

The Case for Motivated Reasoning

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It is proposed that motivation may affect reasoning through reliance on a biased set of cognitive processes—that is, strategies for accessing, constructing, and evaluating beliefs. The motivation to be accurate enhances use of those beliefs and strategies that are considered most appropriate, whereas the motivation to arrive at particular conclusions enhances use of those that are considered most likely to yield the desired conclusion. There is considerable evidence that people are more likely to arrive at conclusions that they want to arrive at, but their ability to do so is constrained by their ability to construct seemingly reasonable justifications for these conclusions. These ideas can account for a wide variety of research concerned with motivated reasoning.

The notion that goals or motives affect reasoning has a long and controversial history in social psychology. The propositions that motives may affect perceptions (Erdelyi, 1974), attitudes (Festinger, 1957), and attributions (Heider, 1958) have been put forth by some psychologists and challenged by others. Although early researchers and theorists took it for granted that motivation may cause people to make self-serving attributions and permit them to believe what they want to believe because they want to believe it, this view, and the research used to uphold it, came under concentrated criticism in the 1970s. The major and most damaging criticism of the motivational view was that all research purported to demonstrate motivated reasoning could be reinterpreted in entirely cognitive, nonmotivational terms (Miller & Ross, 1975; Nisbett & Ross, 1980). Thus people could draw self-serving conclusions not because they wanted to but because these conclusions seemed more plausible, given their prior beliefs and expectancies. Because both cognitive and motivational accounts could be generated for any empirical study, some theorists argued that the hot versus cold cognition controversy could not be solved, at least in the attribution paradigm (Ross & Fletcher, 1985; Tetlock & Levi, 1982).

One reason for the persistence of this controversy lies in the failure of researchers to explore the mechanisms underlying motivated reasoning. Recently, several authors have attempted to rectify this neglect (Kruglanski & Freund, 1983; Kunda, 1987; Pyszczynski & Greenberg, 1987; Sorrentino & Higgins, 1986). All these authors share a view of motivation as having its effects through cognitive processes: People rely on cognitive processes and representations to arrive at their desired conclusions, but motivation plays a role in determining which of these will be used on a given occasion.

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Interestingly, this view of motivation as cognitively mediated has always been integral to the understanding of dissonance reduction phenomena, at least in theory. In the 1968 sourcebook on consistency theories, McGuire expressed regret that the dissonance ideas had not been used to shed light on cognitive processes. Abelson (1968) and Aronson (1968) both illustrated how this might be done, Abelson by outlining a series of cognitive microprocesses—that is, mechanisms that he argued could provide the vehicle for dissonance reduction—and Aronson by providing a detailed example of the cognitive processes that a smoker might engage in to dispel the notion that smoking might be harmful. Dissonance research, however, has not met this challenge, focusing as it has on the conditions that would give rise to dissonance rather than on mechanisms for reducing dissonance (for review, see Wicklund & Brehm, 1976).

In this article I explore the possibility that motivation may affect reasoning through reliance on a biased set of cognitive processes: strategies for accessing, constructing, and evaluating beliefs. I review a large and diverse body of research that has been concerned directly or indirectly with this issue and argue that the proposed mechanisms can account for all of it. By *motivation* I mean any wish, desire, or preference that concerns the outcome of a given reasoning task, and I do not attempt to address the thorny issue of just how such motives are represented. The discussion is restricted to cases in which motivation can be construed as affecting the process of reasoning: forming impressions, determining one's beliefs and attitudes, evaluating evidence, and making decisions. Studies in which motivation was viewed as regulating behavior and determining which people or information one would like to observe (e.g., Frey, 1986; Swann, 1983) are excluded unless the behavioral choices are viewed as indicative of biased reasoning.

The motivated reasoning phenomena under review fall into two major categories: those in which the motive is to arrive at an accurate conclusion, whatever it may be, and those in which the motive is to arrive at a particular, directional conclusion. The importance of this distinction has been stressed in the work of Kruglanski and his colleagues (Kruglanski, 1980; Kruglanski & Ajzen, 1983; Kruglanski & Klar, 1987; see also Chaiken, Liberman, & Eagly, 1989; Pyszczynski & Greenberg, 1987). The

two categories are often discussed in the same breath because they are both indicative of motivated reasoning, but, as pointed out by Kruglanski and his colleagues, it is important to distinguish between them because there is no reason to believe that both involve the same kinds of mechanism. To foreshadow my conclusions, I argue that both kinds of goals affect reasoning by influencing the choice of beliefs and strategies applied to a given problem. But accuracy goals lead to the use of those beliefs and strategies that are considered most appropriate, whereas directional goals lead to the use of those that are considered most likely to yield the desired conclusion.

Reasoning Driven by Accuracy Goals

The work on accuracy-driven reasoning suggests that when people are motivated to be accurate, they expend more cognitive effort on issue-related reasoning, attend to relevant information more carefully, and process it more deeply, often using more complex rules. These ideas go back to Simon's (1957) notion of satisficing, according to which decision makers form aspirations as to how good an alternative they should find and terminate their search for alternatives as soon as they find one that meets that level. Stigler (1961) extended these ideas by pointing out that search strategies have costs that may be weighted against their utility. The implication is that people may focus not only on how good an outcome they desire but also, and sometimes predominantly, on how much cognitive effort they are willing to expend. In other words, people are aware of the effort-accuracy trade-off and select strategies by considering both their costs and their benefits (Beach & Mitchell, 1978; Payne, Bettman, & Johnson, 1988).

An experimental investigation by McAllister, Mitchell, and Beach (1979, Experiment 3) provides some support for these ideas. They manipulated subjects' motivation to be accurate by informing them that the target task was highly important or by leading them to expect to defend their judgments to their peers. Subjects motivated to be more accurate in these ways chose more complex and time-consuming decision-making strategies. But inasmuch as subjects were explicitly provided with lists of strategies to choose from and with details about the probability that each strategy would be accurate, it is not obvious that people motivated to be accurate will choose more complex strategies spontaneously, in the absence of such information. More interesting, from my perspective, are those studies in which subjects' spontaneous selection of cognitive strategies was examined. The researchers who did this also extended these ideas from decision making, construed as choosing among options, to the more general process of forming judgments and beliefs.

In these studies, accuracy goals are typically created by increasing the stakes involved in making a wrong judgment or in drawing the wrong conclusion, without increasing the attractiveness of any particular conclusion. The key strategy used to demonstrate that accuracy motives lead to more deep and careful cognitive processing involves showing that manipulations designed to increase accuracy motives lead to an elimination or reduction of cognitive biases. Thus Kruglanski and Freund (1983; Freund, Kruglanski, & Shpitajzen, 1985) showed that subjects motivated to be accurate (because they expected to be

evaluated, expected to justify their judgments, expected their judgments to be made public, or expected their evaluations to affect the evaluated person's life) showed less of a primacy effect in impression formation, less tendency to use ethnic stereotypes in their evaluations of essay quality, and less anchoring when making probability judgments. Similarly, Tetlock (1983) showed that subjects motivated to be accurate (because they expected to justify their beliefs to others) showed less of a primacy effect in their judgments of guilt in a simulated murder trial.

Although these findings may be due to deeper and more careful processing, they may also result merely from a tendency to make more conservative, less extreme judgments in the presence of accuracy goals. A study by Tetlock (1985) ruled out the latter possibility. Subjects motivated to be accurate (because they expected to justify their beliefs to others) were less susceptible to the fundamental attribution error. In comparison with other subjects, accuracy-motivated subjects made less extreme dispositional attributions about a target person when they knew that the target person had little choice in deciding whether to engage in the observed behavior, but not when they knew that the target person had a high degree of choice. Because the less extreme judgments occurred only in the low-choice condition, they appear to be due to careful processing rather than to undifferentiated conservatism. Other researchers (Pittman & D'Agostino, 1985) have also found that need for accuracy (resulting from control deprivation) reduced the magnitude of the fundamental attribution error. Similarly, Kassin and Hochreich (1977) found that need for accuracy (aroused by instructions indicating that the task reflected an important ability or was important to the experimenter) decreased the tendency to attribute briefly described behaviors to the person.

The underlying assumption in these studies is that many biases and errors result from hasty reasoning; therefore, elimination of these biases indicates more careful thinking. This interpretation is supported by the finding that such biases are exaggerated when subjects are required to make judgments under time pressure—that is, when they are forced to be hasty (Freund et al., 1985; Kruglanski & Freund 1983).¹ There is some evidence that the deeper processing appears to be triggered by accuracy goals rather than by self-presentational pressures, because accuracy-promoting manipulations reduce biases only when they are delivered before subjects' exposure to information. When they are delivered after subjects view the information but before they make their judgments, such manipulations have no impact on judgment (Tetlock, 1983, 1985). Thus the deeper processing results from accuracy motives that affect the initial encoding and processing of information.

More direct evidence that accuracy goals lead to more complex and elaborate reasoning comes from two studies in which the researchers attempted to examine thought processes directly, rather than infer them from their outcome, the judgment. Tetlock and Kim (1987) showed that subjects motivated

¹ Kruglanski and Freund (1983) theorize that this occurs because time pressure leads to the arousal of a need for structure—that is, the need to arrive at a conclusion, whatever it may be.

to be accurate (because they expected to justify their beliefs to others) wrote more cognitively complex descriptions of persons whose responses to a personality test they had seen: They considered more alternatives and evaluated the persons from more perspectives, and they drew more connections among characteristics. Partly as a result of this increased complexity of processing, subjects motivated to be accurate were in fact more accurate than others in predicting the persons' responses on additional personality measures and were less overconfident about the correctness of their predictions.²

In a similar vein, Harkness, DeBono, and Borgida (1985) showed that subjects motivated to be accurate in their assessment of which factors affected a male target person's decisions about whether to date women (because the subjects expected to date him later and therefore presumably wanted to know what he was like) used more accurate and complex covariation detection strategies than did subjects who did not expect to date him.³

In sum, the case for accuracy-motivated reasoning appears quite strong. In the above studies subjects had no reason to prefer one conclusion or outcome over another; their sole goal was to be accurate. The evidence that people process information more carefully under such circumstances is considerable and persuasive. The bulk of this evidence is indirect; the greater complexity of processing is inferred from the fact that the judgments tended to be more accurate and to reflect less reliance on biased strategies or cognitive shortcuts. Although some of these findings may be due to mere conservatism rather than to deeper processing, others may not. There also exists some more compelling, direct evidence that accuracy-motivated subjects use more complex strategies in their thinking. Taken together, the evidence is impressive in its diversity: Several different kinds of bias have been shown to be weakened in the presence of accuracy goals, and such findings have been obtained by different investigators working in diverse content areas and operationalizing the need for accuracy in a variety of different ways. It seems reasonable to conclude that people motivated to be accurate are more likely to access and use those rules and strategies for processing information that are deemed more appropriate.

One should not assume, however, that accuracy goals will always eliminate biases and improve reasoning. In several studies, incentives or admonitions to be accurate did not eliminate bias (Fischhoff, 1977; Kahneman & Tversky, 1972a; Lord, Lepper, & Preston, 1984; Tversky & Kahneman, 1973). For accuracy to reduce bias, it is crucial that subjects possess more appropriate reasoning strategies, view these as superior to other strategies, and be capable of accessing them at will. This is most probably not the case for the biases that have been resistant to accuracy manipulations: for example, biases resulting from using the availability heuristic and from the failure to use the law of large numbers in some situations, and the hindsight bias. One may even imagine that biases will sometimes be exacerbated and reasoning worsened in the presence of accuracy goals. This will occur if people erroneously believe faulty reasoning procedures to be best and are more likely to access these faulty procedures upon reflection. Indeed, it has been shown that subjects motivated to be accurate (because they expected to justify their judgments to others) were *more* susceptible than other subjects

to the dilution effect—that is, were more likely to moderate their predictions about a target when given nondiagnostic information about that target—and this tendency appeared to have resulted from more complex processing of information (Tetlock & Boettger, 1989). Thus accuracy goals led to more complex processing, which in turn led to less rational judgment.

The notion that accuracy goals lead to more complex processing is compatible with and broader than Kruglanski and his colleagues' views on how accuracy goals affect reasoning (Kruglanski, 1980; Kruglanski & Ajzen, 1983). In their view, accuracy goals (or fear of invalidity, in their terminology) may delay the "freezing" of the process of generating and evaluating hypotheses; that is, they may delay the arrival at a conclusion. This delay results from a tendency to entertain a greater number of alternative hypotheses and to consider more evidence. Such lengthier processing is consistent with my view, but my view is broader in that it allows for the possibility that, in addition to increasing the quantity of processing, accuracy goals may also affect its quality, in that they may lead directly to the use of more complex inferential procedures.

