THE USE OF CLOSED CIRCUIT TELEVISION IN EXPECTATION EXPERIMENTS*

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Developments in the technology of closed circuit television have opened up possibilities for the solution of a number of problems that have long plagued social science experimentation with human subjects. Although concerns such as experimenter effects are often discussed (e.g., Rosenthal, 1966), little has been offered in the way of solutions for these problems. The present report deals with the use of closed circuit television in an effort to solve some of the experimental problems generated by research in a particular theoretical context. We will discuss our efforts to solve these methodological problems in terms of a particular theory for it is our view that the advantages and disadvantages of technical equipment can only be assessed in a theoretical context.

The scope conditions of a theory are the fixed initial conditions under which the assumptions of the theory hold. Hence, any experiment that is designed to test a theory must first meet these conditions. Although the initial conditions of a theory provide guidelines for the design of experiments, these conditions also impose stringent requirements on the degree of control necessary in any experiment designed to test the theory. The evaluation of experimental procedures must be in terms of the initial conditions that these procedures are designed to establish. Since the initial conditions are part of a theory, the evaluation of experimental procedures must be in terms of that theory.

Experimental studies of the Theory of Status Characteristics (see Berger et al., 1966) and the Status Value Theory of Distributive Justice (see Berger et al., 1968) require the manipulation and control of status cues. In each

case an experimental subject forms expectations both for his own performance and for the performances of others in the group based on his perception that he and the other members of the group are differentiated with respect to some status characteristic. Thus, for example, in a study of the relation of status conceptions to power and prestige, Air Force staff sergeants formed "low self -- high other" performance expectations when they were told that they were working with an Air Force captain and formed "high self -- low other" expectations when they were told that their partner was an Airman Third Class. One of the initial conditions in both theories is that the subjects are only differentiated on a single characteristic and there is no other basis of discrimination. For example, when our staff sergeant is interacting with a captain, the captain should be his equal with respect to other visible status characteristics such as age, education, social class, etc.

The set of initial conditions for the application of these theories also includes the requirement that individuals work on a valued, collective task. This means that the task situation must be one where each participant takes the behavior of the other or others into account. A task that can be performed individually with the subject ignoring the others in the situation clearly falls outside the scope of our theories. The requirement that the task be valued simply means that there be distinct outcomes of the task, some of which are clearly "successful" and some of which are clearly "failures," and that individuals desire success.

There are additional constraints which increase the difficulty of obtaining the degree of control demanded by these theoretical formulations. In the first place, whatever experimental situation is created must remain

invariant over experimental groups; secondly, the experimental situation must be credible to the subjects. While a free interaction situation is the most credible to experimental subjects, it is obvious that free interaction cannot meet the condition that subjects be discriminated on one and only one status characteristic. Freely interacting subjects give a variety of status cues to one another in their interaction so that participants can make inferences, for example, about education from the manner of speech, about social class from speech and dress, and about organizational status from remarks made in the discussion. Furthermore, the cues and interpretation of these cues which arise in free interaction are likely to vary widely from group to group. Thus, it is difficult to obtain a reasonable approximation of our desired invariance in the completely free interaction situation.

There have been many efforts to modify free interaction experiments, for example, by introducing confederates who role-play with prepared scripts. Apart from the extreme difficulty of the acting task for such role-players, the major difficulty is that the confederate's behavior cannot be both invariant from group to group and credible to the subjects at the same time.

Once the investigator moves away from free interaction, there are many possibilities for controlled experimentation, each of which generates its own technical problems. Berger and Snell (see Berger and Snell, 1961) developed a standardized experimental situation that has been used successfully in studies of the Laboratory for Social Research over the last five years. This situation meets the requirements of research dealing with Status Characteristic Theory and Distributive Justice Theory. It is our contention that the introduction of closed circuit television into the Berger and Snell

situation greatly increases the efficiency of that situation and solves some of the problems that experience in working with this experimental setting has revealed. First we will describe the basic experimental situation as it was used in a study of Air Force personnel; then we will indicate some of the problems that arose in this Air Force study; thirdly, we will describe the incorporation of closed circuit television equipment into a new but similar experiment; and finally, we will present some comparative data with respect to the relative efficiency of the experimental situation with and without closed circuit television.

