TECHNOLOGY FOR CITIZEN PARTICIPATION IN PLANNING

Thomas B. Sheridan, Massachusetts Institute of Technology

Experiments involving a certain technique on citizen participation in community planning were conducted in 200 group meetings in a great variety of settings. By means of special voting technology and meeting procedures, the experimental technique allows every participant to make an anonymous coded response to questions posed by the moderator or another participant and to observe instantaneously a tally of how many people voted in each category. The technique permits a rapid appraisal of consensus and controversy; it allows participants to reveal their ignorance, deal with controversial questions without intimidation, and generally make the discussion more responsive to the real interests and needs of the group. In some cases, quantitative procedures are used to rate alternatives against criteria and find group utilities, but mostly these procedures are regarded as an augmentation of normal free discussion and idea formulation rather than a means for commitment to final decision. These techniques are evaluated as a function of the type of topic and questions used, the personality and experience of participants, the style of the moderator, and other factors including rapidly increasing capabilities for large-scale community communication, such as those provided by 2-way cable television.

•MUCH concern has been voiced recently about citizen participation in community planning (1, 2, 3, 4, 5, 6). Various programs have been proposed to improve such participation, and politicians have given their enthusiastic endorsements to the general idea. In a few cases, such as highway planning, legislation has been passed requiring a certain amount of citizen input. Unfortunately, much of the enthusiasm has been naive. It has been based on an expectation that effective citizen feedback comes freely, but not everyone feels that being a good citizen is a moral obligation. There is also the expectation that a representative spectrum of the community will get involved, but usually those who do are self-selected and usually are not statistically representative. Most of the difficulty, however, results because the channels for ordinary citizens to communicate with those in power simply are insufficient.

Whether more participatory democracy is good for large-scale planning in transportation or similar areas is sometimes questioned. Experts and visionaries cannot be replaced. Democratic rule by an ignorant majority may result in mediocrity and tastelessness. Such arguments challenge the idea that more communication is desirable. One must agree that, when any new communication tools can be manipulated by a few powerful persons, there is real peril. Alternatively, even if these tools are not subject to manipulation by a few people, a community of well-meaning persons may unwittingly adopt technocratic procedures that will allow the majority to oppress the minority. Therefore, in any attempts to improve citizen feedback, one is obliged to assess these dangers along with any benefits that might accrue and to examine the desired balance of democracy, authority, and laissez-faire (7).

Various means exist to bring more citizen participation into transportation planning operations. Individual letters and verbal petitions have impact, but they provide little satisfaction for the sender and the recipient usually treats them as statistics. Citizens are most effective when organized in groups in which they can share concerns, educate each other, and, in the process, become more clear and persuasive in arguing for a particular policy alternative. Whether the citizens are meeting to clarify for themselves a particular issue or whether they are participating in a public hearing or other meeting with public officials or other experts, a central problem is to make that meeting

more effective.

We saw a need to develop and evaluate techniques for improving community dialogue in group meetings and make use of the best technology available in order to aggregate and display responses from all participants.

At the outset, we considered the greatest current need to be that of groups that meet in a single room rather than in meetings in which participants are geographically separated and communicate over telephone or video. Aspects of the latter are discussed in a more complete report of this research (8). It was also taken as an axiom that whatever technology would be employed in the meeting should not constrain the participants from normal and free discussion in natural language.

The subject matter of transportation system and policy planning is typical of a larger class of subjects that community groups deal with. There are always some experts present, but the community at large is not altogether trusting of their expertise. Most of the participants know how transportation affects them, and they consider their own expertise to be valid. Couching problems in technical terms is annoying and alienating to them.

Typically, many of the citizens in a community meeting on transportation hesitate to speak out because they are not accustomed to the give and take of large groups that the experts or politicians appear to thrive upon. They have come to listen, observe, determine the important issues, and share their own perceptions and feelings, provided they can do so without looking foolish.

TECHNOLOGY AND PROCEDURES USED IN THE EXPERIMENTS

The technique we evaluated, the electronic voting and discussion technique (EVDT), employs an electronic polling system as shown in Figures 1 and 2 (9). Figure 1 shows a 10-position participant response switch. Figure 2 shows central display and control equipment. The small display at left indicates in sequence each category number and corresponding votes. The tall display indicates votes for all categories simultaneously. The tall display is the one normally used, but its height [6 ft (1.8 m)] is a disadvantage. A smaller column display [19 in. (48 cm) high] has been used recently. The hardware itself is similar to that of student response systems (10, 11) that have been wired into classrooms in what I consider to be mostly mechanical and unimaginative testing applications. The study discussed in this paper emphasizes the software and participants' reactions.