The research just reviewed did not address the issue of what impact accuracy goals will have when they are accompanied by directional goals—that is, when the person also wants to arrive at a particular conclusion. I turn next to an examination of the effects of directional goals on reasoning.

Reasoning Driven by Directional Goals

Mechanisms for Motivated Directional Biases

As will become clear from the work reviewed in this section, an explanation for how directional goals affect reasoning has to account not only for the existence of motivated biases but also for the findings suggesting that such biases are not unconstrained: People do not seem to be at liberty to conclude whatever they want to conclude merely because they want to. Rather, I propose that people motivated to arrive at a particular conclusion attempt to be rational and to construct a justification of their desired conclusion that would persuade a dispassionate

² A study by Sieber (1974) appears to show opposite results. Subjects motivated to be accurate were more overconfident than others in the correctness of their answers to an exam, which suggests less rather than more careful processing on their part. However, the imputation of different accuracy motives to the different groups in that study seems arbitrary. Sieber assumed that subjects who believed the exam to be their actual midterm exam were more motivated to be accurate than were subjects who believed that if they did well enough on the exam, they would receive an A, and if not, they would receive feedback and take another exam that would determine their grade. It seems just as likely, though, that the latter subjects were more motivated to be accurate than the former, in which case the results would be consistent with Tetlock and Kim's (1987) study.

³ In this study, however, subjects motivated to be accurate may also be presumed to hold a directional goal: namely, they may want the target to like them and therefore to prefer women who possess their own characteristics. This possibility was not examined in this study, and so it is not known whether bias exists on top of the more detailed processing.

sionate observer. They draw the desired conclusion only if they can muster up the evidence necessary to support it (cf. Darley & Gross, 1983). In other words, they maintain an "illusion of objectivity" (Pyszczynski & Greenberg, 1987; cf. Kruglanski, 1980). To this end, they search memory for those beliefs and rules that could support their desired conclusion. They may also creatively combine accessed knowledge to construct new beliefs that could logically support the desired conclusion. It is this process of memory search and belief construction that is biased by directional goals (cf. Greenwald, 1980). The objectivity of this justification construction process is illusory because people do not realize that the process is biased by their goals, that they are accessing only a subset of their relevant knowledge, that they would probably access different beliefs and rules in the presence of different directional goals, and that they might even be capable of justifying opposite conclusions on different occasions.

For example, people who want to believe that they will be academically successful may recall more of their past academic successes than of their failures. They may also use their world knowledge to construct new theories about how their particular personality traits may predispose them to academic success (Kunda, 1987). If they succeed in accessing and constructing appropriate beliefs, they may feel justified in concluding that they will be academically successful, not realizing that they also possess knowledge that could be used to support the opposite conclusion. The biasing role of goals is thus constrained by one's ability to construct a justification for the desired conclusion: People will come to believe what they want to believe only to the extent that reason permits. Often they will be forced to acknowledge and accept undesirable conclusions, as they appear to when confronted with strong arguments for undesired or counterattitudinal positions (Petty & Cacioppo, 1986).

The proposed mechanisms are based on the assumption that directional goals may influence which beliefs and rules are accessed and applied on a given occasion. This assumption seems reasonable because there is considerable evidence that people access different beliefs and rules on different occasions: They endorse different attitudes (Salancik & Conway, 1975; Snyder, 1982), express different self-concepts (Fazio, Effrein, & Faleifer, 1981), make different social judgments (Higgins & King, 1981), and use different statistical rules (Kunda & Nisbett, 1986; Nisbett, Krantz, Jepson, & Kunda, 1983). Although most relevant evidence shows that different knowledge structures are accessed because different external, contextual cues make them differentially salient, the work on the effects of accuracy goals on reasoning reviewed above suggests that people may also access different beliefs and strategies under the influence of different goals.

The proposed view has much in common with the models suggested by Kruglanski and his colleagues (Kruglanski, 1980; Kruglanski & Ajzen, 1983; Kruglanski & Klar, 1987) and by Pyszczynski and Greenberg (1987). In Kruglanski and his colleagues' view, as in mine, directional goals (or, in their terminology, the need for specific conclusions or structures) affect reasoning by affecting which information will be considered in the reasoning process. However, their view differs somewhat from mine in that their model implies that essentially the same sequence of reasoning will be followed in the presence of differ-

ent goals but that the sequence will be arrested, or frozen, at different points in time, depending on one's goals. My view, in addition to allowing for the possibility that directional goals may lead to more or less lengthy processing under different circumstances, also allows for the possibility that different goals will lead directly to the consideration of different beliefs and rules.

Pyszczynski and Greenberg's (1987) model delineating the effects of the self-esteem motive on self-serving attributions is even closer in spirit to the current one. Pyszczynski and Greenberg likened the attribution process to a process of hypothesis generation and evaluation and proposed that motives may have an effect on any or all of the stages of the hypothesis-testing sequence—that is, on the generation and evaluation of hypotheses, of inference rules, and of evidence. My ideas are fully compatible with this view in that all the processes outlined by Pyszczynski and Greenberg may be regarded as resulting from a biased search through memory for relevant beliefs and rules. In this article I wish to extend these ideas by showing that such biased memory search is not restricted to the domain of self-serving attribution. Rather, it may take place under the influence of a broad variety of directional goals and in many reasoning tasks. Furthermore, by shifting the focus of discussion from the process of hypothesis testing to the process of justification construction, my view points to some novel implications of these ideas, particularly the notion that the biased memory search will result in the formation of additional biased beliefs and theories that are constructed so as to justify desired conclusions.

In the following section, I review evidence that directional goals bias reasoning. The studies reviewed came from diverse theoretical perspectives and focused on a variety of content areas. I argue that the biased memory search and belief construction mechanisms that I propose can account for all this research. Although few of the studies reviewed were explicitly concerned with the mechanisms underlying motivated reasoning, many provided indirect evidence for the proposed mechanisms and some provide more direct support for them. I first review evidence indicating that directional goals may bias the accessing and construction of beliefs about the self, other people, and events. Next, I review evidence that directional goals may bias use of inferential rules. Finally, I review evidence that directional goals may bias the evaluation of scientific evidence by biasing the selection of both beliefs and rules.

Biased Accessing of Beliefs

Dissonance research. The most extensive evidence that directional goals may bias reasoning comes from work carried out in the dissonance tradition that has shown that people may bias their self-characterizations when motivated to do so. Most of the research designed to test this theory has been carried out within the induced compliance paradigm, in which people are induced to make statements or to perform behaviors that are counterattitudinal. Having done so, people typically then alter their attitudes to make them more consistent with their behavior (for an extensive review, see Wicklund & Brehm, 1976).

Why does counterattitudinal behavior lead to such attitude change? In its original formulation, dissonance theory pro-

posed that holding two contradictory cognitions causes an unpleasant state of cognitive dissonance that a person strives to reduce by changing one or more of the relevant cognitions (Festinger, 1957). The cognitions "I believe X" and "I have stated or done not X" seem dissonant, and to reduce this dissonance, people change their beliefs so as to bring them into correspondence with their actions (Festinger & Carlsmith, 1959). Thus the general goal was presumed to be to reduce inconsistency among beliefs, and the subgoal of changing one's beliefs and endorsing particular attitudes was constructed as one means of doing so.

More recently, examination of the hundreds of empirical investigations within the induced compliance paradigm has led to a modification and restriction of the original theory. It is now believed that dissonance is aroused only when one freely chooses to engage in behavior that has foreseeable negative consequences (Cooper & Fazio, 1984). These conditions suggest that dissonance arousal requires a threat to the self: The cognition that one has knowingly chosen to engage in a bad or foolish behavior is inconsistent with a self-image as a decent and intelligent person (Aronson, 1968; Greenwald & Ronis, 1978). This interpretation is strengthened by findings showing that dissonance reduction through attitude change is eliminated when one is given alternative means of boosting one's self-image (Steele & Liu, 1983). Subjects' goal in the typical dissonance experiment, then, is to disconfirm the view of themselves as bad or foolish, and the subgoal of changing one's attitudes is created to this end. Thus according to both the original and the modified versions of dissonance theory, people are motivated to believe that they hold a particular attitude. In other words, they hold directional goals.

This motivational account has been challenged by attempts to reinterpret the dissonance findings in nonmotivational terms. Bem (1972) argued that the findings could also result from self-perception: The subjects, who have limited direct access to their attitudes, may infer their attitudes from their behaviors. It has been shown, however, that self-perception cannot fully account for the phenomena, because attitude change in dissonance experiments requires the presence of arousal that cannot be misattributed to other sources (Zanna & Cooper, 1974; for review, see Cooper & Fazio, 1984). The crucial role of such arousal indicates that noncognitive processes are involved. The precise role of arousal in motivated reasoning is discussed in a later section. For now, the important point is that most theorists have accepted this as evidence that attitude change in dissonance experiments results, at least in part, from motivation.

But how does motivation lead to attitude change? The dissonance literature is, for the most part, mute on this question. The work has not been concerned with the processes leading from the arousal of dissonance motivation to attitude change, and it therefore offers little direct evidence about the nature of these processes. There is some indirect evidence, however, that attitude change results from a memory search among existing beliefs for evidence that one has the desired attitude. This evidence lies in the fact that attitude change appears to be constrained by pre-existing beliefs and attitudes, which suggests that these are accessed in the process of constructing current attitudes. Dissonance clearly would be most effectively reduced

if one were able to espouse an attitude that corresponds perfectly to one's behavior. Yet this is not always the case. In many dissonance experiments, the attitudes after performing the counterattitudinal behavior remain in opposition to the behavior.

For example, after endorsing a law limiting free speech, subjects were less opposed to the law than were control subjects, but they remained opposed to it (Linder, Cooper, & Jones, 1967). Similarly, after endorsing police brutality on campus, subjects were less opposed to such brutality than were control subjects but they remained opposed to it (Greenbaum & Zemach, 1972). Induced compliance studies in which subjects are led to describe boring tasks as enjoyable often do produce shifts from negative to positive task evaluations, but in these studies, initial attitudes are not very negative (e.g., -0.45 on a scale whose highest negative value was -5 in Festinger & Carlsmith's classic 1959 study), and postdissonance attitudes still seem considerably less positive than subjects' descriptions of the task. For example, after they were induced to describe a task as "very enjoyable . . . a lot of fun . . . very interesting . . . intriguing . . . exciting," subjects rated the task as 1.35 on a scale whose highest positive value was 5 (Festinger & Carlsmith, 1959).

If we assume that subjects in these induced compliance studies were motivated to espouse attitudes corresponding to their dissonance-arousing behavior, it seems likely that in their attempt to do so, they accessed their initial attitudes and were constrained by them. However, they may have accessed a biased subset of these initial attitudes, which permitted them to shift their current attitudes somewhat in the desired direction. The constraints imposed by prior beliefs on attitude change imply that prior beliefs were accessed in the process of constructing current ones, and the directional shift in attitudes implies that only a biased subset of the relevant prior beliefs were accessed. Therefore, these data lend indirect support to the view that the postdissonance attitude is the end product of a biased search through existing knowledge structures for evidence that one holds the desired attitude. Such a biased search may yield an attitude that is somewhat more positive or somewhat more negative than the attitude that one would report in the absence of motivation, but it is unlikely to completely overturn existing attitudes. Apparently, people are not at liberty to espouse any attitude they want to; they can do so only within the limits imposed by their prior beliefs.

It is also possible that the constraints imposed by prior knowledge reflect a process of anchoring and adjustment (Tversky & Kahneman, 1974). According to this view, the extremity of the behavior that subjects are induced to perform serves as an anchor, and the espoused attitudes are shifted toward it. However, it seems unlikely that anchoring alone can account for the obtained attitude change, because attitudes do not change when the same behaviors are performed under low-choice conditions. If one assumes that anchoring processes occur only in those conditions in which motivation is aroused, it is not clear how the anchoring account differs from the one proposed here. The mechanisms underlying anchoring phenomena are not well understood and may well involve a process of biased memory search and belief construction comparable with the one that I proposed.

