The anatomy of fear
By Maggie Scarf
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The house is more deadly than the street, yet at home we have more control—or at least the illusion of control

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Trivial happenings and ordinary conversations: Early on a Saturday morning the telephone rings. It is my next-door neighbor, her voice panicky: a "suspicious looking" service man is at the back door, saying he wants to check the meter. "I'm alone in the house," she whispers. We agree that I will call her back in a few minutes to make sure that everything is all right. I do, and she is.... That same afternoon, while shopping, I get into a conversation with an elderly saleswoman. Her husband has recently retired and is having trouble figuring out what to do with his time. "There's a lovely big park not far from our home," she says, "but with everything going on these days—you know—he doesn't like taking any chances. So, what can he do? He just sticks to the streets and to the sidewalks." . . . In the evening, at a party, a journalist friend visiting us in New Haven says: "I am more frightened, living on the West Side of New York, than I ever was during my years in Vietnam. There at least you knew where the danger was or where it might be coming from: You could make your own choices about whether to move closer or further away from it. But in Manhattan you have the feeling that anything can happen at any time, day or night, in any part of the city. And these muggers would just as soon kill you as rob you."

Why do we spend so much more time ruminating about this kind of menace than about other sorts of dangers which we actually face? I have never, fortunately, been the victim of any crime, and yet such conversations—which make some kind of victimization seem not only possible but imminent — bring forth from me immediate and intense emotional responses. Why don't I react similarly to the threat of injury or death in an automobile accident?

Some of the answers to these questions may lie in the vast body of psychological literature which has emerged from the experimental study of fear. These studies have raised the suggestion that the degree of fear we feel about a potentially harmful event may be linked primarily, not to the degree of threat (in terms of the probability that it may actually happen to us), nor even to the amount of injury one imagines one might sustain if it did happen, but to the quality of the event or situation itself. Some *types* of external threat evoke far more fear than others. To put it another way, given the possibility that bodily damage might be equal in both cases, most people would find the idea of being injured in a violent encounter far more frightening than of being hurt in a traffic accident.

The two potential sources of danger—violence and automobiles—deserve comparison. Generally speaking, in a given year there are three times as many traffic fatalities as murders; the figures for 1972 cite 18,520 deaths from violence as compared with 56,590 deaths in automobiles. In other words, the murder rate is 8.9 per 100,000 population per year, the automobile fatality rate 27.2 per 100,000. We are, however, rarely preoccupied by the menace presented by the automobile—while fears of random crime touch most of us, affecting a variety of aspects of our thinking and behavior.

These figures, of course, are calculated on a national base and will be altered when broken down into differential bases. Someone living in what police call a "hot crime" area of a major city is clearly going to have a higher probability of being killed during the commission of a felony offense than is someone who lives in a rural area of Vermont. (The Vermonter has a correspondingly higher chance of dying in a traffic accident.) But if one eliminates from that over-all murder total—18,520 in 1972—those deaths resulting from spouse killing spouse, parent killing child, other family killings, romantic triangles, lovers' quarrels, etc., one is left with a very low figure: Some 5,000 murders linked to the currently widespread fantasy of "being killed by a stranger during the commission of a random crime." This means that for the average citizen there is an infinitesimal 1-in-40,000-per-year probability of becoming involved in a felony resulting in death. Such a figure is roughly commensurate with the number of people who choke to death on food or other objects each year.

The same figure—5,000—is less than one-third the number of people who die each year from some kind of fall (an accident which often takes place in the home). But few people I know, myself included, give a moment's reflection to the possibility of getting hurt slipping in the shower or falling down a flight of stairs. We are, it appears, much more entranced by the idea of injuries that come to us at the hands of other people.

I am not trying to imply that fears about crime and violence are without any basis. The crime rate has certainly increased during the last decade: According to a recent issue of the Uniform Crime Reports published by the F.B.I., the average person's chances of becoming victimized in a crime have risen 55 per cent during the last 10 years. Still, according to a recent estimate by the National Center for Health Statistics, close to 24 million injuries — four million of which resulted in either temporary or permanent disabilities (loss of a finger, blindness, paralysis of one or more limbs)—were caused in a single year by accidents in the home. This figure must be contrasted with the number of muggings and robberies where some kind of injury to the victim resulted. The estimate (extremely crude, to be sure, for such crimes are notoriously underreported) is on the order of 100,000 during the same year. Never- *(Continued on Page 13)*

Dangers we face (based on estimates for 1972 by the National Safety Council and the F.B.I.)

