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ARBITRAL DECISIONS: A SOCIAL SCIENCE ANALOG

JOHN E. DROTNING* AND BRUCE FORTADO**

I. INTRODUCTION

This paper develops the idea that arbitral decision making has an analog in social science research.¹ It asserts that the hypothesis testing procedure in social sciences is directly analogous to the arbitral process. The research format of an economist, sociologist, or psychologist might be as follows:

1. Generate the null (H_0) and alternate (H_1) hypotheses to be tested.
2. Collect reliable and valid data relative to the hypothesis.
3. Evaluate and analyze this data by subjecting it to statistical tests.
4. Arrive at conclusions by accepting or rejecting the null hypothesis after statistical testing.
5. Explain and discuss findings.

A typical arbitration proceeding involves the following:

1. Formulate submission question and stipulate facts.
2. Present evidence and testimony.
3. Evaluate and interpret the evidence adduced by the advocates.
4. Arrive at conclusions by sustaining or denying the grievance after arbitral testing of the evidence and arguments presented by the parties.
5. Explain the decision.

The similarity is apparent and a closer examination of each of the steps leading to retention or rejection of the null (H_0) hypothesis in the social sciences will reveal the extent parallel steps appear in the process of reaching an arbitral decision. It will become evident that arbitral decision making closely resembles social science research and that both rely on the scientific method. Arbitration is a social science variant and the effort to quantify the standard of proof in arbitration is no different than identifying the confidence levels in social science research. It is hoped that this interdisciplinary approach can change the common perception of arbitration as an amorphous art to a process

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1. The authors express their gratitude to Paul F. Gerhart for suggesting the concept of the Type I and Type II error and to Char Drotning for her help in integrating the social science hypothesis method with arbitration as well as her editorial contributions.

which has scientific value.³

II. SOCIAL SCIENCE HYPOTHESIS: ARBITRAL SUBMISSION QUESTION

The economist, sociologist, psychologist, or industrial relations scholar ponders cause and effect relationships to discern significant factors affecting the variation in a dependent variable. Once the scholar has generated an interesting research question, it must be phrased in a form which allows it to be tested. Evaluation criteria are generated by constructing an appropriate theoretical model of the problem. Generally, research hypotheses are narrow such as the following example: The longer the time between a petition for a union representation election and the actual election, the greater the chance of a union loss in the representation election. Either this statement is true, or it is not true, and it is the function of the research to test this hypothesis and to accept it or reject it at some level of confidence.

The submission question in arbitration is the counterpart of the hypothesis statement. A typical contract interpretation question in arbitration might read as follows: Did the employer violate Article X of the collective bargaining agreement by not appointing the grievant to the vacant position? Another submission might be: Did the employer have just cause to discharge the grievant? The answers to these questions are either yes or no and the arbitrator's task is to arrive at his conclusion with confidence that it is the most logical outcome of his treatment of the evidence and arguments presented by the parties.

The submission question defines the limit of arbitral authority and states exactly what the arbitration is supposed to answer, just as the social scientist's hypothesis gives specific focus for research. The framed issue sets the stage for the oral and written testimony. If the parties are unable to agree on the question, or if they propose broad issues, a great deal of irrelevant testimony and evidence is produced. The parties incur an added risk since the scope of the question framed by the arbitrator is unknown. In this situation, presentations can easily be misguided due to misconceptions over the appropriate issue. Arbitrators are not omniscient and it makes little sense to give so many degrees of freedom to the professional neutral. Given that the arbitrator must make difficult determinations, the parties should not exacerbate the task by fashioning an imprecise and broad question.

The opposing positions of the parties in an arbitration proceeding correspond to the null (H_0) and alternative (H_1) hypotheses in a social science research problem. The null and alternative hypotheses are constructed as opposites; when one is true the other is false.³ The null hypothesis traditionally stands for the maintenance of the status quo. In contract interpretation cases,

2. See generally P. PRASOW & E. PETERS, *ARBITRATION AND COLLECTIVE BARGAINING* ch. 10 (1970).

3. See P. NOEL & R. JESSEN, *BASIC STATISTICS FOR BUSINESS AND ECONOMICS* (1982); W. WALLIS & H. ROBERTS, *STATISTICS: A NEW APPROACH* (1956).

for example, the union must disprove the status quo with some level of confidence (degree of proof) so that its alternative hypothesis is accepted by the arbitrator. Conversely, in discharge and discipline cases, the company must disprove the null hypothesis, that the grievant is innocent, in order for the alternative hypothesis, namely, that there was just cause for the action, to be accepted by the arbitrator. The party presenting its case first assumes the burden of disproving their opponent's contention that the status quo should be maintained, in other words the null hypothesis.

