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A cognitively oriented examination of belief perseverance.

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A Cognitively Oriented Examination Of Belief Perseverance

by

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ABSTRACT

A COGNITIVELY ORIENTED EXPLANATION

OF BELIEF PERSEVERANCE

by

Michael David Kurak

This thesis offers an explanation of people's tendency to persevere in their beliefs past reasonable lengths and to deal with evidence in various biased manners outlined below. The explanation offered is cognitively oriented, relying both on empirical research and on the observations of philosophers. The thesis also offers suggestions for how to avoid the problems of belief perseverance.

In Chapter I, I review the literature on belief perseverance and review some of the explanations offered for the phenomena. Chapter II introduces my explanation and briefly touches on a strategy for avoiding the problems of belief perseverance. Chapter III offers an examination of the human information processing system in preparation for examining its role in belief perseverance in Chapter IV. Chapter IV presents a more complete explanation of belief perseverance and additions to my strategy for avoiding the problems of belief perseverance. Since this strategy involves accepting beliefs tentatively, Chapter V examines tentative acceptance. Finally, Chapter VI concludes with a brief examination of some possible objections to my project and a summary of my findings.

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CHAPTER I

The Phenomenon Of Belief Perseverance

Introduction

Recent psychological research in the area of belief management has been found to support the views of some philosophers. In particular, the statement of Bacon (1620/1960) that "the human understanding, when it has adopted an opinion draws all things to support and agree with it" (p. 50) is supported by this research. Also supported by this research is Peirce's point that "we cling tenaciously, not merely to believing, but to believing just what we do believe" (1877, p. 99). In Human Inference: Strategies and Shortcomings of Social Judgment (Nisbett and Ross, 1980), the authors note:

> Work by Luchings (1942, 1957) by the Hovland group (for example, Hovland, Janis, & Kelly 1953) showed that opinions, once formed, are slow to change in response to new evidence. Other investigators have demonstrated the rigidity of theories and beliefs in their studies of attitude formation (Asch, 1946; Edwards 1968), post decisional judgments and attitudes (Festinger 1957; Janis 1968), and the maintenance of racial, ethnic, religious, and sex-role stereotypes (Allport, 1954; Taynor & Deaux 1973; Goldberg, 1968; J. Jones 1972; Katz 1960). Scientists themselves have been a chief target of such criticism. The tendency of professional scientists to persist in adhering to theories well past the point at which such adherence can be justified by the evidence has been observed by many (for example, Barber 1952; Kuhn, 1962; Mahoney 1976, 1977; Mahoney & DeMonbreun 1977; McGuigan 1963).

Studies by Ross and his colleagues show that, among other things, "people persist in adhering to their theories to a point far in excess of any normatively justifiable criterion of conservatism" (Nisbett and Ross, 1980, p. 169). Unfortunately, nowhere in the book do Nisbett and Ross tell us what sort of criterion of conservatism they would consider justifiable. Yet it is clear that they believe that people simply hold on to their beliefs longer than is warranted.

Nisbett and Ross (1980) contend that psychological research "supports three hypotheses about perseverance of belief" (p. 169). Roughly stated they are as follows:

H1. When people already believe something before encountering any genuinely probative evidence, exposure to such evidence (whether it supports the belief, opposes it, or is mixed) will tend to result in more acceptance of that belief than seems reasonable.

H2. When people approach a set of evidence without a belief and then form one based on that evidence, that belief will be resistant to subsequent disconfirming, or inconsistent, evidence.

H3. When people form a belief based on some putatively probative evidence and later discover that the evidence is false, the belief often survives such total discrediting.

The first thing to note about these three hypotheses is that the phenomena they describe are closely related. For example, people who preserve beliefs in the face of the discrediting of those beliefs (H3) show the resistance to subsequent

disconfirming evidence that is characteristic of (H2). Similarly, people who demonstrate resistance to disconfirming evidence (H2) will often appear to accept a belief more strongly than is warranted (H1). Thus, as will become more apparent later, it is difficult to discuss these hypotheses in isolation from each other.

The second thing to note is that these hypotheses about how people manage their beliefs are disturbing. Nisbett and Ross (1980) observe that one particularly upsetting implication of the first hypothesis is the seeming inevitability of polarized public opinion on certain issues.

> Before the advent of modern social science, many questions, like the issue of the deterrent value of capital punishment, were ones for which there really was no empirical evidence one way or the other. It was nevertheless possible to appeal to logical or theoretical considerations in support of one's views, and it was possible to justify such views on epistemic grounds. One might expect, though, that once genuine empirical evidence for such questions became available, that evidence would sway opinion to whichever side it supported or, if the evidence were mixed, that it would serve to moderate opposing views. Instead, the effect of introducing mixed evidence may be to polarize public opinion, with proponents of each side picking and choosing for the evidence so as to bolster their initial opinions (p. 171).

Consideration of public opinion on something like the issue of capital punishment or abortion seems to support this view. In talking to people about these issues one often finds both a strongly held opinion on one side of the issue and a distinct inablility of individuals to understand the strength of arguments for the opposite view.

A couple of questions come to mind at this point, but before I raise them let me point out that this thesis is not concerned with whether Nisbett and Ross' three hypotheses are true for all people. It is enough for my purposes that these hypotheses describe a reality for some and outline a set of circumstances that others are actually prone to fall into.

This thesis, then, is concerned with reaching a reasonable answer to primarily two questions: (1) How can one reasonably explain why subjects in the experiments that Nisbett and Ross refer to behaved in the manner outlined in their three hypotheses? (2) What can one do to overcome these apparent deficiencies in the management of one's beliefs?

Before I try to tackle the first question, in order to better understand the phenomena, let's examine one of the experiments that Nisbett and Ross cite and briefly outline their explanations for belief perseverance.

Experimental Evidence Regarding Belief Perseverance

In a widely cited study by Ross, Lepper, & Hubbard (1975) subjects were recruited for a study allegedly concerned with the effects of feedback from problem-solving situations on physiological responses. In the study, subjects were asked to attempt to distinguish between authentic and inauthentic suicide notes. Subjects were randomly assigned to "success", "failure", or "average" performance groups. After subjects came to a conclusion about a given suicide note, they received "false"

feedback from the experimenter on their ability to accurately determine the authenticity of the note. In this way subjects were led to believe that their performance on the task was good, bad, or average.

Following the completion of this first part of the experiment, subjects were debriefed about the predetermined and random nature of the feedback they received and were even shown the experimenters sheet which assigned them to the success, failure, or average performance conditions. After the debriefing subjects were asked to fill out a questionnaire given under the guise of helping the experimenter interpret his physiological records. The questionaire required subjects to estimate their actual performance on the task, to predict their probable success on future related tasks, and to rate their ability both at the suicide discrimination task and at other related tasks involving sensitivity to social circumstances.

The results of the experiment indicated a considerable amount of post-debriefing perseverance. Subjects who had been originally assigned to the "failure" condition continued to rate themselves as unsuccessful and lacking ability for determining the authenticity of suicide notes and for related tasks. Subjects who had been originally assigned to the "success" condition continued to rate their performance and abilities far more favourably than did subjects who had been originally assigned to the "average" condition.

Why is it that Jane, a hypothetical subject in this experiment, who learns that her excellent performance in

discriminating real suicide notes from false ones was determined by a random number table, clings to the belief that she is actually rather proficient at such discrimination? For Nisbett and Ross (1980) one answer is that she may persevere in her beliefs because she becomes emotionally attached to them and wants them to persevere. This explanation has some measure of plausibility. Such tenacity seems apparent in the religious fundamentalists, for example, when confronted with scientific evidence that conflicts with the information presented in their holy books. To the extent that people are emotionally attached to a belief, they will cling to that belief by whatever cognitive manipulations are available.

However, as Nisbett and Ross (1980) note, emotional commitment seems "to be generally neither a necessary nor sufficient explanation of belief perseverance phenomena" (p. 180). It seems unlikely, for example, that subjects in this belief perseverance experiment were emotionally attached to their belief about their ability to determine the authenticity of suicide notes. Even more unlikely is the possibility that subjects in other belief perseverance experiments were emotionally attached to beliefs about adjective strings (Asch, 1946), or about initial impressions of the problem-solving ability of target persons (Jones, Rock, Shaver, Goethals, and Ward, 1968). In addition, the idea that people are emotionally committed to a belief "tells us nothing about the precise cognitive means by which commitment could serve the goal of belief perseverance" (Nisbett and Ross, 1980, p. 180). For these

reasons Nisbett and Ross favour a more cognitively oriented explanation.