The evidence that counterattitudinal behaviors will create

dissonance only when they involve a threat to the self is considerable and compelling. But there is no reason to assume that such behaviors constitute the only source of dissonance or motivation to espouse particular conclusions. Indeed, it seems somewhat puzzling that, given the enormous breadth of the original theory, the research generated by it remained, for the most part, restricted to so narrow a domain. Much of the research to be reviewed in the next section was not carried out within the dissonance tradition, even though its findings could have been derived from that theory.

Additional evidence of biased self-characterizations. Several additional studies indicate that directional goals may bias people's construals of their attitudes, traits, and preferences. For the most part, these studies provide indirect evidence about the processes through which motivation affects self-characterizations, but several of them also provide more direct evidence that motivation may instigate biased memory search through relevant self-knowledge.

In a study providing indirect evidence for the biased memory search and construction model, Kunda and Sanitioso (1989) showed that subjects induced to theorize that a given trait (extraversion or introversion) was conducive to academic success came to view themselves as characterized by higher levels of that trait than did other subjects, presumably because they were motivated to view themselves as possessing success-promoting attributes. These changes in self-concepts were constrained by prior self-knowledge: The subjects, who were predominantly extraverted to begin with, viewed themselves as less extraverted when they believed introversion to be more desirable, but they still viewed themselves as extraverted. Further evidence for such constraints was found in a study in which experimenters preselected subjects who were extraverts or introverts and exposed them to similar manipulations (Sanitioso, Kunda, & Fong, 1990). Both groups viewed themselves as more extraverted when induced to believe that extraversion was beneficial than when induced to believe that introversion was beneficial. But in all conditions the extraverts still viewed themselves as considerably more extraverted than the introverts viewed themselves. In other words, the effects of the manipulation on self-concepts were constrained by prior self-knowledge. These constraints imply that motivated changes in self-concepts may result from a biased search through memory for evidence that one has the desired self-concept; the resulting self-concepts are constrained by the evidence accessed in this process.

Similar results were obtained by Dunning, Story, and Tan (1989), who exposed subjects to a training session that extolled the virtues of social skills and discounted the value of task skills for success in business; the subjects subsequently enhanced their self-ratings on social skills and deflated their self-ratings on task skills. Subjects given the opposite message changed their self-ratings in the opposite direction. Dunning et al. did not report the magnitude of pre- and postmanipulation self-ratings, but the small magnitude of change reported (the highest mean change obtained was 4.3 on a 100-point percentile score) implies that here, too, changes in self-ratings were constrained by prior self-knowledge.

More direct evidence for biased memory search was obtained by Sanitioso et al. (1990), who used a similar paradigm. In one study, subjects were asked to generate autobiographical memo-

ries reflecting their standing on the extraversion-introversion dimension. Subjects led to view introversion as desirable were more likely to generate introverted memories first and generated more introverted memories than did subjects led to view extraversion as more desirable. In another study, subjects led to view introversion as desirable were faster to generate autobiographical memories reflecting introversion and slower to generate memories reflecting extraversion than were subjects led to view extraversion as desirable. These studies both indicate that the accessibility of autobiographical memories reflecting a desired trait was enhanced, which suggests that the search for relevant memories was biased.

Additional direct evidence for biased memory search was obtained by Markus and Kunda (1986). Subjects were made to feel extremely unique or extremely ordinary. Both extremes were perceived as unpleasant by subjects, who could therefore be assumed to have been motivated to see themselves in the opposite light. Subjects were relatively faster to endorse as self-descriptive those adjectives reflecting the dimension opposite to the one that they had just experienced. Apparently they had accessed this knowledge in an attempt to convince themselves that they possessed the desired trait and, having accessed it, were able to endorse it more quickly.

Further direct evidence that directional goals may bias memory search comes from studies showing that directional goals may bias reconstruction of one's past behavior. Subjects led to believe that toothbrushing (Ross, McFarland, & Fletcher, 1981) or caffeine consumption (B. R. Sherman & Kunda, 1989) was bad for their health reported having performed those behaviors in the recent past less frequently than did subjects led to believe that the same behaviors were good for their health. These findings support the notion that directional goals may affect memory search for evidence of past behaviors that are consistent with goals (in this case, the goal is to believe that one's own behaviors were conducive to health). However, in both cases, past behaviors may have been inferred from the newly constructed beliefs about the positivity of the behavior in question. Thus subjects may have changed their attitudes without realizing that change had taken place and then inferred their behaviors from their new attitudes. This account seems plausible for Ross et al.'s study, in which the researchers made every effort to ensure that subjects would not realize that their attitudes had changed: Subjects who were asked to recall the frequency of their behaviors did so in the context of an allegedly different study and were never asked about their attitudes. But the account seems less plausible for B. R. Sherman and Kunda's study, in which no such effort was made.

Positive self-characterizations may be maintained not only by biased recall and construction of one's own traits and behaviors but also through biased construction of the traits. There is considerable evidence that people tend to view themselves as above average on many dimensions (e.g., Weinstein, 1980, 1982). Dunning, Meyerowitz, and Holzberg (1989) showed that this tendency is constrained by people's ability to construe traits in a self-serving manner. Thus people may all view themselves as above average in sensitivity only if they can each define sensitivity as consisting primarily of attributes on which they have high levels. In line with this reasoning, Dunning et al. showed that people are more likely to see themselves as above

average on ambiguous traits that are open to multiple construals than they are on unambiguous traits, and even for ambiguous traits, the tendency is reduced when people are asked to use specific definitions of each trait in their judgments.

Another way of maintaining a positive view of oneself is through self-serving attribution of the causes of one's behavior. There is now considerable evidence that people tend to take credit for their successes and, to a lesser extent, that people tend to deny responsibility for failure. Because this line of work has been reviewed extensively elsewhere, I do not discuss it at length. In the most recent review, Pyszczynski and Greenberg (1987) argued, in line with my ideas, that directional goals play a role in producing this bias and that they do so by leading to biased reliance on cognitive processes.

The studies just cited show that motivation may bias self-characterizations and provide some evidence for the biased memory search and belief construction model of motivated reasoning. The following studies showing motivationally biased self-characterizations provide no evidence for these mechanisms, but they are all consistent with them.

McGuire (1960) showed that the perceived desirability of events may be biased by motivation. Subjects who were persuaded that some events were more likely to occur came to view these events as more desirable, presumably because they were motivated to view the future as pleasant. Subjects also enhanced the desirability of logically related beliefs that had not been specifically addressed by the manipulation, which suggests that they were attempting to construct a logically coherent pattern of beliefs.

S. J. Sherman and Gorkin (1980) demonstrated that behavior may sometimes cause attitudes to shift in a direction opposite to that corresponding to the behavior. Subjects whose failure to solve a trick word problem implied that they might be sexist came to view themselves as more strongly in favor of affirmative action than did controls. This suggests that they may have engaged in a memory search aimed at concluding that they were not sexist, though there is no evidence for this.

Tesser and his colleagues (Tesser, 1986; Tesser & Campbell, 1983) have based their work on the assumption that people are motivated to maintain positive self-evaluation and that they do so through social comparison processes. Self-evaluation is threatened when one is outperformed by similar others. To maintain positive evaluation in the face of such threats, people reduce the self-relevance of the activities in question. These studies do not seem to lend themselves to reinterpretation in cognitive terms, which suggests that the self-descriptions are biased by motivation. The mechanisms producing the bias have not been addressed in this research, but these findings are consistent with the view that changes may result from selective memory search for evidence that the activity in question is not important to the self.

In sum, there is considerable evidence that directional goals may bias people's self-conceptions as possessing various attitudes, traits, and histories. These motivated self-characterizations often appear to be constrained by prior self-knowledge, and these constraints provide indirect evidence that motivation biases self-conceptions by biasing the memory search for relevant information. There is also some direct evidence for this, coming from the biased content of reported memories and

from the enhanced speed both of generating memories that are consistent with desired self-views and of endorsing desired self-conceptions.

Biased beliefs about others. Evidence for the effect of directional goals on judgments about others comes from research involving a manipulation termed *outcome dependency*: Subjects expect their own outcomes to depend in some way on a target person. Such manipulations bias the perceptions of others in ways that are consistent with the biased memory search and belief construction model, though most studies provide no direct evidence for it.

Several studies indicate that people tend to see others as more likable if they expect to interact with them. In a study by Darley and Berscheid (1967), subjects who expected to hold intimate sexual discussions with one target person but not with another read personality descriptions of both. Subjects liked their expected partner better than they liked the other person, presumably because they wanted their partner to be likable. In a later study, Berscheid, Graziano, Monson, and Dermer (1976) employed a similar but more powerful manipulation in which subjects who expected to date one of three persons observed a taped discussion among the three. Once again, subjects liked the person whom they expected to date better than they liked the other persons. Ratings of the three persons' personalities were affected as well: Subjects rated their expected dates more extremely and positively on traits and were more confident of their ratings. Subjects also awarded more attention to their prospective dates and recalled more information about them than about other target persons, but the enhanced liking and trait ratings were not due to differential attention. One may understand these data by assuming that subjects had both a directional goal and an accuracy goal: They wanted their date to be nice so that the expected interactions would be pleasant, and they wanted to get a good idea of what the date was like so that they could better control and predict the interaction. The accuracy goal led to more intense processing, and the directional goal created bias.

A slightly different paradigm employed by Neuberg and Fiske (1987) also showed that outcome dependency enhances liking. In their studies, all subjects expected to interact with the target person, but half the subjects expected the reward that they would get for their own performance to depend on the target person's performance (outcome dependency), whereas half the subjects expected their own performance to be rewarded independently. All subjects observed written or videotaped self-descriptions allegedly produced by the target person. When the information contained in these self-descriptions was not inconsistent with subjects' expectations about the target person, subjects in the outcome-dependency condition attended to this information longer and, after exposure to this information, liked the target person better than did other subjects. Thus these subjects showed the same combination of more intense processing and bias obtained in Berscheid et al.'s (1976) study, which suggests that they too may have held both accuracy and directional goals.⁴

⁴ Neuberg and Fiske (1987) presented these findings as evidence for more accurate processing of the information about the target person, but this argument is difficult to maintain because the liking judg-

One outcome-dependency study in which outcome-dependent subjects' did not enhance their liking for the target person sheds some light on the mechanisms through which the enhanced liking typically obtained in this paradigm occurs. Omoto and Borgida (1988) found that White men who expected to date a White woman did not rate her any more positively on dimensions including likability than did subjects who expected to interact with her only briefly.⁵ One key difference between this study and the earlier ones lies in the quality of the information about the target person that was available to subjects. Unlike the rich and meaningful target information used in earlier studies, very impoverished materials consisting of, in the authors' words, "rather uninformative preference information" (about foods, color, etc.) were used in this study. The failure of outcome dependency to enhance subjects' liking of the target person in this study, despite the finding that outcome-dependency subjects did appear to allocate more attention to the target information, supports the notion that directional goals will bias impressions only when the data are rich enough to permit one to construct a justification for the desired impression (cf. Darley & Gross, 1983). When attempts to justify desired impressions fail, the desired impressions will not be espoused.

A study by Klein and Kunda (1989) showed that evaluations of another person's abilities may also be biased by directional goals, and also provided some indirect evidence for the biased memory search and belief construction model. In this study all subjects were outcome dependent on the target person, but different groups of subjects were given opposite directional goals. All subjects expected to participate in a history trivia game, in which the target person was to be their partner or their opponent. After exposure to a sample of the target person's performance, in which he got a perfect score, subjects who expected the target to be their partner (and therefore probably wanted him to have a high ability) judged him as better at history than did subjects who expected him to be their opponent (and who therefore probably wanted him to have low ability).

This study also provides some evidence for the underlying processes. First, subjects were clearly constrained by the nature of information they had received, inasmuch as even subjects expecting the target to be their opponent judged him as better than average, which indicates that they did not ignore the fact that he had performed very well. Second, changes in subjects' beliefs about the nature of the task reflect an attempt to construct reality so as to justify their evaluations of the target. If the target person's peers are good at the task, one may view his strong performance as less outstanding. Accordingly, subjects for whom the target person was an opponent, and who therefore wanted to disparage him, judged the average student to be better at the task than did subjects for whom the target person was their partner. If luck plays a big role in producing behavior, a strong performance is less likely to reflect ability. Accordingly, "opponent-target" subjects considered luck to play a larger role in producing behavior than did "partner-target" subjects.

ments made by outcome-dependent subjects were not sensitive to different levels of individuating information about the target.

