

1. INTRODUCTION

Formulating discussion agenda is sometimes a problem of importance. When it is desired that the method for developing agenda include a procedure designed to be as balanced as possible from a specified point or set of points of view, experimental design and survey methodology may be used for measurements and incentives. This paper is another in a series of papers directing attention to the possibilities for applying conventional statistical methodology to the practical problems concerned with collecting and summarizing information for critical decisions such as those affecting the environment or international relations. Related previous papers are to be found in Warner (1975, 1981, 1984, 1985, and 1987).

2. THE AGENDA PROBLEM

In his chapter, "On the Agenda of Organizations", Arrow (1984) introduces his ideas with the following remark:

In classical maximizing theory, it is implicit that the values of all relevant variables are at all moments under consideration. All variables are therefore *agenda* of the organization, that is, their values have always to be chosen. On the other hand, it is a commonplace of everyday observation and of studies of organization that the difficulty of arranging that a potential decision variable be recognized as such may be much greater than that of choosing a value for it.

In general both classical maximizing theory and statistical decision theory have ignored the agenda problem and concentrated on the more manageable problem when the agenda items are taken as given. Never-the-less, in comparing the problem of identifying what actions to consider with the problem of selecting the best action from a considered set, not only is the first problem often the more difficult problem, in that searches for obscure and unlimited possibilities may be involved, but the first problem is arguably the more important problem, in that good choices are impossible if they are not considered.

Organizations are necessarily confined to choosing the values for variables, or equivalently to making decisions for items on the agenda, to which their attention has been directed. And at present, as commonly observed at most meetings of most organizations, agenda items usually appear as happenstance from historical crises or from the interests of special groups, just as they always have. The items that appear on most agenda are thus ordinarily the result of a search that is far less comprehensive and rational than the search for the best decisions once the agenda is in place.

Haphazard development of agenda suggests that the options considered by organizations may commonly overlook possibilities which, had they been considered might have been chosen, with the consequential loss due to haphazard procedures occasionally proving catastrophic. Support for

this suggestion is provided by familiar observations. Organizations often attribute past mistakes to oversights which in retrospect seem surprising, and serious mistakes are sufficiently common so that few organizations last as long as they expect to last. Such considerations argue that, at least as a supplementary procedure to the usual procedures, somewhat more formal procedures for developing agenda options might occasionally be of value.

The suggestion by Arrow (1974) and repeated in Arrow (1984) for an approach modeled after adversarial court procedures provides one example of a more formal approach to developing discussion agenda. In particular, for problems such as environmental problems, Arrow suggests the development of an adversarial quasi-judicial system based on two public agencies. The one public agency would play an adversarial role to the defending business firms and would seek to establish social costs and suggest remedies for externalities adversely affecting the public interest. The other public agency would hear evidence and act as a judicial authority. In addition to the usual disadvantages associated with adversary systems, however, such as sensitivity to imbalance in resources and abilities supporting different points of view, a procedure primarily motivated by business-government conflicts might be difficult to apply and interpret in general situations. This paper suggests an alternative non-adversarial approach based on statistical procedures and test populations of opinions.

While the agenda problem is essentially the same in any context which it occurs, both the importance and the difficulty of bringing forward the most promising agenda items are particularly apparent when the problem concerns discussion agenda for competing-cooperating organizations. Habits of thinking of each particular organization tend to be specialized to that organization, as Arrow argued, and are thus poorly adapted *within each organization* to seeing the externalities that might be internalized by the two organizations cooperating together. In addition, it is also natural for habits of thinking between competing organizations to emphasize the competitive aspects and ignore the cooperative aspects of their relation, partly because competition is often more interesting and motivating than cooperation. Moreover, negotiations often imply bargaining, and bargaining theory suggests that in some contexts there are advantages to appearing intransigent. Thus for two competing-cooperating groups such as management and labor, or two competing-cooperating countries such as the USSR and the US, there are some theoretical as well as practical considerations suggesting that conventional methods are apt to produce discussion agenda that may be much more restricted than they need to be.

As a caution it is to be emphasized that a procedure leading to a wider set of possibilities does not necessarily lead to a better final choice. Unfortunately, more possibilities for a good choice may provide more possibilities for a bad choice. There are additional possibilities for mistakes as well as for improvements. The usual approach of decision theory, however, is to assume that bad options even if considered will not be chosen, and this is the implicit assumption of this

paper.

The starting place for the approach of this paper to the agenda problem is that the basic procedure of getting a promising agenda is always in some respects analogous to a small opinion survey in which the viewpoints of a few people are used to measure the promise of an agenda that will affect many people. Under some circumstances it may be useful to make this analogy explicit so that the measurement of promise is done with more formally balanced statistical care and precision even if the sample of opinions measured is much too small to allow statistical significance according to conventional standards. Even without statistical significance, a statistical approach allows a more objective approach to identifying concepts such as promise and balance according to specified criteria, and this more objective approach can in turn be used both to allow the setting of better incentives for those responsible for the search for promising ideas and the identification of promising ideas through the use of conventional experimental design. The next section illustrates ideas with a simple estimation model and a final section provides brief conclusions.

3. A SMALL SAMPLE ESTIMATION MODEL

The notion of the dimensions in which it is desired that an agenda be balanced will clearly be different for different problems. Attendance at almost any meeting where decisions are contemplated, such as a common faculty meeting, a business policy meeting or a government staff meeting, bring different notions of a possible *lack* of balance to mind. There may be a lack of balance with respect to the importance of items which are included on the agenda as opposed to items which are not; there may be a lack of balance with respect to the resources and effort spent in developing the different agenda items with respect to their importance for the general objective; and there may be a lack of balance with respect to the amount of time that is spent in discussion on different items as compared with their perceived importance. And all these notions of balance in turn depend on different perceptions of balance by the different people concerned, with a particularly important example furnished by the problem of balance with respect to the opinions of competing-cooperating groups such as labor and management or the US and USSR of the earlier illustration.