Nisbett and Ross' second explanation for belief perseverance appeals to the fact that people tend to see the relevance of confirming information much more readily than disconfirming information. The idea behind their explanation is as follows:

> Suppose Jane receives feedback suggesting that she is uncannily successful at the [suicide note] task. It seems likely that she will have no trouble generating additional "evidence" that seems consistent with her apparent social sensitivity. Her reasonably good performance in her abnormal psychology course, her ability to make new friends easily, and her increasing sense of confidence and assurance as she progressed in the suicide note task, all might be seen as "further evidence" of such powers. Suppose, on the other hand, that Jane receives feedback suggesting that she is particularly poor at the task. Again, supporting "evidence" probably can be generated with ease. Jane might note her difficulty in imagining herself as lonesome or alienated, her mediocre performance in her social problems course, and her increasing sense of confusion and hesitation as she progressed in the suicide note task. Needless to say, even an objectively neutral set of evidence, if processed in accord with such a "confirmation bias" could bolster the implications of either the success or the failure outcome (p. 181).

Nisbett and Ross go on to point out that although there is no direct evidence that subjects in the suicide note experiment engaged in such confirmation-biased processing, "there is a rich research literature that shows the operation of a variety of encoding and decoding biases that favour confirmation of prior hypotheses or beliefs over disconfirmation" (p. 181). They go on to say that the "literature is quite consistent in showing the advantage that confirmation enjoys over disconfirmation in the retrieval or output stage" (p. 182). Just how retrieval (a term

to be explained in Chapter III) and output processes may work to confirm hypotheses is not explained by Nisbett and Ross. Consequently, the precise cognitive means by which these processes account for belief perseverance is also not explained. Part of my task, then, will be to explain how cognitive processes like retreival are involved in belief perseverance.

Nisbett and Ross' third explanation for belief perseverance is intricately connected to the second but goes one step further. Whereas the second includes the generation of all types of evidence, the third is concerned with the support that a causal explanation can appear to lend to a belief. In addition to searching for confirmatory evidence, Nisbett and Ross believe that subjects will be inclined to search for causal explanations to help explain their performance on the tasks presented to them in belief perseverance experiments. For example, regardless of whether Jane received feedback indicating that she was good or bad at the suicide note discrimination task, it seems likely that she would have no trouble explaining to herself why she performed at the level that she did.

Nisbett and Ross point out that there is both direct and indirect evidence that:

> (a) subjects are indeed inclined to generate causal explanations for events such as successful or unsuccessful performance at the suicide discrimination task, (b) people generate such explanations with ease, and (c) once such explanations are generated, they are reasonably convincing (p. 183).

Nisbett and Ross conclude their section on the tendency of

people to form causal explanations by noting that it appears to be the subjects' misplaced confidence in the causal explanations that they generate that is primarily responsible for their perseverance behavior.

This conclusion seems plausible to me. In the case of Jane, even if she concedes to herself that the feedback that she received from the experimenter was "false" and therefore no reason to believe that she is good at discriminating the authenticity of suicide notes, she may not see any reason to question the acceptability of any additional evidence or causal explanations that she may have generated. So even after she sees that the original support for her belief is unacceptable, she still may not see any need to abandon her belief. Discrediting Jane's original reasons for believing that she was good at the suicide note task may only serve to discredit one small portion of what she views as support for that belief. If people are left with causal explanations and considerable amounts of other "evidence" for a belief after the original evidence has been discredited, then they may have difficulty seeing the need to abandon their views.

But if this explanation is the correct one it raises two important questions: 1) Why do subjects continue to search for further evidence and causal explanations that help confirm a belief after it has been accepted? (2) Why don't subjects question the acceptability of this generated support when the original evidence for the belief becomes questioned or discredited? An answer to the first question comes out of some

suggestions of Alvin Goldman's (1978).

Another Explanation For Belief Perseverance

At the end of Nisbett and Ross' chapter on belief perseverance, they raise the question of what might motivate someone to preserve beliefs unreasonably:

> People's tendencies to persevere in their beliefs are so striking as to raise the possibility that such perseverance serves goals that may be more fundamental and important than holding correct views of particular issues (p. 192).

Goldman (1978) suggests that two such goals are (1) the importance of having a solution to the problems or issues that confront us; and (2) real-world constraints on time, which may prohibit the careful and dispassionate perusal and integration of all new evidence pertinent to any particular belief (pp. 521-522). How far do these goals go towards allowing us an understanding that behavior?

Taking Goldman's second goal first, one may observe that real world constraints on time do often appear to demand that one quickly adopt a belief. The man who wishes to acquire a painting at an auction must quickly come to a decision about its worth, or lose the opportunity to buy it. However, it is difficult to see how constraints on time would (a) prohibit him from remaining receptive to information that may be disconfirming to his belief about the value of the painting, or

(b) demand that he cling tenaciously to the belief that the painting is worth x amount of dollars. So although it seems that time constraints may sometimes motivate one to quickly come to a belief on some issue, it is difficult to understand what role such constraints play in motivating people to preserve their beliefs.

Further, even if we admit that sometimes real-world constraints on time may prohibit the careful integration of new evidence, such time factors are not likely to be factors in the belief experiments on which Nisbett and Ross' findings are based. In these experiments subjects appear to have been allotted ample time to carefully review all relevant information, and still belief perseverance tendencies existed (see for example, Ross, Lepper, Strack, and Steinmetz, 1977). Therefore, although it may be that real-world constraints on time are sometimes influential in causing people to preserve beliefs unreasonably and be unreceptive to disconfirming information, it is unlikely that such time factors are the primary cause of these phenomena.

Goldman's first goal, the importance of having a solution to the problems that confront us, fares much better in explaining why people behave in the manner outlined in Nisbett and Ross' three hypotheses. However, this goal requires a fair amount of interpretation and explanation to be of much use. On Goldman's (1978) suggestion, the end of cognition is not anything so esoteric as the achievement of truth, but rather the solution of problems (p. 521). Consequently, beliefs and the cognitive

strategies that manipulate them are viewed as valuable to the extent that they appear to assist us in the solution of our problems (1978, p. 521). Thus, my belief that it will rain tomorrow is valuable because it assists me in solving the problem of what the weather will be like tomorrow.

Now, observe what happens if someone introduces a conflicting weather report which I consider every bit as valid as the original report. In this case, where I have two equally valuable but conflicting predictions, I am thrown back into a position of being unsure of what the weather will be like tomorrow. If my ultimate goal in this case is to obtain a solution to the problem of what the weather will be like tomorrow then, at first glance, I appear to have lost ground. Where at first I had a solution, now I don't know which to choose, and so I have none. If, however, I disregard the second weather report in favour of the first, then I can retain my solution to the problem of what the weather will be like tomorrow. From the perspective of someone motivated to obtain an apparently acceptable solution to the problem of what the weather will be like tomorrow, allowing the second weather report the same weight as the first is counter-productive. Giving disconfirming information the weight it deserves may result in the loss of one of my goals, i.e., the loss of the apparent validity of my solution to the problem at hand. If obtaining an apparent, or probable, solution to our problems is the ultimate goal of cognition, as opposed to obtaining the correct solution, then it may make sense to protect beliefs as

long as they appear to assist us in solving our problems.

Here, then, we may find the beginnings of an explanation of why people preserve beliefs past reasonable limits, and treat evidence in the manner indicated by Nisbett and Ross. People may protect beliefs because those beliefs appear to solve their problems, and they do not wish to give up the solution to those problems. I believe that this explanation is roughly correct. But it leads to the further question: What might it be about having solved a problem that is so appealing? Having a solution to a problem often results in bad news. Solving the problem of what happened to my wife after she disappeared may result in finding out that she was tortured and killed. Yet most husbands would still wish to solve that problem. If the explanation is roughly correct, then there must be something inherently satisfying about having solved a problem.

Let's look, for a moment, at what it's like to solve a problem. A detective must, if he is to solve a murder, remember and attempt to organize much information that may, on the surface, appear to be unrelated. The process is a difficult one, involving doubts and struggle. Once the murder has been solved, however, the detective can breathe a sigh of relief. For the most part his work is finished, his doubts have been resolved. He enters a comfortable state of formed, solidified belief. One of the benefits, then, of having solved a problem is that one attains a comfortable state of belief where struggling with doubts is no longer necessary.

On page 9 I raised the question of why people in belief

perseverance experiments might continue to search for additional evidence and causal support for a given belief after that belief has already been accepted by the subject. One answer to this question is that subjects continue to search for additional evidence and causal support because they have remaining doubts about the belief in question, even though for the most part they believe it to be true. Since doubt is something which people generally seek to free themselves from, it may be these remaining doubts that are motivating subjects to continue their search.

The idea that the state of doubt which comes with acquisition of a problem to be solved is a state of struggle, while the state of belief is one of comfortable resolve, is not a new idea. In The Fixation of Belief, C. S. Peirce (1877) writes:

> Doubt is an uneasy dissatisfied state from which we struggle tc free ourselves and pass into a state of belief; while the latter is a calm satisfactory state which we do not wish to avoid, or to change to a belief in anything else (p. 99)

Thus, for Peirce, doubts motivate us to dispel their unpleasant sensations and achieve a calm, satisfactory state of belief.