THE AIR FORCE EXPERIMENT

An experiment to test some of the derivations of the Theory of Status Characteristics and Expectation States was conducted at a large Air Force base, using Air Force staff sergeants as experimental subjects (see Cohen et al., forthcoming). Although the experiment dealt with several deductions from the theory, its major focus was the assertion that the degree of influence on a subject performing a collective, decision-making task would depend upon his knowledge of the relative Air Force rank of himself and his partner.

The experimental situation calls for a subject to work with a partner on a decision-making task. Subject and partner are separated by a partition so that they cannot see each other. A host experimenter (who sat in the same room) instructed the subjects, telling them that they would be working together on a series of problems which required that each use his "Contrast Sensitivity" ability, an ability necessary to solve the problems presented. In fact, no such ability exists.

The Contrast Sensitivity problems were presented by the experimenter via a series of slides. Each slide contained two identically sized rectangles, each of which was composed of smaller black and white shapes. Subjects were told that their task was to decide which rectangle had the greater amount of white area.

Each subject made two choices for each slide. He first made an "opinion" which he was told would be communicated to the 'partner.' Once these opinions were exchanged, subjects were then asked to make a "final decision" as to the correct answer. Subjects often did not receive their partner's true choice. ICOM (Interaction Control Machine) panels used to communicate these choices were connected with a master panel (out of sight of the subjects) which controlled their feedback.

In the experimental situation the subject never saw his partner, never communicated with him except through ICOM, and did not receive his partner's actual choices, since ICOM was pre-programmed to give each subject a series of thirty-eight continuous disagreements. The Contrast Sensitivity slides were carefully pretested so that the probability of choosing either black or white for each slide was .5. The series was so constructed in order to remove any predisposition to choose one alternative, while at the same time making it credible that a partner could choose the opposite alternative. In addition, subjects were told that although the choice between alternatives was a difficult one, there was a right answer.

The number of times a subject changes his "final decision" to correspond with what ICOM tells him is his partner's "initial opinion" constitutes the measure of influence. The basic hypothesis of the Air Force study was that

a staff sergeant would be more likely to change his initial opinion when he believed that his partner was an Air Force captain than when he believed his partner was an Airman Third Class. In order to meet the initial conditions of the Theory of Status Characteristics and Expectation States it was essential that the subject know nothing about his partner other than his Air Force rank, that is, that he have no other basis for discriminating between himself and his partner.

In this experiment each subject and his partner were in reality staff sergeants. The experimental instructions, however, led him to believe that the person on the other side of the partition was either of higher (Captain) or lower (Airman Third Class) rank. Under these circumstances, information about the partner's rank could not be given publicly while both partners were present. Furthermore, since the experimental treatment to which the subject was assigned determined the information he received about his partner's rank, and since the host experimenter's knowledge of which treatment he was conducting might operate to produce experimenter bias, the basic manipulation of the experiment was performed in a place other than the experimental room, using different host experimenters from the person who conducted the problem-solving phase of the experiment. Thus, in the manipulation phase each staff sergeant was interviewed briefly by an experimenter who provided him with the crucial information about the rank of his partner. The staff sergeants were then brought separately to the room in which the Contrast Sensitivity problems were presented. Three separate experimenters were involved in this study, two to perform the initial manipulation on each staff sergeant and the third to conduct the problem solving phase of the experiment. The third

experimenter was always blind to the treatment to which the two subjects facing him had been assigned, that is, he did not know whether each had been told in the manipulation phase that his partner was an Airman Third Class or that his partner was a Captain.

