

Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence

Charles G. Lord, Lee Ross, and Mark R. Lepper
Stanford University

People who hold strong opinions on complex social issues are likely to examine relevant empirical evidence in a biased manner. They are apt to accept "confirming" evidence at face value while subjecting "disconfirming" evidence to critical evaluation, and as a result to draw undue support for their initial positions from mixed or random empirical findings. Thus, the result of exposing contending factions in a social dispute to an identical body of relevant empirical evidence may be not a narrowing of disagreement but rather an increase in polarization. To test these assumptions and predictions, subjects supporting and opposing capital punishment were exposed to two purported studies, one seemingly confirming and one seemingly disconfirming their existing beliefs about the deterrent efficacy of the death penalty. As predicted, both proponents and opponents of capital punishment rated those results and procedures that confirmed their own beliefs to be the more convincing and probative ones, and they reported corresponding shifts in their beliefs as the various results and procedures were presented. The net effect of such evaluations and opinion shifts was the postulated increase in attitude polarization.

The human understanding when it has once adopted an opinion draws all things else to support and agree with it. And though there be a greater number and weight of instances to be found on the other side, yet these it either neglects and despises, or else by some distinction sets aside and rejects, in order that by this great and pernicious predetermination the authority of its former conclusion may remain inviolate. (Bacon, 1620/1960)

Often, more often than we care to admit, our attitudes on important social issues reflect only our preconceptions, vague impressions, and untested assumptions. We respond to social policies concerning compensatory education, water fluoridation, or energy conser-

vation in terms of the symbols or metaphors they evoke (Abelson, 1976; Kinder & Kiewiet, Note 1) or in conformity with views expressed by opinion leaders we like or respect (Katz, 1957). When "evidence" is brought to bear it is apt to be incomplete, biased, and of marginal probative value—typically, no more than a couple of vivid, concrete, but dubiously representative instances or cases (cf. Abelson, 1972; Nisbett & Ross, in press). It is unsurprising, therefore, that important social issues and policies generally prompt sharp disagreements, even among highly concerned and intelligent citizens, and that such disagreements often survive strenuous attempts at resolution through discussion and persuasion.

An interesting question, and one that prompts the present research, involves the consequences of introducing the opposing factions to relevant and objective data. This question seems particularly pertinent for contemporary social scientists, who have frequently called for "more empirically based" social decision making (e.g., Campbell, 1969). Very likely, data providing consistent and

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Requests for reprints should be sent to any of the authors, Department of Psychology, Stanford University, Stanford, California 94305.

unequivocal support for one or another position on a given issue can influence decision makers and, with sufficiently energetic dissemination, public opinion at large. But what effects can be expected for more mixed or inconclusive evidence of the sort that is bound to arise for most complex social issues, especially where full-fledged experiments yielding decisive and easy-to-generalize results are a rarity? Logically, one might expect mixed evidence to produce some moderation in the views expressed by opposing factions. At worst, one might expect such inconclusive evidence to be ignored.

The present study examines a rather different thesis—one born in an analysis of the layperson's general shortcomings as an intuitive scientist (cf. Nisbett & Ross, in press; Ross, 1977) and his more specific shortcomings in adjusting unwarranted beliefs in the light of empirical challenges (cf. Ross, Lepper, & Hubbard, 1975). Our thesis is that belief polarization will *increase*, rather than decrease or remain unchanged, when mixed or inconclusive findings are assimilated by proponents of opposite viewpoints. This "polarization hypothesis" can be derived from the simple assumption that data relevant to a belief are not processed impartially. Instead, judgments about the validity, reliability, relevance, and sometimes even the meaning of proffered evidence are biased by the apparent consistency of that evidence with the perceiver's theories and expectations. Thus individuals will dismiss and discount empirical evidence that contradicts their initial views but will derive support from evidence, of no greater probativeness, that seems consistent with their views. Through such biased assimilation even a random set of outcomes or events can appear to lend support for an entrenched position, and both sides in a given debate can have their positions bolstered by the same set of data.

As the introductory quotation suggests, the notions of biased assimilation and resulting belief perseverance have a long history. Beyond philosophical speculations and a wealth of anecdotal evidence, considerable research attests to the capacity of preconceptions and initial theories to bias the consider-

ation of subsequent evidence, including work on classic Einstellung effects (Luchins, 1942, 1957), social influence processes (Asch, 1946), impression formation (e.g., Jones & Goethals, 1971), recognition of degraded stimuli (Bruner & Potter, 1964), resistance to change of social attitudes and stereotypes (Abelson, 1959; Allport, 1954), self-fulfilling prophecies (Merton, 1948; Rosenhan, 1973; Snyder, Tanke, & Berscheid, 1977), and the persistence of "illusory correlations" (Chapman & Chapman, 1967, 1969). In a particularly relevant recent demonstration, Mahoney (1977) has shown that trained social scientists are not immune to theory-based evaluations. In this study, professional reviewers' judgments about experimental procedures and resultant publication recommendations varied dramatically with the degree to which the findings of a study under review agreed or disagreed with the reviewers' own theoretical predilections.