Death at the hand of strangers	Death from choking	Death by falling	Death by auto accidents
5,000	3,900	17,000	56,000

Maggie Scarf, a freelance, frequently contributes articles on scientific subjects to this Magazine.

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theless, given this kind of disparity, why is it that we tend to magnify the one kind of threat and underrate the other, if not to dismiss it completely? Why is there, for so many of us, such an odd discontinuity between dangers as they exist and dangers as we perceive them? Perhaps there is something special about a certain kind of fear—the fear of violence. Perhaps, as recent experimental work has indicated, this fear embodies particular qualities, primarily psychological in nature, which tend to enhance it and make us experience it far more vividly than a cold look at the statistics suggests that we should.

Research into the nature and anatomy of fear—as an emotion, a motivating force, an acquired drive—was inaugurated in the early nineteen-twenties when the great behaviorist psychologist John B. Watson demonstrated that fear could be produced experimentally. In a study which, a half-century later, strikes the reader as cruel as well as ingenious, Watson and a student collaborator, Rosalie Rayner, "conditioned" an 11-month-old child to experience intense fear at the sight of a white rat.

Albert B., known as "little Albert" to generations of later psychologists, was the son of a wet nurse at a children's home in Baltimore. The boy was a cheerful, stolid child who, as Watson and Rayner note in their paper, had never been seen in either a state of fear or rage. As the two psychologists presented him, in succession, with stimuli which *could* have frightened him—a white rat, a rabbit, a dog, a monkey, masks with and without hair, etc.—the baby was no more than delighted and pleased. He appeared to enjoy contact with the animals, especially the white rat.

But Albert did show fear when Watson suddenly clanged two steel bars together, creating a startling, unexpected noise. This kind of "startle stimulus" was, as the psychologist had noted in an earlier paper, innately fear-evoking. The sound caused the child to rear back violently, hesitate in his breathing, fling his arms upward in a self-protective gesture and then burst into a fit of crying.

Watson and Rayner commenced, soon afterward, a series of "classical" or "Pavlovian" conditioning trials. They simultaneously presented the white rat and the sudden frightening noise. In the first two sessions, whenever Albert stretched out his hand to touch the white rat, Watson clanged the steel bars together. It actually took but those two brief experiences to cause the child to fall forward on his face and begin to whimper. A week later, when the rat was introduced again, Albert refused to touch it. He had, clearly, established a mildly negative emotional response to the animal.

It took but seven such trials for Albert to establish a hardy association between "fearful noise" and "white rat." At the end of that period, the sight of the white rat *alone* produced intense fear. Even in the absence of any further startling, shock-producing noises, the previously "neutral" stimulus—the rat—was in itself enough to make Albert turn, cry and crawl away as fast as he could. It had taken on the fear-eliciting properties of the sudden sound. And when the baby was tested five days later, it was evident that his conditioned emotional reaction to rats had generalized to other "furry" stimuli. He had now become afraid of the rabbit, the dog, of a Santa Claus mask with white wool on it and even a sealskin coat.

It was, suggested Watson, through a process similar to this that most human fears were acquired: That is, a child, in his or her natural environment, learned to associate a variety of previously "neutral" stimuli with painful or alarm-evoking events. (As to those psychological theories which proposed that many or most human fears arise from intrapsychic conflicts, linked to incestuous strivings directed toward the parent of the opposite sex, Watson commented: "The Freudians 20 years from now, unless their hypotheses change, when they come to analyze Albert's fear of a sealskin coat—assuming that he comes to analysis at that age—will probably tease from him the recital of a dream which upon their analysis will show that Albert at 3 years of age attempted to play with the pubic hair of the mother and was scolded violently for it. . . .)"* Our fears, maintained Watson, spring from experiences in the environment: If one knew the learning history of the individual, in all its minutiae, one could readily ascertain the true source of those fears which appear to have been

*Albert's mother left her job at the orphanage soon after the experiment, and many subsequent attempts to locate "little Albert" were unsuccessful.

spontaneously produced from within.