In this situation the experimenter controls several important variables. First, since subjects do not see or speak to one another, the status attributes of the partner are completely under experimental control. Secondly, the use of ICOM allows the experimenter to create any amount and any sequence of disagreements perceived by the subjects. Both the amount and sequence of disagreements are invariant across groups. Third, the stimuli (Contrast Sensitivity problems) can be constructed to create the same degree of task difficulty. Fourth, the manipulation which assigns subjects to experimental treatment can be done so that the experimenter in the problem solving phase cannot bias the results by knowing the treatment to which the subject has been assigned. While this experimental situation met the conditions of the theory, produced a tolerable degree of invariance of experimental procedure, and was relatively credible to subjects, it had two major sources of inefficiency that motivated further work on refining and mechanizing the procedures. In the first place, the resources required to run this experiment were considerable. At least three people and three different locations were required to separate the manipulation and problem solving phases of the experiment. Secondly, there were indications that the number of subjects who failed to meet the initial conditions of the theory could be reduced, and also that the suspicion rate could be lowered. If this were the case, fewer subjects would have to be excluded from the data analysis.

PROBLEMS IN THE AIR FORCE EXPERIMENT

Several problems arose in the Air Force study in connection with the manipulation of the experimental variable and the creation of the appropriate initial conditions. Some of these problems had appeared in earlier experiments but were more salient in the Air Force setting. First let us consider the manipulation of the chief independent variable of the experiment, and secondly the features of the situation designed to create the appropriate initial conditions.

Producing a clear discrimination on a single status characteristic without at the same time providing subjects with information about other status attributes of self and other is the chief problem. In the Air Force setting we created this discrimination by telling each subject in an individual interview prior to the problem solving phase of the experiment what the rank of his partner was. In the majority of instances this produced the appropriate beliefs in the subject's mind. However, when these subjects reached the room in which the problem solving took place and found they could not see their partner, who was located on the other side of a partition, several subjects began to doubt what had been told to them in the manipulation phase. In the post experimental interview there were comments such as: "There was nobody on the other side of that partition." Or, "No captain would give up his time for this kind of thing." Subjects who indicated that they were convinced that there was no one on the other side of the partition or that he was not a captain were excluded from the analysis as suspicious subjects. There were, however, a number of staff sergeants who reported in the post experimental interview that they had entertained such notions but were not

convinced and therefore were not excluded as suspicious. Hence, convincing the subject that there was a partner and that it was important to pay attention to that partner was a second problem that arose in this experimental situation.

A third problem concerns guaranteeing a uniform and invariant manipulation phase. In order to keep the experiment running smoothly and meet the contingencies of an air base schedule, several different experimenters conducted the manipulation phase. While the design of the experiment precluded experimenter bias in the problem solving phase, the use of different experimenters did not guarantee a uniform and invariant manipulation phase. Analyzing the data according to which experimenter conducted the manipulation phase suggests wide variability in the success of the manipulation according to which experimenter conducted that phase.

These considerations point to the desirability of a standardized procedure for manipulating states of the status characteristic in circumstances which permit each subject to see a "real live" partner. Of course, the subject cannot see too much "real live" other, since too much information concerning additional status attributes (besides the independent variable) would be given to him. For example, if our sergeants actually saw captains, they would be able to make inferences about many other things such as age, education, etc., from their encounter with the captain. In addition to the difficulty of actually using captains (the demands on captains at this particular air base would have made it very difficult to get the required number of captains to participate), the use of actual captains would have created a different situation for each experimental group that was run. A sergeant

participating with Captain Jones would, according to our theory, be in a different status situation from a sergeant participating with Captain Vishinski.

If subjects could briefly see their partner, we believe that many of their doubts about the presence of the other, the status of the other, and the importance of the other in solving the task would be eliminated. At the same time, presenting a brief exposure to a standardized other, such as would be the case with showing the subject his partner on video tape, would satisfy our requirement of an invariant manipulation of the status variable. Naturally, the success of video tape would depend upon the subject not realizing that it was a tape, that is, believing that he was witnessing a "live performance" from another location. In the next section we describe how closed circuit television was incorporated into our experimental situation.

INTRODUCTION OF CLOSED CIRCUIT TELEVISION

We introduced closed circuit television into this experimental situation in the course of a new study involving a different subject population as well as the manipulation of different status characteristics (see Cohen et al., 1969). The subject population consisted of girls between the ages of seventeen and twenty-two who were recruited from a temporary employment agency. The status characteristics employed in this study were either "race" or "education." Since we requested the employment agency to supply us with subjects who were not four-year college students, our theory argues that the status situation created when the subjects were told that their partner attended Stanford would be similar to that of the staff sergeant when told his partner was a captain. Similarly, since these subjects were all Caucasian, subjects

who believed that their partner was Negro would be in a similar status situation [insofar as race met the definition of a diffuse status characteristic (see Berger et al., 1966)]as were staff sergeants who believed their partner was an Airman Third Class.