Thus, there is considerable evidence that people tend to interpret subsequent evidence so as to maintain their initial beliefs. The biased assimilation processes underlying this effect may include a propensity to remember the strengths of confirming evidence but the weaknesses of disconfirming evidence, to judge confirming evidence as relevant and reliable but disconfirming evidence as irrelevant and unreliable, and to accept confirming evidence at face value while scrutinizing disconfirming evidence hypercritically. With confirming evidence, we suspect that both lay and professional scientists rapidly reduce the complexity of the information and remember only a few well-chosen supportive impressions. With disconfirming evidence, they continue to reflect upon any information that suggests less damaging "alternative interpretations." Indeed, they may even come to regard the ambiguities and conceptual flaws in the data *opposing* their hypotheses as somehow suggestive of the fundamental *correctness* of those hypotheses. Thus, completely inconsistent or even *random* data—when "processed" in a suitably biased fashion—can maintain or even reinforce one's preconceptions.

The present study was designed to examine both the biased assimilation processes that

may occur when subjects with strong initial attitudes are confronted with empirical data concerning a controversial social issue and the consequent polarization of attitudes hypothesized to result when subjects with differing initial attitudes are exposed to a common set of "mixed" experimental results. The social controversy chosen for our investigation was the issue of capital punishment and its effectiveness as a deterrent to murder. This choice was made primarily because the issue is the subject of strongly held views that frequently do become the target of public education and media persuasion attempts, and has been the focus of considerable social science research in the last twenty years. Indeed, as our basic hypothesis suggests, contending factions in this debate often cite and derive encouragement from the same body of inconclusive correlational research (Furman v. Georgia, 1972; Sarat & Vidmar, 1976; Sellin, 1967).

In the present experiment, we presented both proponents and opponents of capital punishment first with the results and then with procedural details, critiques, and rebuttals for two studies dealing with the deterrent efficacy of the death penalty—one study confirming their initial beliefs and one study disconfirming their initial beliefs. We anticipated biased assimilation at every stage of this procedure. First, we expected subjects to rate the quality and probative value of studies confirming their beliefs on deterrent efficacy more highly than studies challenging their beliefs. Second, we anticipated corresponding effects on subjects' attitudes and beliefs such that studies confirming subjects' views would exert a greater impact than studies disconfirming those views. Finally, as a function of these assimilative biases, we hypothesized that the net result of exposure to the conflicting results of these two studies would be an increased polarization of subjects' beliefs on deterrent efficacy and attitudes towards capital punishment.

Method

Subjects

A total of 151 undergraduates completed an in-class questionnaire that included three items on capital punishment. Two to four weeks later, 48 of these

students were recruited to participate in a related experiment as partial fulfillment of a course requirement. Twenty-four were "proponents" who favored capital punishment, believed it to have a deterrent effect, and thought most of the relevant research supported their own beliefs. Twenty-four were "opponents" who opposed capital punishment, doubted its deterrent effect, and thought that the relevant research supported *their* views.

Procedure

Upon entering the experiment, mixed groups of proponents and opponents were seated at a large table. The experimenter, blind to subjects' attitudes, told them that they would each be asked to read 2 of 20 randomly selected studies on the deterrent efficacy of the death penalty and asked them to use their own "evaluative powers" in thinking about what the author(s) of the study did, what the critics had to say, and whether the research provided support for one side or the other of this issue.

The experimenter next showed subjects a set of 10 index cards, each containing a brief statement of the results of a single study. Each subject was asked to choose one card and read it silently. In reality, all 10 cards in any one session were identical, providing either prodeterrent information, for example:

Kroner and Phillips (1977) compared murder rates for the year before and the year after adoption of capital punishment in 14 states. In 11 of the 14 states, murder rates were *lower* after adoption of the death penalty. This research supports the deterrent effect of the death penalty.

or antideterrent information, for example:

Palmer and Crandall (1977) compared murder rates in 10 pairs of neighboring states with different capital punishment laws. In 8 of the 10 pairs, murder rates were *higher* in the state *with* capital punishment. This research opposes the deterrent effect of the death penalty.

To control for order effects, half of the proponents and half of the opponents saw a "prodeterrence" result first, and half saw an "antideterrence" result first. The studies cited, although invented specifically for the present study, were characteristic of research found in the current literature cited in judicial decisions.

After reading one of these "result cards," subjects answered two sets of questions, on 16-point scales, about changes in their attitudes toward capital punishment (from -8 = more opposed, to 8 = more in favor) and their beliefs about the deterrent efficacy of the death penalty (from -8 = *less* belief that capital punishment has a deterrent effect, to 8 = *more* belief in the deterrent effect). One set of questions examined change occasioned by the single piece of information they had just finished reading; a second set of questions assessed the cumulative change

produced by all of the materials read since the start of the experiment.¹

Next the experimenter distributed detailed research descriptions bearing code letters corresponding to those on the result cards. The descriptions gave details of the researchers' procedure, reiterated the results, mentioned several prominent criticisms of the study "in the literature," listed the authors' rebuttals to some of the criticisms and depicted the data both in table form and graphically. After reading this more detailed description and critique of the first study, subjects were asked to judge how well or poorly the study had been conducted (from -8 = very poorly done, to 8 = very well done), and how convincing the study seemed as evidence on the deterrent efficacy of capital punishment (from -8 = completely unconvincing, to 8 = completely convincing).² Following this evaluation, subjects were asked to write why they thought the study they had just read did or did not support the argument that capital punishment is a deterrent to murder, and then to answer a second set of attitude and belief change questions on the effects of the description alone and the effects of all experimental materials (i.e., the results and subsequent description and critique) up to that point in time.