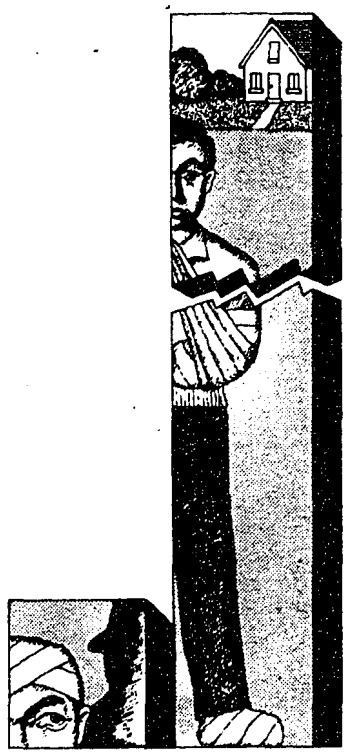
The Watson-Rayner study was a dramatic demonstration that fear could be produced in the laboratory—could be, as it were, isolated, measured, analyzed, teased apart into its primitive emotional and motivational components. The many experiments which followed were, however, (happily) conducted for the main part with rat and dog, rather than human subjects.

One study, carried out in the early nineteen-forties by Prof. Neal Miller of Yale University (now at Rockefeller) attempted to measure the relative strengths of fear and of the primary drive of hunger. Miller found that albino rats that had been trained to run down an alley to their food, would—when restrained by a harness, and very hungry—pull toward the food with a strength of 50 grams. Other rats, trained to avoid receiving an electric shock at the end of the same alley, would pull against the restraining harness — away from the goal — with a force of 200 grams. Furthermore, animals first trained to get their victuals, and then given an electric shock at the end of the alley, would *not* return to the goal to get food again—even though they were nearly starved. As a variety of other experiments have demonstrated, fear interferes not only with eating, but with drinking in spite of thirst, and with sexual behavior.

In a 1948 paper that was to become a landmark in the experimental study of fear, Miller demonstrated that this emotion was more than merely a reaction to painful or innately alarming stimuli: It was in itself an acquired drive, at least as powerful as the primary drives—hunger, thirst, sex, etc.—in promoting the learning of new behaviors. In other words, just as a hungry rat could be motivated to learn to run a maze in order to obtain "rewarding" food, so a terrified rat could be trained to perform rather complicated, unratlike tasks to obtain a "rewarding" reduction of fear.

Miller's study was elegant and simple. He designed an apparatus which consisted of two compartments, one white with a grid floor, the other black with a solid floor. Electric shocks could be delivered through the grid in the white section, and the animal could escape the painful stimulus by running through an open door into the black room.

When a series of brief electric shocks were begun, the animals reacted with all the behavioral signs of intense fear —urination, defecation, squealing, agitated running about. They soon learned the escape route through the open door into the "safe" black compartment. Before long the animals had become conditioned to fear the white side of the box: "white walls" and "grid floors" were in and of themselves cues for terror. Whenever the rats were placed in the white side of the box they scurried frantically into the black half of the apparatus. This behavior persisted for literally hundreds of trials *after the electric shock had been turned off.*



Injuries of all kinds in robberies 100,000

Serious injuries in home accidents 4,000,000

A habit motivated by fear was, clearly, extraordinarily persistent. Certainly an animal running down an alley to get a food reward would have stopped after a number of trials in which no food was found at the goal. What seemed to be happening in the fear experiment was that the rat, having learned a response that could enable it to avoid danger and pain, was unlikely ever to return to find out whether that danger still actually existed. The fear of the white compartment was so intense that merely getting out of it appeared to be rewarding. Miller demonstrated this by closing the door separating the compartments and arranging a small gate which would open (enabling the rat to escape the white side) if the animal rotated a wheel just above it. The rats soon learned the effect of the wheel. On being placed in the white compartment, they would scurry to the wheel, give it a turn, and open the way into the black compartment. After learning the new response, reported Miller, their general behavior took on a somewhat casual appearance. Yet the relentlessness with which they would run to rotate the wheel was extraordinary to observe. Like many neurotic behaviors in humans, the rats' stereotyped conduct appeared incomprehensible, but, Miller wrote, "if you know the history, the bizarre behavior is understandable."