In sum, research manipulating outcome dependency shows that directional goals may bias liking for a target person, as well as trait and ability evaluations of the target person. There is some indirect evidence that the biases are obtained through biased memory search, and all the findings are consistent with this view. There is also some evidence that outcome dependency may lead to more extensive processing of information, perhaps because the manipulations also arouse accuracy goals, but this extensive processing does not eliminate bias.

Indeed, it seems possible that accuracy goals, when paired with directional goals, will often enhance rather than reduce bias. This is because the more extensive processing caused by accuracy goals may facilitate the construction of justifications for desired conclusions. Thus people expecting to incur heavier costs if their desired beliefs turn out to be wrong may expend greater effort to justify these desired beliefs. This intuition runs counter to the common assumption that strong accuracy goals will minimize the impact of directional goals (e.g., Pyszczynski & Greenberg, 1987). To determine how these two kinds of goals interact with each other to affect reasoning, it is necessary to pit them against each other in the same study. To date, there has been no serious attempt to address this question empirically.⁶

A strength of the outcome-dependency paradigm is that none of the studies seem open to reinterpretation in purely cognitive terms: In all cases, subjects were randomly assigned to conditions, and the dependency manipulation had no additional informational value and could not be assumed to affect expectations in nonmotivational ways.

Biased beliefs about events. There are several sources of evidence that directional goals may bias people's beliefs about the nature, the causes, and the likelihood of various events. Klein and Kunda's (1989) study indicated that the goal of disparaging or enhancing another's abilities at a given task may lead to changes in one's beliefs about the nature of that task. Theories about the causal determinants of events may also be influenced by goals. Kunda (1987) showed that people tend to believe that their own attributes are more conducive to marital happiness and to academic success than are other attributes. It is possible that people construct such beliefs by selectively accessing only information that is consistent with them, but there is no evidence for this. The motivational interpretation of this bias as resulting from people's wish to believe that they will experience desirable outcomes was strengthened by the finding that in the domain of academic success, the effect was not found for people for whom the outcome was not personally relevant.

Similarly, Dunning, Story, and Tan (1989) found that people view their strengths as more predictive of success than their weaknesses are. They showed that the self-ratings of management students on a variety of dimensions correlated positively with their beliefs about the importance of these dimensions for success as a business executive. They also found that undergrad-

⁵ White men expecting to date a Black woman rated her less positively than did those expecting a brief interaction with her. But these effects may be due to differential willingness to express prejudice in the different conditions.

⁶ Seemingly relevant studies in the self-serving attribution paradigm typically confound accuracy goals with self-presentational concerns.

uates preselected because they had strong verbal and weak math skills or strong math and weak verbal skills were more positive in their evaluations of prospective students who shared their strengths and weaknesses than of those with an opposing pattern of strengths and weaknesses. In both Kunda's (1987) and Dunning, Story, and Tan's (1989) studies, however, subjects were not randomly assigned to motivational conditions, and so the findings may also be due to different prior beliefs held by people with different attributes.

Directional goals may also bias the interpretation of athletic events. Gilovich (1983) showed that fans of a winning and a losing team are differentially affected when their attention is called to a fluke event that happened in the game and that may have determined its outcome. For fans of the losing team, the occurrence of such a fluke serves to restore their faith in their team and its ability and increases their belief in the likelihood that their team would win on a rematch. Fans of the winning team, on the other hand, are hardly affected by the fluke. This suggests that the fluke event is construed as having different meaning and implications by the different groups. Interestingly, in the absence of a fluke, fans of the losing team do lose faith in its talent, which suggests that their ability to maintain faith in their team's talent is constrained by their ability to construct an acceptable justification for such faith. They will not blindly expect their team to win despite a history of losses, but they will seize upon opportunities to explain its losses away. These data do not provide unambiguous support for the role of motivation in producing the biases because the biases may also have been due to differences in the prior beliefs held by fans of the two teams.

There is some evidence that people's evaluations of medical conditions may be biased by goals. In two studies (Ditto, Jemmott, & Darley, 1988; Jemmott, Ditto, & Croyle, 1986), subjects were given a laboratory test said to diagnose the presence of a potentially risky (fictitious) enzyme deficiency. In both studies, subjects diagnosed as having the deficiency rated it as less serious and health threatening and rated the diagnostic test as less accurate than did subjects diagnosed as not having it. These findings could result from a motivated attempt to minimize the likelihood that one has the disease and the danger involved in having it. However, the findings may also result from prior beliefs: College students tend to assume that they are and will be healthier than average (Weinstein, 1980). They therefore may infer that a test diagnosing deficiencies is invalid or that a deficiency that they have cannot be serious.

Several studies have shown that the perceived likelihood of an event may be biased by goals: More desirable events are perceived as more likely to occur. Marks (1951) asked children whether they expected to pick a picture card from a mixed pack. A higher proportion of subjects expected to draw a picture card when pictures were desirable (i.e., subjects expected to gain a point with each picture) than when pictures were undesirable (i.e., subjects expected to lose a point with each picture). This was true even though subjects knew the proportion of picture cards in each pack and were sensitive to it in their guesses, in that they were more likely to predict pictures for those packs that had higher proportions of pictures. Similar results have been found for adults asked to bet on the likelihood of drawing a marked card (Irwin, 1953; Irwin & Snodgrass,

1966) or to estimate the probability that different kinds of lights would flash (Pruitt & Hoge, 1965). Conceptually similar effects were found in two studies guided by dissonance theory. Subjects thought that they were more likely to be asked to take a test if they had invested or anticipated investing considerable effort in preparing for the test than if the effort had been or was expected to be minimal (Arrowood & Ross, 1966; Yaryan & Festinger, 1961).

How are these biased likelihood estimates produced? Because in most of these studies probability estimates were not measured directly, one possibility is that the bias affected not subjects' probability estimates, but rather the subjective interpretation of these estimates. Thus people may interpret their belief that an event has a 60% probability of happening to mean that the event is either slightly likely or somewhat likely to happen, depending on whether they want to view it as likely. Such an interpretation, in turn, may affect their willingness to assume and bet that the event will occur. This account gains support from Arrowood and Ross's (1966) finding that subjects in different conditions made different predictions, on a 6-point scale, about their own likelihood of taking the test even though their believed probabilities, expressed in percentage scores, that people in their experimental condition in general would take the test did not differ. This account suggests that the beliefs accessed and constructed to determine the subjective meaning of percentage scores may have been biased by directional goals.

A different account is needed to explain one study that did get an effect on probability estimates (Irwin & Snodgrass, 1966). This is the only study in which subjects were required to infer the probabilities that desired events would occur from a series of observations (these probabilities were given to subjects in the other studies). This is also the only study in which subjects' responses were not sensitive to actual probabilities: Higher probability estimates were given for events with lower actual probabilities. This suggests that in this case, desirability of particular events may have affected the process through which the frequency of events was detected. But there is no direct evidence for this possibility.

Biases in Selection of Statistical Heuristics

The evidence reviewed so far implies that directional goals may bias the selection and construction of beliefs about the self, other people, and the world—that is, the selection of declarative knowledge structures. The studies reviewed next imply that directional goals may also bias the selection of inferential rules—that is, procedural knowledge structures.

In two studies, researchers examined directly whether people with different directional goals use different statistical heuristics spontaneously. A study by Ginossar and Trope (1987) suggested that goals may affect the use of base rate information. Subjects read Kahneman and Tversky's (1972b) cab problem, in which a witness contends that the car involved in a hit-and-run accident was green. They received information about the likelihood that the witness was correct and about the prior probability that the car would be green (the base rate) and were asked to estimate the likelihood that the car was green. Subjects typically ignore the base rate when making such estimates. How-

ever, when asked to answer as though they were the lawyer for the green car company (a manipulation presumed to motivate subjects to conclude that the car was not green), subjects did use the base rate information and made considerably lower estimates when the base rate was low. The finding that only motivated subjects used base rate information suggests that motivated subjects conducted a biased search for an inferential rule that would yield their desired conclusion. It is also possible, however, that those subjects conducted a more intense but essentially objective search for rules. This is because the pattern of results and the design do not permit assessment of whether all subjects pretending to be lawyers used the base rate or whether only subjects for whom use of base rate could promote their goals (i.e., subjects told that the prior probability was low) used it.

Research by Sanitioso and Kunda (in press) suggested that goals may affect the use of a variant of the law of large numbers. Subjects had to decide how many instances of athletic competitions they would want to observe before they predicted how the participating athletes would be ranked at the end of the season. Subjects were led to believe that the observation of each competition would require either high or low effort, and they were then asked to assess the predictability of the athletes' final scores either from a single competition or from an aggregate of competitions. Only subjects expecting evidence collection to be highly effortful accessed the aggregation principle—that is, believed that aggregates afforded greater predictability than did single instances. Because these high-effort subjects wanted to avoid collecting large samples, their goal was to conclude that they needed only small samples of competitions to arrive at reasonable levels of predictability. Their belief that predictability increased sharply with sample size could allow these subjects to arrive at that conclusion: As the increase of predictability with sample size becomes sharper, the size of the sample yielding a given level of predictability becomes smaller. Thus it appears that motivation may affect whether the aggregation principle will be accessed. But, once again, it is not clear whether high-effort subjects' use of the heuristic resulted from a more intense but essentially objective search for heuristics or whether it resulted from a biased search for a heuristic that would yield the desired conclusion. This is because the study did not permit assessment of the intensity of processing engaged in by low-effort subjects.

In sum, there is some evidence that directional goals may affect the use of statistical heuristics. Neither of the studies that demonstrated this directly are open to reinterpretation in cognitive terms because in both cases subjects were randomly assigned to conditions and the manipulations conveyed no information that could account for the results. In both cases subjects appeared to access rules only when these were conducive to their goals, which implies that subjects engaged in a biased search for rules. However, neither study ruled out the possibility that goals led to more intense and objective processing that just happened to yield helpful rules. To do this, it would be necessary to show that subjects with the same goals use a given rule when it is likely to support their goals but not when it is likely to thwart them, or to show that subjects with opposite goals use equally complex but different heuristics.

Biased Research Evaluation

The studies reviewed so far indicate that directional goals may bias the selection and construction of beliefs, as well as the selection of inferential rules. In studies concerning biased evaluation of scientific research, experimenters explore an arena for the biased selection of both types of knowledge structures. In the typical study, subjects are exposed to alleged scientific evidence whose conclusions are differentially acceptable to different subjects, and they are then asked for their reactions to this evidence. The typical finding is that subjects motivated to disbelieve the evidence are less likely to believe it, and there is some evidence that this outcome is mediated by differential processing of the information.

Wyer and Frey (1983) gave subjects success or failure feedback on an intelligence test and then exposed them to a report containing favorable and unfavorable information about intelligence tests. Afterwards, subjects receiving failure feedback judged intelligence tests to be less valid than did subjects receiving success feedback. Indirect evidence that this was mediated by failure subjects' attempts to refute the pro-test arguments is provided by the findings that they recalled more of these arguments, but there is no direct evidence for such attempts at refutation. More direct evidence that subjects are critical of research that they are motivated to disbelieve was found in a similar study by Pyszczynski, Greenberg, and Holt (1985). Subjects were given success or failure feedback on a social sensitivity test and then exposed to two studies, one concluding that the test's validity was high and another concluding that it was low. In comparison with failure subjects, success subjects judged the high-validity study to be more convincing and better conducted, and they judged the low-validity study to be less convincing and less well conducted. Pyszczynski et al. did not attempt to assess what mediated subjects' evaluation of how well the research was conducted. In both their study and Wyer and Frey's, the reluctance to believe in the validity of tests indicating failure may have resulted from a nonmotivational inference: Subjects who believe themselves to have high levels of a certain ability are justified in doubting the validity of tests showing otherwise.

An early study by Kassarjian and Cohen (1965) showed that smokers were less persuaded than nonsmokers by the Surgeon General's report about the health risks of smoking, which suggests that people threatened by scientific evidence are motivated to disbelieve it. But here, too, prior beliefs may have been responsible for the phenomenon, inasmuch as smokers may have believed smoking to be less dangerous than did nonsmokers even before exposure to the report.

More recently, Kunda (1987) found similar results in studies in which she attempted to control for the possibility that the effects were mediated by prior beliefs rather than by motivation. Subjects read an article claiming that caffeine was risky for women. Women who were heavy caffeine consumers were less convinced by the article than were women who were low caffeine consumers. No such effects were found for men, who may be presumed to hold the same prior beliefs about caffeine held by women, and even women showed this pattern only when the health risks were said to be serious. Thus only subjects who stood to suffer serious personal implications if the article

were true doubted its truth. This study provides a stronger case for the role of directional goals in biasing the evaluation of research.