Following completion of these questions, the entire procedure was repeated, with a second fictitious study reporting results opposite to those of the first. Again, subjects initially received only a brief description of the results of this second study but were then provided with a detailed presentation of the procedure, results, and critiques. As before, subjects were asked to evaluate both the impact of each single piece of evidence and the impact of all experimental materials up to that point in the experiment on their attitudes toward capital punishment and their beliefs concerning its deterrent efficacy.

To control for possible differences in the inherent plausibility of the two studies, two sets of materials were employed that interchanged the ostensible results of the two invented experiments. The overall design was thus completely counterbalanced with respect to subjects' initial attitudes, order of confirming vs. disconfirming evidence, and the association of the "before-after" vs. "adjacent states" designs with positive or negative results.³ At the end of the procedure, subjects were carefully debriefed concerning the fictitious nature of the studies and were asked not to reveal this deception to others. In addition to insuring that subjects understood the fictional nature of the experimental materials, this debriefing included discussion of the processes underlying the assimilation of evidence to previous theories and reassurance that a skeptical reaction to poorly designed research is often a praiseworthy cognitive response.

Results

Evaluations of the Two Studies

Our first hypothesis was that subjects holding different initial positions would differ-

entially evaluate the quality and "convincingness" of the same empirical studies and findings. The relevant evaluations, presented in Table 1, revealed strong support for the hypothesized bias in favor of the study that confirmed subjects' initial attitudes.

A two-way analysis of variance (Initial Attitude $\times$ Order of Presentation) on the differences between ratings of convincingness of the prodeterrence and antideterrence studies yielded only a main effect of initial attitude, $F(1, 44) = 32.07, p < .001$. Proponents

¹ Since most of our subjects had reported initial positions at, or very close to, the ends of the attitude and belief scales used for selection purposes, our initial plan to assess attitude polarization—in terms of difference scores assessing changes in subjects' attitudes and beliefs on these same scales from these initial measures to the completion of the experiment—proved impossible. As a substitute, we employed three sorts of measures to assess attitude change. First, we asked subjects, after each new piece of information, to indicate any changes in their attitudes and beliefs occasioned by that single piece of information. Second, we asked subjects, at these same points, to report on "cumulative" changes in their attitudes and beliefs since the start of the experiment. Third, subjects were asked to keep "running records" of their attitudes and beliefs on enlarged versions of the scales initially used for selection purposes. Although all of these measures individually raise some problems, the congruence of data across these different measurement devices gives us some confidence concerning the results reported. Indeed, because the results obtained on the "running record" measure so completely parallel the findings obtained on the cumulative change question depicted in Figures 1 and 2, in terms of both the array of means and the obtained significance levels, the data from this measure will not be reported separately.

² Subjects were also asked, at this point, whether they thought the researchers had favored or opposed the death penalty and whether they thought an unbiased consideration should lead one to treat the study as evidence for or against capital punishment. Analyses on the first question showed only that subjects believed the researchers' attitudes to coincide with their stated results. Analyses on the second question proved wholly redundant with those presented for the "convincingness" and "well done" questions.

³ Preliminary analyses were conducted to see if the particular association of positive versus negative results with either the before-after or adjacent-states designs would affect the results obtained. There were no significant effects or interactions involving this variation in stimulus materials; hence, the data were collapsed across this factor.

Table 1
*Evaluations of Prodeterrence and Antideterrence
 Studies by Proponents and Opponents of
 Capital Punishment*

Study	Proponents	Opponents
Mean ratings of how well the two studies had been conducted		
Prodeterrence	1.5	-2.1
Antideterrence	-1.6	-.3
Difference	3.1	-1.8
Mean ratings of how convincing the two studies were as evidence on the deterrent efficacy of capital punishment		
Prodeterrence	1.4	-2.1
Antideterrence	-1.8	.1
Difference	3.2	-2.2

Note. Positive numbers indicate a positive evaluation of the study's convincingness or procedure. Negative numbers indicate a negative evaluation of the study's convincingness or procedure.

regarded the prodeterrence study as significantly more convincing than the antideterrence study, $t(23) = 5.18$, $p < .001$,⁴ regardless of whether it was the "before-after" design that suggested the efficacy of capital punishment and the "adjacent states" design that refuted it, or vice versa. Opponents, by contrast, regarded the prodeterrence study as significantly less convincing than the antideterrence study, $t(23) = -3.02$, $p < .01$, again irrespective of which research design was purported to have produced which type of results. The same was true of the difference between ratings of how well done the two studies had been, $F(1, 44) = 33.52$, $p < .001$.⁵ As above, proponents found the prodeterrence study to have been better conducted than the antideterrence study, $t(23) = 5.37$, $p < .001$, whereas opponents found the prodeterrence study to have been less well conducted, $t(23) = -2.80$, $p < .05$. As one might expect, the correlation between the "convincingness" and "well done" questions was substantial, $r = .67$, $p < .001$.