Miller's pioneer work on so-called "avoidance conditioning" was followed by a host of related experimental studies. One series, carried out at the University of Pennsylvania under the direction of Dr. Richard Solomon, used 13 dogs as subjects. All were given avoidance training, as follows: The dog would be placed in one side of a box which was divided in half by a high barrier. The compartment into which the dog was placed was well-lit, but whenever the lights were dimmed, the dog would receive a painful electric shock. The animal could escape the shock by leaping the barrier into the other side of the box.

The "lights out" signal soon became a cue for intense fear. As in the Miller study, the shock was then turned off, and the researchers commenced a series of "extinction trials" to see how long it would take the dogs' acquired fear-reaction (jumping the hurdle when the lights dimmed) to dissipate. Because the barrier was fairly high, making the jump quite an effort, the psychologists believed this would take place readily. To their astonishment, however, the animals continued jumping through hundreds of trials. Indeed, they improved their style, becoming speedier and more accomplished. At the same time their behavior, like that of the rats, became markedly less agitated and emotional. Yelping, trembling, defecation, urination all diminished, for they had a response which enabled them to avoid remaining in the terrifying "lights out" situation. Still, the dogs would not unlearn the fear-motivated jumping reaction.

Puzzled by this perseveration in the absence of any further shock or punishment, the Solomon team tried a variety of methods for "counter-conditioning" the animals—

that is, teaching responses that would oppose or be incongruous with jumping. For example, the experimenters arranged the apparatus in such a way that, when they jumped on the dimmed-lights cue, the dogs would receive a shock on the other side of the barrier. Nevertheless, 10 out of the 13 dogs continued to leap the hurdle throughout 100 extinction trials. In general, as the animals jumped *into* shock, their jumping styles showed improvement — they jumped faster and better. Punishing the fear response only seemed to strengthen it.

In this situation, the need to escape fear appeared to be more powerful than the desire to escape predictable pain. The sheer craziness of the dogs' reactions indicated, at least to this reader, the degree to which strong fears may underlie and motivate very maladaptive kinds of behaviors. On the other hand, the merits of this kind of emotional conditioning ought not to be overlooked: An animal (or human) that is "wired up" in such a way that it learns very quickly which cues are associated with danger, and then attaches anxiety to those cues and persistently avoids them, is not — as one psychologist remarked to me — "going to get eaten up by tigers very often."

In a sense what this emotional conditioning urges upon the organism is the adoption of a very conservative strategy, a strategy which, in the language of game theory, has a minimax character — minimizing the maximum harm an opponent can do to you. Such a strategy is, obviously, adaptive in the broad meaning of the term: It promotes survival. But as the Solomon study demonstrated, it contains a crucial disadvantage: one may spend a good deal of time avoiding things that actually are not there. Avoidance stratagems are expensive to the individual inasmuch as they place stringent limits on flexibility and freedom, and interrupt behaviors which might be directed toward positive, enjoyable goals.

The fact that humans and lower animals readily learn to attach fear to previously neutral stimuli—so that those stimuli become in themselves autonomous cues for anxiety and alarm — does not, of course, explain why one kind of fear may be experienced more intensely than another. What, to return to my original question, can serve to explain the ease with which we become conditioned to fear those stimuli (streets at night, lonely places, parks, etc.) associated with violence and criminal strangers, while our fears about things like automobiles, highways, home and work accidents appear to remain somewhat unrealistically low? Some clues may be found, perhaps, if we return to the handful of studies using humans as subjects which followed Watson's "little Albert" experiment.

In 1929 C. W. Valentine, an English psychologist, did a study in which he used his own child as the subject. ("One hesitates," he wrote, "to perform experiments causing even momentary discomfort to one's little ones, but 'Y' was an exceptionally healthy, strong and jovial youngster, and I hardened my heart sufficiently to try one or two simple tests with her...") What Valentine did was to place his small daughter, then just over a year old, on her mother's lap, near a small table upon which an ornate pair of opera glasses had been set. Each time the child reached out to touch the glasses, the psychologist blew a harsh blast on a whistle. His daughter, observed Valentine, "quietly turned round as if to see where the noise came from"; the process was repeated several times, but the whistle failed to alarm her.