The above studies all imply that subjects motivated to disbelieve evidence do so by recruiting those beliefs and inferential rules that could be used to criticize it. But none of them provided direct evidence for this. More direct evidence demonstrating that goals may bias the evaluation of scientific evidence comes from a study by Lord, Ross, and Lepper (1979). These authors preselected subjects who were for or against capital punishment and exposed them to two studies with different methodologies, one supporting and one opposing the conclusion that capital punishment deterred crime. Subjects were more critical of the research methods used in the study that disconfirmed their initial beliefs than they were of methods used in the study that confirmed their initial beliefs. The criticisms of the disconfirming study were based on reasons such as insufficient sample size, nonrandom sample selection, or absence of control for important variables; this suggests that subjects' differential evaluations of the two studies were based on what seemed to them a rational use of statistical heuristics but that the use of these heuristics was in fact dependent on the conclusions of the research, not on its methods. Having discounted the disconfirming study and embraced the confirming one, their attitudes, after exposure to the mixed evidence, became more polarized. Because subjects were given methodological criticisms and counterarguments, however, the study did not address whether people would spontaneously access differential heuristics. In fact, after exposure to a single study but before receiving the list of criticisms, all subjects were swayed by its conclusions, regardless of their initial attitudes. This suggests further that people attempt to be rational: They will believe undesirable evidence if they cannot refute it, but they will refute it if they can. Also, although the differential evaluation of research obtained in this study may have been due to subjects' motivation to maintain their desired beliefs, it may also have been due to the fact that one of these studies may have seemed less plausible to them because of their prior beliefs.

B. R. Sherman and Kunda (1989) used a similar paradigm to gain insight into the process mediating differential evaluation of scientific evidence. Subjects read a detailed description of a study showing that caffeine either facilitated or hindered the progress of a serious disease. Subjects motivated to disbelieve the article (high caffeine consumers who read that caffeine facilitated disease, low caffeine consumers who read that caffeine hindered disease) were less persuaded by it. This effect seemed to be mediated by biased evaluation of the methods employed in the study because, when asked to list the methodological strengths of the research, threatened subjects spontaneously listed fewer such strengths than did nonthreatened subjects. Threatened subjects also rated the various methodological aspects of the study as less sound than did nonthreatened subjects. These included aspects pertaining to inferential rules such as those relating sample size to predictability, as well as to beliefs about issues such as the validity of self-reports or the prestige of research institutions.

Of importance is that all subjects were also quite responsive to the differential strength of different aspects of the method, which suggests that they were processing the evidence in depth.

Threatened subjects did not deny that some aspects were strong, but they did not consider them to be as strong as did nonthreatened subjects. Thus bias was constrained by plausibility.

Taken together, these studies suggest that the evaluation of scientific evidence may be biased by whether people want to believe its conclusions. But people are not at liberty to believe anything they like; they are constrained by their prior beliefs about the acceptability of various procedures. These constraints provide indirect support for the biased memory search and belief construction model.

As a group, these studies are vulnerable to reinterpretation in terms of nonmotivational accounts. This is because the experimenters created different levels of motivation either by preselecting subjects presumed to have different goals, who therefore may also hold different prior beliefs, or by subjecting subjects to success or failure experiences that may be deemed differentially likely to reflect their abilities because of prior beliefs. But such nonmotivational mechanisms cannot fully account for these findings because the few researchers who attempted to rule out the role of prior beliefs obtained results similar to those of researchers who did not.

Does Issue Involvement Lead to Unbiased Processing?

The work on motivated evaluation of scientific evidence suggests that people can process information in depth and be differentially sensitive to its strengths and weaknesses and yet be biased at the same time. The notion that systematic, in-depth processing does not eliminate bias helps resolve an apparent conflict between this line of work and the work on the effects of involvement on responsiveness to persuasive communications. The latter line of work, conducted mostly by Petty, Cacioppo, and their colleagues and by Chaiken and her colleagues, has relied on a paradigm that is remarkably similar to that used in investigations of biased evaluation of scientific evidence but has yielded seemingly different conclusions: Rather than demonstrating bias, this work seems to show that directional goals lead to more objective, less biased processing. Petty and Cacioppo (1986) and Chaiken et al. (1989) both assumed that in some circumstances, directional goals may bias responses to persuasion, but existing work in this paradigm has generally been interpreted as indicating objective and unbiased processing (see also Johnson & Eagly, 1989). In the following section, I review the relevant research and argue that the conclusion that involved subjects are unbiased in their processing of persuasive messages is premature: Although they appear to process messages in greater depth, it is possible that they are also biased. Therefore, the findings obtained in that paradigm are not inconsistent with the work reviewed earlier.

In studies conducted in the involvement and persuasion paradigm, subjects are exposed to messages promoting counterattitudinal policies, such as raising college tuition; highly involved subjects expect these policies to affect their own lives, whereas less involved subjects do not. Involvement is presumed to lead to two distinct goals: Because subjects' own futures are at issue, one may assume that they are motivated to determine which policy is best for them or, in other words, to be accurate. But because the messages are always counterattitudinal, one

may also assume that involved subjects hold a directional goal: namely, that of preserving their attitudes and avoiding recognition of the necessity of undesirable policies. Both these goals should be weaker for uninvolved subjects.

The major finding of this line of research is that highly involved subjects appear to process the messages more carefully than do less involved subjects: They are less sensitive to non-message factors such as source expertise or audience reaction and are more sensitive to the actual content of the message, most notably to the strength of the arguments, even when this leads them to adopt counterattitudinal, undesired stances (Chaiken et al., 1989; Petty & Cacioppo, 1986). In other words, they appear to behave very much like subjects whose only goal is accuracy.

In a typical study (e.g., Petty & Cacioppo, 1979), highly involved and less involved subjects are exposed to strong arguments (i.e., arguments that usually lead people to generate pro-argument thoughts) or to weak arguments (i.e., arguments that usually lead people to generate counterargument thoughts). In comparison with less involved subjects, highly involved subjects exposed to weak arguments are typically less persuaded: Their reported attitudes are less promessage. This effect seems to be mediated by more extensive processing because they recall more of the arguments and, when asked to list thoughts that had occurred to them while reading the message, they list more thoughts that are unfavorable to the arguments. These responses are consistent with objective processing, but they are also consistent with biased processing, inasmuch as highly involved subjects are motivated to form (or maintain) countermessage arguments, a goal well-served by derogating weak arguments. Responses to *strong* arguments, however, seem to point to objective processing. If the processing were biased, highly involved subjects would also be expected to be less persuaded by strong arguments, but the opposite pattern is found: They are typically more persuaded by strong arguments (their reported attitudes are more promessage) than are less involved subjects. Once again, this seems to be mediated by more extensive processing, because they recall more arguments and list more thoughts that are favorable to the arguments. Some researchers have therefore concluded that the main concern of involved subjects is accuracy, that this concern leads them to process information more carefully and thoroughly, and that they do so in an objective and impartial manner.

It is important to note, however, that although this pattern of data does suggest that high involvement leads to more extensive and thorough message processing, it does not rule out the possibility that the deeper processing is also biased by directional goals. In order to determine whether directional goals are exerting an influence on reasoning, it is necessary to compare the responses of subjects holding opposite goals to the same message or to compare the responses of subjects holding the same goals to messages with opposing conclusions, as done in research on biased processing of scientific evidence. It is possible, for example, that even though involved subjects exposed to strong counterattitudinal messages that they wanted to disbelieve could not escape viewing these messages as strong, they still viewed them as less strong than would subjects for whom the same messages were pro-attitudinal. People could be responsive to message strength and biased at the same time, much

as people evaluating scientific evidence are responsive to the differential strength of different methodological aspects and, at the same time, biased. But most studies carried out in the involvement and persuasion paradigm do not include the conditions necessary to assess this possibility.

Support for the possibility that directional bias may coexist with deeper processing is provided by one study in the persuasion and involvement paradigm in which subjects were exposed to both pro and con arguments concerning an issue likely to involve important attitudes. Howard-Pitney, Borgida, and Omoto (1986) provided subjects with messages that were for and against raising the drinking age to 21, an issue prominent in the media at the time the study was run. Rather than manipulating involvement, they obtained two different levels of involvement by preselecting subjects so that highly involved subjects were those who had indicated that the issue was more important to them and more likely to affect their activities than it was for less involved subjects. As in earlier studies, it was found that highly involved subjects did process the messages more thoroughly: In response to both pro and con statements, they listed proportionally more issue-related versus issue-unrelated thoughts than did less involved subjects. But they also showed some evidence of biased, partisan processing: They listed more thoughts about their own position and had a higher percentage of thoughts that were unfavorable to the counterattitudinal arguments. This pattern of results suggests that directional biases may coexist with elaborate processing. This study is only suggestive, however, because inasmuch as highly involved and less involved subjects also differed in the extremity of their prior attitudes, the processing differences may have been due to these differences rather than to the different levels of involvement.

In sum, if one assumes that in studies in which the persuasion and involvement paradigm are used both accuracy goals and directional goals are aroused, there is considerable evidence that such a combination leads to more detailed and thorough processing of goal-related information not unlike that obtained when only accuracy goals are present. This deeper processing is capable of uncovering information that clashes with directional goals, and such information is not ignored. Clearly, then, if directional goals do exert an influence on reasoning, this influence is limited by people's perceptions of reality and plausibility. Directional goals, at least relatively weak ones of the sort aroused in these studies, are unlikely to blind people to information that clashes with the goals. But this does not rule out the possibility that directional goals are capable of biasing reasoning, and in the one study designed to detect such bias, the researchers did in fact detect it. This and the considerable evidence for such biases reviewed earlier suggests that responsiveness to persuasive communications may also be biased.

Dissonance and Motivated Reasoning

It is interesting that every one of the directionally motivated phenomena reviewed here may be derived from dissonance theory, as originally stated (Festinger, 1957). Dissonance theorists can easily restate any of the motivational states presumed to be aroused in these studies in terms of tensions between two inconsistent beliefs. For example, the studies concerning

biased evaluation of scientific evidence may be described as involving the dissonant beliefs "I am or want to be healthy, competent, or correct in my beliefs" and "This research implies that I am not." And the studies showing the biasing effects of outcome dependency on the evaluation of others may involve the dissonant beliefs "I want this person to be nice, competent, or incompetent" and "The evidence implies otherwise" (cf. Berkowitz & Devine, 1989).

A problem with this insight is that there is now compelling evidence that the mere inconsistency between two beliefs does not suffice to produce dissonance motivation and its resulting attitude change. It has been argued that in the induced compliance paradigm, dissonance motivation is provoked, instead, by the implication of such inconsistency to one's self, namely that one is a fool for having performed the counterattitudinal behavior (Steele, 1988). This is evidenced by the findings that in the induced compliance paradigm, dissonance reduction through attitude change occurs only in the presence of conditions that could lead to the attribution of one's behavior to folly: free choice to engage in a behavior with foreseeable negative consequences (Cooper & Fazio, 1984). And such dissonance reduction is eliminated in the presence of unrelated alternative routes for concluding that one is not a fool (Steele, 1988).

Thus dissonance motivation in the induced compliance paradigm amounts to the arousal of a directional goal, the goal of concluding that one is not a fool. Because in the one paradigm studied extensively by dissonance researchers, dissonance motivation appears to arise from directional goals rather than from inconsistency among beliefs, it seems reasonable to conclude that it is the presence of directional goals that is also responsible for the many other directional motivational phenomena reviewed here. Attempts to restate these phenomena in terms of mere inconsistency among beliefs are likely to obscure the key role of directional goals in affecting reasoning and are unlikely to lead to any gains in explanatory power.

The exercise is useful, however, in that it may serve to bring the scope of a reformulated dissonance theory back full circle to its founder's original intent. Theoretical developments in dissonance theory have served to drastically restrict the range of phenomena and circumstances under its jurisdiction. Current wisdom holds that dissonance is aroused only when people freely choose to engage in activities that bear foreseeable negative consequence (Cooper & Fazio, 1984) and only when the self is involved and threatened (Aranson, 1968). These conditions clearly are necessary for the arousal of dissonance in the very narrow set of circumstance in which it has been traditionally investigated: namely, in the induced compliance paradigm, in which they give rise to the dissonance-provoking cognition "I may be a fool." But it is just as clear that in other settings arrival at the same cognition may be predicated on other conditions, and as the research reviewed here implies, many other cognitions may be equally dissonance arousing (e.g., "I may be unhealthy," "I may fail," "my date may be unpleasant").