The following arbitration questions illustrate how the null and alternative hypotheses and the burden of proof depend on the subject matter.

Contract Interpretation

H₀: The Company's present and past practice is consistent with the contract and should remain unchanged.

H₁: The Company's action violates the contract and should be changed regardless of past practice.

Discharge And Discipline

H₀: The Union asserts that the grievant is innocent.

H₁: The Company alleges that the grievant is guilty of serious infraction and, therefore, termination is for just cause.

The benefit of doubt is always given to the null hypothesis. Only after it has been shown that there is a very small probability that the null hypothesis is true can the researcher or the arbitrator reject the null hypothesis and accept the alternative.

III. SOCIAL SCIENCE DATA: ARBITRAL EVIDENCE AND TESTIMONY

The social scientist generates data to test the hypothesis by defining variables and developing a research model. This model might include experiments, secondary sources, samplings of the population, or interviews and questionnaires. The researcher decides what sources and form of data are appropriate to study. This is often the most critical part of the researcher's job. The quality of data establishes the value of the study. If these data are inappropriate, skewed, or biased, the finding can be questioned. Thus, the social scientist must identify a set of data which will allow him to make valid conclusions about his hypotheses.

In a similar fashion, the testimony and written evidence adduced in the arbitral forum produce data for the arbitrator. It is not the arbitrator that decides the source or the form of these data. The parties decide this in their examination and cross examination of the witnesses and by the documents and other evidence submitted in the hearing. The data introduced by each party is biased in favor of the introducer. It is designed to support a position and to

increase the probability of a win. From these diametric stances, the most important points should emerge. Although each party presents a biased view, the processes of cross, rebuttal, and expert testimony, coupled with the scrutiny of an experienced arbitrator, raise the data quality to a fairly high level.⁴ By utilizing these processes, the parties are enhancing the internal validity of the data and decreasing the probability of arbitral error.

IV. EVALUATE AND ANALYZE THE DATA: INTERPRET EVIDENCE AND TESTIMONY

The data generated by social science research is usually not as clear cut as the result from a carefully controlled scientific experiment. The social science researcher evaluates the data obtained to assess its reliability and validity. A particular result may be attributable to a number of extraneous factors. The union success rate in winning representation elections is influenced by other factors as well as the length of time between the petition and the election. The social scientist has a box full of statistical tools to assess the quality of his data, to put it in useable form, and to determine what, if anything, the data show in relation to the hypothesis. After the appropriate manipulations are complete the stage is set to evaluate the merits of the null hypothesis.

Similarly, it is not unusual for the testimony and evidence obtained in the arbitration hearing to be messy and to contain extraneous and conflicting information. The advocates in arbitration have first crack at assessing the degree to which the evidentiary data support the submission question. The arguments put forth by the parties, either in the oral closing statements or in written post hearing briefs, alter the character of the evidence by showing its relevance to the respective positions. In briefs, the advocates give meaning to the testimony and written evidence in the same way that the researcher's statistical manipulations give meaning and significance to his data. Just as the social scientist must test his data to accept or reject the null hypothesis, the arbitrator also must evaluate the data and situation—the testimony, evidence and argument—to answer the submitted question.

V. RESEARCH FINDING: ARBITRAL DECISION

The concluding step of a research project is relatively easy for a social scientist. The researcher has been unbiased from the start and the various statistical tests and tables provide him with a quantitatively objective basis on which to accept or reject the null hypothesis and give him a certain degree of confidence that the data and his analysis correctly describe the true variation in the dependent variable.

The arbitrator's job, however, has just begun. He has had no part in the design of the hearing or arguments and is faced with opposing positions. The

4. G. LILLY, AN INTRODUCTION TO THE LAW OF EVIDENCE, 40-91 (1978).

powerful inferential statistical decision testing techniques available to social scientists are not useful in providing a basis for an arbitral decision or in giving the arbitrator confidence that his decision reflects the true situation. However, the arbitrator is not without information. He has a large body of information from published cases, as well as from books, articles and monographs. The arbitrator also has his own internal arbitral file stored in his memory. These guidelines, along with intelligence and integrity, comprise the arbitral tool box which is akin to the statistical tests and tables of the social science researchers. The arbitrator can call on a wide variety of resources as he subjects the arbitral data, namely testimonial evidence, written documents, and the advocates' arguments, to generally accepted arbitral testing techniques.