It is apparent that, provided resources are adequate, conventional experimental design combined with sample survey procedures at least allow an approach to these problems of balance in a more objective way than is usually the case. For example, in the two group competing-cooperating case, competing teams each equally represented by both groups might vie to develop a promising agenda as measured by the influence of the proposed agenda on samples of members from the two groups. An objective might be to develop incentives and measurements designed to produce agenda items promising for the achievement of some joint objective such as the maximization of joint interests.

As a relatively simple problem to illustrate the basic ideas, suppose the simplest case in which only one reasonably homogeneous population of decision makers is involved, and that the problem is to identify the best five item agenda in terms of the agenda's promise for the achievement of some stated objective. In other words, the problem is to find the

five item set which, upon being made known to a randomly selected member from some relevant test population, would tend to maximize that person's subjective probability that the stated objective would be achieved assuming that the agenda he sees were to become the agenda chosen. Of course, the person could only speculate how the agenda would be acted upon should it become the agenda, but his viewpoint would be influenced by this perception as well as by the proposed agenda itself. In terms of decision theory, the agenda becomes itself a course of action, and interest centers on the subjective perception of losses conditioned by the assumptions by different randomly chosen members that different agenda are considered.

To illustrate the nature of the type of statistical design problems that are involved, suppose that two different persons are each charged with developing a five item agenda designed to maximize the subjective promise of their proposed agenda as measured by a randomly chosen member of the test population. Suppose additionally that the relative success of each of the two proposed agenda is to be measured by a random sample of five members. That is, to suggest possibilities, the sample is supposed to be as small as possible and still allow an individual estimate of the strength of each of the ten items on the two competing agenda. Depending on the perceptions of those developing the agenda, the two sets of five items might or might not turn out to be relatively similar.

If it is contemplated that either the one agenda or the other will be chosen, though some items from the chosen agenda may be deleted, an obvious design would appear to have all but one of the items appear on each of the agenda offered to the sampled members. This would provide nearly the maximum efficiency for the important problem of identifying the person who developed the best agenda, and still allow an estimate of the implied individual effects of the different items. Supposing a simple linear model with no interactions as a first approximation, it is of some interest to consider the kind of statistical statements that can still be made with this very small sample procedure which obviously can not ordinarily be expected to result in significant differences by conventional standards.

Each of the sampled members of the test population sees a list of four items and reports his subjective probability that the stated objective will be achieved should those items become the agenda. For the five observation model it is supposed that the dependent variable constituted by the reported probabilities (or somewhat better the log of the odds based on those probabilities) is regressed using a 5×5 design matrix that takes the form of zero's down the diagonal and ones everywhere else, and note that because of this design the variance of each observation is not large since only one agenda item is omitted from each observation.

Supposing for simplicity that the reported probabilities are used for the dependent variable and the usual linear assumptions are made, including equal variance and normality, the estimates of the promise and of the individual effects are of the form $(1/4, 1/4, 1/4, 1/4, 1/4)\beta$ and $(-1, 1/4, 1/4, 1/4, 1/4)$ with corresponding variances $(5/16)\sigma^2$ and $(20/16)\sigma^2$. Thus, supposing for illustration that the original reported probabilities are uniform over a range of say $(3/8)$, statements such as the following are straightforward.

If the population subjective probabilities for the two sub-

mitted five-item agenda differed by an expected value of at least one tenth, the probability that the superior agenda would be identified in this procedure would be at least .76. The individual items might be expected to differ more, but even simply assuming that the implied probability associated with item 1 was better than that for item 2 by at least one tenth, this fact would be identified with a probability of at least .57. The variance of σ^2 is the variance of the reported probabilities which is $(1/12)(3/8) = (1/32)$. In turn $2(5/16)(1/32) = (5/256)$ is the variance of the difference between the estimated promise for the two competing agenda providing a standard deviation of .13975. Thus the probability that a standard normal variable exceeds $(-.1/.13975)$ is at least .76 for the example. Similarly, since the estimate of $\beta_1 - \beta_2$ is given by $(-5/4, 5/4)\beta$, the variance of the estimated difference in the promise of two individual items is $(50/16)\sigma^2$ or $(25/256)$ providing a standard deviation of $(5/16)$ or .55907. Thus the probability that a standard normal variable exceeds $(-.1/.55907)$ or $(-.179)$ is .57. These numbers are not large, but they are sufficiently large for incentives to be based on them, and they are to be contrasted with the ambiguous interpretations possible with no controls and no numbers at all in the usual approach to the agenda problem.

4. CONCLUSIONS

Even for pedagogy and classroom experiments, the value of procedures such as those suggested ought to be substantial. It is to be noted that almost all the basic elements of an elementary statistics course are to some degree represented in these procedures, and the problems in modeling and design that are suggested could be considered at quite an advanced level. The contrast of a statistical approach to the usual ad hoc approach to a familiar problem should be instructive in itself. Much more importantly, it would appear to be generally advantageous to encourage the wide practical use of such procedures, at least as a supplementary procedure to the procedures that are usually employed. The most important question to ask and efficiently investigate in every organization is "Are we even talking about the things

we should be talking about?" For large organizations such as nations or pairs of nations, the question may be particularly crucial.

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