Possibly the desire to reach the calm, satisfactory state of belief, or conversely, the desire to get free from the struggle of doubt, is partially responsible for the appeal of having an apparent solution to one's problems. Could it be that once we have attained a state of belief on some issue, we are entirely satisfied, and that it is something about this state that

creates in us the tendency to treat new evidence in biased ways?

Peirce (1877), consistent with Goldman, believes that "the sole object of inquiry is the settlement of opinion" (p. 100). He writes:

> We may fancy that this is not enough for us, and that we seek not merely an opinion, but a true opinion. But put this fancy to the test, and it proves groundless; for as soon as firm belief is reached we are entirely satisfied, whether the belief be false or true... The most that can be maintained is that we seek for a belief that we shall think to be true. But we think each one of our beliefs to be true, and, indeed, it is a mere tautology to say so (p. 100).

I suspect that Peirce is, for the most part, correct on this count.

In The Will To Believe, William James (1896/1956) agrees with Peirce when he writes:

> Our reason is quite satisfied, in nine hundred and ninety-nine cases out of every thousand of us, if it can find a few arguments that will do to recite in case our credulity is criticized by some one else... Our belief in truth itself, for instance, that there is a truth, and that our minds and it are made for each other--what is it but a passionate affirmation of desire, in which our social system backs us up? We want to have a truth;.. (p. 9).

Once again, there appears to be something about having our problem solved that is very appealing. So much so that it seems we will accept the first solution that appears to be reasonable. I suspect that there is something about attaining a state of belief, of solving a problem, that is responsible for motivating the perseverance behavior that Nisbett and Ross refer to.

One explanation of what motivates this perseverance behavior, as I have begun to suggest, would be that people want

to keep their solutions, keep their beliefs, and actively defend them in order to do so. But this explanation is too simple. Researchers find that (1) people in belief perseverance experiments do not appear to be aware that they are preserving beliefs unreasonably, and giving preferential treatment to confirming information (Nisbett and Ross, p. 179). Instead, (2) subjects appear to believe that they are behaving quite rationally. A good explanation must account for these two facts.

Although I believe that Goldman and Peirce start us off in the right direction, a more complete understanding of why people preserve beliefs past reasonable limits requires an integration with Nisbett and Ross' explanations for belief perseverance and, as they suggest in their book, with an understanding of the mechanisms of the human information processing system.

In fact it is my thesis that the behavior described in Nisbett and Ross' three hypotheses can best be understood as stemming from primarily two factors. First, people's preference for the satisfactory state of belief; second, the natural operation of the human information processing system.

Chapter II

Belief Perseverance After Evidential Discrediting

The Beginnings Of An Explanation

Why is it that Jane, our hypothetical subject in the experiment by Ross, Lepper and Hubbard (1975), who learns that her excellent performance in discriminating real suicide notes from false ones was determined by a random number table, clings to the hypothesis that she is actually rather talented at such discrimination and appeals to "rationalizations" that she generated about herself to help explain her excellent performance? As noted earlier Nisbett and Ross suggest one answer to this question comes from studies which conclude that there is a tendency in people to favour confirmation of accepted hypotheses or beliefs over disconfirmation (pp. 183-186). For instance, Wason and Johnson-Laird (1965) found that people tend to recognize the relevance of confirming cases more readily than that of disconfirming ones and therefore tend to search for such cases in evaluating their hypotheses, or beliefs. Snyder and Cantor (1979) show that memory searches favor hypothesis confirming evidence even when the hypothesis is merely a tentative one.

According to Nisbett and Ross (1980) there may be a close link between this hypothesis-confirming tendency and some people's difficulty in understanding that their beliefs have

been discredited. In what follows I elaborate on this link and offer the beginnings of my own hypothesis about the causes of belief perseverance.

The first point to be noted in this explanation is Peirce's point that doubt is an unsatisfying state which we seek to avoid, "while belief is a satisfactory state which we do not wish to avoid, or to change to a belief in anything else" (1877, p. 99). I suspect that our dissatisfaction with doubt and our preference for the satisfaction that comes with belief is at the heart of people's tendency to be more receptive to confirming evidence for a given belief once they have begun to accept it. For if we prefer the satisfaction of believing, then it seems that we are also likely to prefer that which furthers that satisfaction. As a result, we would expect that the confirmation of a hypothesis, a tentative belief, would be preferable to remaining impartial and considering everything objectively. For remaining impartial requires that one remain in a state of doubt and actively struggle to consider all relevant information, while the confirmation of a hypothesis allows one to believe, and discontinue those labours.

Instead of remaining impartial to confirming information and weighing it objectively, then, preference for the satisfaction of belief may create a preference for confirming information. Then, once all doubts have been dispelled and belief has been reached, there will be little or no motivation to continue further inquiry of any kind, unless it comes from without, in the form of a challenge. Further, when the "believer" is finally

challenged, and does finally rethink the issue he is, for reasons that I will shortly make clear, likely to have much difficulty in understanding the force of this newly introduced disconfirming information. The relevance and force of the confirming information that he has stored in memory, on the other hand, is likely to be quite vivid. The availability of this confirming information, and the relative absence of disconfirming information, will tend to reaffirm, and even strengthen, his belief.

In order to elaborate on this hypothesis about the causes of belief perseverance, I will now review the case of Karen from Change In View (Harman, 1986). The analysis of this case will not only support this hypothesis, but also show what role the information processing system might play in keeping us from seeing the force of disconfirming information.

In Change In View Harman is primarily interested in developing principles of belief revision. The Karen case enters in as a possible objection to a foundations theory of belief revision. However, as it stands, it provides a realistic, though fabricated, account of the kind of behavior that people in belief perseverance studies exhibit.

> Consider Karen, who has taken an aptitude test and has just been told her results show she has a considerable aptitude for science and music but little aptitude for history and philosophy. This news does not correlate perfectly with her previous grades. She had previously done well not only in physics, for which her aptitude scores are reported to be high, but also in history, for which her aptitude scores are reported to be low. Furthermore, she had previously done poorly not only in

> philosophy, for which her aptitude scores are reported to be low, but also in music, for which her aptitude scores are reported to be high.
>
> After carefully thinking over these discrepancies, Karen concludes that the reported aptitude scores accurately reflect and are explained by her actual aptitudes; so she has an aptitude for science and music and no aptitude for history and philosophy; therefore her history course must have been an easy one, and also she did not work hard enough in the music course. She decides to take another music course and not to take any more history.
>
> Some days later she is informed that the report about her aptitude scores was incorrect! The scores reported were those of someone else whose name was confused with hers. Unfortunately, her own scores have now been lost. (pp. 33-34)

How does Karen go about revising her beliefs in light of the information that the results of the aptitude test are not hers? The first thing to recall is that in attempting to accept the conclusions of the aptitude test, we are told that Karen recalls a few small facts that seem inconsistent with the conclusions of the aptitude test, i.e., she had previously done well in history, but the aptitude tests suggests that she has no aptitude for it. She had previously done poorly in music, but the aptitude test suggests that she should be good at it. Then, we are told, after consideration Karen decides to accept that the results of the aptitude test accurately reflect and are explained by her actual aptitudes. Karen's behavior, thus far, follows closely the behavior exhibited by subjects of belief perseverance studies (Nisbett and Ross, 1980).

What appears to have happened, so far, is that the inconsistencies that Karen recalls have created some doubts in

Karen, and a corresponding preference for information that would appear to eliminate those doubts, for she continues her "inquiry" on the matter of her aptitudes until she has cleared up the inconsistencies by recalling that, (a) her history course was easy, and therefore her good marks in it are not a true reflection of her aptitude, and (b) she did not work hard enough in music, therefore her poor marks in music are not a true reflection of her aptitude for it either. Thus, information that was originally inconsistent with the hypothesis that the results of the aptitude test are valid has become consistent by discrediting its relevance as disconfirming information. Karen has, at this point, eliminated all apparent inconsistencies and doubts, solved the problem of her aptitudes, and has achieved a comfortable belief state.

In explaining the results of her actions, the first thing to note is that by "clearing up" her original inconsistencies, she has discredited or discounted information that would have been consistent with the new finding that the results of the aptitude test are not valid. As a result information that supports her belief that the aptitude test is valid has become highly available, while the information that supports the belief that the aptitude test is invalid has been altered so as to support the belief. When later the results of the test are discredited and Karen thinks about how this may affect her recently acquired beliefs about her aptitudes, she is able to recall many reasons that she has for believing that the results of the aptitude test are an accurate reflection of her actual aptitudes, but very few

reasons to believe that the results of the test are not valid.

My second point is closely related to the first, but will need much elaboration in later chapters before its full force can be appreciated. The idea is that once one has eliminated all one's doubts concerning the acceptance of some belief, further consideration of that issue necessarily emanates from what I refer to as a "believer's perspective". In Chapter IV I will argue that as soon as one begins to become comfortable with accepting some belief one begins to adopt what I am calling a believer's perspective. This perspective, it will be argued, enhances one's ability to recall and see the relevance of information that confirms one's beliefs and inhibits one's ability to recall and see the relevance of information that is disconfirming of those beliefs. Further, the believer's perspective will be shown to result from the operation of the human information processing system.

