

Kabat-Zinn, J. (1990). Full Catastrophe Living.

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## Stress

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The popular name for the full catastrophe nowadays is *stress*. Any concept that covers such a broad scope of life circumstances as does this particular term is bound to be somewhat complex. Yet at its heart the notion of stress is also very simple. It unifies a vast array of human responses into a single concept with which people strongly identify. As soon as I say to someone that my job is in stress reduction, the response is invariably, "Oh, I could really use that." People know exactly what it means, at least to them.

But stress occurs on a multiplicity of levels and originates from many different sources. We all have our own version of it, one which may be continually changing in its details while its overall pattern remains the same. In order to understand what stress is in its broadest formulation and to know how to work with it effectively under many different circumstances, it makes sense to think about it from a systems perspective. In this chapter we will look at the origin of the concept of stress, various ways of defining it, and at a unifying principle that will help us to handle it more effectively in our own lives.

Stress can be thought of as acting on different levels, including the physiological level, the psychological level, and the social level. As you might expect, all these levels interact with each other. These multiple interactions influence the actual state of your body and mind under specific circumstances. They also influence the range of options you have for facing and coping with stressful events. For simplicity we will consider these various levels separately while keeping in mind that they are interconnected and are different aspects of one phenomenon.

Dr. Hans Selye first popularized the term *stress* in the 1950s based on his extensive physiological studies of what happens when animals are injured or placed under unusual or extreme conditions.

In its popular usage the word has become an umbrella term connoting all the various pressures we experience in life. Unfortunately, this way of using the word confuses whether stress is the *cause* of the pressures we feel or the *effect* of those pressures, or in more scientific terms, whether stress is the stimulus or the response. We often say things like "I feel stressed," which implies that stress is what we are experiencing in response to whatever is making us feel that way, and on the other hand, "I've got a lot of stress in my life," which implies that stress is an outside stimulus that causes us to feel a certain way.

Selye opted to define stress as a response, and he coined another word, *stressor*, to describe the stimulus or event that produced the stress response. He defined stress as "*the nonspecific response of the organism to any pressure or demand.*" In his terminology stress is the total response of your organism (mind and body) to whatever stressors you experience. But the picture is further complicated by the fact that a stressor can be an internal as well as an external occurrence or event. For instance, a thought or a feeling can cause stress and therefore can be a stressor. Or, under other circumstances, that same thought or feeling might be a response to some outside stimulus and therefore be the stress itself.

The interplay of external and internal factors in identifying the ultimate cause of disease was very much in Selye's mind when he developed his theory of stress and the notion that diseases could originate from failed attempts to adapt to stressful conditions. Thirty years before the emergence of the field of psychoneuroimmunology, Selye was well aware that stress could compromise immunity and therefore resistance to infectious organisms:

Significantly, an overwhelming stress (caused by prolonged starvation, worry, fatigue, or cold) can break down the body's protective mechanisms. This is true both of adaptation which depends on chemical immunity and of that due to inflammatory barracades. It is for this reason that so many maladies tend to become rampant during wars and famines. If a microbe is in or around us all the time and yet causes no disease until we are exposed to stress, what is the "cause" of our illness, the microbe or the stress? I think both are—and equally so. In most instances, disease is due neither to the germ as such, nor to our adaptive reactions as such, but to the inadequacy of our reactions against the germ.

The genius of Selye's insight was in emphasizing the non-specificity of the stress response. He claimed that the most interesting and fundamental aspect of stress was that the organism undergoes a generalized physiological response in its efforts to adapt to the demands and pressures it experiences, whatever they might be. Selye called this response the *General Adaptation Syndrome* and saw it as a pathway by which organisms are able to maintain fitness, even life itself, in the face of threat, trauma, and change. He emphasized that stress is a natural part of life and cannot be avoided. Yet at the same time, stress ultimately requires adaptation for the organism to survive.

Selye saw that, under certain circumstances, stress might lead to what he called *diseases of adaptation*. In other words, our actual attempts to respond to change and to pressure, no matter what their particular source, might *in themselves* lead to breakdown and disease if they are inadequate or disregulated. From this it follows that the more we can bring attention to the *effectiveness* of our efforts to cope with the stressors we experience, the more we will be able to guard against disregulation and perhaps avoid making ourselves sick or sicker.