It is also important to note that a reformulation of dissonance theory as concerned mostly with threats to the self still does not address the question that is of central interest to this article: namely, how is dissonance reduced? Reinterpretation of findings in terms of dissonance theory will be fruitful only to the extent that the theory is further expanded to provide an ac-

count of the mechanisms through which attitudes are changed in the service of dissonance reduction.

Arousal and Motivated Reasoning

The most exciting development in dissonance theory in the 1970s was the recognition of the importance of arousal for dissonance reduction. The dispute between cognitive and motivational accounts of dissonance reduction phenomena was put to rest when it became clear that arousal played a central role in the process, a finding that could not be accounted for by purely cognitive mechanisms. But just what is that role? The evidence suggests that dissonance-arousing manipulations cause measurable physiological arousal, and the presence of such arousal appears to be necessary for dissonance reduction to take place; when the arousal is inhibited with a tranquilizer, no dissonance-reducing attitude change occurs (Cooper, Zanna, & Taves, 1978). However, arousal is not a sufficient condition for dissonance reduction; when the arousal is misattributed to an external source, attitude change is attenuated (Zanna & Cooper, 1974). Reviewing the relevant literature obtained in the induced compliance paradigm, Cooper and Fazio (1984) concluded that the acceptance of responsibility for an unwanted event leads to arousal that the person seeks to explain. If the arousal is attributed to discomfort that is due to one's behavior, dissonance motivation—that is, aversive pressure to change one's attitude—occurs.

What is this aversive dissonance motivation? From my perspective, it might be useful to view it as embodied in the cognition "I am concerned that what I have just done makes me a fool" or, more generally, "I am concerned that X might be true." Thus the cognition that one is concerned about X is inferred from the fact that one is aroused. This cognition, in turn, leads one to search for conditions under which X might not be true ("If I believed in the cause I just contributed to, I wouldn't feel like a fool," "If the method used in this study were poor, I wouldn't have to believe it"), and the presence of such conditions then tends to be confirmed through biased memory search and belief construction. Thus the arousal serves as a signal, a red light indicating concern about a particular cognition.

It follows that the role of arousal in motivated reasoning is likely to be more important the more ambiguous the attribution that one is concerned. In those cases in which one has strong and unambiguous reasons to be concerned, arousal may play a reduced role or no role at all in triggering motivated reasoning. For example, a person who has just killed someone or who has just been diagnosed as having a deadly disease is unlikely to require arousal to conclude that there are reasons for concern and would be unlikely to misattribute arousal stemming from such events to other factors. The ease with which arousal is misattributed to just about any external source—a pill, an unpleasant room, anticipation of shock—may be a unique feature of the induced compliance paradigm, in which it is not at all obvious that one should be concerned about the implications of one's actions. It also follows that cues other than arousal may also serve to trigger the conclusion that one is concerned and, consequently, to enhance motivated reasoning.

Unfortunately, the one study that addressed this issue yielded

mixed results (Pittman, 1975). In that induced compliance study, a confederate provided a cue that subjects might be concerned by saying that he was nervous about making a counterattitudinal speech, thereby implying that subjects might be nervous about doing so too. The cue was expected to enhance dissonance motivation and its resulting attitude change because it gave subjects reason to conclude that they were concerned. On the positive side, this cue did enhance attitude change for subjects who expected to receive electrical shocks shortly (subjects expecting shock did not change their attitudes in the absence of the cue because they misattributed their arousal to the anticipated shocks). The cue apparently replaced arousal as an indicator of concern, or blocked the misattribution of arousal to the shocks. But, on the negative side, the cue did not enhance attitude change in understandable ways for subjects not expecting shocks, and results for these subjects were difficult to interpret.

I have proposed that arousal may be one of a variety of cues that can serve to trigger the inference that one is concerned about a particular cognition and, consequently, to trigger motivated reasoning directed at disputing that cognition. This notion suggests that rather than focusing exclusively on the role of arousal in dissonance reduction, it might be more fruitful to broaden the scope and explore a wider range of cues that could lead people to conclude that they are concerned about a diverse range of behaviors, events, and beliefs and that could thereby bring about motivated reasoning.

Discussion

The case for directional motivated reasoning appears quite strong. Directional goals have been shown to affect people's attitudes, beliefs, and inferential strategies in a variety of domains and in studies conducted by numerous researchers in many paradigms. Some of these studies and paradigms are open to reinterpretation in nonmotivational terms, but many are not. Even in paradigms in which individual studies may reasonably be attributed to entirely cognitive processes, such as the dissonance paradigm, evidence indicating that arousal is crucial for motivated reasoning suggests that motivational factors are involved. The position that all self-serving biases are due to purely cognitive processes is therefore no longer tenable.

Cognitive interpretations for ambiguous phenomena were viewed by their proponents as preferable to motivational ones on the grounds of parsimony. The argument, which seemed persuasive at the time, was that because all extant evidence purporting to demonstrate motivational biases could be accounted for in terms of well-established cognitive processes, there was no need to infer the additional existence of motivational processes for which no independent evidence existed (Dawes, 1976; Miller & Ross, 1975; Nisbett & Ross, 1980). The evidence reviewed in this article suggests that psychologists are now in a position to turn that argument on its head (cf. Showers & Cantor, 1985). A single motivational process for which unequivocal independent evidence now exists may be used to account for a wide diversity of phenomena. Many of these cannot be accounted for at all in nonmotivational terms. Accounting for the others in cognitive terms would require making a multitude of auxiliary assumptions that are special for each case,

many of which have no empirical support. For example, cognitive accounts may require the assumption that people with different backgrounds differ in their prior beliefs about a particular issue when no evidence or plausible grounds for such differences exist. Thus, under the current state of knowledge, the motivational account appears to be more parsimonious and coherent than the purely cognitive one (Thagard, 1989).

The Mechanisms for Motivated Reasoning

Although cognitive processes cannot fully account for the existence of self-serving biases, it appears that they play a major role in producing these biases in that they provide the mechanisms through which motivation affects reasoning. Indeed, it is possible that motivation merely provides an initial trigger for the operation of cognitive processes that lead to the desired conclusions.

I have proposed that when one wants to draw a particular conclusion, one feels obligated to construct a justification for that conclusion that would be plausible to a dispassionate observer. In doing so, one accesses only a biased subset of the relevant beliefs and rules. The notion that motivated reasoning is mediated by biased memory search and belief construction can account for all of the phenomena reviewed earlier, but the evidence for this process is mostly indirect. The most prevalent form of indirect evidence lies in the constraints that prior knowledge imposes on motivational biases, a pervasive finding obtained in several paradigms. In the dissonance paradigm, prior attitudes appear to constrain motivated shifts in postdissonance attitudes (e.g., Greenbaum & Zemach, 1972; Linder et al., 1967). Prior self-concepts similarly appear to constrain directional shifts toward desired selves (Kunda & Sanitioso, 1989; Sanitioso et al., 1990). Prior beliefs about how performance reflects ability appear to constrain motivated perceptions of the ability of a person (Klein & Kunda, 1989) or of a sports team (Gilovich, 1983). And prior beliefs about the strength of scientific methods appear to constrain motivated evaluations of scientific research (B. R. Sherman & Kunda, 1989). The existence of such constraints indicates that prior knowledge is accessed in the process of arriving at desired conclusions; the existence of bias implies that not all relevant prior knowledge is accessed.

Such constraints, however, do not necessarily reflect biased memory search and belief construction; they could also result from alternative processes. For example, the existence of constraints in the dissonance paradigm may reflect a compromise between a desire to espouse new attitudes and an opposing desire to maintain current ones (though the process of arriving at such a compromise may still be one of biased memory search). In the absence of measures indicating which prior beliefs have been accessed, the existence of constraints can provide only indirect evidence for the notion of biased memory search.

However, the interpretation of these constraints as reflecting biased memory search processes is strengthened by the existence of some more direct evidence for biased memory search. Three kinds of data are taken as evidence that directional goals bias the accessing of relevant knowledge structures. The first consists of cases in which subjects spontaneously listed differ-

ent memories or beliefs under the influence of different directional goals. Thus subjects were more likely to list those autobiographical memories that were consistent with their currently desired self-concepts (Sanitioso et al., 1990); subjects reported performing behaviors more frequently in the past when these behaviors reflected their currently desired attitudes and beliefs (Ross et al., 1981; B. R. Sherman & Kunda, 1989); and subjects reported finding fewer methodological strengths in scientific studies when they were motivated to disbelieve the conclusions of these studies (B. R. Sherman & Kunda, 1989).

The second type of data providing relatively direct evidence for biased memory search processes comes from studies in which experimenters found faster reaction times for generating and endorsing those memories and beliefs that could be used to justify desired conclusions. Such findings suggest that these memories and beliefs had become relatively more accessible to subjects. Thus subjects were faster to generate those autobiographical memories that were consistent with their currently desired self-concepts (Sanitioso et al., 1990), and subjects were faster to endorse as self-descriptive those traits reflecting currently desired self-concepts (Markus & Kunda, in press). In both the memory-listing and the reaction-time studies, subjects were typically asked to list, generate, or endorse specific memories or traits before they were asked about their current attitudes or beliefs. This is important because it reduces the plausibility of an alternative account for these findings: namely, that they result from post hoc attempts at justifying previously endorsed attitudes and beliefs.

The third type of evidence pointing to biased memory search comes from studies showing that people use different statistical heuristics in the presence of different goals. Thus subjects were more likely to use base rate information (Ginossar & Trope, 1987) and the law of large numbers (Sanitioso & Kunda, in press) when the use of these heuristics enabled them to draw desired conclusions.

These effects of directional goals on memory listing, on reaction time, and on rule use provide converging evidence for the notion that goals enhance the accessibility of those knowledge structures—memories, beliefs, and rules—that are consistent with desired conclusions. Such selective enhanced accessibility reflects a biased search through memory for relevant knowledge.

Even these relatively direct indications of goal-directed memory search may, however, be open to alternative interpretations because truly direct measures of cognitive processes are impossible. For example, the memory-listing findings may reflect a response bias rather than enhanced memory accessibility. Thus the enhanced tendency to report autobiographical memories that are consistent with currently desired self-concepts may have resulted from a desire to present oneself as possessing these self-concepts. And the reaction time findings may have resulted from affective interference with speed of processing rather than from altered accessibility. However, neither of these alternative accounts provides a satisfactory explanation of the full range of findings. Thus self-presentational accounts do not provide a good explanation of reaction time findings, which are less likely to be under volitional control. And affective interference with speed of processing does not provide a good explanation for changes in overall levels of recall. Therefore, the pres-

ence of converging evidence from these different lines of work is best explained by the notion of biased memory search. Nevertheless, the evidence is as yet limited in its quantity and breadth. Thus the case for the biased accessing and construction model is by no means ironclad. But the evidence seems suggestive enough to justify concentrated efforts to strengthen the case.

If, as I propose, directional motivated reasoning results from a biased search through memory, it is still necessary to ask how the biased memory search comes about. One intriguing possibility is that the motive, or goal, merely leads people to ask themselves whether the conclusion that they desire is true; they ask themselves directional questions: "Do I support police intervention on campus?" "Am I extraverted?" "Is my date nice?" Standard hypothesis-testing processes, which have little to do with motivation, then take over and lead to the accessing of hypothesis-confirming information and thereby to the arrival at conclusions that are biased toward hypothesis confirmation and, inadvertently, toward goal satisfaction.

There is substantial evidence that in testing hypotheses, people tend to rely on a positive test strategy: They seek out instances in which the hypothesized property is known or expected to be present rather than absent (for review, see Klayman & Ha, 1987). In other words, people are biased toward seeking instances that are consistent with a hypothesis that they are testing rather than instances that are inconsistent with it. Such biases have been found in the solution of logic problems (Wason & Johnson-Laird, 1965), in attempts to discover the rules governing object categorization (Klayman & Ha, 1989), in the assessment of correlations (see Nisbett & Ross, 1980), and, of greatest relevance here, in the evaluation of people (Snyder & Cantor, 1979). In many cases this strategy is useful (Klayman & Ha, 1987), and it does not preclude sensitivity to the diagnosticity of instances (e.g., Skov & Sherman, 1986; Trope & Bassok, 1983). Nevertheless, under some circumstances, this strategy will lead to the favoring of hypothesis-confirming evidence. Thus if people possess mixed evidence that includes some instances that are consistent with the hypothesis and some that are inconsistent with it, their tendency to favor consistent instances will result in a hypothesis-confirmation bias. This is what happened in a study by Snyder and Cantor (1979) in which subjects read a rich account of a target person's behavior and then, several days later, were asked to judge, after first reporting all facts relevant to the judgement, whether the target person was suitable for a job requiring an extraverted or an introverted profile. Subjects were more likely to report facts supporting the hypothesis that the target person was suitable for the job they were asked about and judged the target person as more suitable for that job than did subjects who had judged suitability for the other job. Similar biased accessing of hypothesis-confirming evidence has been found for directional questions about the self (Sanitioso, 1989). Subjects who were asked whether they were extraverted recalled more extraverted material about themselves and judged themselves as more extraverted than did subjects who were asked whether they were introverted.