The phenomenon of belief perseverance in the face of the evidential discrediting may thus be best understood as a product of two factors: (1) the operation of the hypothesis confirming tendency, as explained above, which functionally generates many reasons for keeping a given belief that may be appealed to for support when that belief is challenged; (2) the adoption of a believer's perspective, understood in terms of cognitive theory, which enhances one's ability to recall, and recognize the relevance of confirming information, while inhibiting one's ability to recall, and recognize the relevance of disconfirming information.

A Strategy For Avoiding Belief Perseverance

As was discussed in the last section, the hypothesis-confirming tendency can be thought of as resulting from an inclination to eliminate remaining doubts concerning the acceptance of some belief. After all doubts have been eliminated there remains an unrepresentative availability of confirming information and a relative absence of disconfirming information in memory which tends to influence one's judgement about the certainty of that belief, creating overconfidence and further satisfaction that one holds the correct view. If all one can recall is confirming information for one's view, then the likelihood is that one's impression of that view will be that it is correct. Thus, for example, if Karen is completely satisfied with her recently acquired beliefs then it is unlikely that she will ever seriously consider the possibility that those beliefs are unacceptable unless she is challenged from without.

If one is completely satisfied with a belief, then one is not motivated to doubt it. But if one is to seriously doubt the acceptability of a given belief and to consider alternatives, one needs to hold on to these feelings of doubt that are motivating one to search for further evidence and causal explanations. Just as a further search may uncover confirming information it may also uncover disconfirming information. As I will go on to explain later, just what information someone is sensitive to appears to depend to a considerable extent on the exact perspective from which one considers the issue at hand. As

it turns out, an awareness of the problems of belief perseverance may be very helpful in allowing one to be more receptive to disconfirming information. Such an awareness can sometimes provide the initial doubt that will get me to rethink my beliefs, as well as help provide me with a more impartial perspective from which to examine my beliefs. Without this awareness however, the tendency will be to dispel existing doubts prematurely and to deal with information in the manner outlined in Nisbett and Ross' three hypotheses. However, if one remains aware of the pitfalls of the satisfaction associated with believing then it is possible to use existing doubts to one's advantage.

From this point, we can begin to see that if Karen had refrained from clearing up the inconsistencies that arose from accepting the results of the aptitude test, then she may have been in a better position to consider disconfirming information. For example, if Karen had refrained from clearing up the inconsistencies with her test scores then she might have reasoned in something like the following manner:

> Well, the results of the aptitude test create an inconsistency with my marks in history and music. Maybe my marks in these courses are not a good indicator of my aptitudes for one reason or another. Then again, maybe my marks in these courses are a good indication of my aptitude for them, and there is a problem with the validity of the aptitude test. For now, I think that I'll leave things inconsistent until I can get some more information on the matter.

Now when the results of the test are found to be not hers, Karen can easily recall two facts that are consistent with this

finding. "Well", she might reason, "the aptitude test was invalid after all, I guess then I probably am good at history and no good at music."

An impartial, or doubtful, perspective will make it much more likely that there will be a better balance in one's receptivity to confirming and disconfirming information. A balanced receptivity in turn will allow one to be less susceptible to being overconfident about any new beliefs. Just how changing one's perspective will allow one to remain receptive to disconfirming information, both from memory and from the environment, is the subject of the next chapter.

Chapter III

The Human Information Processing System

The purpose of this chapter is to give the reader a basic understanding of the human information processing system from which I may build a cognitively oriented explanation of belief perseverance.

The Dominant View

The dominant view of the human mind likens it to a computer. One of the characteristics that the computer and the human mind have in common is that they are processors of information; that is, they both take information and do something with it before a response is produced. Many theorists have taken note of this similarity between the computer and the human mind and have taken a close look at the specific parallels between the way that a computer processes information and the way that the human mind processes information. This endeavor has produced a view that sees the mind as an information processing system composed of a combination of memory structures and operations performed on information as it travels specific routes in the mind. The memory structures are responsible for storing information; consequently they are referred to as memory stores.

A typical model of the human information processing system postulates the following three memory stores:

1. A sensory store, capable of storing a small amount of sensory information for a very brief period of time, about 250 milliseconds.

2. A short-term store, also of limited capacity, but capable of maintaining information for longer periods than the sensory store.

3. A long-term store, having a large capacity, and capable of storing memories for very long periods of time, i.e., years.

Although a thorough understanding of these stores is not absolutely necessary, an acquaintance with their properties and operations will enhance understanding later explanations.

To help understand what properties the three stores have we shall examine three general operations: encoding, storage, and retrieval.

But before we examine human memory system in any detail, we must first discuss memory types because the studies on belief perseverance cited in here may not be relevant to all memory types. I turn now to that discussion.

Types Of Memory

There are a number of different ways of classifying memory types. One way, supported by recent neurophysiological research, concludes that there must be at least two categories of memory; fact memory and skill memory (see, for example, Mishkin & Petri, 1984). Fact memory refers to memory for explicit information, such as names, dates, locations, and words. Skill memory, by

contrast, refers to memory for such things as motor behavior such as knowing how to play the piano. The most obvious difference between these two types of memory is that one need not recall skill memory in any verbalizable form; rather one demonstrates retention of skills through performance. While some researchers believe that fact and skill memory are fundamentally similar, the issue of how memories for motor skills are represented still is a major problem. Adams (1985) claims that the "ways of encoding dimensions of movements and the implication of them for retention" are "empirically and theoretically underdeveloped" (p. 93).

Another way of classifying memory purports to "improve the fit between facts and theory" (Tulving, 1985). Tulving believes that memory is composed of three interrelated major systems. He calls these systems: procedural, semantic, and episodic. Procedural memory compares well with skill memory, both having to do with motor behavior and other complex stimulus and response patterns. Semantic memory is considered a subsystem of procedural memory by Tulving. Semantic memory's function is to represent, internally, aspects of the world that are not perceptually present. Episodic memory, in turn, is a subsystem of semantic memory. Episodic memory provides humans with the ability to acquire and store knowledge about personally experienced events.

Evidence for Tulving's classificatory scheme comes from experiments designed to study the effects of brain lesions or brain stimulations on the performance of subjects engaging in

various learning tasks. (For reviews of these types of findings, see Hirsch, 1974; and Oakley, 1981).

I have distinguished between types of memory here for reasons of comprehensiveness and clarity. The findings concerning memory that I will discuss primarily refer to fact memory, on Hirsch's scheme, or to semantic and/or episodic memory, on Tulving's scheme, because the experiments that support these findings involve tasks that primarily use these memory systems. Research that would allow generalizations from findings on fact memory to be applied to skill memory have, for the most part, not been performed (Prophet, 1976; Schendel, Shields & Katz, 1978).

Iconic Memory and Other Sensory Stores

In the late 1950's, George Sperling, a psychology graduate student at Harvard University, addressed a question that had long been of interest to psychologists. The question was, "How much information can be seen in a single glance?" Sperling's investigation led to the discovery of what is known as iconic memory.

When we look at a scene, our eyes tend to scan the scene in little jumps that are called saccadic eye movements. These saccadic eye movements are necessary because we can only see a small portion of a scene clearly. To observe a scene clearly, our eyes fixate on one portion of the scene, then make a saccade to another portion of the scene and fixate on that. This process

is repeated until the scene has been adequately perceived. A person typically makes about four saccadic eye movements each second. Some psychologists (e.g., Dick, 1974; Sperling, 1963) have suggested that we let information enter iconic memory shortly after our eyes come to rest on some area of the environment, then we direct attention to the information and receive the information that is stored.

As far as researchers are concerned, iconic memory is only relevant to visual information. But parallel memory structures have also been postulated for other types of sensory information. The function of this type of brief memory store seems to have primarily to do with providing new information to the memory system for later processing. The flow of information appears to be from these sensory stores to the long-term store, which is purported to store semantic information.

The Long-Term Store

Before I begin a discussion of the long-term store, I would like to further clarify my use of this term and some others. The view of the memory system adopted in this thesis is the widely accepted view that the memory system is composed of the three memory stores that have already been introduced: the sensory stores, the short-term store, and the long-term store. The terms "short-term memory" and "long-term memory" refer to strategies used when the experimental or life situation calls for information to be retained for a short time, in the case of

short-term memory, or for a long time, in the case of long-term memory. Just what constitutes a short time and what constitutes a long time will be discussed later when I discuss storage duration.

The first question to be asked about the long-term store is "How much information can the long-term store hold"? One difficulty in answering this question lies in defining information quantitatively. For example, it is not clear how much "information" a person will have received from a list of 10 unrelated words, particularly if they are in a foreign language. Since it is difficult to quantify information accurately, we might address a weaker version of our question concerning storage capacity. Instead of asking how much information can be stored, one might ask whether there is an upper limit to the capacity of the long-term store. But investigation reveals that it is also not possible to give a reliable answer to this latter question. Instead psychologists often deal with the question of capacity of the long-term store by suggesting that the capacity may be infinite (e.g., Hintzman, 1978) or by not specifying what the limits may be (e.g., Atkinson & Shiffrin, 1968). At present there are too many unknowns for a definite answer.