These differing opinions of the quality of the two studies were also reflected in subjects' written comments. At the risk of opening ourselves to a charge of "biased assimilation," we present a set of subjects' comments—

selected for dramatic effect but not unrepresentative in content—in Table 2. As these comments make clear, the same study can elicit entirely opposite evaluations from people who hold different initial beliefs about a complex social issue. This evidence of bias in subjects' evaluations of the quality and convincingness of the two studies is consistent with the biased assimilation hypothesis and sets the stage for testing our further predictions concerning attitude and belief polarization.

Overall Attitude Polarization

Given such biased evaluations, our primary hypothesis was that exposure to the "mixed" data set comprised by the two studies would result in a further polarization of subjects' attitudes and beliefs rather than the convergence that an impartial consideration of these inconclusive data might warrant. To test this hypothesis requires a consideration

⁴ All p values reported in this article are based on two-tailed tests of significance.

⁵ In order to examine possible main effects of either study direction or initial attitude on subjects' ratings of how convincing and how well done the studies were—findings that would not be portrayed in the difference score analysis reported—a three-way analysis of variance (Initial Attitude $\times$ Order of Presentation $\times$ Direction of Study) was also performed. There were no main effects of study direction on either measure. A main effect of initial attitude—indicating that opponents evaluated the total set of evidence more negatively than did proponents—proved significant for the "well done" question, $F(1, 44) = 4.69$, $p < .05$, but not for the "convincing" question, $F(1, 44) = 1.53$, ns .

⁶ The term *mixed*, we should emphasize, refers to the fact that one study yielded evidence confirming the deterrent efficacy of the death penalty, whereas the other study yielded evidence disconfirming such efficacy (with appropriate counterbalancing of purported procedures and purported results). Subjects, regardless of initial position, clearly recognized this discrepancy between results, as will be apparent in our analyses of their responses to the simple statements of the study's main findings. We do not mean to imply that the subjects "phenomenologically" judged the two studies to be of equal probative value; indeed, as indicated in the preceding discussion, identical procedures were clearly judged to differ in their probativeness depending on the congruity between the study's outcomes and the subject's initial beliefs.

Table 2

Selected Comments on Prodeterrence and Antideterrence Studies by Proponents and Opponents of Capital Punishment

Subject	Comments on	
	Prodeterrence study	Antideterrence study
Set 1 materials		
S8 Proponent	"It does support capital punishment in that it presents facts showing that there is a deterrent effect and seems to have gathered data properly."	"The evidence given is relatively meaningless without data about how the overall crime rate went up in those years."
S24 Proponent	"The experiment was well thought out, the data collected was valid, and they were able to come up with responses to all criticisms."	"There were too many flaws in the picking of the states and too many variables involved in the experiment as a whole to change my opinion."
S35 Opponent	"The study was taken only 1 year before and 1 year after capital punishment was reinstated. To be a more effective study they should have taken data from at least 10 years before and as many years as possible after."	"The states were chosen at random, so the results show the average effect capital punishment has across the nation. The fact that 8 out of 10 states show a rise in murders stands as good evidence."
S36 Opponent	"I don't feel such a straightforward conclusion can be made from the data collected."	"There aren't as many uncontrolled variables in this experiment as in the other one, so I'm still willing to believe the conclusion made."
Set 2 materials		
S14 Proponent	"It shows a good direct comparison between contrasting death penalty effectiveness. Using neighboring states helps to make the experiment more accurate by using similar locations."	"I don't think they have complete enough collection of data. Also, as suggested, the murder rates should be expressed as percentages, not as straight figures."
S15 Proponent	"It seems that the researchers studied a carefully selected group of states and that they were careful in interpreting their results."	"The research didn't cover a long enough period of time to prove that capital punishment is not a deterrent to murder."
S25 Opponent	"The data presented are a randomly drawn set of 10. This fact seems to be the study's biggest problem. Also many other factors are not accounted for which are very important to the nature of the results."	"The murder rates climbed in all but two of the states after new laws were passed and no strong evidence to contradict the researchers has been presented."
S38 Opponent	"There might be very different circumstances between the sets of two states, even though they were sharing a border."	"These tests were comparing the same state to itself, so I feel it could be a fairly good measure."

of subjects' final attitudes, after exposure to both studies and related critiques and rebuttals, relative to the start of the experiment.

The relevant data provide strong support for the polarization hypothesis. Asked for their final attitudes relative to the experi-

Table 3
*Mean Attitude and Belief Changes for a
 Single Piece of Information*

Issue and study	Initial attitudes	
	Proponents	Opponents
Results only		
Capital punishment		
Prodeterrence	1.3	0.4
Antideterrence	-0.7	-0.9
Combined	0.6	-0.5
Deterrent efficacy		
Prodeterrence	1.9	0.7
Antideterrence	-0.9	-1.6
Combined	1.0	-0.9
Details, data, critiques, rebuttals		
Capital punishment		
Prodeterrence	0.8	-0.9
Antideterrence	0.7	-0.8
Combined	1.5	-1.7
Deterrent efficacy		
Prodeterrence	0.7	-1.0
Antideterrence	0.7	-0.8
Combined	1.4	-1.8

Note. Positive numbers indicate a more positive attitude or belief about capital punishment and its deterrent effect. Negative numbers indicate a more negative attitude or belief about capital punishment and its deterrent effect.

ment's start, proponents reported that they were *more* in favor of capital punishment, $t(23) = 5.07$, $p < .001$, whereas opponents reported that they were *less* in favor of capital punishment, $t(23) = -3.34$, $p < .01$. In a two-way analysis of variance (Initial Attitude $\times$ Order of Presentation), the effect of initial attitude was highly significant, $F(1, 44) = 30.06$, $p < .001$, and neither the order effect nor the interaction approached significance. Similar results characterized subjects' beliefs about deterrent efficacy. Proponents reported greater belief in the deterrent effect of capital punishment, $t(23) = 4.26$, $p < .001$, whereas opponents reported less belief in this deterrent effect, $t(23) = -3.79$, $p < .001$. Final attitudes toward capital punishment and beliefs concerning deterrent efficacy were highly correlated, $r = .88$, $p < .001$.