Five steps outline the procedure.

1. The meeting moderator or some participant poses a question or makes a statement by means of an overhead projector, blackboard, or chart. Accompanying the question or statement, 2 to 10 alternative responses coded with numbers from 0 to 9 are listed. From those each of the participants is asked to select the most appropriate. Both the question and the responses can consist of words, numbers, or pictures or a combination of these. Sometimes the responses are direct substantive answers to the question; sometimes they are reactions such as "I don't care," "I want to object," or "Other."
2. Each participant (up to 90 in a group) holds a small 10-position thumb-wheel switch. These are wired to a common line that runs to the front of the room. After observing the question and possible responses, the participant sets the number on the switch corresponding to his or her choice from the response alternatives. Voting is secret. The switch dial setting is recessed in a plastic case and can be guarded from view simply by covering it with the thumb.
3. After all participants have been given sufficient time to make their selections (usually no more than a few seconds) the moderator pushes a button and instantaneously a totalizer display in the front of the room indicates the number (00 to 99) of people voting in each category.
4. The first 3 steps, which normally take 1 to 2 min, serve as a basis for a longer period of group reaction and discussion, which is the most important step in the series.

Figure 1. Response switch.

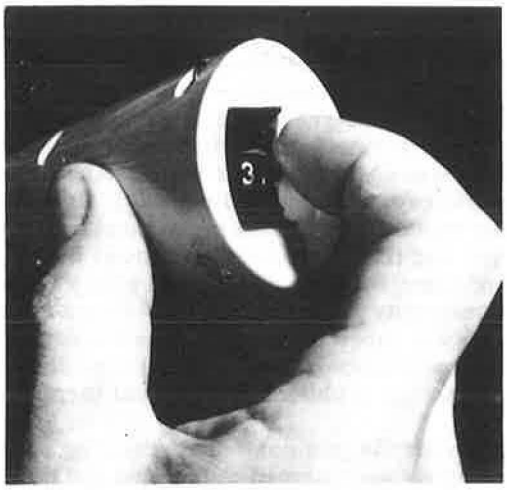
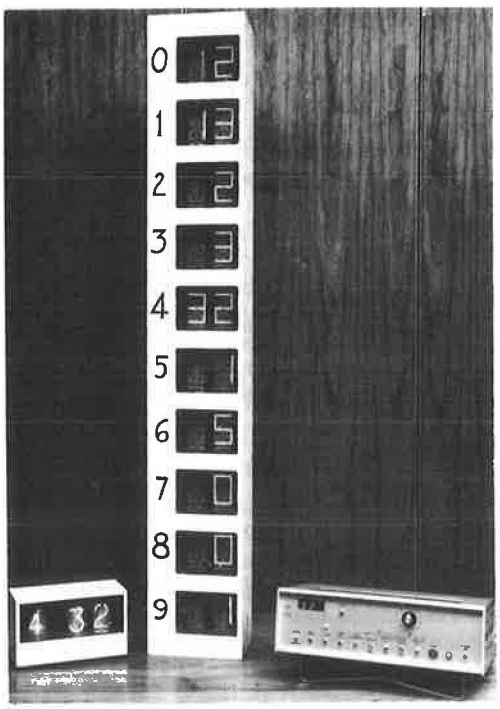


Figure 2. Central display and control equipment.



The moderator's task during this period is to point out salient features of the polling results—where consensus is indicated and where there is controversy—and to induce representative participants from various response categories to indicate why they voted as they did. Equally important is drawing out the reasons why people did not understand or objected to the question.

5. When certain words in the question or response categories are criticized, the moderator sometimes solicits a rephrasing and a revote. A change in the vote profile invariably motivates a discussion on the cause of the change. If certain assumptions are questioned, the moderator can ask for several revotes under different assumptions, limit the next vote to particular subgroups, or go on to the next question.

PLAN OF EXPERIMENTS

EVDT technology and the polling-discussion procedure were applied in approximately 200 group meetings. The groups ranged in size from 10 to 90. The meetings lasted from 1 to 3 h each. Some of the types of the experimental meetings will be discussed.

