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Problems in the Use of Survey Questions to Measure Public Opinion

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Sample interview surveys are frequently proposed and sometimes used as a way of studying public choices among alternatives. Questions in such surveys may be either "open" or "closed." Two experiments are reported that demonstrate the difficulty of inferring not only absolute levels but even relative orderings of public choices from either type of question, although such questions can be used more successfully to study temporal change or variations across social categories.

A SEEMINGLY SIMPLE WAY OF ASSESSing public opinion is to ask a random sample of the public to choose from among an explicit or implicit set of alternatives. The form of the question, however, can greatly affect such choices. One crucial distinction is whether respondents are expected to answer in their own words from alternatives they construct (open questions) or to select instead from a list of offered alternatives (closed questions). Very little research has been carried out on what effect this difference in question form makes in studying public opinion (*1*).

We present experimental evidence on the limitations of both open and closed questions in attempts to measure public choices. Closed questions are shown to sharply restrict frames of reference by focusing attention on the alternatives offered, no matter how impoverished those alternatives may be and no matter how much effort is made to offer respondents freedom to depart from them. Open questions are shown to exercise their own form of constraint, though in subtle ways that can easily be missed by investigators. The goal of the experiments is not to argue against either form of question, but to emphasize that question content is always based, whether recognized or not, on important assumptions about what should be included in respondent frames of reference. The unexamined question is not worth asking.

Limitations of closed questions. For this experiment we employed a frequently used open question, that about "the most important problem facing this country today" (Table 1) (*2*). This open question was asked to a random half of a national sample in the October 1986 Monthly Random Digit Dial Telephone Survey conducted by the Survey Research Center. The other half of the sample was asked a specially constructed closed version of the question (Table 1). The closed version listed four problems, each of which had been mentioned by less than 1% of the population in recent use of the open question by the Gallup organization. Respondents were not, however, forced to choose one of these rare alternatives, but were told as part of the question that "if you prefer, you may name a different problem as most important."

As expected, Table 1 shows that less than 3% of the national sample spontaneously mentioned any of the four "rare" problems to the open question. The categories most frequently coded were unemployment (17%), general economic problems (17%), threat of nuclear war (12%), and foreign affairs (10%), with the rest of the responses scattered among a dozen categories, including 5% "don't know."

On the closed form, however, 60% of the sample chose one of the four "rare" alternatives as "most important," only 40% taking the option of naming some other problem. Moreover, unemployment, the most frequently mentioned single problem on the open form, was given by only 6.2% of the respondents on the closed form.

On the basis of the closed question, one would conclude that the quality of public schools is what troubles Americans most, followed by the issue of pollution and then by abortion, whereas on the open question it is economic and international problems that loom largest, while the issues of education, pollution, and abortion are practically invisible.

Most readers will assume, as do we, that the issues mentioned on the open question give the better overall picture of American concerns and that the findings on the closed question are distorted by the constraint or inertia produced by listing the four problems as part of the question, despite the explicit provision offered to respondents to depart from them (*3*).

The limitations of open questions. The preceding results suggest that open questions provide a clearer picture of the concerns of a survey sample than do closed questions. Yet this ignores the possibility that open questions can also provide a constraining frame of reference. The following experiment was carried out to test this assumption as clearly as possible.

The experiment was suggested in the course of another survey. Respondents had been asked to name one or two of the most important "national or world event (events) or change (changes)" during the past 50 years that came to mind. To this open question, the most commonly given responses had to do with World War II and the Vietnam War, but, as intended, many answers referred to broader social changes, such as the civil rights movement or to scientific and technological developments, such as space exploration. Hardly mentioned at all, however, was the development of the computer, which might not have seemed surprising except that references to computers occurred frequently in responses to later questions.

This discrepancy suggested that computers had made a considerable impact on the public, but that the "national or world event or change" open question tended unwitting-

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Table 1. Offering rare responses. The open question was, "What do you think is the most important problem facing this country today?" The closed question was, "Which of the following do you think is the most important problem facing this country today—the energy shortage, the quality of public schools, legalized abortion, or pollution—or if you prefer, you may name a different problem as most important."

Category	Response (%)			
	Open question		Closed question	
The energy shortage	0.0		5.6	
The quality of public schools	1.2	2.4	32.0	60.0
Legalized abortion	0.0		8.4	
Pollution	1.2		14.0	
All other responses	93.0		39.3	
Don't know	4.7		0.6	
Total	100 (n = 171)		100 (n = 178)	

ly to preclude such responses. The question probably focuses thoughts on the broad political domain, and even where this is not the case, as with space exploration responses, dramatic incidents like the moon landing may have been necessary to yield a large response category.

To test the hypothesis that computer-related responses would be much more common if offered as an explicit choice, we included "the invention of the computer" as an alternative to a closed question, as shown in Table 2, along with the four categories that had been most commonly given to the open question in the earlier study. This closed question was administered to a random half of a national monthly telephone sample in July and August 1986, the other half receiving an exact replication of the original open question (*4*).