Such results provide strong support for the main experimental hypothesis that inconclu-

sive or mixed data will lead to increased polarization rather than to uncertainty and moderation. Moreover, the degree of polarization shown by individual subjects was predicted by differences in subjects' willingness to be less critical of procedures yielding supportive evidence than of procedures yielding nonsupportive evidence. Significant correlations were found between overall attitude change regarding capital punishment and differences in ratings of both how convincing, $r = .56$, $p < .001$, and how well done, $r = .56$, $p < .001$, the studies were. Overall changes in beliefs in deterrent efficacy produced comparable correlations of .53 and .57, both $ps < .001$.

Components of Attitude Polarization

In view of this strong evidence of overall attitude polarization, it is worth examining the course of attitude polarization as subjects' opinions were successively assessed after exposure to the first study, the details and critiques of the first study, the results of the second study, and the details and critiques of the second study. At each stage, it will be recalled, subjects were asked about the impact of the single piece of information they had just considered and the cumulative impact of all information presented to that point. Let us first examine the reported effects of single segments of evidence and then the effects of accumulated evidence over time.

Effect of Exposure to the Results of Each Study

Considering the result cards as single pieces of evidence, both proponents and opponents reported shifting their attitudes in the direction of the stated results for both the prodeterrence, $t(47) = 4.67$, $p < .001$, and antideterrence, $t(47) = -5.15$, $p < .001$, studies. As shown in the top half of Table 3, however, subjects' responses to the two studies also varied with initial attitude. Proponents tended to be influenced more by the prodeterrence study and opponents more by the antideterrence study. Thus a two-way analysis of variance (Initial Attitude $\times$ Order of Pre-

sensation) on combined change from the two result cards considered individually yielded only a main effect of initial attitude for both attitudes toward the death penalty, $F(1, 44) = 6.35$, $p < .02$,⁷ and beliefs about its deterrent effect, $F(1, 44) = 10.37$, $p < .01$. Interestingly, the analysis of beliefs regarding deterrent efficacy also showed an unanticipated interaction effect, $F(1, 44) = 7.48$, $p < .01$, with proponents showing a differential response to results alone regardless of order of presentation but opponents showing a differential response to results alone only when the confirming study was presented first.

Effect of Exposure to Procedures and Data, Critiques and Rebuttals

When provided with a more detailed description of the procedures and data, together with relevant critiques and authors' rebuttals, subjects seemed to ignore the stated results of the study. As shown in the bottom half of Table 3, both proponents and opponents interpreted the additional information, relative to the results alone, as strongly supporting their own initial attitudes. Detailed descriptions of either the prodeterrence or the antideterrence study, with accompanying critiques, caused proponents to favor capital punishment more and believe in its deterrent efficacy more, but caused opponents to oppose capital punishment more and believe in its deterrent efficacy less. A two-way analysis of variance (Initial Attitude $\times$ Order of Presentation) on attitude change for the two descriptions combined yielded only a significant main effect of initial attitude for both the capital punishment issue, $F(1, 44) = 28.10$, $p < .001$, and the deterrent efficacy question, $F(1, 44) = 26.93$, $p < .001$.

Changes in Attitudes Across Time

Subjects' reported changes in attitudes and beliefs, relative to the start of the experiment, following exposure to each of the four separate pieces of information are depicted in Figure 1 for attitudes concerning capital punishment and in Figure 2 for beliefs concerning deterrent efficacy. These data, portrayed separately for subjects who received

first either the prodeterrence study or the antideterrence study, provide a more detailed view of the attitude polarization process. They allow, as well, an examination of the hypothesized "rebound effect," that the provision of any plausible reason for discounting data that contradict one's preconceptions will eliminate the effects that mere knowledge of those data may have produced.

The existence of such a "rebound effect" is obvious from examination of these figures. Whether they encountered the disconfirming result first or second, both proponents and opponents seemed to be swayed momentarily by this evidence, only to revert to their former attitudes and beliefs (and in 23% of the individual cases, to even more extreme positions) after inspecting the procedural details and data, and the critiques and rebuttals found in the literature. Across all subjects, this rebound in opinions proved significant for both the capital punishment, $t(47) = 4.43$, $p < .001$, and deterrent efficacy, $t(47) = 4.58$, $p < .001$, issues. By contrast, no compensating rebound effects resulted from reading the descriptions and critiques of studies supporting subjects' initial attitudes, for either capital punishment, $t(47) = .60$, ns , or deterrent efficacy, $t(47) = .23$, ns .