In designing the experimental evaluation, we decided that the conventional type of meeting with discussion and rules of order should be the basis from which to measure changes in objective behavior and subjective evaluation. We also believed that the meeting to be studied must be real. It would consist of people who come together to communicate on an issue or make a group decision. Participants would be told that they would use a novel procedure for their meeting, but their purpose for the meeting would be emphasized and not the experimental nature of the dialogue technique. (When groups feel they are guinea pigs serving an experimenter, social interactions are abnormal and experimental findings become biased.)

General

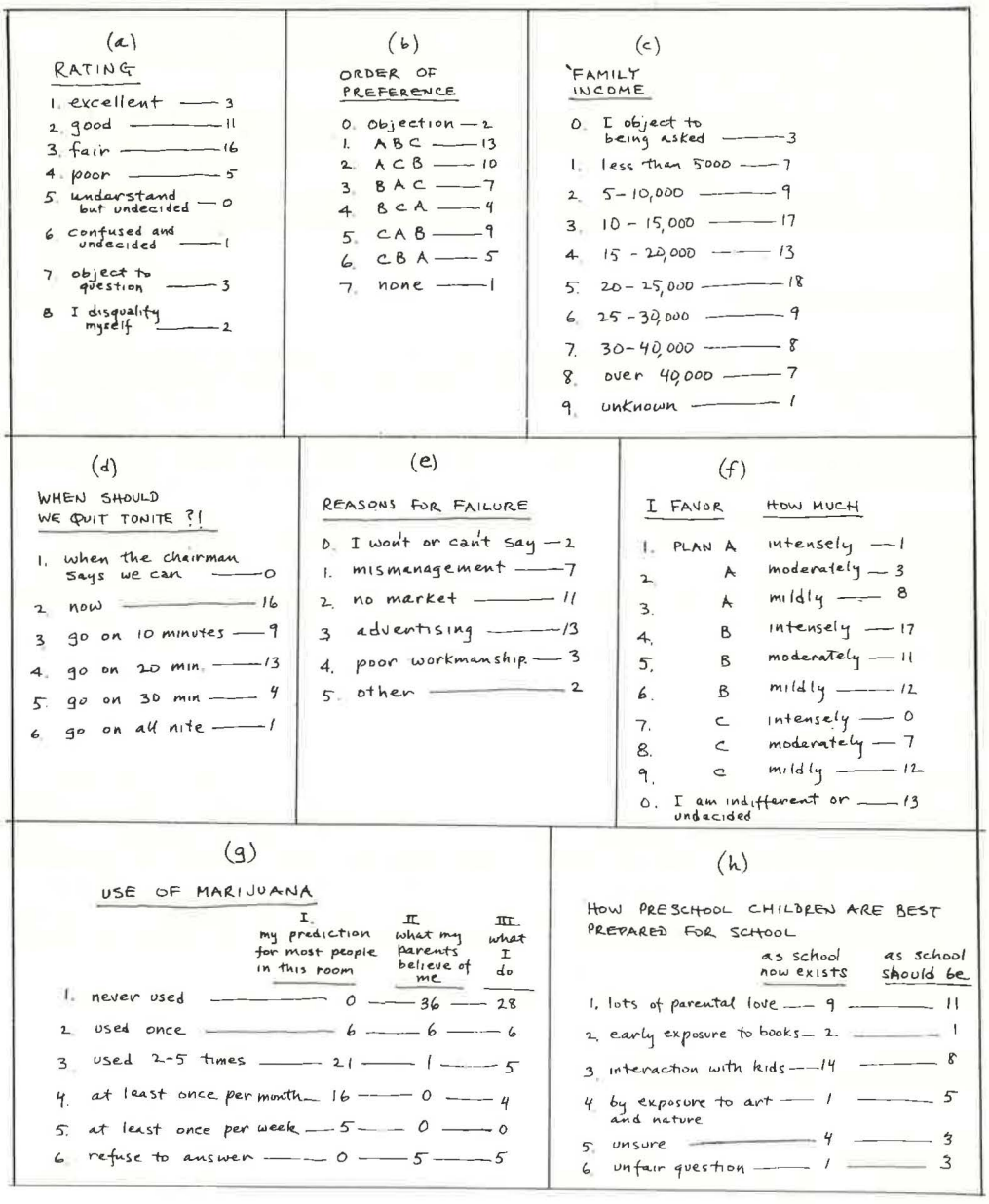
The general type of meeting, the one in which EVDT uses were solicited by the client, was the largest category and the least amenable to experimental control. The operative criterion was that some group requested the services of the project presumably to see whether the novel technology and procedures might help the group achieve its purposes.

