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ABSTRACT

The problem of the uncooperative experiment arises with the use of human subjects. Evidence shows that typical volunteer subjects have the following characteristics: better education, higher paying jobs, greater need for approval, lower authoritarianism, higher I.Q. score, and better adjustment to personal questions than nonvolunteers. Data also suggest that volunteers are more sociable, arousal seeking, younger, firstborn, and more unconventional than nonvolunteers. How representative, then, can volunteers be? Influences of experimenter on subject must also be considered. An experimenter can unknowingly communicate expectancies through transmission of cues. Professional experimenters should be carefully trained in the detection and control of artifact and expectancy-demand characteristics of experiments. There has also been discussion of using a more natural setting than the laboratory. Individual human characters and differences may lead to confusing results in an experiment despite all efforts to control behavior. (PB)

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A SEPARATE REALITY: THE PROBLEM OF UNCOOPERATIVE EXPERIMENTS*

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A SEPARATE REALITY: THE PROBLEM OF UNCOOPERATIVE EXPERIEMENTS

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Allerton Conference May 1973

Those who attempt to fashion reality or better, truth, by experiments, do so at the risk of placing boundaries around belief. Experiments, according to the devoted behavioral scientist, are an attempt at the understanding of natural phenomena via unnatural manipulation. It is interesting that we attempt to reveal the natural by distorting it by the use of treatments. Many of us earnestly believe that if we try hard enough and work long enough then the puzzle of human behavior can be elucidated. Some of us are skeptical since we cannot view the whole on a part-time basis and we are just humanists enough to believe in mysteries. Reductionism is under the greatest attack ever in it's history at the present time. The literature is alive with debate between a sea of mini-Skinners and a neo-urgent group of third force psychologists a la Rogers, Maslow, and company.

The question posed seems to be, "Who owns reality and how do we come to believe in it?" Michael Polanyi, a scientist and a philosopher, may have an answer to the dilemma. He argues in Personal Knowledge (11) that knowledge cannot be made wholly explicit since it is implicit and to a great extent, tacit. It is the knower that must involve himself, personally, if he is to know reality, and this is a profound subjective process. Objectivity is earnest but ineffective in dealing with the unexpected response, the infrequent stimulus and the "error variance" of human behavior. In this connection, Kuhn, in The Structure of Scientific Revolutions. (7) has pointed out a key mistake. Many who deal in something called science, especially those who work on similar problems, are guilty of sameness in method. Kuhn points out that the history of science is replete with research based on acceptable norms defined by exclusive world views. This amounts to the worship of paradigms as the only means to understanding natural phenomena.

The paradigm is selected by some dominant researcher, used to fashion acceptable information and then knighted to become the generation of reality. It can then be only when a new world view with its new paradigm comes into being (scientific revolution) that alternative realities can happen. In short, if your world view verified a theory, there would be two options open to you. One, you need not test the theory since you already believe it to be a representation of reality. Second, you might think it entertaining to propose a test and then manipulate it so that it just coincidentally verifies your theory. However, if your test happens to be an experiment which includes other living persons with their own world views, your outcome may hopelessly confuse you despite your best efforts at controlling behavior. This is the problem of uncooperative experiments.

Unlike the botanist, most of us deal with human beings who, with experimenters and their assistants, comprise large or small groups known as experiments or theatre companies, take your pick. The theatical element of these groups can be performed by either experimenters or their subjects. Elements of this essentially social interaction can produce various degrees of fact or artifact.

> "It is a wise experimenter who knows his artifact from his main effect and wiser still is the researcher who realizes that today's artifact is tomorrow's independent variable. One man's artifact may be another man's effect." (15)

The idea of artifact has been well known to occur in experiments but attention to it has been recent due to prompting by especially Campbell and Stanley[3]. Various issues such as privacy, deception, and the humanistic consciousness have spotlighted the study of artifacts, themselves. These artifacts or "rival hypotheses" have been explicated under threats to internal and external validity [3] including subject characteristics, experimenter bias, multi-variate interactions and the nature of controls.

There has, to date, been a good deal of investigation of human subjects spearheaded by Rosenthal and Rosnow[13]. It seems that in the past, subjects were, in fact, treated as objects or machines capable of a limited group of responses. If we can believe the accounts, Wundt called subjects "reagents" as if they were chemicals of one sort or another. The early psychophysicists actually trained subjects to react in certain ways. Even behaviorists of the most reductive sort do not train subjects to respond in experiments even though little attention is paid to the meaning components of response for the subject. The early German psychologists evidently practiced the worst form of I-it relationships between subject and experimenter [17].