Discussion

The results of the present experiment provide strong and consistent support for the attitude polarization hypothesis and for the biased assimilation mechanisms postulated to underlie such polarization. The net effect of exposing proponents and opponents of capital punishment to identical evidence—studies ostensibly offering equivalent levels of support and disconfirmation—was to increase further the gap between their views. The mechanisms responsible for this polarization of subjects' attitudes and beliefs were clearly

⁷ In order to rule out the possibility that direction of study interacted with initial attitude, a three-way analysis of variance (Initial Attitude $\times$ Order of Presentation $\times$ Direction of Study) was also performed on these data. The relevant interaction term did not approach significance, $F(1, 44) = 1.62$, ns .

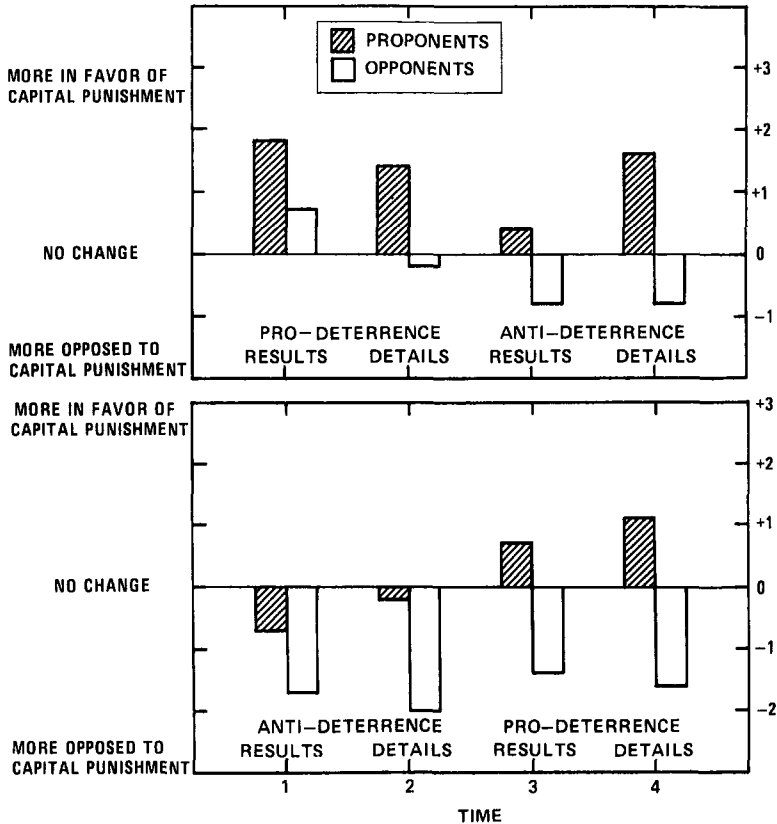


Figure 1. Top panel: Attitude changes on capital punishment relative to start of experiment as reported across time by subjects who received prodeterrence study first. Bottom panel: Attitude changes on capital punishment relative to start of experiment as reported across time by subjects who received antideterrence study first.

suggested by correlational analyses. Subjects' decisions about whether to accept a study's findings at face value or to search for flaws and entertain alternative interpretations seemed to depend far less on the particular procedure employed than on whether the study's results coincided with their existing beliefs.

The Normative Issue

It is worth commenting explicitly about the normative status of our subjects' apparent biases. First, there can be no real quarrel with a willingness to infer that studies supporting one's theory-based expectations are more probative than, or methodologically superior to, studies that contradict one's expectations. When an "objective truth" is known or

strongly assumed, then studies whose outcomes reflect that truth may reasonably be given greater credence than studies whose outcomes fail to reflect that truth. Hence the physicist would be "biased," but appropriately so, if a new procedure for evaluating the speed of light were accepted if it gave the "right answer" but rejected if it gave the "wrong answer." The same bias leads most of us to be skeptical about reports of miraculous virgin births or herbal cures for cancer, and despite the risk that such theory-based and experience-based skepticism may render us unable to recognize a miraculous event when it occurs, overall we are surely well served by our bias. Our subjects' willingness to impugn or defend findings as a function of their conformity to expectations can, in part, be similarly defended. Only the strength of

their initial convictions in the face of the existing inconclusive social data and arguments can be regarded as "suspect."

Our subjects' main inferential shortcoming, in other words, did not lie in their inclination to process evidence in a biased manner. Willingness to interpret new evidence in the light of past knowledge and experience is essential for any organism to make sense of, and respond adaptively to, its environment. Rather, their sin lay in their readiness to use evidence already processed in a biased manner to bolster the very theory or belief that initially "justified" the processing bias. In so doing, subjects exposed themselves to the familiar risk of making their hypotheses unfalsifiable—a serious risk in a domain where it is clear that at least one party in a dispute holds a false hypothesis—and allowing them-

selves to be encouraged by patterns of data that they ought to have found troubling. Through such processes laypeople and professional scientists alike find it all too easy to cling to impressions, beliefs, and theories that have ceased to be compatible with the latest and best evidence available (Mahoney, 1976, 1977).

Polarization: Real or Merely Reported?