Typically, one of the project staff who was to serve as moderator would meet with a few of the leaders of the requesting group and explain what the procedure is. For example, it is a means to focus quickly on how members of the group feel about an issue and on where there is consensus or conflict; it is a means to involve everyone in the room, but it allows them to do so anonymously to be able to deal with controversy or admit what they do not know without embarrassment; it is a means to let the agenda be guided by what the group wants to deal with; and, most important, it is a means to augment natural discussion.

The project staff person also would explain to the client group leaders what the procedure is not. For example, it is not a replacement to a paper and pencil questionnaire in which individual answers are sought and in which reaction to responses is not relevant; it is not a foolproof means for casting final votes on important decisions. The traditional paper ballot, because of its built-in time delays, has real advantages.

Questions or propositions and alternative responses to them put in the briefest possible wording were usually drawn up in the preliminary meeting. Almost always a few of the 10 switch categories were left to be filled in by suggestions from the participants during the meeting. Sometimes all of the response categories were left open. Some examples of questions and response categories are shown in Figure 3. Figure 3a shows rating of alternatives including some process feedback; Figure 3b shows the complete preference ordering of 3 alternatives; Figure 3c shows a quantitative scale; and Figure 3d shows a typical procedural question. Figure 3e shows an ad hoc list of categories drawn from a group discussion; Figure 3f shows a 2-dimensional response, that is, alternatives versus degree of favor; Figure 3g shows a sequence of 3 votes on the same question and compares perceptions to facts; and Figure 3h shows a sequence of 2 votes

Figure 3. Questions and responses.



on the same question under different assumptions. It can be seen that a fairly rich communication can be accomodated this way with words, numbers, photographs, and multiple votes.

The EVDT has several modes. The mode just described is the question mode. There also is the branching mode, which is a procedure that does not depend on prepared questions. In this mode the meeting begins with a blank blackboard or one on which only a general indication of the problem to be discussed is found. The moderator then begins by asking for suggestions on what should be discussed, what the problems are, and what some relevant criteria are to generate a list of 5 to 10 items. Then the group, by using the polling devices, votes on first choice, and perhaps second or third choice. The most popular item or items then are selected for further discussion, and, based on these, a new list of items is elicited from the audience, a new vote is taken, and so on. In this way, a branching list that provides an idea map of the discussion is produced.

Of the 70 meetings conducted in this general category, most were moderated by project staff; some, however, were moderated by people not connected with the Massachusetts Institute of Technology. Subject matter and size and constitution of the groups ranged widely. The questions mode was used in most of the meetings.

Use of Electronic Voting and Discussion Technique in Transportation Planning

A transportation consulting firm proposed to the county planning commission of a major eastern city a transit study that would include several citizen seminars. This firm was dissatisfied with the results of previous seminars. They had been frustrated with both the level of participation they had been able to elicit and the judgments and rankings of alternatives. They were not sure that the individuals filling out rating sheets had understood the ranking concept. This firm decided that EVDT would be used at a citizen seminar. I served as the interactive moderator, a company representative served as the principal resource person, and an official of the planning commission acted as chairman of the proceedings. This ensured that responsibility for use of EVDT did not fall on someone unfamiliar with it. It also did not require that I pose as an expert on the transportation problems of the community.

Overhead projector slides were prepared containing questions similar to those employed in previous citizen seminars. Items included relative importance of different routes and frequency of buses, different fare structures, transit goal priorities, and new alternatives such as demand-responsive transportation.

The consulting firm tended to plan too many questions. I suggested that if free reaction and discussion were desired then 15 to 20 questions would be the most that could be handled. Because unanticipated questions from the moderator or audience should be allowed for, I prepared 12 questions. The consulting firm prepared 25 questions in case free time occurred. But, even though the participants voted (using the EVDT) to go on 30 min longer than the original schedule specified, only 12 questions were used.

The sponsors did not get all the quantitative data they had wanted, but they gleaned qualitative expressions and arguments that they had not anticipated.

In a vote taken at the end on how useful the EVDT was for the meeting, the majority felt that it was useful. Their comments revealed an increased sense of participation for many who normally would have been completely passive during the session.

Other Uses of Electronic Voting and Discussion Technique

A new state secretary of educational affairs posed 8 questions to a gathering of 90 regional superintendents and principals to learn what they thought his policies should be.

A national professional society convention arranged that speakers in 2 sessions ask the audience after each speech 2 or 3 questions about the presentation.