As we saw when we discussed Dr. Seligman's studies on optimism and health, *it is not the potential stressor itself but how you perceive it and then how you handle it that will determine whether or not it will lead to stress.* We all know this from personal experience. Sometimes the slightest little thing can trigger an emotional over-reaction in us, completely out of proportion to the offending event itself. This is more likely to happen at times when we are under pressure and we feel anxious and vulnerable. At other times we might be able to handle not just little annoyances but major emergencies with almost no sense of effort. At such moments you may not even realize that you are under stress. It may only be later, after the event is over, that you feel the effects of what you went through, perhaps in the form of feeling emotionally drained or physically exhausted.

To some extent our ability to cope with stressors depends on how virulent they are. At one end of the spectrum are stressors that, if not avoided, will destroy life regardless of the way we perceive them. Among these are exposure to high levels of toxic chemicals or radiation or being hit by bullets that destroy vital organs. Absorption of high enough levels of energy of any kind into the body will kill or severely damage any living thing.

At the other end of the spectrum, there are many forces that

impinge on us that almost nobody finds particularly stressful. For instance, we are all continuously subjected to the gravitational pull of the earth, just as we are all continually exposed to the changing seasons and to the weather. Since gravity is always affecting us, we tend not to notice it. We are hardly aware of how we adapt to it by shifting the body from one leg to the other in the standing posture or by propping ourselves up against a wall. But if you work for eight hours at a time standing in one place on a concrete floor, you will be very aware of gravity as a stressor.

Of course, unless you are an iron worker, a steeple painter, a trapeze artist, or a ski jumper, gravity is usually the least of your stress problems. But it illustrates the point that some stressors are unavoidable and that we are continually adapting to the demands they place on our body. As Selye pointed out, such stressors are a natural part of living. The example of gravity reminds us that, in and of itself, stress is neither good nor bad, it's just the way things are.

In the vast middle range of stressors, where exposure is neither immediately lethal, like bullets or high-level radiation or poison, nor basically benign, like gravity, the general rule for those causing psychological stress is that *how you see things and how you handle them makes all the difference in terms of how much stress you will experience*. You have the power to affect the balance point between your internal resources for coping with stress and the stressors that are an unavoidable part of living. By exercising this capacity consciously and intelligently, you can control the degree of stress you experience. Moreover, rather than having to invent a new way of dealing with every individual stressor that comes up in your life, you can develop a way of dealing with change *in general*, with problems *in general*, with pressures *in general*. The first step, of course, is recognizing when you are under stress in the first place.

Much of the early research on the physiological effects of stress was carried out on animals and did not distinguish between a psychological component of the stress reaction and a physiological component. For example, Selye's critics point out that the physiological damage seen in an animal forced to swim in freezing water might be due more to the animal's terror than to purely physiological reactions to either cold or water as stressors. So Selye might have been measuring the effects of a psychological response to a harmful experience rather than a purely physiological response, as he thought. With this in mind, researchers set about to investigate the role of psychological factors in the stress response in

animals as well as in people. These efforts led to the demonstration that psychological factors are an important part of an animal's response to physical stressors. In particular it has now been shown conclusively that the extent to which an animal is given options to respond effectively to a particular stressor strongly influences how much physiological deregulation and breakdown will occur as a result of exposure to a stressor. *Control*, a psychological factor, is a key factor in protecting an animal from stress-induced disease.

From everything we know about stress in human beings, the same relationship holds. (Recall that control was a major factor in the study of nursing home residents—the plant experiment described in Chapter 16, and in Dr. Kobasa's work on psychological hardness, described in Chapter 15.) And since people usually have many more psychological options than do animals in laboratory experiments, it stands to reason that by becoming conscious of our options in stressful situations and by being mindful of the relevance and effectiveness of our responses in those situations, we may be able to exert considerable control over our experience of the stress and thereby influence whether or not it will lead to disease.

Stress studies with animals demonstrated the extreme toxicity of *learned helplessness*, a term describing a condition in which we discover that nothing we do matters. But if helplessness can be learned, it can also be unlearned, at least by people. Even if there is no actual course of *external* action we can take that will have a meaningful effect under certain extremely stressful circumstances, human beings still have profound *internal* psychological resources that can give us a sense of being engaged and in control to some degree and thereby protect us from helplessness and despair. Certainly this is suggested by Dr. Antonovsky's studies of the survivors of concentration camps.