Before further pursuing the broader implications of the present demonstration, it is necessary to consider an important question raised by our procedure: Did our subjects really show change (i.e., polarization) in their private beliefs about the desirability and deterrent efficacy of capital punishment? Certainly they told us, explicitly, that their

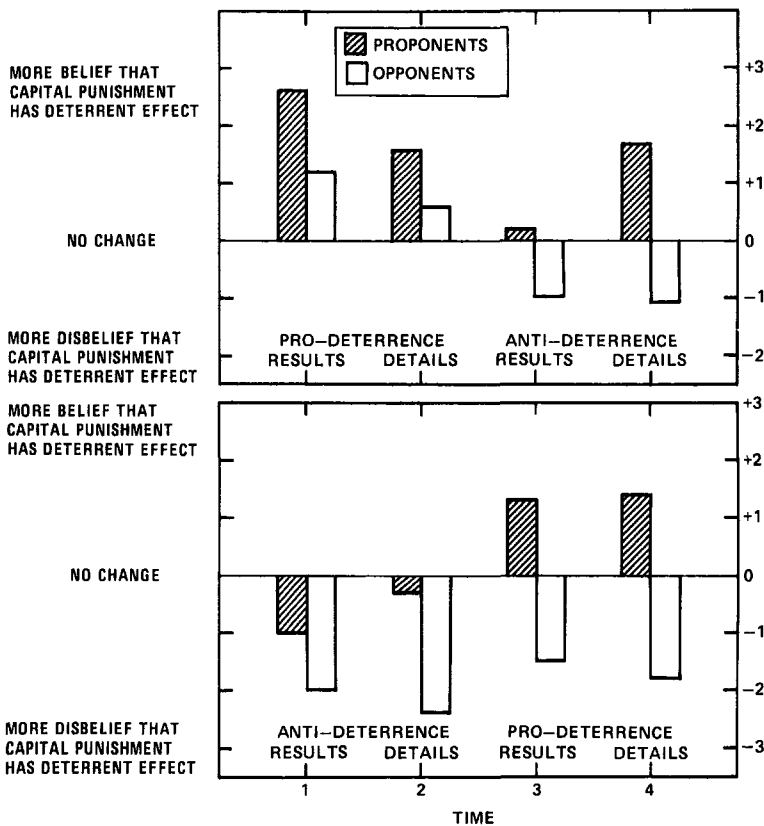


Figure 2. Top panel: Belief changes on capital punishment's deterrent efficacy relative to start of experiment as reported across time by subjects who received prodeterrence study first. Bottom panel: Belief changes on capital punishment's deterrent efficacy relative to start of experiment as reported across time by subjects who received antideterrence study first.

attitudes and beliefs did change after each new piece of evidence was presented, and from the beginning to the end of the experiment. Moreover, they did show a willingness to report a shift in their attitudes in the direction of findings that were contrary to their beliefs, at least until those findings were exposed to methodological scrutiny and possible alternative interpretations. Nevertheless, it could be argued that subjects were not reporting real shifts in attitudes but instead were merely reporting what they believed to be a rational or appropriate response to each increment in the available evidence. Although we believe that it remains an impressive demonstration of assimilation biases to show that contending factions both believe the same data to justify their position "objectively," the potential limitations of the present measures should be kept in mind in evaluating the relationship of this study to prior polarization research. As noted earlier (see Footnote 1) our intended strategy of assessing direct changes from our initial selection measures of attitudes and beliefs, rather than asking subjects to report such changes within the experiment, was neither feasible nor appropriate, given the necessity of selecting subjects with strong and consistent initial views on this issue. Potentially such methodological problems could be overcome in subsequent research through the use of less extreme samples or, perhaps more convincingly, by seeing whether biased assimilation of mixed evidence will make subjects more willing to *act* on their already extreme beliefs.

Belief Perseverance and Attribution Processes

The present results importantly extend the growing body of research on the perseverance of impressions and beliefs. Two of the present authors and their colleagues have now amassed a number of studies showing that, once formed, impressions about the self (Ross et al., 1975; Jennings, Lepper, & Ross, Note 2; Lepper, Ross, & Lau, Note 3), beliefs about other people (Ross et al., 1975), or theories about functional relationships between variables (Anderson, Lepper, & Ross, Note 4) can survive the total discrediting of

the evidence that first gave rise to such beliefs. In essence, these prior studies demonstrate that beliefs can survive the complete subtraction of the critical formative evidence on which they were initially based. In a complementary fashion, the present study shows that strongly entrenched beliefs can also survive the addition of nonsupportive evidence.

These findings pose some fundamental questions for traditional attribution models. To the extent that beliefs and impressions can be shown to persevere in the face of subsequent challenging data, we need a "top down" rather than—or perhaps in conjunction with—a "bottom up" approach (cf. Bobrow & Norman, 1975) to the question of how individuals extract meaning from their social environment. Instead of viewing people as impartial, data-driven processors, the present research suggests our models must take into account the ways in which intuitive scientists assess the relevance, reliability, representativeness, and implications of any given sample of data or behavior within the framework of the hypotheses or implicit theories they bring to the situation (Lepper, 1977). In everyday life, as well as in the course of scientific controversies (cf. Kuhn, 1970), the mere availability of contradictory evidence rarely seems sufficient to cause us to abandon our prior beliefs or theories.

Social Science Research and Social Policy

We conclude this article, as we began it, by considering the important links between social policy, public attitudes and beliefs about such policy, and the role of the social scientist. If our study demonstrates anything, it surely demonstrates that social scientists can not expect rationality, enlightenment, and consensus about policy to emerge from their attempts to furnish "objective" data about burning social issues. If people of opposing views can each find support for those views in the same body of evidence, it is small wonder that social science research, dealing with complex and emotional social issues and forced to rely upon inconclusive designs, measures, and modes of analysis, will frequently fuel rather than calm the fires of debate.