When it comes to estimating the storage duration of information in the long-term store, one has about as much luck as with estimating its capacity. The main problem in estimating the storage duration of the long-term store is that forgetting may be due to either or both of two factors: (1) information is no longer in memory; (2) the stored information is still there

but it cannot be retrieved. Although it has been claimed that information may be permanently stored, a consideration of the relevant studies suggests that changes occur to information in the long-term store over time. More on this point later.

The Short-term Store

On most modern models of memory, the short-term store consists of information from the long-term store that has been activated sufficiently to bring it into consciousness. On these models there is not transportation of information from one place, the long-term store, to another place, the short-term store. Instead activation energy is thought to be applied in some as yet unknown manner to information in the long-term store making that information conscious. The information of which one is presently conscious is, thereby, the information in the short-term store. I will presently return to this intriguing story, but let me first address some more basic questions about the short-term store.

When we ask how much information the short-term store can hold, we are really asking how much information a person can consciously hold on to at one time. Studies have indicated that the short-term store can hold up to two or three familiar units of information, or chunks (Glanzer & Razel, 1974; Watkins, 1974). An example of a familiar unit of information, or chunk, would be a word.

A better understanding of a chunk is obtained by considering

a principle of memory that dates back at least as far as Aristotle, the principle of contiguity. This principle asserts that events that occur close together in time or space become associated together in memory. Thus, because lightning and thunder co-occur in nature, mention of the word "lightning" usually brings the word "thunder" to mind. It is commonly assumed by psychologists today that underlying this principle of contiguity is the ability of the information-processing system to form associations among information represented in the long-term store.

Looking only briefly at the symbols below which do you think you would be able to more accurately duplicate?

To a person not familiar with the Chinese language, but familiar with the English language, the English word will be much easier to duplicate because the long-term store will already contain a representation of that word to which one may refer. In effect all the lines and angles that form each letter of the word will be associated together, and the letters, in turn, will be associated together to form the word.

According to the principle of contiguity, the lines and angles of each letter have become associated together, and the

letters in the word have become associated together because we have encountered these stimuli repeatedly in close physical and temporal proximity. As a result, these lines and letters that ultimately go to make up the word exist and function in our information-processing system as a coherent single unified representation, otherwise known as a chunk.

One big advantage of having chunks in the long-term store is efficiency. Chunks are considered as single familiar units of information by the information-processing system effectively allowing the small storage capacity of the short-term store of roughly 2 or 3 chunks to function adequately when managing large amounts of information. The following example suggested by Simon (1974) demonstrates this. Read and try immediately to recall these words from memory: Lincoln, milky, criminal, differential, address, way, lawyer, calculus, Gettysburg. Now read and try to recall the following words: Lincoln's Gettysburg address, Milky Way, criminal lawyer, differential calculus. By arranging the words in this new manner one reduces the number of chunks that one must recall from nine to four.

Two possibilities exist for information in the short-term store. One is that the information in the short-term store could decay, and the other is that it could be displaced by new information entering the store. Neither possibility allows for a definite storage duration estimate to be made. First, the displacement mechanism is not well suited to be characterized in terms of a time interval. The usual measure for displacement uses information about the number of interfering inputs to the

store and not temporal information. The decay mechanism, on the other hand, although theoretically suited to temporal measurement, proves to be very difficult to test. Part of the reason for this difficulty results from the fact that displacement appears to be a more potent factor for the removal of information from the short-term store than decay (Glanzer, Gianutsos, and Dubin, 1969).

Retrieval

The ability of the retrieval system to find a matching set of stimuli in the long-term store from the vast number of stimuli that are, in some as yet to be defined sense, represented there is truly remarkable. The voice of a person we once knew, the smell or taste of something we have not encountered for years, an emotion that we have not recently felt can often suddenly and unexpectedly re-construct experiences of the past in memory.

Although evidence to support a serial memory scanning operation in humans has been offered (Sternberg, 1966), research has made it clear that the retrieval operations needed for identification of stimuli are more like a parallel scanning process rather than a serial process (Sperling, 1970; Wikelgren, 1977, p. 15). In a parallel scan, all items are examined in some manner simultaneously rather than one after another. A good analogy that illustrates this parallel process likens chunks to tuning forks.

Imagine that someone has a collection of tuning forks, each of which vibrates at a unique frequency. We'll call these tuning forks f(x). They can be likened to chunks in the long-term store. Another individual has tuning forks of an unknown frequency which he wishes to be able to determine. We'll call these forks f(u), (u) for undetermined. These forks can be likened to representations of stimuli in a sensory store. One way he could determine the frequency of f(u) would be to strike one of f(u) and get it vibrating and then hold it near to each of f(x). If the frequency of this f(u) is the same as one of f(x) then the match to f(u) will start to vibrate as f(u) is brought near to its match, thus allowing us to determine f(u)'s frequency.

The analogy, of course, does not explain exactly how the retrieval process works. But it does illustrate several important features of the retrieval process. First, it illustrates the parallel nature of the process. Second, it illustrates the automaticity of the retrieval process. The tuning fork f(u) is sending signals to every f(x) at the same time, instead of one at a time. Third, it illustrates the concept of activation energy. Thus, as f(u) is brought closer to f(x) the vibrational energy given off into the air by f(u) automatically activates, in the sense of starts vibrating, one of f(x). In the same sense, as one attends to information in a sensory store, activation energy is automatically applied to its match in the long-term store, provided there is a match. The activation of the match functionally brings that information

into consciousness, which is being thought of here as being synonymous with the short-term store. Finally, the analogy illustrates the re-constructive nature of the retrieval process. As f(u) begins to make f(x) vibrate a link is re-constructed between these two tuning forks that was, in some sense, established when the forks were constructed. In memory when one thinks about the relationship between two ideas for the first time one, in some as yet to be discovered sense, constucts a link between these two ideas. Later when one once again thinks about these ideas that link is re-constructed by the retrieval process.

One feature of the memory system that the tuning fork analogy fails to throw light on concerns the existence of associations between information in the long-term store. If it is assumed that information in the long-term store is associated somehow, then the following prediction can be made. Activation of one of unit of information should allow energy to spread to associated units. This, in fact, was the conclusion of a study by Meyer, Schmaneveldt, and Ruddy (1975). The phenomenon in which the activation of one unit of information in the long-term store also activates another associated unit of information is often referred to as priming. Studies have found that priming occurs automatically (Fischler & Goodman, 1978) and that the priming effect is temporary.

Retrieval Cues

Earlier I mentioned the current view that the flow of information takes place from a sensory store to the long-term store. Although this is true it is not the whole story. Information in the short-term store is also capable of retrieving matching information in the long-term store. Information that is capable of retrieving matching information from the long-term store, whether in the short-term store or the sensory stores, is known as a retrieval cue.

Retrieval cues keep the information processing ball rolling. What one thinks and how one reasons depends to some extent on what retrieval cues are used and exactly how information in the long-term store is organized. As one thinks or reasons, information is constantly being brought into the short-term store by the retrieval process outlined above. As new information becomes conscious it displaces the information that was in the short-term store immediately prior to it. This new information then functions as a retrieval cue for further information, further fuel for thought.

The Effects Of Perspective Change

A good illustration of how the retrieval cues operate, and a good introduction into the effects of perspective change, is outlined in a study by Anderson and Pichert (1978). In this study, two groups of subjects were given a story to read. One

half of these subjects were instructed to read the story from the perspective of a burglar, the other half was instructed to read the story from the perspective of a homebuyer. Here is part of the story:

> The two boys ran until they came to the driveway. "See, I told you today was good for skipping school," said Mark. "Mom is never home on Thursday," he added. Tall hedges hid the house from the road. The pair strolled across the finely landscaped yard. "I never knew your place was so big," said Pete. "Yeah, but it's nicer now than it used to be since Dad had the new stone siding put on and added the fireplace."... There were three upstairs bedrooms. Mark showed Pete his mother's closet which was filled with furs and the locked box which held her jewels. His sisters' room was uninteresting except for the color TV which Mark carried to his room. Mark bragged that the bathroom in the hall was his since one had been added to his sisters' room for their use. The big highlight in his room, though, was a leak in the ceiling where the old roof had finally rotted (p. 310).

A 12-minute period of unrelated activity followed the subjects' reading of the story. Subjects were then asked to write down as much of the story as they could remember. The first thing that the Anderson and Pichert noticed was that the information recalled by subjects was highly dependent on the perspective they took. On the first recall, subjects that read the story from the perspective of a burglar recalled just that information that would appear relevant to a burglar. Subjects that read the story from the perspective of a homebuyer recalled just that information that would appear relevant to a homebuyer. This suggests that subjects encoded the story in a manner that would facilitate recall from their assigned perspective. Their perspective, then, was greatly influential in determining which

aspects of the story were to be encoded and stored, and consequently which aspects of the story would be remembered.