Rosenthal and Rosnow[15] have carefully studied the volunteer subject. Volunteering is a reliable response, and the incentives may be money (widely used), for the "sake of science", expected behavior as a group norm or as a substitute for work (academic work, for example). It has been pointed out that volunteers who never show up are more like non-volunteers. In other words, those persons who are pseudo-volunteers are persons who give, for uncertain reasons, their consent to participate but who have no intention of doing so. A variety of characteristics of the typical volunteer subject have been uncovered and the evidence is enough to startle the researchers who have relied on volunteers for most of their research. The data is certainly not equivocal but it has been shown that volunteers are likely to be better educated, have a "better" occupation (money), have a greater need for approval, be lower in authoritarianism, have a better I. Q. score and adjust to personal questions better when compared with non-volunteers. Some confidence can be attached to volunteers being more socialable, arousal seeking, younger, firstborn, and unconventional than non-volunteers. The male volunteers tend to be interested in less conventional studies (task interests) whereas females are much less the risk takers.

Work has also been done to establish Jewishness and rural-urban subjects as variables important in volunteering[15].

The obvious question from this is how representative can volunteers be? Need psychologists get nervous when they are accused of developing a psychology of college sophmores who are, in fact, comprised of eager psychology majors? What about research in motor learning which is confined to physical education activity class volunteers? Motor learning researchers have not begun to cope with this issue if indeed it can be viewed as an issue. No research has been carried out using volunteers and non-volunteers to locate any differences in experimental outcomes. How can non-volunteers be used as subjects? One approach would be to sample from non-volunteers only after the initial volunteer had been removed. Sampling is sorely needed outside of age biased university populations. Community subject resource pools could be formed via data collection centers so that young and older ages could appear more regularly in our research.

Orne[10] has explored the notion of demand characteristics in terms of the obedience that subjects display in experiments. It seems that there can be a number of cues which may give a subject the opportunity to know what the experimental hypothesis is. These cues are suggested to be rumors from other subjects, information given during solicitation, personality of the experimenter, the setting of the experiment and overt/covert communications between all participants. Sigall, et. al.[16] suggests that subjects will try to define the experimental situation in order to make a favorable impression and to cooperate. Many subjects suffer from an "evaluation syndrome" which may make them fearful of being judged uncooperative. The dilemma here is that one cannot be sure if subjects are trying to "look good" or whether they are really cooperating with an hypothesis. Since demand characteristics will most certainly vary with the perceptions of subjects, replication of certain types of experiments may be difficult, if not impossible.

Some approaches to these problems may be to make demand cues independent variables, use post experimental surveys of subject attitudes and simulate the effects of the experimental variables on role playing subjects. The almost incredible studies by Milgram[8] give a good indication of how obedient subjects can be. These now famous studies utilized a wide range of subjects in terms of age, occupation, and sex. Ingenious deception-accomplic patterns were arranged within contrived learner-teacher relationships involving pseudo shock of low to intense strength. The great majority of "teachers" obeyed the experimenter's command to shock unsatisfactory "learner" performance to a frightening extent. The conclusion was that Americans enjoy authority (in the form of esteem for the experimenter), brutality and agression.

In summary, subjects who volunteer do display different characterestics from those who do not. There is a special category of subjects who volunteer but have no intention of ever showing up for the experiment. There is evidence to indicate that subjects will attempt either to interpret and support the hypothesis (es) and thereby "look good" or simply avoid what they perceive to be "bad behavior". Obedience to the wishes of an experimenter seems to be strong enough to cause subjects to act in a pseudo brutal fashion. Culturally based norms may have quite a bit to do with the obedience factor and current forms of consciousness in American may operate to make subjects less obedient to authority.

We have considered only a part of the persons in an experiment and experimenters may well be the most significant actors in the drama. Again, Rosenthal[13, 14] has provided information about the transmission of cues to subjects from the experimenter. Under the category of un-intended experimenter effects would be sex, anxiety, treatment of male and female subjects differently, subtle physical (movement) cues and observer effects (recording data). Intentional effects could include the above and the manner in which subjects were selected.