Social scientists rely on common statistical tests and the appropriateness of specific tests are obvious. There is no such consensus among arbitrators as to which tools or testing procedures are most appropriate in a particular situation. In a general sense, the arbitral decision making process is analogous to the statistical testing procedures used by social scientists in evaluating the null hypothesis.

The social scientist's critical value for acceptance or rejection of the null hypothesis will depend on how important he views the probability of errors associated with that decision. That is, how costly he views mistakes. Two types of errors are possible when a conclusion is drawn about an unknown state of reality. The first type of error is to reject the null hypothesis when reality supports it. This is called an alpha or Type I error. The second error involves acceptance of the null hypothesis when it is not true. This is called a beta or Type II error. These two types of errors are shown below in schematic form.

Reality (unknown)		
	H=0: True	H=0: False
Accept (H=0) Hypothesis	Correct (1 - alpha)	Type II Error (beta)
Reject (H=0) Hypothesis	Type I Error (alpha)	Correct (1 - beta)

The researcher can use statistical means to balance Type I and Type II errors. A common practice is to designate as the null hypothesis (H_0) that hypothesis for which rejecting when it is true, is the more serious error, so that the Type I error would be worse than the Type II error.⁵ The social scientist has formulas and tables to which he can turn once he has determined acceptable risk levels.

An arbitrator has no statistical tables, but a similar process of balancing

5. L. LAPIN, STATISTICS FOR MODERN BUSINESS DECISIONS, 287 (1978).

risks takes place. This can be illustrated by a discharge case in which the null hypothesis is that the grievant is innocent and the discharge unjust. An arbitrator's goal is to make decisions that agree with reality, that is, to be in the two correct boxes in the above contingency table. Since reality is unknown to him and he is presented with two opposing positions, there is a possibility that the arbitrator's decision will be incorrect.

The dual risks involved in discharges are the probability an arbitrator will make a Type I error of discharging an innocent grievant or a Type II error of reinstating a guilty grievant. This is shown below:

H=0: Grievant is Innocent
Reality (Unknown to Arbitrator)

Arbitral Decision	H=0: True Grievant Innocent	H=0: False Grievant Guilty
Accept Null (Reinstate)	Correct	Reinstate - Type II Error (beta)
Reject Null (Sustain Discharge)	Fire unjustly Type I Error (alpha)	Correct

The arbitral process, because of the lack of statistical techniques, utilizes the concept of standards of proof. In discharge cases unions insist that management be the moving party and prove its allegation that the employee was justly discharged with a standard of proof designated as "beyond a reasonable doubt."⁶ This standard shifts the balance or fulcrum from what it would be if the required standard were a preponderance of evidence. The preponderance of the evidence standard is equivalent to a statistical probability greater than .5 that the null hypothesis is false. The "beyond a reasonable doubt" standard requires management to show a much higher probability that the null hypothesis is false. By requiring a standard of "beyond a reasonable doubt" the arbitrator is saying that management must show that the grievant was guilty of the charge at a very convincing level. In effect, the arbitrator has to be comfortable that the facts and arguments of management allow him to reject the null hypothesis, namely, that the grievant is innocent. Requiring this higher standard of proof reduces the probability that the arbitrator will commit a Type I or alpha error by sustaining the discharge of an innocent grievant. Management prefers a preponderance of the evidence standard which would reduce the probability of a Type II (beta) error, reinstating a guilty grievant.

Both Type I and Type II errors are important, but many arbitrators prefer to reduce the likelihood of committing a Type I error by not sustaining the

6. G. LILLY, *supra* note 4, at 70.

discharge of an innocent grievant. Thus, the possibility of a Type II error increases and guilty grievants are reinstated more often than innocent persons are discharged.⁷ If lower standards of proof are accepted by the arbitrator the likelihood of making a Type I error by firing an innocent grievant increases, and the chances of a Type II error by reinstating a guilty grievant decreases. Controversy over standards of proof directly parallels a debate over the trade-offs involved in changing alpha (Type I) and beta (Type II) levels.