Two classes of high school students were asked 10 questions about drug use. Questions covered their own experiences, their judgments of what their parents knew, and their estimates of drug use by their peers.

One hundred businessmen met in Washington and went through a list of questions pertaining to federal policies affecting their companies while a group of 30 government officials observed.

A regional medical organization invited experts to estimate 1975 personnel needs in various nursing, laboratory technician, and other paramedical specialties to plan state college programs in these areas.

A citizen committee planning a town's participation in the 1976 bicentennial celebration started with a matrix with alternative proposals as columns and criteria as rows. After they accepted 1 or 2 additional proposals and criteria from visitors, they rated the relevance of each criterion to each proposal.

A few of the meetings used the branched discussion. For example, in an environment-conscious West Coast region, 8 meetings were conducted to raise the consciousness level of citizens regarding the effects of growth on the region. They started with the idea of growth of the region and elicited various meanings and implications. Then they assigned importance and desirability ratings. The branched discussion that followed inevitably led to questions concerning quality of life and other broad issues.

Systematic questionnaire data were collected from only a few of these meetings. Anecdotal evidence was recorded by the moderator or another meeting attendee in all of the meetings; it also was collected from debriefings, letters, and comments received after the meetings.

Results

The meetings generally were successful, and the reactions were positive. A few meetings were disasters, and most could have been better in some respects. Some of the factors that seem to have had the most effect will be reviewed.

1. It was important that the organizers of a meeting be briefed on the EVDT, plan not more than 12 questions/h, decide on the mode to be used, and dispel the notion that an electronic voting machine is necessarily a balloting device to be used only after all in the group are clear on the question and response alternatives. It was also important to ensure that the moderator (at least during the EVDT part of the meeting) be experienced in EVDT techniques; otherwise the regular chairperson might try to run the meeting in the conventional manner. Awkward pauses to vote would result. Worse, the moderator, not knowing what to do with the devices, might simply save the votes until the end of the meeting.
2. Meetings went better when the physical arrangements were informal and gave those present a sense that they had something to contribute. This meant that the meeting had to be moderated from the same level as the audience and that the chairs had to be arranged in semicircles (if possible) rather than straight rows. It also meant that a large blackboard or pieces of newsprint pad were needed so that the moderator, in addition to showing the question and response categories, could record the votes and the comments made in the discussion that followed. (In the branched discussion mode, it was essential that none of the discussion map be erased.) The moderator was assisted on occasion by a person who sat facing the audience and took notes on the discussion.
3. The success of the meeting was highly dependent on the skill of the moderator. At the beginning of the meeting the audience generally appreciated a chance to try out the devices and learn that the votes would not be traced to their origins. Humor was especially helpful at the beginning and served to relax the group. It was found helpful at the beginning of the meeting to use EVDT in having the participants identify themselves anonymously according to their organizational affiliations and politics. As meetings progressed to their main agendas, the moderator had to pay attention to the

apparatus and the audience simultaneously. The danger was that he or she might pay too much attention to the apparatus and too little to the audience. Thus, following each vote, the moderator had to make sure that expressions representative of the different vote categories were heard especially from those who voted "other" or "object to question." If, in the course of this discussion, other questions or suggestions came up, including those on procedural matters, the moderator needed the presence of mind to use the EVDT to get spontaneous opinion from the group. The moderator had to learn to use the EVDT to encourage shy people and discourage those disposed to making lengthy speeches or haggling about procedure. Sometimes the moderator would have to impose his or her will to force a vote.

4. Reactions of the participants and meeting organizers generally were enthusiastic. To a great extent, the reactions were dependent on the backgrounds and expectations of the participants. Some groups loved the intellectual game-playing aspect, and some regarded the whole EVDT as not serious or even irrelevant. Many individual reactions from participants and moderators are available elsewhere (11, 12, 13, 29).

Acceptability Studies

Another set of experiments, administered in a semicontrolled fashion and based on repeated uses of the technology by the same groups, assessed the acceptability of the technology and EVDT meeting procedures as a function of certain individual characteristics of the participants and certain procedural differences. These experiments were carried out by Lemelshtrich (12).

Most of the meetings were conducted among social studies students in a Springfield, Vermont, high school and a Boston, Massachusetts, high school. Some were conducted among the parents of these students. There were 9 groups that had an average of 22 participants. All but 2 of the groups met repeatedly; 3 met at more than 12 sessions. All of the groups kept the same moderator, and several moderators served 2 groups. The moderators predominantly used the open, branched-discussion procedure. There were very few prepared questions.