In this study subjects were isolated in individual rooms, each equipped with a television camera focused on the subject's chair, a television monitor, a microphone, and an ICOM panel. Upon arriving at the experiment, the subject was immediately brought to this room and told that she would receive instructions on the television monitor. She was told that she would be working with a partner and that as soon as the partner arrived, the study would begin. (Although the design of the study did not call for an actual partner and in some cases subjects were run singly, it was much more efficient to run two subjects at a time.)

All experimental instructions and the experimental stimuli were presented by video tape. The subject's ostensible partner was also introduced by video tape.

The program the subject witnessed on her monitor began with the experimenter introducing himself as "Dr. Gordon" and thanking the subject for coming to the study. (The subjects were led to believe that "Dr. Gordon" was upstairs in another part of the laboratory and that when her partner had arrived, he would be signalled to begin.) Following a brief rationale for the study, "Dr. Gordon" introduced the subjects to each other. This was done in the following way: the subject's television monitor went blank for a short interval to simulate switching from one location to another, after which a confederate appeared on the screen. Only the head and shoulders

of the confederate was presented. The confederate had actually been taped in one of the subject rooms so that the credibility of the "live" other would be enhanced. Depending upon the experimental treatment, the confederate was either Caucasian or Negro; and again depending upon the experimental treatment, "Dr. Gordon" proceeded to ask three simple questions to which the confederate responded. In the low status condition, for example, the questions were: What is your name? What school do you attend? How long have you lived in this area? Following the confederate's responses to the last of these questions, the screen again went blank. The subject next saw herself on her own monitor and was asked the identical series of questions. The 45-second exposure of the taped confederate constituted the entire status manipulation. The 45-second exposure of herself to the subject greatly enhanced the credibility of the entire situation. Limiting the visual picture to head and shoulders, and limiting the oral responses to a few short questions, minimized the number of additional status cues available to the subject. Even the confederate's name was held constant across experimental treatments. Both our Caucasian and Negro confederates used the name "Diane Williams" as a relatively 'status neutral' name.

To remind the subject of her partner's status, as well as to further strengthen concern for working collectively with the partner, there was one additional exposure of the video taped confederate and the self on the television monitor. This occurred approximately two-thirds through the instructions when Dr. Gordon ostensibly spoke first to the confederate and then to the subject to determine whether they understood the use of ICOM. This exposure was carried out in exactly the same manner as the first exposure with

a blank screen to simulate switching. We felt that it was necessary to provide subjects with a rationale for the equipment in order to explain their role in the situation and to alleviate both fears and speculations concerning, for example, the television cameras. Dr. Gordon announced that we were interested in testing the effects of communication via modern communications networks on group problem solving tasks. This rationale gave the subjects an explanation for being physically isolated and also motivated them to pay attention to communications from their partner.

Attention to very minor details also enhanced the credibility of the entire situation. For example, at one point in the taped instructions, Dr. Gordon announced that he was pressing a button to clear the lights on all the ICOM panels, and the tape actually shows him pressing the button. Exactly at the moment that he does this on tape, a research assistant in the laboratory control room actually clears the lights on the subject's ICOM panel.

COMPARISONS OF VIDEO AND NON-VIDEO EXPERIMENTS

Although the Air Force study and the experiment using closed circuit television are not directly comparable, we can evaluate the use of video tape equipment by employing the data from a number of previous experiments that used the same experimental situation to test Status Characteristics Theory. The main reason that the video experiment and the Air Force study are not directly comparable is that the Air Force study contained only disagreement feedback to the subject during the problem solving phase of the experiment, while the video experiment interspersed three agreement feedbacks for every ten disagreements. Thus, differences between the two studies could

be attributed to the way in which the subject's feedback was manipulated. We mention this as a caution in interpreting our discussion. We believe, however, that the total range of our experience with this experimental situation rules out the presence of agreement feedback as the sole source of, for example, reduced suspicion. In other experiments which contained agreement feedback, the suspicion rate was never as low as in the video experiment.