Later that afternoon, the child, seated upon her father's knee, was presented with a woolly caterpillar which a favorite brother had brought in upon his hand. She had seen such insects before, but had never touched one. She shifted away slightly, then turned back to look at it. At this moment her father blew a loud blast on the whistle: She screamed in terror, and turned away from the insect. This process was repeated four more times. "It is remarkable," reported Valentine, "that the blowing of the whistle, which that same morning had caused only a slight interest, should now so accentuate the reaction to the caterpillar. It can only be explained, I think, on the assumption that the attitude towards the caterpillar was a very *unstable* one, ready to be changed to great excitement and fear.... The loud whistle, in itself undisturbing, provided just the slight added shock to make the fear of the caterpillar burst forth."

If all human fears were, as Watson had said, simply conditioned reflexes resulting from early painful experiences in the environment, little "Y"

ought to have formed a negative association to the opera glasses as easily as she did to the caterpillar. But there was, it appeared, something "special" about stimuli like white rats and caterpillars—perhaps there was, for human beings, something "special" about animals and insects in general. They might have a very particular kind of significance.

To examine this possibility, psychologist Elsie Bregman tried to condition a group of young children to fear stimuli which were indisputably "neutral" (a wooden block, a triangle, a swatch of cloth). Bregman, working in the early nineteen-thirties at the Home for Hebrew Infants in New York—I assume that orphanages no longer permit these experiments—used an electric bell hidden behind a high chair to startle her child subjects each time they reached toward one of these objects, which were among other playthings on the high-chair tray. Of the 15 children, all in "little Albert's" age range, none showed any measurable change in emotional responses toward the block, triangle or cloth. Bregman concluded that the white rat in the Watson study had not been a "neutral" stimulus after all: It appeared to have had some intrinsic biological significance. Perhaps Albert had displayed an innately human tendency to learn a specific, easily arousable kind of fear—the fear of animals.

Are we as a species—as the Bregman study suggests—genetically "prepared" to learn to fear certain classes of stimuli? Are we neurally "prewired" for acquiring fears about certain objects, or situations, which have perhaps affected human survival over the long course of our evolutionary history? In "The Biological Boundaries of Learning," edited by Martin Seligman and Joanne Hager, experimental studies — some new, some dating back to the twenties—have been gathered together which tend to support the hypothesis that humans, as well as lower animals, are remarkably choosy about what stimuli they are actually willing to learn to fear. One of the studies, an intriguing experiment carried out with rats, demonstrates this "finickiness" about fears. In essence, it was a replication of the 1948 Miller "avoidance" experiment, except for one crucial difference. The black and white compartments were reversed. The rats were shocked in the black area and from there ran into the white area.

Under these conditions, the animals were extremely slow to learn the avoidance response (running through the door). *Some even failed to perform it at all.* Why? The natural history of a cavity-dwelling, night-adapted animal suggests the answer: Black walls, signifying darkness, might be experienced as a signal of safety, while whiteness (daylight) might be an instinctual cue for danger. Running, therefore, from the black part to the white part of the apparatus may be something for which the rat is biologically counterprepared.

In other words, there may be bred into the rat as a species a selective advantage for those individuals which learn readily to fear daylight (for which the animal is ill-adapted) as there may have been, during our long prehistory in the wild, a selective edge favoring those human beings who acquired fears about animals with great rapidity and maintained those fears with great persistence. As psychologist Martin Seligman notes in a critical essay at the close of "The Biological Boundaries of Learning": "... animals and humans do a great deal of learning about contingencies which their species has faced for aeons. Not only do birds learn to turn wheels for grain [in learning experiments] . . . which their ancestors never did, but they also *learn* to migrate away from the North Star in the fall... a contingency their ancestors faced before them. Not only do humans learn to fear crossing busy streets, but also to fear the dark. All of this learning may not be the same." There are, Seligman suggests, stimuli associated with regularly recurring kinds of dangers, which human beings are biologically *ready* to learn to fear.

Crucial to the experience of fear is the issue of whether one will be able to cope effectively in a given situation.

In our species, in which the original adaptation was for food-getting during daylight hours, for sleep during night hours when predatory animals roamed, and in which social communities early became a major source of protection for individuals, it does not seem unreasonable to suppose that certain kinds of fears (of darkness, of animals, of violent strangers, of lonely or exposed places) might spring up more readily and persist more stubbornly than, say, fears about auto accidents, exploding aerosol cans or the possibility of getting one's hand mangled in the garbage disposal. These later, "modern" kinds of fear have clearly no evolutionary significance; no selective environmental pressures have prepared us for learning about such dangers with the same degree of emotional reactivity and alarm. We fail, therefore, to experience them with the same kind of intensity—and often to evaluate them as being as dangerous as they actually are.