The primary measuring instrument was the written questionnaire, parts of which were multiple choice and parts of which were constructed response or open comment. Questionnaires were administered to both meeting participants and moderators at the beginning of the experiment to obtain data on age, sex, social and religious preferences, and experience, ease, and effectiveness in group participation. After each meeting, questionnaires were administered to obtain subjective reactions to the technology, procedures, other participants, and the moderator. Questions focused on interest in continuing use of the technology at subsequent meetings, effects of the technology on participation, effects of the technology on discussion quality, participant attitudes toward the anonymity that the technology allowed, and effects of the technology on the participants' attitudes toward each other.

A nonparticipating observer categorized group votes according to whether they were taken to provide opinions or information on the discussion theme or whether they were taken to make decisions about the group's process, to evaluate the quality of discussion, or to change the theme entirely.

Certain of the constructed subjective statements on the questionnaires were independently analyzed and categorized by 3 coders. Extensive chi-square significance tests were performed on the coded results as well as on the multiple choice and observational data by means of the statistical program for social scientists software package. If the requisite data involved insufficient intercoder agreement, the test was not used. Some of the noteworthy results will be discussed.

1. From as early as the conclusion of the first session, large majorities of the groups expressed interest in continuing with EVDT. After subsequent meetings the groups that were allowed to control their agendas sustained high interest in continuing; the groups whose agendas were set by the moderator showed less interest.

2. The EVDT has significantly more effect on nonvocal participation than on vocal

participation. About half the participants claimed they became more involved after experience with EVDT. Only 5 percent claimed they became less involved. Twenty percent claimed they were more encouraged to speak out; about 5 percent were less encouraged.

3. About half the participants stated that they liked the anonymity that EVDT provided; negative reaction was insignificant. The number of positive references increased over time. Participants claimed the use of the feedback technology made them know more about each other but not like each other more. Anecdotal evidence suggested that strong social pressures previously had inhibited students from speaking out on certain issues that EVDT had helped them confront.

4. The most vocally aggressive and, to a lesser extent, the most vocally inhibited participants by their own rating were significantly less favorable toward the EVDT than the larger group at neither extreme.

5. Female participants, with significantly greater frequency than males, expressed positive reactions to EVDT, indicated that it made them more involved nonvocally, and concluded that EVDT improved the quality of their group's discussions.

6. The majority of moderators claimed that EVDT increased their awareness of the participants' opinions and helped them focus the discussions to satisfy the group. On the other hand, most moderators said that it was harder for them to predict the direction of the discussion, and therefore they had to work harder to keep up with all that was going on. The most important features of EVDT cited by the moderators were its anonymity guarantee and its potential to increase participation. All the moderators felt that their own and the students' abilities to benefit from EVDT would increase with continued use.

Use of EVDT Aided by On-Line Computation for Quantitative Social Choice

The problem considered in this study was that of aiding large, technically unsophisticated groups to make quantitative policy decisions in 1 session by using real-time on-line computation and utility theory. These experiments are reported by W. B. Rouse and T. B. Sheridan (13).

Theoretical Considerations

Conventional procedure provides a means by which to scale on a single continuum different kinds of things or events in terms of their worth to a single person (14). Various procedures have been devised for scaling the utility of events as functions of multiple attributes (15, 16, 17). Although many questions remain about the validity of the assumptions (18), the theory is being developed actively.

Yntema and Kelm (19) have shown experimentally that, if a computer is given only the extreme values of a person's multiattribute utility space and a small set of marginal values, the computer can predict that person's utility values within the space rather well. It can predict these values better, on the average, than another person familiar with the situation can.

Although developments in assessing multiattribute utility for single persons is encouraging, the same cannot be said for more than 1 person. The reason is because of a landmark contribution by Arrow (20). Arrow questioned whether, given knowledge of how each of a number of persons orders his or her preferences among alternatives, there is a fair way to order preferences for the whole group. Arrow's paradox or "impossibility theorem" has created lively debate in theoretical economics and political science, and various writers have tried to show why Arrow's result is irrelevant to practical matters. The difficulties here are significant and are not likely to be resolved by any theoretical brushstroke in the near future.

The EVDT has been employed mostly to allow each person only 1 vote from a set of alternatives; frequency of first choices determines the social order. This procedure

obviates the Arrow problem because it never asks a person to order other-than-first-choice alternatives. Curiously, this is the principle by which the consumer market functions and on which most empirical economics is based. Faced with any set of decision alternatives, a person decides on only 1 alternative; anything else considered has no effect on the market.