The experience and work load of an experimenter can also act to produce changes in the manner of dealing with subjects. The suggestion of a tape recorder to aid the experimenter in the control of expectancy cues is well known. It is quite possible that subjects can, in fact, influence an experimenter to the point where his expectations for a study may change and the conception of hypotheses as well. I suppose that it would be interesting if subjects were able to select volunteer experimenters from a pool of possible experimenters. Maybe, then the subtle matching of personalities would have taken place so that demand characteristics and apprehension would be minimized. What would be the differences between volunteer and non-volunteer experimenters?

A number of people believe that what you perceive about someone and expect is what will actually happen. Studies done on the so called pygmalion effect[14] are put forward to substantiate this idea. What is suggested is that an experimenter perceives the ability of a subject and both parties understand it and seek to do no more than that. In a classroom then, the teacher will teach to the level of judged ability and by manipulation may actually control academic progress. I feel that, at least in experiments, this phenomenon may be comparable since the contact or control of the experimenter-subject relationship is typically an evaluatively charged one.

Barber, T. and Silver, M.[1] offer a rebuttal to Rosenthal in that they doubt that the experimenter bias effect is clear or demonstrable. In this work, Barber and Silver criticize a number of studies purporting to show the bias effects claimed by Rosenthal. A list of expectancies that were claimed to transmit to subjects were paralinguistic cues, movement cues, misrecording and fabrication of data, and reinforcements. It was pointed out that some of these "biases" would not really affect behavior of subjects.

Generally, a call for more rigor through the use of careful multivariate designs, predetermined probabilities, reliability of instruments, presence of independent variables, and control groups was indicated. Questions of importance were raised. Which mode of experimenter expectancy (cue) transmission is most important? How do we know when the subject has accepted (if at all) the cue transmission? More recently, Barber[2] has addressed this problem once again. In this work, destinctions are made between investigators and experimenters. The investigator develops the experimental plan, design, and data analysis. effects attributable to him would be the following:

1. Paradigm effect-biased world view
2. Loose protocal effect-imprecision of experimental procedures
3. Analysis effect-changes in statistical analysis, i.e. .01 to .05
4. Fudging effect-reporting improper results

The experimenter conducts the study and may have the following effects:

1. Attributes-personal characteristics
2. Failure to follow protocal
3. Misrecording-data
4. Fudging-falsification effect
5. Unintentional expectancy-"Rosenthal effect"

Barber prefers the use of "pitfall" to expectancy effect and again discusses the difficulty of demonstrating Rosenthal's claim. Data must show that the experimenter, in fact, influenced the subjects by knowingly transmitting cues so that the subject was aware of this and then responded accordingly.

I believe that it is true that a clear demonstration of the experimenter expectancy effect has yet to be done, and Rosenthal indicates the paucity of good data here. Barber is a bit silly in his analysis, however, especially with the investigator-experimenter dichotomy and the griping over statistical elegance. In fact, Rosenthal is an able statistican.

The controversy is quite interesting and quite important and it only remains to create some ingenious studies where expectancy cues are named variables.

Very recently, due to the concern of researchers about the ethics of experiments coupled with the surge of interest in humanism, there has been some work using disclosure as an independent variable[12]. Two groups were identified: An "ethical" group was selected and was told (full disclosure) all about the study; a second group was "traditional" and naive. The experiment had to do with verbal conditioning. Findings indicated that the nonethical group showed significant positive conditioning (typical finding) while the ethical group displayed negative conditioning. Furthermore, the ethical group missed 50% of their appointments and took five times longer to test. Some speculations were that a loss of interest occurred or that the ethical dimension made subjects wary (disbelief). The last explanation was that disclosure was too obvious and subjects reacted in opposite manner thinking that this was the "good response". The conclusion was "are we ready to accept a qualitatively different ordering of reality which may result from changing our methods of investigating it?" Epstein, et. al.[5] was interested in the various responses of both experimenters and subjects to the "contract" between them for research. Questionnaires were given to 309 undergraduate students who responded both as experimenters and as subjects. The obligations of an experimenter are (in rank order):

1. clear instructions
2. safety of subjects
3. warning about danger
4. disclose nature of study
5. purpose of study
6. respect for subject
7. anonymity of subject
8. disclose results
9. be punctual
10. be honest

Subject obligations were:

1. Cooperation
2. Honesty
3. Punctuality
4. Seriousness

Another questionnaire was used to indicate sanctions for violations of the contract. If the experimenter violated, the subject would:

1. walk out of the study
2. report the experimenter
3. demand extra money or credit
4. nothing
5. law suit
6. refuse in future
7. refuse to cooperate in study

If the subject violated, the experimenter would:

1. withold payment or credit
2. bar subject from other participation
3. lower subject's grade
4. dismissal
5. nothing
6. find out reason for behavior

Two other groups of students were asked to rate all of the responses independently and this revealed that experimenter lateness, unclear instructions, no respect, electric shock, and poor protection from disclosure to others were the primary concerns.