Dr. Richard Lazarus, a prominent stress researcher, and his colleagues at the University of California at Berkeley emphasize that perhaps the most fruitful way to look at stress from a psychological point of view is to consider it as a *transaction* between a person and his or her environment. Dr. Lazarus defines psychological stress as "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being." This means, as we have already discussed, that an event can be more stressful for one person, who for one reason or another has fewer resources for dealing with it, than for another person, who has greater coping resources. It also implies that the meaning of the transaction will determine whether

a situation is labeled as stressful or not. If you appraise or interpret an event as threatening your well-being, then it will be taxing to you. But if you see it differently, then the same event might not be stressful at all, or a good deal less stressful to you.

This is good news because, given a particular situation, there are usually many ways of seeing it and many potential ways of handling it. It means that the way we see, appraise, and evaluate our problems will determine how we respond to them and how much distress we will experience. It also implies that we may have much more control over things that may potentially cause us stress than we might ordinarily think. While there will always be many potential stressors in our environment over which we cannot have immediate control, *by changing the way we see ourselves in relationship to them, we can actually change our experience of the relationship and therefore modify the extent to which it taxes or exceeds our resources or endangers our well-being.*

The transactional view of psychological stress also implies that you can be more resistant to stress if you build up your resources and enhance your physical and psychological well-being in general (via exercise and meditation, for example) during times when you are not particularly taxed or overwhelmed. The word *resources* really means that combination of inner and outer supports and strengths that helps us to cope with a changing field of experiences. Supportive family members, friends, and membership in groups that you care about are examples of external resources that could help buffer your experiences of stress. Inner resources might include your beliefs about your ability to handle adversity, your view of yourself as a person, your views on change, your religious beliefs, and your levels of stress hardness, sense of coherence, and affiliative trust. All these can be strengthened, as we have seen, by practicing mindfulness.

Stress-hardy individuals have greater coping resources than other people under similar circumstances because they view life as a challenge and assume an active role in attempting to exert meaningful control. The same is true of people with a high sense of coherence. Strong internal convictions about the comprehensibility, manageability, and meaningfulness of life experiences are powerful internal resources. People who cultivate such strengths are less likely to feel taxed or threatened by events than someone with fewer resources of this kind. This is also true for all the other health-enhancing cognitive and emotional patterns that we looked at in Chapter 15.

If, on the other hand, our reactions to things are usually clouded by emotions of fear, hopelessness, or anger, or by underlying motives of greed and distrust, then our actions will more than likely create additional problems and dig us deeper into a hole, to the point where it may be hard for us to see our way out of what seems more and more overwhelming. We bog down and get stuck. This can lead to feelings of vulnerability and helplessness.

But Dr. Lazarus's definition also implies that for something to be psychologically stressful, it has to be appraised in some way as a threat. Yet we know from experience that there are many times when we are *unaware* of the degree to which our relationships with our inner or outer environment are taxing our resources even though they are. For example, much of our life-style may be undermining our health, exhausting us physically and mentally without our conscious acknowledgment of it. Moreover, our negative attitudes and beliefs about ourselves and others and about what is possible may also be major factors preventing us from growing or healing or taking control in times of difficulty. These, too, may be below our level of conscious awareness.

Precisely because perception and appraisal or the lack of them play such a major role in our ability to adapt and respond appropriately to change and to pain and to threats to our well-being, the major avenue available to us *as individuals* for handling stress effectively is to *understand* what we are going through. We can best do this by cultivating our ability to perceive our experience in its full context, as we did with the puzzle of the nine dots in Chapter 12. In this way, we can discern relationships and feedback that we may not have been aware of before. This allows us to see our life situation more clearly and thereby influence the level of stress associated with our habitual reactions in difficult situations. It also frees us from the tight grip of our many unconscious beliefs that ultimately inhibit our growth. So it can be particularly helpful to keep in mind from moment to moment that it is not so much the stressors in our lives but how we see them and what we do with them that determines how much we are at their mercy. If we can change the way we see, we can change the way we respond.