What determines the information that a person chooses to attend to and store? The answer to this question could easily fill a large book. However, one plausible, though not wholly satisfactory, answer is that the perspective with which we approach an issue, event, etc., involves primed information in the long-term store relevant to that perspective. This primed information is sensitive to matching information from the environment. Conceivably then, thoughts about home buying prime information relevant to that perspective, i.e., questions about the condition of a house. When information about the condition of a house becomes available in the environment it serves as retrieval cues for the primed information in the long-term store. Thinking about this retrieved information, in turn, would serve to re-encode it for storage in the long-term store. In this way the perspective from which we approach something may influence what we attend to and store.

To continue with Anderson and Pichert's study, five minutes after this first recall period had ended, subjects were instructed to recall the whole story a second time. However, this time some subjects were to attempt to recall the story from the opposite perspective. Thus, some of the subjects who read the story from the perspective of a burglar attempted to recall the story from the perspective of a homebuyer, and vice-versa. On the average, subjects who changed perspective on the second recall exhibited up to a 10-percent increase in recall of

information relevant to the new perspective, while subjects who maintained the same perspective on the second recall showed about a 3-percent decrease in information recalled that was relevant to the other (never-mentioned) perspective.

Why did shifting perspectives allow subjects to recall information that they had previously been unable to remember? The most probable explanation would appear to be that the new perspective allowed subjects to generate retrieval cues that better matched the previously unretrieved information in memory. For example, a subject who read and first recalled the story from the perspective of a homebuyer might have originally generated retrieval cues suitable for extracting information about such things as the condition and size of the house and surrounding property, and the number and size of the rooms in the house. Such cues, however, would be of little use in retrieving the information that a burglar would wish to know about the house, such as whether the contents of the home were of little or great value.

Although it is difficult to determine precisely what information the subjects put into their retrieval cues, interviews conducted by Anderson and Pichert after the experiment was over indicate that subjects often imagined themselves in the role of either a burglar or a homebuyer and then attempted to reason, or think, like someone in one of those roles. Here is a transcript of some of these interviews.

> You say "OK, I'm a burglar, now what do I want to get out of this house," and then you write it down... I knew that there were a lot of things , like furs and stuff, that had been described, but I couldn't

> remember them because I wasn't programmed that way the first time. I ended up putting pretty much what I put the first time. I remembered that one the doors was kept unlocked. I hadn't remembered that the first time but when it said I was supposed to be a burglar that popped into my head. [Q: Why do you think that popped into your head?] Well, because a burglar would want to know that!
>
> Well, a funny thing happened. When he gave me the homebuyer perspective, I remembered the end of the story, you know, about the leaky roof. The first time through I knew there was an ending, but I couldn't remember what it was. But it just popped into my mind when I thought about the story from the homebuyer perspective. (Anderson & Pichert, 1978, pp. 9-10).

In conclusion, the Anderson and Pichert (1978) study suggests that: (1) The perspective with which one approaches some problem, event, etc., will be influential in determining what aspects of the problem, event, etc., will be viewed as relevant, and consequently be stored and remembered. (2) Reconsideration of a problem, event, etc., from a perspective other than the one from which it was originally interpreted will facilitate retrieval of information relevant to, or consistent with, that new perspective.

In the next chapter I will attempt to apply what has been learned about the information-processing system to the phenomenon of belief perseverance.

Chapter IV

Revisions To The Explanation Of Belief Perseverance

The Continuing Case of Karen

Consideration of the effects of perspective change adds a new element to my hypothesis about Karen's behavior and, more generally, the phenomenon of belief perseverance. The Anderson and Pichert study suggests that the simple act of adopting a perspective will be influential in determining what aspects of the issue under consideration will be viewed as relevant, and consequently remembered when the issue is reconsidered. Could it be, then, that there is something about the perspective from which Karen approaches the problem of her aptitudes which is responsible for creating her increased receptivity to confirming information? And if there is something about Karen's perspective that is creating an increased receptivity, what might it be?

In order to answer these questions, I will begin with the observation that the relationship between the perspective one adopts on an issue and the information that one views as relevant appears to be such that one may easily make predictions in both directions. By knowing that a subject is approaching Anderson and Pichert's story from the perspective of a homebuyer for instance, I may easily predict which aspects of the story they will view as relevant. Oppositely, by observing which aspects of the story a subject views as relevant I may, with

some degree of certainty, predict what perspective he is approaching the story from. Extending this bit of reasoning to Karen's case, if Karen were receptive to all relevant information one might say that hers was simply the perspective of someone interested in learning about her aptitudes. However, such a broad perspective seems unlikely for Karen in light of what appears to be her strict preference for one type of relevant information, i.e., confirming information. Karen's refined receptivity to the relevance of information that confirms her beliefs appears to indicate a narrower perspective on the problem of her aptitudes. So, how might one characterize that perspective?

Let's look again at how Karen responds to the results of the aptitude test. After receiving the results of the aptitude test, Karen consults her memory and finds that some previous grades appear to support the results of the test, while others do not. After thinking the matter over for some time, Karen then decides that she had misinterpreted the relevance of her good grades in history and poor grades in music. The effect of this reinterpretation is that the doubts initially created by her grades in history and music are now eliminated. At this point we must ask what information Karen is likely to have primed in the long-term store and consequently what information she is likely to have available to serve as retrieval cues. The answer to both these questions is that it will be information that confirms her new beliefs about her aptitudes.

Now, when there is much support for a given belief available

to a subject, other support is likely to appear to fit right in, while evidence that contradicts the belief is likely to appear foreign or even nonsensical. By saying that Karen approaches the issue of her aptitudes from a believer's perspective then, I mean that Karen approaches this issue with much primed information in long-term memory which supports her beliefs about her aptitudes. The resulting great availability of confirming information creates a predisposition for seeing the relevance of confirming information and impedes one's ability to notice, recall, and see the relevance of disconfirming information.

When I introduced my hypothesis about belief perseverance I said that the preference for the satisfaction that comes with believing may cause one to be sensitive to confirming information. This point can now be better explained. It may be that a preference for the satisfaction of belief influences us to prematurely adopt a believer's perspective. This perspective then may create the increased receptivity to confirming information demonstrated by subjects in belief perseverance experiments in the manner suggested above.

The Advantages of Perspective Change

Returning to Karen's case, I will attempt to illuminate the advantages that could be had by Karen if she changed her perspective on the validity of the results of the aptitude test. What would happen if, for instance, Karen was made aware of and consequently attended to the potential problems associated with

coming to believe something? The Anderson and Pichert (1978) study seems to suggest that such a change in perspective would, to some degree, overcome the influence of the hypothesis-confirming tendency and help Karen retain her ability to see the relevance of disconfirming information by creating a more impartial perspective.

Consider the following possibility. Karen thinks to herself:

> Well, I know that if I'm too quick to get myself to a state of belief and out of this problem of what my aptitudes are, I may be letting myself in for trouble. I may end up believing things that could create problems for me. Conceivably, I might spend four years studying music only to discover that I really am no good at it. Therefore, I think that I better be critical of this aptitude test and take my time in coming to my beliefs about what my aptitudes are.

In this scenario, Karen's awareness of the problems of pursuing a quick resolution allows her to take a different perspective on herself and the problem of her aptitudes than the one presented in the story. This new perspective, in turn, allows for more increased availability of disconfirming information, and a resulting greater receptivity to disconfirming information.

The awareness that one's beliefs may be sustained, not by their reasonableness, but by the satisfaction associated with believing them, throws a new doubtful light on their acceptability. This new doubtful perspective, in turn, generates retrieval cues and primes information which allows for a greater receptivity to disconfirming information. Studies indicate that subjects in belief perseverance experiments can be successfully made to see that their new beliefs are unacceptable if they are

made to change their perspective about the experiment and their newly acquired beliefs by thoroughly understanding how the phenomena of belief perseverance may have operated in their own case (Nisbett & Ross, p. 177).

The Resistance Of Belief To Subsequent Evidence

I began my investigation of the phenomenon of belief perseverance by saying that I was going to offer an explanation of why people behave in the manner outlined by Nisbett and Ross' three hypotheses about belief perseverance. So far, however, I have only directly addressed the third hypothesis which stated that when people form a belief based on some putatively probative evidence and later discover that the evidence is false, the belief often survives such total discrediting. I have given my explanation of that phenomenon. I now wish to offer a suggestion as to why people behave in the manner outlined by the other two hypotheses.

I begin with the second hypothesis which stated that when people approach a set of evidence without a belief and then form one based on initial evidence, that belief will be resistant to subsequent inconsistent, or disconfirming, evidence. The first thing to note about this second hypothesis is that it is not all that different from the third. Hence, the explanation offered for the third hypothesis may also work for the second. People who persevere in their beliefs after the evidence for those beliefs has been discredited exhibit the resistance to

subsequent inconsistent evidence that is central to the second hypothesis. This resistance is more accurately characterized as an inability to see the relevance of this evidence to the beliefs in question.