In a conversation I had with Dr. Seligman, who is an associate professor of psychology at the University of Pennsylvania, this issue was explored further. "If you look at the phobias in humans," he remarked, "by which I mean those persistent and irrational fears which some people attach to certain stimuli (such as snakes), then you'll notice pretty quickly that the phobias fall into a quite limited set. That is, fear of open spaces, of specific animals, of insects, of heights, of closed-in spaces —there may be a dozen of them, all told. They include xenophobia, the fear or mistrust of strangers, people who seem foreign. . . . The current alarums about crime in the streets surely partake of phobic elements of this sort—that is, fear of people with skins of different color, who may not look like oneself."

Phobias in humans correspond, Seligman believes, to those objects or events in the environment which we are biologically "prewired" to learn to fear. "We know," he explained, "that for children things like pajamas are often paired with psychological trauma; yet you don't see pajama phobias. Also, objects like hammers and electric outlets are commonly linked with very painful experiences: I know of no instance of an electric-outlet phobia. A child may, after an unfortunate experience with an outlet, learn to fear it (wisely); but you won't see him tremble or be-

come rigid with fear at the mere suggestion that he's anywhere near an outlet, as would, for instance, a cat phobic if he espied a cat in the distance." The more neurally "set" the organism is, at some primitive, noncognitive level, for learning to fear a certain kind of stimulus, the "more robust a fear you are going to see, and the harder that fear will be to get rid of. . . ." We respond, with disproportionate emotional force, to those objects and events which have, during the long course of our evolutionary past, been reliable predictors of danger.

Biological "preparedness" is not the sole factor which might tend to make our fears about violence more intense than our fears about other dangers we face. According to Dr. Seligman, violent situations encompass other dimensions which are known to amplify and increase subjective feelings of fear. One such dimension is that of unpredictability. In an experiment which he carried out in 1966, which used rats and electric shock, Seligman demonstrated that unpredictable punishment arouses much more fear than does precisely *the same amount* of pain when the organism has some means for predicting it.

"Consider two situations," explained Seligman, "in which hungry rats are pressing bars to obtain 'rewarding' food pellets. In the first condition, we present a tone that is paired with electric shock. When the tone is on, as he rapidly learns (rats become exquisitely sensitive to this contingency after a brief period of training), he is going to get that jolt. And so he'll feel fear at the signal, and he'll stop bar pressing.

"On the other hand, he'll have learned, also, that when the tone is off, he is perfectly safe. This will put him in a quite different position from, say, another rat who is receiving exactly the same number of tones and shocks but who is getting them randomly. There is, for the latter animal, no relationship at all between tone and shock. For him, the experience is one of complete unpredictability. There's no stimulus which tells him he is all right (as the absence of the tone does for the first rat) and not going to get shocked. There is, in other words, no sanctuary."

Seligman compared two groups of rats, one receiving shocks reliably paired with the warning tone, the other receiving shocks and tones at random intervals. Those animals in the latter category, he reported, spent most of their time huddled in a corner and lived in a state of unrelieved fear. Of the eight rats in this group, six developed stress ulcers; among the group receiving paired shock and tone, no stomach ulcers were found. "Unpredictability," Seligman points out, "makes the fear continual; it stretches out in time. There is a much greater degree of strain and worry, because the organism has no signal, such as absence of tone, which lets him know that the bad thing won't be happening—that it's possible to relax."

Street violence has, he notes, a certain built-in "unpredictability": it can descend upon anyone, anywhere, at any time. "You can't slip in the shower unless you're *in* the shower," remarks Seligman. "You can't get into an automobile smash-up unless you're riding in an automobile. But where random crime and violence are concerned, one reads, all the time, about someone who's just walking along a street—or is even at home in bed—who suddenly becomes embroiled, as if out of nowhere, in some terrifying event. The lack of any clearly defined places where it can't, and won't, happen—where we know we are perfectly safe—is one aspect of this kind of fear which tends to make it more hardy, more chronic. . . . For some people it becomes an unremitting anxiety, like that of the rats huddled in the corner."

