptive statistics for part-worths are presented in Table 2. These statistics portray the relative importance respondents placed on each bargaining issue. The part-worths were re-scaled so that for a given subject the sum of part-worths across the levels of a particular attribute would be zero. The data were then oriented so that a negative part-worth would be expected for all attribute levels that the union negotiators should prefer, and positive for the levels that management should prefer.

Table 2 indicates that the mean part-worths for union and management exhibit strong construct validity, in that all union means are negative, while all management means are positive. The right-most column in Table 2 indicates that some individuals had signs in the "wrong" direction, although the percentages translate to only 7 incorrect out of a total of 130 estimated coefficients.

One could interpret the data to signify that on an aggregate basis, union negotiators put much emphasis on wages, strongly preferring real increases. Additional fringe benefits were also very important; liberal work rules were of relatively little importance, which perhaps explains the number of "incorrect" signs for part-worths of that attribute.

Table 3
STRESS MEASURES (%)

	Entire Group	Union	Management
N	26	13	13
Mean	3.85	1.74	5.95
Standard error	1.37	1.35	2.37
Skewness	1.59	3.14	.87
Minimum	0.00	0.00	0.00
Maximum	19.80	17.90	19.80
% ≤ 10%	80.77	92.31	69.23

TABLE
DESCRIPTIVE STATISTICS
Part-worths
Union

Issue	Mean	Std. Error	Skewness	Mm.	Max.	% ≤ 0
Pay differential	.51	.20	.35	-1.95	1.16	92
Work rules	.26	.16	.71	- .97	.84	62
Benefits	.96	.13	.22	-1.97	-.10	100
Union shop	.55	.13	-1.04	-1.66	.00	100
Wages	-1.32	.17	.82	-1.94	-.14	100

Management

Issue	Mean	Std. Error	Skewness	Mm.	Max.	% ≥ 0
Pay differential	1.16	.14	-.18	.49	1.95	100
Work rules	.82	.11	-.09	.10	1.54	100
Benefits	.46	.07	.11	.00	2.02	100
Union shop	1.22	.19	-.45	.00	2.02	100
Wages	.47	.12	1.71	-.01	1.66	92

Another output of the conjoint analysis is a "stress value" for each participant. This value represents the ability of the respondent to rank order the outcomes in a consistent way. The methodology considers a set of rankings to be consistent if it can derive a set of part-worths which, when substituted into a simple additive utility model, can recover the original rankings. Stress is scaled to range between 0% and 100%, with low stress meaning more consistency.

Table 3 provides descriptive statistics on the stress values achieved in this exercise. Table 3 shows that stress values are uniformly low. It is interesting to note that management representatives tended to exhibit generally higher stress than did union representatives. The sample is small (n = 13 in each group) and the data are not normally distributed, so it would be difficult to assess the statistical significance of this result. However, it is plausible that the management role was inherently more difficult in terms of coming to grips with the bargaining issues.

USEFULNESS OF CONJOINT ANALYSIS

The data indicate that participants in the simulation were able to organize and prioritize a large amount of information in preparation for the experiential exercise. Failure to assimilate the materials would have been evident in the form of higher stress scores. A question remains however, as to the role the conjoint analysis exercise played in the assimilation process.

Table 4 shows responses to the debriefing questionnaire administered after the entire bargaining exercise was completed. The table confirms that participants did, indeed, find the exercise generally helpful, especially in organizing their own thoughts and in dealing with fellow subjects in the same role (union or management).

We have continued development of the computer program used to process the rank ordering of alternative outcomes, and the next time the class is taught, we will be able to feed the part-worth data back to participants either during the simulated negotiation or afterwards. This can serve either to enhance the process of the negotiation or the interpretations of results.

TABLE 4
RESULTS OF DEBRIEFING QUESTIONNAIRE*

Question	Entire Group	Union	Management	Significance of difference between union and management
1. How helpful was the exercise in getting you to understand the specific provisions of the contract?	3.85 (.19)	3.54 (.29)	4.15 (.25)	$p < .10$
2. How helpful was it in organizing your priorities?	3.69 (.16)	3.69 (.24)	3.69 (.24)	n. s.
3. How helpful was it in understanding the trade-offs to be made?	3.77 (.17)	3.92 (.24)	3.62 (.19)	n. s.
4. How helpful was having gone through the exercise in subsequently dealing with the other members of your bargaining team?	3.50 (.18)	3.15 (.30)	3.85 (.19)	$p < .05$
5. How helpful was it in subsequently dealing with the opposing bargaining team?	3.04 (.18)	2.92 (.29)	3.15 (.25)	n. s.

*This table shows the means (and standard errors in parentheses) of responses on five-point scales where 1 = "not very helpful" and 5 "extremely helpful".

SUMMARY

This paper has demonstrated the applicability of conjoint analysis as a learning device for experiential exercise participants faced with prioritizing complex issues. The methodology was applied to the simulation of a union-management contract negotiation. The act of first individually and then jointly completing the measurement procedure required by the methodology appears to have facilitated the participants' assimilation of the issues to be negotiated. This has encouraged the authors to concentrate on proactively introducing other aspects of the conjoint analysis procedure into future experiential exercises.

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