Further evidence indicating that such hypothesis-confirmation phenomena result from biased accessing of a subset of relevant knowledge comes from studies showing that the phenomenon is reduced or eliminated when subjects are encour-

aged to conduct more symmetrical memory searches. Subjects' confidence in the correctness of their responses to general knowledge questions is not affected when they are asked to provide reasons supporting their responses, which suggests that they do so spontaneously, even when not asked to; however, their confidence is reduced when they are asked to provide reasons contradicting their responses, which suggests that they do not engage in such hypothesis-disconfirming searches spontaneously (Koriat, Lichtenstein, & Fischhoff, 1980). Similarly, subjects' hindsight bias—that is, their belief that events that happened were bound to have happened—is not reduced when subjects are merely admonished to resist such bias, but it is reduced when subjects are asked to explain why opposite outcomes may have occurred, which suggests that subjects do not consider alternative hypotheses spontaneously (Fischhoff, 1977). In a similar vein, the tendency to evaluate research supporting counterattitudinal positions more harshly (Lord et al., 1979) is not affected when subjects are told to be objective and unbiased, but it is eliminated when subjects are asked to consider what judgments they would have made had the study yielded opposite results (Lord et al., 1984).

Taken together, these findings imply that people are more likely to search spontaneously for hypothesis-consistent evidence than for inconsistent evidence. This seems to be the mechanism underlying hypothesis confirmation because hypothesis confirmation is eliminated when people are led to consider inconsistent evidence. It seems either that people are not aware of their tendency to favor hypothesis-consistent evidence or that, upon reflection, they judge this strategy to be acceptable, because accuracy goals alone do not reduce this bias.

Thus the tendency to confirm hypotheses appears to be due to a process of biased memory search that is comparable with the process instigated by directional goals. This parallel lends support to the notion that directional goals may affect reasoning by giving rise to directional hypotheses, which are then confirmed; if the motivation to arrive at particular conclusions leads people to ask themselves whether their desired conclusions are true, normal strategies of hypothesis-testing will favor confirmation of these desired conclusions in many cases. One implication of this account is that motivation will cause bias, but cognitive factors such as the available beliefs and rules will determine the magnitude of the bias.

In its strongest form, this account removes the motivational "engine" from the process of motivated reasoning, in that motivation is assumed to lead only to the posing of directional questions and to have no further effect on the process through which these questions are answered. If this were true, many of the distinctions between cognitive, expectancy-driven processes and motivated processes would break down. Both directional goals and "cold" expectancies may have their effects through the same hypothesis-confirmation process. The process through which the hypotheses embedded in the questions "Is my desired conclusion true?" and "Is my expected conclusion true?" are confirmed may be functionally equivalent. Indeed, there are some interesting parallels between motivated reasoning and expectancy confirmation that lend support to this notion. For example, B. R. Sherman and Kunda (1989) found that implausible evidence (namely, that caffeine may be good for one's health) was subjected to elaborate and critical scrutiny that

was comparable to the scrutiny triggered by threatening evidence. Similarly, Neuberg and Fiske (1987) found that evidence inconsistent with expectations received increased attention comparable in magnitude to the increase caused by outcome dependency. Finally, Bem's (1972) findings that the beliefs of observers mirrored those of actors in dissonance experiments suggest that observers' expectations and actors' motivations may lead to similar processes.⁷ These parallels between motivational processes and expectancy-confirmation processes suggest that rather than attempting to distinguish between the two, it may be more fruitful to focus attention on the mechanisms underlying both.

It is also possible, though, that the effects of motivation on reasoning may go beyond the mere posing of directional questions. For example, when motivation is involved, one may persist in asking one directional question after another (e.g., "Is the method used in this research faulty?" "Is the researcher incompetent?" "Are the results weak?"), thus exploring all possible avenues that may allow one to endorse the desired conclusion. It is also possible that in addition to posing directional questions, motivation leads to more intense searches for hypothesis-confirming evidence and, perhaps, to suppression of disconfirming evidence (cf. Pyszczynski & Greenberg, 1987). If motivation does have these additional effects on reasoning, the parallels between motivated reasoning and expectancy confirmations gain new meaning. They suggest that seemingly "cold" expectancies may in fact be imbued with motivation. The prospect of altering one's beliefs, especially those that are well established and long held, may be every bit as unpleasant as the undesired cognitions typically viewed as "hot." It was this intuition that led Festinger (1957) to describe the hypothetical situation of standing in the rain without getting wet as dissonance arousing.

It is difficult to tell, at this point, whether the effects of motivation on reasoning go beyond the posing of directional questions. It seems clear that the examples of motivational reasoning reviewed here could result merely from posing directional questions. Further research is necessary to determine whether motivation plays an additional role.

Implications

Although the mechanisms underlying motivated reasoning are not yet fully understood, it is now clear that directional goals do affect reasoning. People are more likely to arrive at those conclusions that they want to arrive at. Whatever the mechanisms, the implications are serious and important. Taylor and Brown (1988) implied that motivated reasoning may be beneficial because the resulting illusions promote mental health; unrealistically positive views of oneself and the world are often adaptive. This seems true for illusory beliefs that do not serve as the basis for important action. But motivated illusions can be dangerous when they are used to guide behavior and decisions, especially in those cases in which objective rea-

⁷ It is known that actors' responses are not due only to expectancies, because they occur only in the presence of arousal that cannot be attributed to other sources (Cooper & Fazio, 1984).

soning could facilitate more adaptive behavior. For example, people who play down the seriousness of early symptoms of severe diseases such as skin cancer and people who see only weaknesses in research pointing to the dangers of drugs such as caffeine or of behaviors such as drunken driving may literally pay with their lives for their motivated reasoning. Hopefully, once the mechanisms producing such biases are fully understood, it will be possible to help people overcome them.

References

- Abelson, R. P. (1968). Psychological implication. In R. P. Abelson, E. Aronson, W. J. McGuire, T. M. Newcomb, M. J. Rosenberg, & P. H. Tannenbaum (Eds.), *Theories of cognitive consistency: A sourcebook* (pp. 112–139). Chicago: Rand McNally.
- Aronson, E. (1968). Dissonance theory: Progress and problems. In R. P. Abelson, E. Aronson, W. J. McGuire, T. M. Newcomb, M. J. Rosenberg, & P. H. Tannenbaum (Eds.), *Theories of cognitive consistency: A sourcebook* (pp. 5–27). Chicago: Rand McNally.
- Arrowood, A. J., & Ross, L. (1966). Anticipated effort and subjective probability. *Journal of Personality and Social Psychology*, 4, 57–64.
- Beach, L. R., & Mitchell, T. R. (1978). A contingency model for the selection of decision strategies. *Academy of Management Review*, 3, 439–449.
- Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6, pp. 1–63). New York: Academic Press.
- Berkowitz, L., & Devine, P. G. (1989). Research traditions, analysis, and synthesis in social psychological theories: The case of dissonance theory. *Personality and Social Psychology Bulletin*, 15, 493–507.
- Berscheid, E., Graziano, W., Monson, T., & Dermer, M. (1976). Outcome dependency: Attention, attribution, and attraction. *Journal of Personality and Social Psychology*, 34, 978–989.
- Chaiken, S., Liberman, A., & Eagly, A. H. (1989). Heuristics and systematic information processing within and beyond the persuasion context. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought: Limits of awareness, intention, and control* (pp. 212–252). New York: Guilford Press.
- Cooper, J., & Fazio, R. H. (1984). A new look at dissonance theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 17, pp. 229–266). New York: Academic Press.
- Cooper, J., Zanna, M. P., & Taves, P. A. (1978). Arousal as a necessary condition for attitude change following induced compliance. *Journal of Personality and Social Psychology*, 36, 1101–1106.
- Darley, J. M., & Berscheid, E. (1967). Increased liking as a result of anticipation of personal contact. *Human Relations*, 20, 29–40.
- Darley, J. M., & Gross, P. H. (1983). A hypothesis-confirming bias in labeling effects. *Journal of Personality and Social Psychology*, 44, 20–33.
- Dawes, R. M. (1976). Shallow psychology. In J. Carroll & J. Payne (Eds.), *Cognition and social behavior* (pp. 3–12). Hillsdale, NJ: Erlbaum.
- Ditto, P. H., Jemmott, J. B., & Darley, J. M. (1988). Appraising the threat of illness: A mental representational approach. *Health Psychology*, 7, 183–201.
- Dunning, D., Meyerowitz, J. A., & Holzberg, A. (1989). Ambiguity and self-evaluation: The role of idiosyncratic trait definitions in self-serving assessments of ability. *Journal of Personality and Social Psychology*, 57, 1082–1090.
- Dunning, D., Story, A. L., & Tan, P. L. (1989). *The self as model of excellence in social evaluation*. Unpublished manuscript, Cornell University.
- Erdelyi, M. H. (1974). A new look at the new look: Perceptual defence and vigilance. *Psychological Review*, 81, 1–25.
- Fazio, R. H., Effrein, E. A., & Falender, V. J. (1981). Self-perception following social interaction. *Journal of Personality and Social Psychology*, 41, 232–242.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.
- Festinger, L., & Carlsmith, J. M. (1959). Cognitive consequences of forced compliance. *Journal of Abnormal and Social Psychology*, 58, 203–211.
- Fischhoff, B. (1977). Perceived informativeness of facts. *Journal of Experimental Psychology: Human Perception and Performance*, 3, 349–358.
- Freund, T., Kruglanski, A. W., & Shpitajzen, A. (1985). The freezing and unfreezing of impressional primacy: Effects of the need for structure and the fear of invalidity. *Personality and Social Psychology Bulletin*, 11, 479–487.
- Frey, D. (1986). Recent research on selective exposure. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 19, pp. 41–80). New York: Academic Press.
- Gilovich, T. (1983). Biased evaluation and persistence in gambling. *Journal of Personality and Social Psychology*, 44, 1110–1126.
- Ginossar, Z., & Trope, Y. (1987). Problem solving in judgment under uncertainty. *Journal of Personality and Social Psychology*, 52, 464–474.
- Greenbaum, C. W., & Zemach, M. (1972). Role playing and change of attitude toward the police after a campus riot: Effects of situational demand and justification. *Human Relations*, 25, 87–99.
- Greenwald, A. G. (1980). The totalitarian ego: Fabrication and revision of personal history. *American Psychologist*, 35, 603–618.
- Greenwald, A. G., & Ronis, D. L. (1978). Twenty years of cognitive dissonance: Case study of the evolution of a theory. *Psychological Review*, 85, 53–57.
- Harkness, A. R., DeBono, K. G., & Borgida, E. (1985). Personal involvement and strategies for making contingency judgments: A stake in the dating game makes a difference. *Journal of Personality and Social Psychology*, 49, 22–32.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.
- Higgins, E. T., & King, G. A. (1981). Accessibility of social constructs: Information-processing consequences of individual and contextual variability. In N. Cantor & J. F. Kihlstrom (Eds.), *Personality, cognition, and social interaction* (pp. 69–121). Hillsdale, NJ: Erlbaum.
- Howard-Pitney, B., Borgida, E., & Omoto, A. M. (1986). Personal involvement: An examination of processing differences. *Social Cognition*, 4, 39–57.
- Irwin, F. W. (1953). Stated expectations as functions of probability and desirability of outcomes. *Journal of Personality*, 21, 329–335.
- Irwin, F. W., & Snodgrass, J. G. (1966). Effects of independent and dependent outcomes on bets. *Journal of Experimental Psychology*, 71, 282–285.
- Jemmott, J. B., Ditto, P. H., & Croyle, R. T. (1986). Judging health status: Effects of perceived prevalence and personal relevance. *Journal of Personality and Social Psychology*, 50, 899–905.
- Johnson, B., & Eagly, A. H. (1989). The effects of involvement on persuasion: A meta-analysis. *Psychological Bulletin*, 106, 290–314.
- Kahneman, D., & Tversky, A. (1972a). Subjective probability: A judgment of representativeness. *Cognitive Psychology*, 3, 430–454.
- Kahneman, D., & Tversky, A. (1972b). On prediction and judgment. *ORI Research Monograph*, 12(4).
- Kassarjian, H. H., & Cohen, J. B. (1965). Cognitive dissonance and consumer behavior. *California Management Review*, 8, 55–64.
- Kassin, S. M., & Hochreich, D. J. (1977). Instructional set: A neglected