Group Interaction With a Computer-Based Model

It is common that the general form of a policy is given and the community or institution assumes the task of setting its parameters. Can this be done democratically? And can group interaction make the final decision more than a simple average or majority vote (21, 22)? The model TAXPKG was devised to explore this problem for income taxation. It fits the present Internal Revenue Service policy except that the following parameters were left free:

1. Maximum taxation percentage,
2. Gross income below which there is no tax, and
3. Gross income tax above which the maximum percentage is applied.

A computer was programmed with the model, the distribution of gross incomes in the United States, and the national budget figure that would have to be met by a satisfactory policy. Various on-line input and display schemes were devised that permitted parameters to be set 1 at a time by democratic vote. The result would be displayed in tabular or graphical form.

Trials with a few groups revealed interest and some surprise at the effects of their decisions. These trials also showed that nonsophisticated persons were unable to grasp the quantitative trade-off problems. They became impatient with the need to format data for entry and the need to wait and interpret the results. Many participants enjoyed espousing their goals and moral theories, but some did not want to be involved in the quantitative detail.

Group utility functions can be derived from such models after the group is finished setting parameters if one assumes that with a fair taxation policy everyone experiences the same utility loss by taxes relative to gross income.

Group Searching of a Utility Space

One software package in this category, SOLVER, was designed to help a group deal with any arbitrary multiattribute choice problem (24). The group was asked to name the relevant dimensions (attributes) with respect to which alternative policies might differ. Then they were asked to specify several levels of each including the level that represented the status quo. The combinations of these levels for the various dimensions served as points in a utility space. The computer tried to maximize group acceptance of an allocation policy by considering points in the neighborhood of a given reference point starting with the status quo and asking for a popular vote on whether each neighboring point was better than the reference. The program let percentage of better votes be a positive gradient and percentage of worse votes be a negative gradient. The steepest ascent procedure would, theoretically, lead the group to a more acceptable position.

Trials were not completely successful with this procedure because groups had difficulties estimating costs, and many comparison trials seemed to the subjects to be unnecessary. From the efforts to help groups make decisions by interacting with a computer it became evident that most participants need more understanding or a mental model of what the computer is doing. Further, the group should not have to deal with special entry or display formats; the programmer-moderator should do that job and serve as an intermediary between computer and group. Finally, time-sharing pauses should be eliminated whenever possible because they are socially awkward and distracting.

Other Experiments

Several other experiments are described more fully elsewhere (8, 25, 26, 27, 28, 29, 30). They will be discussed only briefly in this paper.

Interactive Slide-Tape Shows

Four slide shows formulated to be used interactively with EVDT were produced on controversial value-laden themes. The subjects were patriotism, racism, sexism, and nutrition (25, 26, 27, 28). Each consisted of a showing of several slides sometimes accompanied by a sound track to introduce an issue, visually awaken feelings, and associations and a posing of a question and response alternatives to be voted on and discussed by the group. Such a sequence might take 2 min to show, 1 min to vote, and 10 min to discuss. There were 8 to 10 such sequences in a complete show. Reactions to these interactive slide shows were enthusiastic and revealed even distribution of participation in discussion (29).

Experiments on Continuous Feedback

In continuous feedback, EVDT is used to provide the speaker or panel continuous audience reaction on whether they are understood, whether the audience agrees with them, and whether the audience feels the pace is too fast or too slow. The few experiments performed in this mode indicate that continuous multiattribute feedback is difficult for the listener to provide and for the speaker to absorb (8).

Interpersonal Behavior and Attitude Change Under EVDT and Videotape

These experiments were designed to compare several means by which a group can deal with a threatening situation: (a) direct face-to-face discussion, (b) videotaping comments and showing them to the group, (c) EVDT in branched face-to-face discussion, and (d) EVDT and videotape combined. Preliminary results from this experiment suggest that the most significant effect is that of the EVDT on increasing verbal participation (30).

Use of EVDT on Television

A series of three 90-min TV shows used an in-studio audience to respond to questions by means of EVDT and to elaborate their answers in discussion. The experiments are discussed further elsewhere (8, 31).