As the reader will no doubt remember, I have already discussed why people who have solidified beliefs on some matter have difficulty in seeing the relevance of evidence that is disconfirming to, or inconsistent with, those beliefs. In the last section, I noted that Karen's inability to see the relevance of the discrediting of the aptitude test can be understood as resulting, at least partially, from the kind of information that she has primed in her long-term memory, or in other words from the perspective from which she approaches new evidence.

The suggestion here is that it is the perspective from which one approaches new evidence that is primarily responsible for one's sensitivity or insensitivity to that evidence. The elimination of all serious doubts on some issue creates an over-availability of information that is suitable only for the interpretation of confirming information. The result is a flood of thoughts that tends to confirm one's original beliefs on the matter, and a relative absence of thoughts suitable for the interpreting the relevance of disconfirming information. Confirming information "just seems to fit" while disconfirming information doesn't "seem to fit" at all. Before I offer an example of this appearance of fit phenomenon, however, I would like to consider Nisbett and Ross' first hypothesis.

Tenacity

The first of Nisbett and Ross' hypotheses roughly states that when people already believe something before encountering any genuinely probative evidence, exposure to such evidence (whether it supports the belief, opposes it, or is mixed) will tend to result in more acceptance than is reasonable. More particularly a study by Lord, Ross, and Lepper (1979) found that: (a) different standards are used for evaluating confirming information than are used for disconfirming information; (b) information that is presented in a manner that does not much affect belief when it is disconfirming of the belief strengthens the belief substantially when it is confirming; and (c) mixed information, which gives roughly equal support to each of two opposing views, does not reduce confidence for holders of either view but instead reinforces confidence for holders of both views.

Once again, the explanation offered for the third hypothesis can be extended to provide an explanation for this remaining hypothesis. Information from the environment is likely to be processed, or considered, relative to primed information in the long-term store. But in the case of someone who has adopted a believer's perspective on some matter, new information on this matter has a much better chance of appearing relevant if it is confirming of existing beliefs. Confirming information is far more likely to appear to "fit", or to make sense, than is disconfirming information. Consequently, confirming information

is much more easily integrated into existing beliefs. The result is that the existing beliefs are often strengthened by an encounter with new information.

To the observer who isn't burdened with the believer's perspective on the matter, the relevance of some disconfirming information may seem as obvious as the nose on "the believer's" face. The behavior of "the believer" may appear unreasonable, seeming to use different standards for evaluating confirming and disconfirming information. But to the believer his behavior is the epitome of rationality. He adjusts his beliefs when and how they appear to need adjustment. This accounts for the confusion that often results when "a believer" and "an observer" attempt to discuss whatever is the object of belief.

As an illustration of how confirming information can simply appear to fit consider this exchange between a detective and an interested party concerning a hypothesis about the cause of someone's death taken from Dashiell Hammett's, The Thin Man.

> "Then you don't know positively that he was robbing Wynant?"
>
> "Sure we know. It doesn't click any other way. The chances are Wynant was going away on a trip the 3rd of October, because he did draw five thousand dollars cut of the bank in cash, but he didn't close up his shop and give up his apartment. That was done by Macaulay a few days later. Wynant was killed at Macaulay's in Scarsdale... because on the morning of the 4th, when Macaulay's cook, who slept at home, came to work, Macaulay met her at the door with some kind of trumped-up complaint and two weeks' wages and fired her on the spot, not letting her in the house to find any corpses or blood-stains."
>
> "How did you find that out? Don't skip details."
>
> "Ordinary routine. Naturally after we grabbed him we went to his office and house to see what we could find out-you know, where-were-you-on-the-night-of-June-6-1934 stuff-and the present cook said she'd only been working for him since the 8th of October,

> and that led to that. We also found a table with a very faint trace of what we hope is human blood not quite scrubbed out. The scientific boys are making shavings of it now to see if they can soak out any results for us." [It turned out to be beef blood.]
> "Then you're not sure he-"
> "Stop saying that. Of course we're sure. That's the only way it clicks..."
> "But this is just a theory isn't it?"
> "Call it any name you like. It's good enough for me."

In the mind of the detective everything fits nicely. He is satisfied with his theory and distrustful of objections to it. In the real world this kind of tenacity could put an innocent man in jail. What, then, can one do to avoid behaving with the tenacity of the detective in this story? How does one go about remaining receptive to disconfirming information? These questions are the subject of the next chapter.

In this Chapter then, I have suggested that one of the culprits behind the perseverance of beliefs is the perspective from which one views the problem or issue that is before them. By perspective I mean the nature of the information through which one interprets the problem or issue at hand. Or, in terms of cognitive theory, perspective may be understood as that which results from the information that is most available in memory by reference to which one interprets the problem or issue at hand. Since information consistent with what is available in memory is most readily interpreted and incorporated, confirmation of belief is most probable whenever the issue at hand is considered.

One way to overcome belief perseverance then, may be to alter the nature of the most readily available information so as to allow one to be more receptive to information that may disconfirm one's belief. For example, such an alteration of information may be accomplished by learning about the problems of belief perseverance and bringing this information to bear on the beliefs under consideration. Additional strategies for overcoming belief perseverance are discussed in the next chapter.

Chapter V

Tentative Acceptance

How To Be More Receptive To Disconfirming Information

The key to being more receptive to disconfirming information, whether it is in the long-term store or in the environment, and thus the key to overcoming the problems we have considered, would appear to be the generation of a more impartial attitude towards the problems that confront us. Not to the extent that one shouldn't believe anything without sufficient evidence, as Clifford recommends in The Will To Believe (James, 1896/1956); but to the extent that one balances one's eagerness to confirm one's suspicions with, as James (1896/1956) writes, "an equally keen nervousness lest [one] become deceived" (p. 21). This advice is easier heard than followed. Our inclination for getting the problem solved, for removing doubts from our mind at the first opportunity that seems reasonable, appears to be strong. Recognizing that the dissatisfaction associated with remaining in a state of "problem yet to be solved" is influencing our thinking and reasoning in ways that protect existing beliefs seems to be the first step in allowing disconfirming information into our thoughts. If one is to remain receptive to disconfirming information, then, it helps to be aware of the problems created by the inclination to remove doubts at the first, seemingly reasonable, opportunity.

The second thing that one may need to do is change the way one treats inconsistencies that arise when considering accepting some belief. When one eliminates doubts and inconsistencies one functionally decreases one's ability to remain receptive to the impact of what may be valuable inconsistent, or disconfirming, information. It follows that if one is going to take a problem or issue seriously, then one should be careful not to eliminate doubts prematurely. At the same time, it must be admitted, it is often necessary to accept some hypothesis in order to attend to a matter that requires immediate action. This, however, doesn't mean that one must accept that hypothesis wholeheartedly, and "rationalize" away all thoughts that are inconsistent with that, now accepted, hypothesis. One can instead accept something tentatively, where tentative acceptance is acceptance that does not lose sight of doubts.

Tentative acceptance of some hypothesis, however, requires that one be willing to accept the increase in struggle and discomfort that may come with keeping doubts alive. Accepting something tentatively involves retaining those feelings of doubt, and not allowing oneself the luxury of a quick resolution. By retaining information that enhances one's ability to recall, and seeing the relevance of disconfirming information, one is better able to remain receptive to disconfirming information and overcome the hypothesis-confirming tendency. Early comfort with a belief may carry a high price if truth and good decisions are near the top of your table of values. "But", the reader might ask, "how does one go about

accepting something tentatively and keeping doubts alive?" That is the topic of the next section.

An Argument Against Tentative Acceptance

What is involved in accepting a belief tentatively? Are people able to tentatively accept many beliefs at the same time? In Change In View, Harman (1986) argues that:

> Until an inquiry is ended, one needs to keep a record of reasons for various conclusions, possible counters to these reasons, counters to those counters, and so on... But since one does not have such unlimited powers of record keeping and has a quite limited ability to survey reasons and arguments, one is forced to limit the amount of inquiry in which one is engaged and one must fully accept most of the conclusions one accepts, thereby ending inquiry. Tentative acceptance must remain a special case of acceptance. It cannot be the general rule (p. 50).

In order to support his contention that tentative acceptance must remain a special case of acceptance, he notes that jurors must remember all the reasons for the tentative acceptance of any conclusions that they personally reach right up until the jury as a whole makes a decision. This task, he suggests, is quite difficult and could not possibly be extended to many issues at the same time.

Let's critically examine Harman's argument. An assumption of this argument is that in order for anything (conclusion, belief, etc.) to be tentatively accepted, all the reasons for and against that thing must be remembered. I believe that this assumption is incorrect. Let's return to Karen for a moment.

Suppose that upon hearing the results of the aptitude test Karen, although believing them be true, retains a nagging feeling of doubt about their accuracy. There is no "reason" that she can find to doubt the accuracy of the results. However, everytime she thinks about her aptitudes and the test results she feels uneasy about accepting them as accurate. Nevertheless, she chooses her courses on the hypothesis that these results are accurate.