"Unpredictability," of course, is intimately related to the overarching problem of control and mastery of the environment. Humans and lower animals have a psychological need to feel that their actions —what they do as individuals —will affect what happens to them. The opposite of mastery is helplessness, and feelings of helplessness demonstrably intensify the experience of fear. In a series of studies carried out at Yale University in 1968, psychologist Jay Weiss showed that albino rats which were given the opportunity to learn a "coping response"—rotating a small wheel or jumping up on a platform—that enabled them to escape or avoid shock, developed far fewer stress ulcers than did passive partners who were receiving precisely the *same amount of shock* but could do nothing about it.

The feeling that one can make a difference, can act effectively in the environ-

ment, has, it appears, a generalized influence upon the total magnitude of the fear one experiences.

Worries about potential loss of control invade our thinking about "violence in the streets," Dr. Seligman observes, and tend to amplify our feelings of fear: "Random crime is a rather good example of something which renders an individual personally helpless. It's not something which he brings upon himself, nor something which he can readily escape from once it's happened, nor something which, generally speaking, he's been trained to cope with. Of course, a person might be able to do things to avoid its occurring in the first place—within limits — but there's very little he's going to be able to do about it when he becomes caught up in some ongoing violent event. . . . That's what gives so many people the feeling that there is this thing that, should it happen to them, will render them powerless to affect their own fates."

Crucial to the experience of fear is the issue of whether one will be able to respond meaningfully to a situation—to cope. As one ingenious study showed, merely *believing* that one's coping response is working—even if it is making no realistic difference whatsoever—serves to diminish fear and stress markedly. In this experiment, carried out in 1970 by three psychologists at the Stony Brook campus of the State University of New York, 40 male student volunteers were the subjects. In what purported to be a study of "reaction times," each man first received a series of electric shocks, each lasting precisely six seconds.

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The group was then divided into two sections. Half of the subjects were told that if their reactions to the onset of shock were swift enough and they pulled a nearby switch rapidly enough, the shocks they received could be reduced to half—3 seconds—their timed length. These men were, thus, led to believe that something they *did* could vitally affect what happened to them.

The subjects in the other half of the group were simply told that the shocks they received in the second part of the study would last for 3 seconds no matter what they did. In reality, both groups received precisely the same amount of shock—3 seconds —throughout the latter part of the experiment.

Curiously enough, the men who *believed* they were doing something, who thought they were acting upon and exercising some control over their environment, were far less emotionally reactive (as measured by galvanic skin response) than were those who thought that there was nothing they could do about it. The first group—the "copers" —also appeared to find the shocks, subjectively speaking, far less painful; and indeed were able to withstand higher levels of shock. In summing up this study, the authors, James Geer, Gerald Davison and Robert Gatchel, quoting the anthropologist Malinowski, wrote: "Man creates his own gods to fill in gaps in his knowledge about a sometimes terrifying environment . . . creating an illusion of control which is presumably comforting." The psychologists added: "Perhaps the next best thing to being master of one's fate is being deluded into thinking that one is. . . ."

Still, there are circumstances which are so threatening—or which an individual perceives as so threatening—that a sense of mastery over them is deemed impossible. Then fear may become a chronic rather than a transient state or mood (which is the way most of us experience it). The individual will exist in a state of constant mobilization, of readiness to meet the expected threat—and therefore in a state of continual tension. The common effects of living with this kind of fear are fatigue, feelings of depression, a slowdown in mental processes and bodily movements, restlessness, bursts of aggression and irritability, loss of appetite, a tendency to startle, insomnia and nightmares.

Many internal bodily changes accompany feelings of fear, for one of its "uses" is that it facilitates high-speed responses in the face of danger. When one is frightened, more sugar pours into the blood (producing a burst of energy), breathing becomes more rapid as the blood circulates faster; blood pressure rises and the heart beats faster; more adrenalin is secreted; the pupils of the eyes dilate, so that one can actually see more clearly—one becomes physiologically prepared for taking the necessary action. (Such changes are not clearly distinguishable from those occurring when a person is angry.) If, however, an individual remains in a fearful state for long periods without relief, it is as if he were running his motor too fast and without letup—he puts pressure upon the system itself. Eventually this "racing engine" condition can harm a human being—as well as a rat—physically. It can cause symptoms which range from severe headache to ulcers, high blood pressure, cardiac arrhythmias and hypertension, genito-urinary problems, and diseases such as asthma, which are known to be linked to and exacerbated by emotional stress. ■