Reference Notes

1. Kinder, D. R., & Kiewiet, D. R. *Economic grievances and political behavior: The role of personal discontents and symbolic judgments*. Paper presented at the meeting of the American Psychological Association, San Francisco, August 1977.
2. Jennings, D. L., Lepper, M. R., & Ross, L. *Persistence of impressions of personal persuasiveness: Perseverance of erroneous self assessments outside the debriefing paradigm*. Unpublished manuscript, Stanford University, 1978.
3. Lepper, M. R., Ross, L., & Lau, R. R. *Persistence of inaccurate and discredited personal impressions: A field demonstration of attributional perseverance*. Unpublished manuscript, Stanford University, 1979.
4. Anderson, C. A., Lepper, M. R., & Ross, L. *Theory perseverance: The persistent influence of discredited information*. Unpublished manuscript, Stanford University, 1979.

References

- Abelson, R. P. Modes of resolution of belief dilemmas. *Conflict Resolution*, 1959, 3, 343-352.
- Abelson, R. P. Are attitudes necessary? In B. T. King & E. McGuinnies (Eds.), *Attitudes, conflict, and social change*. New York: Academic Press, 1972.
- Abelson, R. P. Script processing in attitude formation and decision making. In J. S. Carroll and J. W. Payne (Eds.), *Cognition and social behavior*. Hillsdale, N.J.: Erlbaum, 1976.
- Allport, G. W. *The nature of prejudice*. Reading, Mass.: Addison-Wesley, 1954.
- Asch, S. Forming impressions of personality. *Journal of Abnormal and Social Psychology*, 1946, 41, 258-290.
- Bacon, F. *The new organon and related writings*. New York: Liberal Arts Press, 1960. (Originally published, 1620.)
- Bobrow, D. G., & Norman, D. A. Some principles of memory schemata. In D. G. Bobrow & A. Collins (Eds.), *Representation and understanding: Studies in cognitive science*. New York: Academic Press, 1975.
- Bruner, J. S., & Potter, M. C. Interference in visual recognition. *Science*, 1964, 144, 424-425.
- Campbell, D. T. On reforms as experiments. *American Psychologist*, 1969, 24, 409-429.
- Chapman, L., & Chapman, J. The genesis of popular but erroneous psychodiagnostic observations. *Journal of Abnormal Psychology*, 1967, 72, 193-204.
- Chapman, L., & Chapman, J. Illusory correlation as an obstacle to the use of valid psychodiagnostic signs. *Journal of Abnormal Psychology*, 1969, 74, 271-280.
- Furman v. Georgia, 408 U.S. 238, 1972.
- Jones, E. E., & Goethals, G. R. Order effects in impression formation. Attribution context and the nature of the entity. In E. E. Jones et al. (Eds.), *Attribution: Perceiving the causes of behavior*. Morristown, N.J.: General Learning Press, 1971.
- Katz, E. The two-step flow of communication: An up-to-date report on an hypothesis. *Public Opinion Quarterly*, 1957, 21, 61-68.
- Kuhn, T. S. *The structure of scientific revolutions* (2nd ed.). Chicago: University of Chicago Press, 1970.
- Lepper, M. R. Cognition and social behavior. *Science*, 1977, 196, 765-766.
- Luchins, A. S. Mechanization in problem solving: The effect of Einstellung. *Psychological Monographs*, 1942, 54, 1-95.
- Luchins, A. S. Experimental attempts to minimize the impact of first impressions. In C. I. Hovland (Ed.), *The order of presentation in persuasion*. New Haven, Conn.: Yale University Press, 1957.
- Mahoney, M. J. *Scientist as subject: The psychological imperative*. Cambridge, Mass.: Ballinger, 1976.
- Mahoney, M. J. Publication prejudices: An experimental study of confirmatory bias in the peer review system. *Cognitive Therapy and Research*, 1977, 1, 161-175.
- Merton, R. K. The self-fulfilling prophecy. *Antioch Review*, 1948, 8, 193-210.
- Nisbett, R., & Ross, L. *Human inference: Strategies and shortcomings of social judgment*. Englewood Cliffs, N.J.: Prentice-Hall, in press.
- Rosenhan, D. L. On being sane in insane places. *Science*, 1973, 179, 250-258.
- Ross, L. The intuitive psychologist and his shortcomings: Distortions in the attribution process. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10). New York: Academic Press, 1977.
- Ross, L., Lepper, M. R., & Hubbard, M. Perseverance in self-perception and social perception: Biased attributional processes in the debriefing paradigm. *Journal of Personality and Social Psychology*, 1975, 32, 880-892.
- Sarat, A., & Vidmar, N. Public opinion, the death penalty, and the Eighth Amendment: Testing the Marshall hypothesis. *Wisconsin Law Review*, 1976, 171-197.
- Sellin, T. (Ed.). *The death penalty*. New York: Harper & Row, 1967.
- Snyder, M., Tanke, E. D., & Berscheid, E. Social perception and interpersonal behavior: On the self-fulfilling nature of social stereotypes. *Journal of Personality and Social Psychology*, 1977, 35, 656-666.

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