It must be emphasized that the closed question in this case was quite differently constructed than the closed "most important problem" question in Table 1, since the latter had offered only rarely given open categories. In the present instance, exactly the opposite was done: with the exception of the computer category, the alternatives offered as part of the closed question were based on the most frequently given open responses. Previous research indicates that such categories will increase in size when read as part of a closed question, but that their ranking will not change appreciably relative to one another (*5*). In the present experiment, however, we hypothesized that "the invention of the computer" would increase in frequency much more than other alternatives when offered as part of a closed question, because many respondents would realize that it is a legitimate response to the question. The data in Table 2 strongly support this hypothesis: on the open question, the invention of the computer is the least frequently mentioned (1.4%) of the five categories that are our concern; on the closed question it is given by 30% of the public, becoming the modal response for the entire sample. Moreover, the statistically significant likelihood-ratio chi square for the question form by five category table (χ^2 = 54.2, df = 4, $P < 0.001$) is based almost entirely on the contrast of the computer response with all others (χ^2 = 50.3, df = 1); when that row is omitted the remaining two by four table no longer approaches significance (χ^2 = 3.9, df = 3).

There is further evidence that the process revealed in Table 2 is different from that in Table 1. In the previous experiment, despite the impressive constraint produced by the listing of rare categories in the closed question, nearly 40% of the sample did choose to go outside the listed alternatives. In the present experiment virtually everyone (94%) was satisfied to select one of the listed choices, which is consistent with our having deliberately included the four that are most frequently given spontaneously plus one that we hypothesized to be a potentially preferred choice once it is made legitimate and equally salient. It is also noteworthy that the space exploration category did not show a jump similar to the computer alternative on the closed form, indicating that more than a shift of emphasis from political to nonpolitical answers was involved. More likely it was a shift from changes that reach public consciousness through dramatic incidents (for example, the televised moon landing) to changes that are more gradual and cumulative in impact (the computer) (*6*).

These two experiments demonstrate how misleading univariate distributions can be in representing public choices. On the one hand, respondents tend to choose among the alternatives offered to them, even where they are explicitly instructed that this is not necessary. If an investigator wishes to know how the public ranks all alternatives that come to mind, the initial ranking must be provided in a free answer situation. This in itself is not an insurmountable problem, since it is possible to proceed in a two-step sequence: first, obtain spontaneous expressions by the public, then use these to construct a set of closed choices (*7*).

However, this strategy assumes that answers provided to an initial open question do represent what respondents have "in mind." This may be the case in terms of the respondent's interpretation of the wording of the open question, but not in terms of the investigator's goals. Our second experiment showed that the wording of the open question may constrain respondents by not legitimating types of responses that the investigator had intended to include. There is no simple way around such a constraint, since investigators themselves are likely to be unaware that respondents are unaware of the possibility of giving such responses. In studies that are attempting to determine frames of reference, there is no substitute for repeated efforts to learn in a variety of loosely

Table 2. Omitting possible responses. The open question was, "There have been a lot of national and world events and changes over the past 50 years—say from 1930 right up until today. Would you mention one or two such events or changes that seem to you to have been especially important. There aren't any right or wrong answers to the question—just whatever national or world event or change over the past 50 years that comes to mind as important to you." The closed question was, "There have been a lot of national and world events and changes over the past 50 years—say from about 1930 right up until today. Would you choose from the list I read the event or change that seems to you to have been the most important, or if you wish you can name an event or change different from the ones I mention. There aren't any right or wrong answers to the question—just whatever national or world event or change over the past 50 years that seems most important to you. Here is the list: World War II, the exploration of space, the assassination of John F. Kennedy, the invention of the computer, or the Vietnam War?"

Category	Response (%)			
	Open question		Closed question	
World War II	14.1		22.9	
Exploration of space	6.9		15.8	
Assassination of John F. Kennedy	4.6	37.1	11.6	94.3
Invention of the computer	1.4		29.9	
The Vietnam War	10.1		14.1	
All other responses	52.2		5.4	
Don't know	10.6		0.3	
Total	100 (n = 347)		100 (n = 354)	

structured ways what respondents have "on their minds."

There is one practical solution to the problems pointed to in this report. The solution requires giving up the hope that a question, or even a set of questions, can be used to assess preferences in an absolute sense or even the absolute ranking of preferences and relies instead on describing changes in responses over time and differences across social categories (*3*). The same applies to all survey questions, including those that seem on their face to provide a picture of public opinion (*8*).