CONCLUSIONS

According to the variety of applications discussed, EVDT can be very useful largely independent of group size and subject matter for delving into issues with greater speed and penetration. It can help to uncover the profile of participants' opinions and clarify an initially poorly stated or vaguely defined issue. The instantaneous anonymous feedback promotes participation and involvement not only in the opinion-voting phase but also in the discussion that follows. The meeting no longer can be dominated by a few people. EVDT also permits the group to deal with subject matter that normally would be intimidating either because it is too controversial or too personal or because people might have to reveal their ignorance.

Although some positive results may have been caused by the novelty effect, there

were numerous situations in which the same group employed EVDT repeatedly. Evidence suggests that as moderators and participants gained experience they became more favorably inclined toward the system.

Individual reactions depended on certain background and personality factors. Those who were accustomed to dominating group discussion and those normally alienated tended to be negative; EVDT could be considered threatening to both groups. Most people in between these 2 groups tended to be positive.

EVDT works best when meeting organizers have been briefed properly and when the physical arrangements of the room are conducive to informality.

The most significant factor in the success or failure of EVDT meetings was the style of the moderator. The success of a meeting depended on the moderator's ensuring that voting results were discussed and different viewpoints heard, that the EVDT was used spontaneously to resolve questions that arose, and that the group was allowed to guide the agenda. Participants were most satisfied when the moderator kept the meeting moving at a brisk pace with humor, wide participation, and a minimum of procedural haggling.

To some extent, EVDT altered the conventional face-to-face group communication process. Because the group became involved in coding ideas in words and phrases for voting, they seemed to become committed to such words and phrases. The EVDT also separated people's opinions from their personalities; a statement could become significant not because a particular person presented it or another spoke favorably of it but because the group voted anonymously to support it. At the same time, the voting introduced new pressures into the group; the votes revealed decisions of surprising and compelling agreement that had to be dealt with immediately.

RECOMMENDATIONS FOR FUTURE DEVELOPMENTS

Training

Because the success of EVDT depends heavily on the moderator's skill, there is a need for better means to train moderators. This can include instructional documents, films and videotapes, training seminars, and short courses. Use of EVDT also should be subjected to further critique and refinement by organizational development experts and similar professionals in group process.

Production and Use of EVDT-Media Interactive Packages

The process of producing interactive EVDT slide shows provides a promising mechanism by which a group of concerned people can come together, focus on a problem, and share ideas to determine what they, as a group, want to say and ask of other groups. Because it is a flexible mode of communication, EVDT can render ideas in verbal, graphical, and pictorial form. It is a welcome change from the conventional committee report. Most important, it has a built-in guarantee of producing feedback and reaction from the group at which it is directed. EVDT should be exploited for schoolroom or community education and consciousness raising or to have opposing groups respond to each other.

EVDT Equipment

Most electronic voting systems are not portable and are otherwise inflexible. Some are outrageously expensive for what they provide. Wireless systems can be accommodated in the technology, but the requirement that the totalizing computer receive independent messages from each participant's transmitter makes them more complex and costly.

Rugged, flexible, and, especially, lower cost systems for EVDT use should be developed.

Cable Television

Two-way cable television systems are in their infancy, and no serious experiments involving cable television for town meetings, citizen polls, and the like have been completed (32). Because participants would be further isolated from each other on a cable network, industry probably will strive to make cable EVDT closely resemble single-room EVDT. By artificially keeping participants from speaking or talking to each other, the EVDT meeting in a single room can simulate the meeting over cable at a much lower cost and with far more flexibility in experimental control than by using actual cable systems at this stage.

Democracy and Other Perils

EVDT developments raise questions about how extensively decisions should be made on a democratic basis, or how far the vote of the unsophisticated, apathetic, self-interested, or imaginative citizen should be counted. Making important decisions on a large scale by electronic voting has dangers, such as the bandwagon effect, which have been discussed, and surely other perils that have not been anticipated. There is the ever present danger of electronic manipulation or of deceiving participants about anonymity and then identifying individual votes electonically. Dangers and safeguards related to small- and large-scale EVDT need further exploration.

Technology Assessment

It is clear to everyone that technological development is no longer an unmitigated blessing; there is a need to forecast and assess the impact of technology. There is no objective formula for accomplishing this assessment. Such assessment must be in social values. And, because democracy is at work, a large number of people should be involved in making the judgments. EVDT and related techniques offer a means by which to focus the interest of groups of people on future technology, assess its possible effect on their values, and then share with each other their reasons for doing so. Thus, just as EVDT technology is an aid in fostering democracy, the creative democratic process is a means to assess technology.

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