With this caution in mind, let us consider the four problems we have already enumerated: (1) producing a clear discrimination on a single status characteristic without at the same time providing information about other status attributes; (2) convincing the subject that there was a partner and that it was important to pay attention to that partner; (3) guaranteeing a uniform and invariant manipulation phase and eliminating experimental bias in the problem solving phase; and (4) enhancing the credibility of the entire experiment. These problems are, of course, interrelated and were so treated in our earlier discussion, and it is only for convenience that we analytically separate them at this point.

First, the problem of discriminating between subject and partner on only one status dimension without providing other status cues is, as one might suspect, not completely resolved by the use of closed circuit television. It is quite obvious that being able to see one's partner provides the subject with more cues from which to make inferences than simply telling the subject that his partner is a captain. Hence, in the post-experimental interview, subjects did comment on occasion about the subject's dress, personal appearance, grooming, and facial expression. It is not clear, however, how much of this kind of response can be attributed to the cues on the video tape and

how much should be attributed to the subject's projections. Thus, for example, a subject described a Negro confederate in the post-experimental interview as being a good student because she had a serious expression on her face. On the other hand, subjects also described the Caucasian confederate as being extremely well dressed, sophisticated, and intelligent (projections consistent with the state of the status characteristic) whereas the actual confederate (also hired from the employment agency) was not particularly well dressed, not sophisticated, and lacked the amount of 'intelligence' usually ascribed to a Stanford student. These same sort of projections have occurred in our previous experiments as well, where the subject never saw her partner. Since the Theory of Status Characteristics and Expectation States asserts that these projections are part of what makes up a diffuse status characteristic, they should occur in all of our experimental situations. Nevertheless, it is clear that we are providing more information on which the subject can base inferences about status dimensions. How much more information we are providing and how serious this is cannot presently be evaluated. Furthermore, we have only begun to explore the different ways in which the confederate can be presented on tape so that it is possible that we may further reduce this information without sacrificing the other advantages of the closed circuit television. For example, in the experiment we have described we used a closeup shot of the head and shoulders of the confederate in presenting the status manipulation. A distant shot might accomplish our purpose without providing the detailed cues present in a closeup. One of the distinct advantages of this kind of equipment is that it is now economically feasible to test out such alternatives, since the cost of dubbing in variations from one master experimental tape is minimal.

The second of our problems listed concerned the requirement that subjects pay serious attention to their partner's behavior in performing the task. This is one of the initial conditions of the theory which we call collective orientation. In the Air Force study, 21 percent of the staff sergeants were classified as not collectively oriented. This 21 percent was in addition to those who had been excluded on grounds of suspicion. Since subjects classified as not collectively oriented fall outside the scope conditions of our theory, we would ordinarily exclude them from the analysis of the data. (In the Air Force study they were included in some analyses of the results in order to demonstrate the effects of the failure to meet this condition of the theory.) The proportion of subjects that withdrew from the video tape experimental situation, that is, who did not consider the feedback from their partner in making their final decision, was only 4 per cent. (The same coding system for collective orientation was used for both experiments.) In some of our previous studies the failure of this initial condition has been as high as 50 per cent, and subjects have repeatedly reported in our earlier studies that the inability to see their partner made the partner irrelevant. Hence, we believe that the brief exposure to the partner contributed to the much larger proportion of subjects who took the feedback seriously.

With respect to the third problem listed above, if we analyze the Air Force data according to which experimenter conducted the manipulation phase of the experiment, we get the following table:

TABLE I

Mean[1] and Variance of the Number of Changes of Initial Opinion According to Which Experimenter Conducted the Manipulation Phase (Air Force Study)

Experimenter	High-Low Treatment			Low-High Treatment		
	$\bar{X}$	σ^2	N	$\bar{X}$	σ^2	N
1	5.00	18.60	21	11.29	59.51	28
2	6.44	27.59	25	9.94	25.67	32
3	7.30	22.12	20	8.80	62.74	15
4	6.62	20.20	21	8.00	29.18	18

[1]The mean number of times a subject changes his "final decision" to correspond with his partner's "initial opinion."