- variable in attribution research? *Personality and Social Psychology Bulletin*, 3, 620-623.
- Klayman, J., & Ha, Y.-W. (1987). Confirmation, disconfirmation, and information in hypothesis testing. *Psychological Review*, 94, 211-228.
- Klayman, J., & Ha, Y.-W. (1989). Hypothesis testing in rule discovery: Strategy, structure, and content. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15, 596-604.
- Klein, W. M., & Kunda, Z. (1989, March). Motivated person perception: Justifying desired conclusions. Paper presented at the meeting of the Eastern Psychological Association, Boston.
- Koriat, A., Lichtenstein, S., & Fischhoff, B. (1980). Reasons for confidence. *Journal of Experimental Psychology: Human Learning and Memory*, 6, 107-118.
- Kruglanski, A. W. (1980). Lay epistemology process and contents. *Psychological Review*, 87, 70-87.
- Kruglanski, A. W., & Ajzen, I. (1983). Bias and error in human judgment. *European Journal of Social Psychology*, 13, 1-44.
- Kruglanski, A. W., & Freund, T. (1983). The freezing and unfreezing of lay-inferences: Effects on impressional primacy, ethnic stereotyping, and numerical anchoring. *Journal of Experimental Social Psychology*, 19, 448-468.
- Kruglanski, A. W., & Klar, Y. (1987). A view from the bridge: Synthesizing the consistency and attribution paradigms from a lay epistemic perspective. *European Journal of Social Psychology*, 17, 211-241.
- Kunda, Z. (1987). Motivation and inference: Self-serving generation and evaluation of evidence. *Journal of Personality and Social Psychology*, 53, 636-647.
- Kunda, Z., & Nisbett, R. E. (1986). The psychometrics of everyday life. *Cognitive Psychology*, 18, 199-224.
- Kunda, Z., & Sanitioso, R. (1989). Motivated changes in the self-concept. *Journal of Experimental Social Psychology*, 25, 272-285.
- Linder, D. E., Cooper, J., & Jones, E. E. (1967). Decision freedom as a determinant of the role of incentive magnitude in attitude change. *Journal of Personality and Social Psychology*, 6, 245-254.
- Lord, C. G., Lepper, M. R., & Preston, E. (1984). Considering the opposite: A corrective strategy for social judgment. *Journal of Personality and Social Psychology*, 47, 1231-1243.
- Lord, C. G., Ross, L., & Lepper, M. R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology*, 37, 2098-2109.
- Marks, R. W. (1951). The effects of probability, desirability, and "privilege" on the stated expectations of children. *Journal of Personality*, 19, 332-351.
- Markus, H., & Kunda, Z. (1986). Stability and malleability of the self-concept. *Journal of Personality and Social Psychology*, 51, 858-866.
- McAllister, D. W., Mitchell, T. R., & Beach, L. R. (1979). The contingency model for the selection of decision strategies: An empirical test of the effects of significance, accountability, and reversibility. *Organizational Behavior and Human Performance*, 24, 228-244.
- McGuire, W. J. (1960). A syllogistic analysis of cognitive relationships. In M. J. Rosenberg, C. I. Hovland, W. J. McGuire, R. P. Abelson, & J. W. Brehm (Eds.), *Attitude organization and change* (pp. 65-111). New Haven, CT: Yale University Press.
- McGuire, W. J. (1968). Theory of the structure of human thought. In R. P. Abelson, E. Aronson, W. J. McGuire, T. M. Newcomb, M. J. Rosenberg, & P. H. Tannenbaum (Eds.), *Theories of cognitive consistency: A sourcebook* (pp. 140-162). Chicago: Rand McNally.
- Miller, D. T., & Ross, M. (1975). Self-serving biases in attribution of causality: Fact or fiction? *Psychological Bulletin*, 82, 213-225.
- Neuberg, S. L., & Fiske, S. T. (1987). Motivational influences on impression formation: Dependency, accuracy-driven attention, and individualizing information. *Journal of Personality and Social Psychology*, 53, 431-444.
- Nisbett, R. E., Krantz, D. H., Jepson, C., & Kunda, Z. (1983). The use of statistical heuristics in everyday inductive reasoning. *Psychological Review*, 90, 339-363.
- Nisbett, R. E., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgement*. Englewood Cliffs, NJ: Prentice-Hall.
- Omoto, A. M., & Borgida, E. (1988). Guess who might be coming for dinner?: Personal involvement and racial stereotyping. *Journal of Experimental Social Psychology*, 24, 571-593.
- Payne, J. W., Bettman, J. R., & Johnson, E. J. (1988). Adaptive strategy selection in decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 534-552.
- Petty, R. E., & Cacioppo, J. T. (1979). Issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *Journal of Personality and Social Psychology*, 37, 349-360.
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 19, pp. 123-203). New York: Academic Press.
- Pittman, T. S. (1975). Attribution of arousal as a mediator in dissonance reduction. *Journal of Experimental Social Psychology*, 11, 53-63.
- Pittman, T. S., & D'Agostino, P. R. (1985). Motivation and attribution: The effects of control deprivation on subsequent information processing. In G. Weary & J. Harvey (Eds.), *Attribution: Basic issues and applications* (pp. 117-141). New York: Academic Press.
- Pruitt, D. G., & Hoge, R. D. (1965). Strength of the relationship between the value of an event and its subjective probability as a function of method of measurement. *Journal of Experimental Psychology*, 69, 483-489.
- Pyszczynski, T., & Greenberg, J. (1987). Toward and integration of cognitive and motivational perspectives on social inference: A biased hypothesis-testing model. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 20, pp. 297-340). New York: Academic Press.
- Pyszczynski, T., Greenberg, J., & Holt, K. (1985). Maintaining consistency between self-serving beliefs and available data: A bias in information evaluation. *Personality and Social Psychology Bulletin*, 11, 179-190.
- Ross, M., & Fletcher, G. J. O. (1985). Attribution and social perception. In G. Lindzey & E. Aronson (Eds.), *Handbook of social psychology* (pp. 73-122). NY: Random House.
- Ross, M., McFarland, C., & Fletcher, G. J. O. (1981). The effect of attitude on recall of past histories. *Journal of Personality and Social Psychology*, 40, 627-634.
- Salancik, G. R., & Conway, M. (1975). Attitude inference from salient and relevant cognitive content about behavior. *Journal of Personality and Social Psychology*, 32, 829-840.
- Sanitioso, R. (1989). *Mechanisms for motivated changes in the self-concept*. Unpublished doctoral dissertation, Princeton University.
- Sanitioso, R., & Kunda, Z. (in press). Ducking the collection of costly evidence: Motivated use of statistical heuristics. *Journal of Behavioral Decision Making*.
- Sanitioso, R., Kunda, Z., & Fong, G. T. (1990). Motivated recruitment of autobiographical memory. *Journal of Personality and Social Psychology*, 59, 229-241.
- Sherman, B. R., & Kunda, Z. (1989, June). Motivated evaluation of scientific evidence. Paper presented at the American Psychological Society convention, Arlington.
- Sherman, S. J., & Gorkin, L. (1980). Attitude bolstering when behavior is inconsistent with central attitudes. *Journal of Experimental Social Psychology*, 16, 388-403.
- Showers, C., & Cantor, N. (1985). Social cognition: A look at motivated strategies. *Annual Review of Psychology*, 36, 275-305.

- Sieber, J. E. (1974). Effects of decision importance on ability to generate warranted subjective uncertainty. *Journal of Personality and Social Psychology, 30*, 688-694.
- Simon, H. (1957). *Models of man: Social and rational*. New York: Wiley.
- Skov, R. B., & Sherman, S. J. (1986). Information gathering processes: Diagnosticity, hypothesis-confirmatory strategies, and perceived hypothesis confirmation. *Journal of Experimental Social Psychology, 22*, 93-121.
- Snyder, M. (1982). When believing means doing: Creating links between attitudes and behavior. In M. P. Zanna, E. T. Higgins, & C. P. Herman (Eds.), *Variability in social behavior: The Ontario Symposium* (Vol. 2, pp. 105-130). Hillsdale, NJ: Erlbaum.
- Snyder, M., & Cantor, N. (1979). Testing hypotheses about other people: The use of historical knowledge. *Journal of Experimental Social Psychology, 15*, 330-342.
- Sorrentino, R. M., & Higgins, E. T. (1986). Motivation and cognition: Warming up to synergism. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition: foundations of social behavior* (pp. 3-19). New York: Guilford Press.
- Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 21, pp. 261-302). New York: Academic Press.
- Steele, C. M., & Liu, T. J. (1983). Dissonance processes as self-affirmation. *Journal of Personality and Social Psychology, 45*, 5-19.
- Stigler, G. J. (1961). The economics of information. *The Journal of Political Economy, 69*, 213-225.
- Swann, W. B. (1983). Self-verification: Bringing social reality into harmony with the self. In J. Suls & A. G. Greenwald (Eds.), *Social psychological perspectives on the self* (Vol. 2, pp. 33-66). Hillsdale, NJ: Erlbaum.
- Taylor, S. E., & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin, 103*, 193-210.
- Tesser, A. (1986). Some effects of self-evaluation maintenance on cognition and action. In R. M. Sorrentino & E. T. Higgins (Eds.), *The handbook of motivation and cognition: Foundations of social behavior* (pp. 435-464). New York: Guilford Press.
- Tesser, A., & Campbell, J. (1983). Self-definition and self-evaluation maintenance. In J. Suls & A. Greenwald (Eds.), *Social psychological perspectives on the self* (Vol. 2, pp. 1-31). Hillsdale, NJ: Erlbaum.
- Tetlock, P. E. (1983). Accountability and the perseverance of first impressions. *Social Psychology Quarterly, 46*, 285-292.
- Tetlock, P. E. (1985). Accountability: A social check on the fundamental attribution error. *Social Psychology Quarterly, 48*, 227-236.
- Tetlock, P. E., & Boettger, R. (1989). Accountability: A social magnifier of the dilution effect. *Journal of Personality and Social Psychology, 57*, 388-398.
- Tetlock, P. E., & Kim, J. I. (1987). Accountability and judgment processes in a personality prediction task. *Journal of Personality and Social Psychology, 52*, 700-709.
- Tetlock, P. E., & Levi, A. (1982). Attribution bias: On the inconclusiveness of the cognition-motivation debate. *Journal of Experimental Social Psychology, 18*, 68-88.
- Thagard, P. (1989). Explanatory coherence. *The Behavioral and Brain Sciences, 12*, 435-467.
- Trope, Y., & Bassok, M. (1983). Information-gathering strategies in hypothesis-testing. *Journal of Experimental Social Psychology, 19*, 560-576.
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5*, 207-232.
- Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*, 1124-1131.
- Wason, P. C., & Johnson-Laird, P. N. (1965). *Psychology of reasoning: Structure and content*. London: Batsford.
- Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology, 39*, 806-820.
- Weinstein, N. D. (1982). Unrealistic optimism about susceptibility to health problems. *Journal of Behavioral Medicine, 5*, 441-460.
- Wicklund, R. A., & Brehm, J. W. (1976). *Perspectives on cognitive dissonance*. Hillsdale, NJ: Erlbaum.
- Wyer, R. S., & Frey, D. (1983). The effects of feedback about self and others on the recall and judgments of feedback-relevant information. *Journal of Experimental Social Psychology, 19*, 540-559.
- Yaryan, R. B., & Festinger, L. (1961). Preparatory action and belief in the probable occurrence of future events. *Journal of Abnormal and Social Psychology, 63*, 603-606.
- Zanna, M. P., & Cooper, J. (1974). Dissonance and the pill: An attributional approach to studying the arousal properties of dissonance. *Journal of Personality and Social Psychology, 29*, 703-709.

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