Given the preference of many arbitrators to avoid the commission of Type I errors, the employer must provide extremely weighty testimony and written evidence to reduce this probability below the neutral's tolerance level. This is akin to management proving that the disciplinary offense was committed by the grievant beyond a reasonable doubt. This shows that the probability that the null hypothesis is true is about .10 and allows the arbitrator to reject the null and accept the alternate hypothesis and sustain the discharge. The disagreement among arbitrators over the critical cut off level for determining guilt is congruent with social scientists using different levels of significance such as .10, .05, and .01. The acceptable balance of risk between firing innocent grievants and reinstating guilty employees depends on the values of the individual arbitrator. This does not mean arbitration is unscientific, because the same sort of conflict appears over acceptable levels of significance in the social sciences.

The other question is how to decrease the probability of both errors simultaneously, as contrasted to the alpha-beta tradeoff. The only way to decrease the probability of both errors simultaneously is to increase sample size, which is often accomplished by introducing past practice and prior arbitral decisions in similar discharge cases. An arbitrator finds it very risky to make a decision if points are unclear in testimony, or when pertinent information has been omitted, intentionally or accidentally, in the advocates' presentation. Although there is controversy over when arbitrators should probe with their own questions, this can be viewed as an effort to increase the database and reduce both types of error simultaneously.

VI. EVALUATING THE PROCESS

Social science research is evaluated in terms of validity which is defined as how good an answer the study yields.⁸ Thomas Cook and Donald Campbell have broken validity into four components.⁹ Internal and external validity are two of the four aspects of validity that must be considered if one is to have

7. See Grief Bros. Cooperage Corp., 42 Lab. Arb. (BNA) 555 (1964) (Daugherty, Arb.).

8. J. SIMON, BASIC RESEARCH METHODS IN SOCIAL SCIENCE 21 (1978).

9. Cook & Campbell, *Four Kinds of Validity*, in RESEARCH IN ORGANIZATIONS: ISSUES AND CONTROVERSIES 77-101 (R. Mowday & R. Steers ed. 1979).

confidence in cause-effect outcomes.¹⁰

The arbitration process, although much less rigorous raises a number of validity issues. After receiving a list of possible neutrals, many parties research past decisions in hopes of improving the reliability of awards. The parties inclination to use a small set of arbitrators reflects their concern over random variance in decisions. The critical importance of temporal antecedence has been vividly emphasized by Arbitrator Carroll Daugherty in determining just cause for discharge:

The company's investigation must normally be made *before* its disciplinary decision is made. If the company fails to do so, its failure may not normally be excused on the ground that the employee will get his day in court through the grievance procedure after the exaction of discipline. By that time there has usually been too much hardening of position.¹¹

Delay in processing grievances can make it difficult "to verify disputed facts, or acquire additional facts."¹² Key witnesses may no longer be with the firm, and memories weaken over time, which directly influences the validity of the arbitration. Separating witnesses can be viewed as an effort to avoid subject interaction and improve validity. These examples reflect concerns over the internal validity of an arbitration.

Consideration of mitigating circumstances in discipline and discharge cases can be viewed as an arbitrator's consideration of confounding variables. The importance of mitigating circumstances should not be underestimated, because they can be the turning point in cases close to the critical level for evaluating the null hypothesis of no change.¹³ The proposition that an employee is unsatisfactory due to a momentary outburst of insubordination would be weakened if he had a clean record. The strength of the relationship between variables is cast into doubt, so regardless of the clarity demonstrated, the importance of the event is diminished. Moreover, mitigating circumstances affect the remedy as well as the decision.

Varying company and industry standards are critical third variables that must be considered. The level of proof required for guilt could be the same in two diverse discharge cases, yet the remedy different. For example, Company A, a bus line, always discharges any employee for drinking alcoholic beverages in uniform or arriving at work intoxicated. Company B, a brewery, rarely fires

10. *Id.* at 79. The authors note the following: The good experiment: (1) makes temporal antecedence clear; (2) is sensitive and powerful enough to determine that a potential cause and effect could have covaried; (3) rules out all third variables which might alternatively explain the relationship between cause and effect; and (4) eliminates alternative hypotheses about the constructs in the relationship.