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1. See S. Sudman and N. M. Bradburn [*Asking Questions* (Jossey-Bass, San Francisco, 1982)] for a discussion of the open-closed distinction. H. Schuman and S. Presser [*Questions and Answers in Attitude Surveys* (Academic Press, New York, 1981)] and a few earlier but marginally relevant reports cited therein provide partial exceptions to the statement about lack of research for questions about public opinion.
2. Although relatively simple questions were used in this investigation in order to provide precision in results, there is little reason to think that the basic conclusions will differ when questions are more complex.
3. We cannot compare correlates of the four focal issues on the two question forms, since there are too few cases in those categories on the open form to allow comparison. Considering the closed form alone, there is no significant relation between education and choosing one of the listed alternatives rather than giving an unlisted problem. However, among the four closed alternatives taken as a set, there are statistically significant associations with education, for example, choice of quality of public schools increases with respondent educational level.
4. The closed question was itself divided into five randomly administered forms, each with a different ordering of the five alternatives. No significant order effect was discovered in this sub-experiment, though such effects occur for some questions; see H. Schuman and S. Presser in (*1*).
5. H. Schuman, J. Ludwig, J. Krosnick, *Public Opin. Q.* **50**, 519 (1986).
6. Although we cannot compare correlates of the computer response on the two question forms—there are only five such cases on the open form—the closed form does yield a highly significant correlate for the computer response versus all other closed choices. "The invention of the computer" was chosen especially by the youngest (18 to 29) of four age categories. Closer study of the two forms suggests that young people tended to give space-related responses to the open question, but shifted to the computer response on the closed form.
7. There is evidence that such a sequence can produce close correspondence between open and closed question distributions. See Schuman and Presser in (*1*) and Schuman, Ludwig, and Krosnick (*5*).
8. Exactly this point was made explicitly in one of the first major uses of survey data [S. A. Stouffer *et al.*, *The American Soldier: Adjustment During Army Life* (Princeton Univ. Press, Princeton, NJ, 1949)]. Of course, all such comparisons assume that the form of the question has been held constant.

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Lipoprotein Uptake by Neuronal Growth Cones in Vitro

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Macrophages that rapidly enter injured peripheral nerve synthesize and secrete large quantities of apolipoprotein E. This protein may be involved in the redistribution of lipid, including cholesterol released during degeneration, to the regenerating axons. To test this postulate, apolipoprotein E–associated lipid particles released from segments of injured rat sciatic nerve and apolipoprotein E–containing lipoproteins from plasma were used to determine whether sprouting neurites, specifically their growth cones, possessed lipoprotein receptors. Pheochromocytoma (PC12) cells, which can be stimulated to produce neurites in vitro, were used as a model system. Apolipoprotein E–containing lipid particles and lipoproteins, which had been labeled with fluorescent dye, were internalized by the neurites and their growth cones; the unmetabolized dye appeared to be localized to the lysosomes. The rapid rate of accumulation in the growth cones precludes the possibility of orthograde transport of the fluorescent particles from the PC12 cell bodies. Thus, receptor-mediated lipoprotein uptake is performed by the apolipoprotein B,E(LDL) (low density lipoprotein) receptors, and in the regenerating peripheral nerve apolipoprotein E may deliver lipids to the neurites and their growth cones for membrane biosynthesis.

INJURED MAMMALIAN PERIPHERAL nerves can regenerate for long distances through a distal sheath populated by Schwann cells, macrophages, and other nonneuronal "sheath" cells (*1*). When transplanted into injured central nervous system (CNS) pathways, these peripheral nerve sheaths can support growth of normally nonregenerating CNS axons (*2*). Attention has therefore been directed at identifying factors present in the injured peripheral nerve that might initiate or facilitate the growth of the damaged fibers (*3*). One candidate is a soluble protein of M_r 37,000. The rate of synthesis of this protein increases dramatically after injury to an adult rat sciatic nerve; this protein can account for nearly 5% of the total protein secreted by the nerve 3 weeks after injury (*4*). This protein, identified as apolipoprotein E (apo-E) (*5*), is produced by the macrophages that enter the damaged nerve within 3 days of injury (*6*).

Apolipoprotein E is associated with various plasma lipoproteins, including high density lipoproteins (HDL), and participates in the transport of cholesterol into various cells. It serves as a ligand for the apo-B,E(LDL) (low density lipoprotein) receptor, which mediates the uptake of the apo-E–containing lipoproteins and provides cells with lipids for various metabolic pathways, including membrane biosynthesis (*7*). Thus, apo-E may participate in the redistribution of lipids to various cells in neural tissue through similar mechanisms.

After nerve injury, the cholesterol released from myelin membranes is reused in the reassembly of both myelin and axonal membranes in the regenerating nerve (*8*). It has been suggested (*5, 9*) that apo-E secreted by macrophages in the injured nerve provides the mechanism for lipid reutilization by facilitating the production of apo-E–containing lipoproteins that could be bound and internalized via lipoprotein receptors on both Schwann cells and regenerating axons. We have asked whether the secreted apo-E in injured nerve is complexed with lipid, whether these apo-E complexes and apo-E–containing plasma lipoproteins can be taken up by neuronal growth cones, and whether the uptake is mediated by apo-B,E(LDL) receptors.

Conditioned medium containing apo-E was obtained from cultures of injured segments of rat sciatic nerves 2 weeks after crush injury, as described (*4*). Newly synthesized and secreted apo-E was obtained by incubating the injured segments with [^{35}S]methionine. To determine whether both the accumulated and newly synthesized apo-E were associated with lipid, the conditioned medium was subjected to density-gradient ultracentrifugation (Fig. 1). SDS–

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