Since only experimenters 1 and 2 produced sizeable differences between treatments and experimenters 1 and 3 produced large variances, we conclude that use of these four experimenters did not provide a uniform and invariant manipulation phase. That is, experimenters 1 and 2 were more 'successful' in manipulating differences between treatments than were experimenters 3 and 4. In addition, experimenters 1 and 3 produced more highly variable responses from the subjects they manipulated than did 2 and 4.

The video tape equipment allows us to present the identical manipulation phase to all subjects in a given experimental treatment. Furthermore, the identical problem solving phase could be presented to all subjects regardless of experimental treatment. The use of the tape meant that no more than two

host experimenters were necessary to conduct the post-experimental interviews, and only one person was needed to monitor the equipment during the course of the experiment. We guaranteed that everything presented to the subject except the introduction of the partner was identical for all subjects by producing a master tape containing all the instructions, the stimulus series, and containing two blank spots of one-minute duration each. Separate tapes for each experimental treatment were then made by copying the master and dubbing in the confederate that was appropriate for the particular experimental treatment--the "Stanford" confederate in the case of the low status treatment and the Negro confederate for the high status treatment. The use of this master tape precluded the host experimenter from biasing the results of the problem solving phase, and in addition provided a constant set of behaviors by the two confederates during the manipulation phase.

Finally, let us consider the credibility problem. In the Air Force study 25 per cent of the subjects were classified as suspicious of the experimental manipulations. In the television experiment the proportion was 5 per cent. In no previous study has the proportion of suspicious subjects gone below 15 per cent, even where agreement feedback was included with the express purpose of allaying suspicion (e.g., Moore, 1968, Seashore, 1967). Although we were originally concerned about the possibility of subjects becoming suspicious that their partner was on tape, and hence suspicious of the true nature of the experiment, not one subject suspected that their partner was a video-taped confederate. A small number of subjects stated that they thought the experimenter and/or the stimulus series were on tape but they were surprised when told that the exposure to their 'partner' was also part of the tape. One of our subjects was a part time

employee of the company from which we purchased the television equipment, and even she was not suspicious of the manipulation. According to the post-experimental interview, the only factor in the experimental setting which induced suspicion was the nearly continuous disagreement (40 disagreements out of 52 feedbacks to the subject). This feature of the situation, incidentally, is the only facet which is not altered by video tape presentation. It appears to us that the amount of suspicion generated by the preponderance of the disagreement feedbacks was considerably reduced by other video features of the situation.

UNEXPECTED ADVANTAGES OF TELEVISION

The use of the closed circuit equipment aided in the solution of all of the four basic problems described above. In addition, as we began to use the equipment, we perceived other unanticipated advantages. First, the physical isolation of subjects eliminated the possibility for them to ask questions or engage in other verbal behaviors which might bias the results of their partner. In the live situation, with both subjects sitting in the same room, any verbal outburst on the part of one was always heard by the other.

Second, experimenters who conducted the post-experimental interviews were able to monitor subjects during the experiment and thus perceive any building tension or hostility on the subject's part. Since one of the interviewer's tasks was to reduce such tension, the opportunity to watch subjects as they performed was of great help.

Third, in those cases where one subject did not appear for her appointment, we were able to conduct the experiment without a paid confederate. In

previous experiments, a "no-show" meant that either we had to place a confederate in the room with the subject who did arrive or else send the subject home. Both alternatives were expensive in terms of both time and money.

SUMMARY

The introduction of closed circuit television into a particular experimental situation that was designed to test the Theory of Status Characteristics and Expectation States was discussed in terms of some of the methodological problems confronted in live experimentation. Four such problems were enumerated. We concluded that the video equipment meets these problems by:

(1) producing a clear discrimination on a single status characteristic without at the same time providing too much information about other status attributes;

(2) convincing the subject that there was a partner and that it was important to pay attention to that partner;

(3) guaranteeing a uniform and invariant manipulation phase and eliminatin experimental bias in the problem solving phase;

and (4) enhancing the credibility of the entire experiment.

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