11. Grief Bros., *supra* note 7 at 558.

12. McKersie & Shropshire, *Avoiding Written Grievances: A Successful Program*, 35 J. BUS. UNIV. CHI. 135, 137 (1962).

13. M. Stone, *Why Arbitrators Reinstate Discharged Employees*, MONTHLY LAB. REV. Oct. 1969, at 10, 47.

and usually only sends a worker home for excessively drinking before work. The social norm in the second case is quite different since it may be common for brewery workers to have a couple of beers before work. Therefore, it may be understandable if a careless worker had a few too many on rare occasions. The bus line, however, could be severely damaged if a reputation of drivers' drinking ever appeared. This example shows arbitrators, like social scientists, consider third variables that explain the cause and effect relationship they have found.

When cases are cited by an advocate, the arbitrator must make a judgment on external validity. Do the specifics of a case restrict its applicability? What principles are appropriate to draw from this outside source? Past practice and the relevance of an industry standard are issues which clearly affect arbitral decisions.

The categories of validity developed in social science can be meaningfully applied to arbitration. This comparison can be taken beyond mere clarification of issues. There are tradeoffs involved between some aspects of validity. Social scientists recognize that experiments held in carefully controlled settings are bound to be more difficult to generalize to other situations.¹⁴ Arbitrators must similarly balance the importance of the very special circumstances of a case in light of the general consistency of principles necessary for the parties to interact daily.

VII. EXPLAINING THE OUTCOMES

It is important for the social scientist to explain the significance of his findings. He must give substance to his results by showing how they fit into and add to current knowledge. It is essential to indicate what his findings mean in terms of public policy. At this point the researcher's insight, background, education, experience, and biases come into play. If the social scientist does not discuss the significance of his findings the research is only a statistical exercise.

The arbitrator's decision should be succinct and clear so its impact is self evident. While the arbitrator does not explain the consequences of his decision, he must elaborate on the "testing procedures" he used to reach that decision. For example, if the arbitrator makes the assumption that the issue to be decided in a discharge case is not whether there is just cause for termination, but whether there was sufficient cause for the employer to break the employment relationship he must explain that assumption.¹⁵ Arbitration awards not only explain what tests were used to analyze the testimony and evidence, but also discern other relevant factors used in determining the answer.¹⁶

14. Cook, *supra* note 9, at 98-100.

15. A. Ross, *Comments on Kadish*, in B. MELTZER, *LABOR LAW* 789 (1977).

16. R. Mittenthal, *Credibility—A Will-O'-The Wisp*, in TRUTH, LIE DETECTORS, AND OTHER PROBLEMS IN LABOR ARBITRATION: PROCEEDINGS OF THE THIRTY-

There are a number of common tests. Did the arbitrator consider the credibility of the witnesses if their veracity was attacked? If so, how well did he evaluate this question of credibility? Was it based on his observations of the witnesses behavior or inconsistent responses to direct, cross, or both? Did the arbitrator weigh past practice and show how it affected his decision? Did he incorporate arbitral precedent and judicial opinions if appropriate? Did he indicate the standard of proof used in answering the question? The most important consideration is whether the arbitrator used the evidentiary data in conjunction with the post-hearing arguments logically? Did he write his answer in a clear and lucid manner so that the losing party can understand why and how he arrived at his conclusion?

VIII. CONCLUSION

This paper analyzes arbitration in terms of social science hypothesis testing. It shows that the parties and the arbitrators ought to view arbitral decision as an analog to social science methodology because to do so can produce better questions and more pertinent written evidence—in short, a better evidentiary base than often occurs in practice. This analogy, in turn, will lead to a greater chance that arbitral decisions reflect reality.

The arbitrator needs good data if he is to use his toolbox productively and efficiently. The arbitrator wants to maximize the likelihood that he evaluates reality correctly; he tries to make his decision fall in the correct cells in each and every case. The evidentiary data do not always allow correct decisions, but that does not negate the arbitrator's goal.

This is a lofty ideal and one that is not easily attained. It might be easier if arbitrations could be quantified, but that is not possible. While there may be many factors common to discharge cases, the uniqueness of each case must be thoroughly considered by the arbitrator. Even though it is difficult to quantify arbitration, it can be described in scientific fashion. A good, well-reasoned and carefully written argument in a party's brief can be as clear and concise as the steps in the solution of a problem in plane geometry. By the same token, the parties have a right to expect the arbitrator to reach his conclusion in the same manner. His answer must flow from his treatment and analysis of the evidentiary data. It should be well-reasoned and conform in a qualitative sense to the procedures used in hypothesis testing.

The existence of this analog between social science hypothesis testing and arbitration can, we believe, enhance the quality of the evidentiary aspects of arbitration as well as the concomitant arbitral decisions.