While full disclosure does seem to be the ethical thing to do, there is a risk of destruction to a well developed research design and disinterest or even disbelief from subjects. Clearly, the nature of the research will dictate the terms of disclosure. In many universities these days, there are human research committees which are watchdogs over the welfare of subjects and act to screen all forms of research. The age of accountability has reached the laboratory.

One specific interest in motor learning which has not been explored and it is related to the experimenter-subject relationship is the interesting area of learner strategies for motor tasks. It would, indeed, be interesting if at the end of some specified practice period on a motor task, subjects were simply asked what strategies they had used to make whatever success they had happen. The scores themselves would have less meaning than the processes used to arrive at them. Here also, the subjects could be asked to talk about the role of the researcher as facilitator of learning. A series of studies might be done this way where the experimenter modifies his involvement so that he finally acts like a teacher after many strategies used by subject-learners are known. This would be a multiple replication design of the simplest sort at first but growing more complex as the subjects provided information about the processes (cognitive-motor) they were utilizing. Here then, is a way to collect important data in many settings and to check the influence of the experimenter effect on subjects by using post study inquiry.

The experiment is, then, a social contract where the volunteer subjects agree to play the role of subject and probably quite unnaturally, in order to help the experimenter test some hypothesis. It is understood that subjects are never neutral. In a recent book, Hendrick and Jones[6] argue that because of the possible delicate nature of behavior in experimental contexts and the probable confounding of both experimental and demand variables, the position of "professional experimenter" ought to be developed. This person would be carefully trained in the detection and control of artifact and expectancy-demand characteristics of experiments. Automation could replace some types of experimenters but just as I do not enjoy speaking to a doctor who dictates my symptoms to a machine, I suppose that subjects might not be interested in being directed by some Wizard of Oz bellowing out of a black box. "Blinds" have been in use for some time and may be an effective means of expectancy control especially when the hypothesis is shielded.

Another possibility is to have two experimenters work independently, one with the dependent variable and one with the independent variable. That way, the subjects may get the impression that they are involved in two experiments rather than one especially if the experimenters build elaborate schemes around the variables. A final possibility is to lie to your assistants. The experimenter tells one assistant that he will work with lower class children and the other assistant that he will work with high class children. What really happens is that each will be given samples of both high and low class children in order to check the expectancy effect that these class identified children automatically create.

There are no easy solutions to the problems discussed in this paper and indeed, we have not begun the careful work to denote which particular forms of artifact are most closely allied with research in motor behavior. It would appear that research in natural settings might offer the opportunity to get out from the artificaility of the laboratory where people are less comfortable and the guinea pig effect is strong. We have pleaded with each other before about working in natural settings and sacrificing controls for some authentic behavior assessed via unobtrusive measures. The threats to the findings of experiments described in this paper may serve as another stimulus for exploration of new research designs in natural settings. Our separate realities may remain separate if we continue to ignore the natural setting and neglect to employ a multitude of research strategies instead of a few sterotyped paradigms. The matter really rests with the world view that you care to hold.

By substituting the word experiment for smoke, the following quote summarizes my comments quite well:

> "'The difficulty of the ingredients,' he proceeded suddenly, 'makes the smoke mixture one of the most dangerous substances I know. No one can prepare it without being coached. It is deadly poisonous to anyone except the smoke's protegé. Pipe and mixture ought to be treated with intimate care.

And the man attempting to learn must prepare himself by leading a hard, quiet life. Its effects are so dreadful that only a very strong man can stand the smallest puff. Everything is terrifying and confusing at the outset, but every new puff makes things more precise. And suddenly the world opens up anew! Unimaginable! When this happens, the smoke has become one's ally and will resolve any question by allowing one to enter into inconceivable worlds. This is the smoke's greatest property, its greatest gift. And it performs its function without hurting in the least. I call the smoke a true ally!'" (4).

KL:gmg

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