Examination of this scenario reveals that Karen has a working hypothesis which she accepts tentatively, and nothing in the way of a "reason" to doubt that belief. Yet when she considers the issue of her aptitudes she is motivated to continue inquiry on the matter. It seems to me that all that is needed to accept something tentatively is that a feeling of doubt comes to mind upon consideration that thing in order to motivate further inquiry and thus, keep one from accepting that thing fully. Even if Karen had many reasons against believing that the results of the aptitude test were accurate and forgot them all, by retaining a feeling of doubt about their acceptability it seems to me that tentative acceptance of her beliefs can be maintained. Although Harman can argue that jurors should remember all the reasons for the tentative acceptance of their conclusions, there seems to be definite problems with arguing that they must remember all their reasons in order to make tentative acceptance of their conclusions possible.

Another problem with Harman's argument is that he appears to greatly underestimate the powers of human memory. Harman argues

that one is forced to limit the amount of inquiry in which one is engaged and fully accept most of one's beliefs because of "quite limited" powers of record keeping. This seems to me to forget that people have the ability to understand things and do not have to catalogue information in the manner of a computer. Understanding is the key to reducing the burden on memory and allowing us to remember or reconstruct the reasons for and against a myriad of beliefs.

How Understanding Reduces The Burden On Memory

Information that is well understood is encoded in memory in a way that facilitates efficient retrieval of that information, i.e., it is encoded distinctively. Information encoded distinctively in the long-term store is, with few exceptions, more likely to be retrieved than information which is not encoded so distinctively. The more distinctively information is encoded, the less likely it is that a given cue for that information will match many other chunks in the long-term store thereby making retrieval difficult or impossible. During retrieval, cues containing the relevant distinctive information will make contact with only those chunks containing that distinctive information in the long-term store.

An interesting point to be made here is that deep processing leads to distinctive encodings. Deep processing refers to the kind of thinking that examines such things as the meaning of information and its relationship to other information. Shallow

processing, by contrast, refers to such things as memorization by rote, where only, so called, surface features of information is examined.

Consider the following two passages constructed by Anderson and Reder (1979). The first arouses general information already in the long-term store and allows for deep processing. The second, on the other hand, doesn't correspond well to information already in the long-term store, and so doesn't readily allow for deep processing. Which passage do you find more memorable upon first reading?

> A. The dog loved his masters. He also loved to sit on the chairs. His masters had a beautiful black chair. One day he climbed on it. He left his white hairs all over the chair. His masters were upset by this. They scolded him.
>
> B. The word dog is in the book. The word dog is also known to be above the word chair. The book has the word chair printed in large red letters. On one page, the word dog is larger than the word chair. The word dog has its green letters printed beside the word chair. The book tells about this. The book illustrates the word dog.

Although no experiments have been performed to contrast the effect on memory of these two passages, the advantage of the first seems obvious. The first passage, in contrast to the second, presents information in a manner that allows one to form unique associations between the individual ideas that make up the passage and one's own ideas on the subject. This extra processing that can be performed much more easily on the first passage is deep processing. Deep level processing has a tendency

to be more elaborate than shallow level processing. The elaborateness of deep level processing allows for many unique associations to be made between items of information in the long-term store. These unique chunks then facilitate efficient retrieval of the stored information.

If all the information that must be remembered in order to accept something tentatively was inherently difficult to organize and process deeply, like the information in passage B, then one may be forced to limit the amount of inquiry in which one is engaged. However, this is most certainly not the case. Information generally yields to efficient organization if sufficient time and effort is spent on understanding it.

The Role Of Understanding

Another way of saying that to-be-learned information is processed deeply is simply to say that it is understood. Either way, such processing is a powerful aid to memory performance and reasoning. This is because such processing ultimately enables one to; (a) furnish oneself with distinctive cues to help retrieval; (b) recognize the relationship and relevance of externally provided or memory system provided cues to the sought-for information in the long-term store; and/or (c) rebuild or regenerate lost information by capitalizing on the conceptual scaffolding supplied through one's understanding. Such processing also chunks and integrates information more efficiently, thereby enhancing organizational coherence, and

reducing the burden on the memory system. Generally, the more that the learner can integrate new incoming information with existing information in the long-term store, the better the new information will be remembered (Farr, 1987, p. 98).

Remembering the feelings of doubt associated with considering an issue is of primary importance because it is these feelings, these sensations, that will motivate one to reconsider one's belief and to take seriously new disconfirming information. Remembering the reasons so that they can be recalled at a moment's notice is of less importance assuming that the issue in question is thoroughly understood. Besides allowing an individual to generate, or regenerate, missing or forgotten information from the existing conceptual scaffolding, understanding an issue will also allow one to encode information about that issue distinctively and so further reduce the burden on memory. Without the feeling of doubt however, there will be no motivation to begin investigation anew.

What may be required, then, for the individual interested in remaining receptive to disconfirming information, besides an awareness of the pitfalls of the satisfaction of a quick resolution, is a change in attitude towards believing things. The new attitude should incorporate a decrease in one's reluctance to remain in a state of dissonance, or doubt; not to the extent of being a bullheaded individual who accepts nothing short of mathematical proof; but to the extent that one thinks things like, "yes, that seems to be the case, and if I need to act on the issue I will act as if it were the case, but there

are still those aspects to the issue that leave me with feelings of doubt, and I must remember those feelings if I am to get near to the truth of the matter". In other words, if one wishes to avoid behaving in the manner outlined by Nisbett and Ross' three hypotheses then one must learn to accept things tentatively, while remaining aware of the pitfalls that come with the acceptance of any belief.

Chapter VI

Conclusion

Criticisms and Problems

In the course of my thesis, I have offered an explanation for why people behave in the manner outlined by Nisbett and Ross' three hypotheses about the perseverance of beliefs. This is not to say that it is the only explanation or even that it is a correct explanation. It must be admitted that to some degree the explanation central to the thesis is only armchair speculation. However, wherever possible I have tried to support my speculation with research. Obviously if problems exist with the research that I use then there also may be problems for my explanation.

In respect to this possibility let me note that Goldman (1986) believes the following:

> We should not accept Nisbett and Ross's characterizations of people's habits too uncritically. Concerning confirmation bias, for example, they themselves admit that some research indicates that confirming instances are not always more 'available' to a theory holder than disconfirming ones. As R. Hastie and P. A. Kumar (1979) noted, suprising or incongruent events may be attended to and stored in memory more often than expected or hypothesis-confirming events. Concerning causal explanation, it is not clear just how readily people manufacture causal explanation. That they readily invent causal explanations when given such a task by an experimenter hardly shows that they always invent them spontaneously, even on the slimmest of evidence. Clearly, much empirical work remains to be done on these matters (p. 218).

Goldman's criticisms are primarily concerned with exactly how far Nisbett and Ross can legitimately extend their research and with the accuracy of their explanations for these phenomena. However, it is enough for my thesis that Nisbett and Ross's three hypotheses about belief perseverance outline real problems for a considerable number of people in a variety of circumstances. Goldman doesn't seem to deny that the problems are real or exist for a considerable number of people. I offer my explanation as a reasonable explanation that has the benefits of providing a description of the cognitive structures and operations that may be involved in the behavior. The explanation also suggests strategies for overcoming the problems of belief perseverance which I have outlined most completely in Chapter IV.

Final Notes

As my thesis observes, the problems of belief perseverance as noted by Nisbett and Ross largely appear to result from the perspective from which evidence is approached. That is, the problem seems largely to stem from biases in the information-processing system created by an overabundance of confirming information. How can one allow information to influence one's beliefs when one is unable to see its relevance? To the believer, his behavior is likely to be the epitome of rationality. To the observer, however, who doesn't share the perspective of the believer, the behavior of the believer seems

unreasonable. Who is right? Although my sentiments lie with the observer, I am not prepared to argue for his opinion that the believer ought to change his beliefs. It is for those who see a problem in themselves that I offer my suggestions for how to avoid the problems of belief perseverance.

I end here with a quote from James (1896/1956) concerning our preference for full belief and the cut and dry kind of evidence that most easily allows for it.

> But now, since we are all such absolutists by instinct, what in our quality of students of philosophy ought we to do about the fact? Shall we espouse and endorse it? Or shall we treat it as a weakness of our nature from which we must free ourselves, if we can?
>
> I sincerely believe that the latter course is the only one we can follow as reflective men. Objective evidence and certitude are doubtless fine ideals to play with, but where on this moonlit and dream-visited planet are they found? I am, therefore, a complete empiricist so far as my theory of human knowledge goes. I live, to be sure, by the practical faith that we must go on experiencing and thinking over our experience, for only thus can our opinions grow more true; but to hold any one of them--I absolutely do not care which--as if it never could be reinterpretable or corrigible, I believe to be a tremendously mistaken attitude, and I think that the whole history of philosophy will bear me out (p. 14).

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