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## Change: One Thing You Can Be Sure Of

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The concept of stress suggests that, in one way or another, we are continually faced with the necessity of adapting to all the various pressures we experience in life. Basically this means adapting to *change*. If we can learn to see change as an integral part of life and not as a threat to our well-being, we will be in a much better position to cope effectively with stress. The meditation practice itself brings us face-to-face with the undeniable experience of continual change within our own minds and bodies as we watch our constantly changing thoughts, feelings, sensations, perceptions, and impulses. This alone should be enough to demonstrate to us that we live immersed in a sea of change, that whatever we choose to focus on changes from one moment to the next, it comes and it goes.

Even inanimate material is subject to continual change: continents, mountains, rocks, beaches, the oceans, the atmosphere, the earth itself, even stars and galaxies all change over time, all evolve, and are spoken of as being born and dying. We humans live for such a brief time, relatively speaking, that we tend to think of these things as permanent and unchanging. But they are not. Nothing is.

If we consider the major forces that impinge on our lives, the first thing we will have to acknowledge is that nothing is absolutely stable, even when our lives seem to be on "an even keel." Just being alive means being in a continual state of flux. We, too, evolve. We go through a series of changes and transformations to which it is difficult to affix an exact beginning or an exact end. We emerge as discrete individuals out of a stream of preceding beings of whom our parents are only the most recent representatives. And at a certain point, usually unknown to us, our life as a discrete individ-

ual comes to an end. But unlike inanimate matter and most living things, we know the inevitability of change and of our own death. We are able to think about the changes we experience and wonder about them and even fear them.

Consider just the physical changes we go through. During our lives, the body is constantly changing. A discrete human life begins its journey as a single cell, the fertilized human egg. This microscopic entity contains all the information necessary to become a new human being. As it descends through a fallopian tube and becomes implanted in the wall of the uterus, it begins dividing: from this one cell come two; then those two divide to make four; then those four divide to make eight; and so on. As the cells continue to divide, they gradually develop from a clump into a hollow sphere. The cells at the top differentiate slightly from those at the bottom of this tiny sphere that is to become the body. The sphere grows as the cells continue to divide. As it does, it also changes its shape. It folds in upon itself, creating different layers and regions that ultimately differentiate into specialized tissues and organs with different functions: bones and nerves, muscles and skin, all the inner organs and organ systems, the eyes, ears, nose, tongue, hair, teeth.

Yet even in the body's earliest stages, death is part of the process. Some of the cells that are originally laid down to form the structures of the hands and feet die selectively to give rise to the spaces between the fingers and toes so that we don't wind up with paddles at the ends of our arms and legs. And many cells within the developing nervous system die before we are born if they don't find other cells to connect up with. Even on the cellular level, connectedness to the whole appears to be of vital importance.

By the time we are born, our body consists of over ten trillion cells, all doing their jobs, all more or less in the right place. If they are, then we come out whole, ready for the ongoing transformations we will experience during infancy, toddlerhood, preadolescence, adolescence, and young adulthood; and, if we are receptive to the idea, growth and development and learning need not stop at young adulthood. In fact there is no need for us ever to stop growing and learning.

At the far end of this seamless process, if we make it that far, our bodies grow old and die. Death is part of their nature. The life in individuals always comes to an end, even as the potential for life continues on in the flow of the genes and the emergence of new members of the family and the species.

The point is that life is constant change from the word go. Our bodies change in countless ways as we grow and develop over the course of a lifetime. So do our views of the world and of ourselves. Meanwhile the external environment in which we live is also in continual flux. In fact, nothing at all is permanent and eternal, although some things appear that way since they are changing so slowly.



Living organisms have developed impressive ways of protecting themselves from all the unpredictable fluctuations in the environment and of preserving the basic internal conditions for life against too much change. The concept of inner biochemical stability was first articulated by the French physiologist Claude Bernard in the nineteenth century. He hypothesized that the body has evolved finely tuned regulatory mechanisms that are controlled by the brain and mediated by the nervous system and the secretion of hormone messenger molecules into the bloodstream to ensure that the conditions throughout the body that are necessary for the optimal functioning of its cells are maintained in spite of large fluctuations in the environment. These fluctuations may involve temperature changes, lack of food for long stretches of time, and of course threats from predators and competitors. The regulatory responses, all accomplished via feedback loops, preserve the dynamic internal balance, called *homeostasis*, by keeping the corresponding fluctuations of the organism within certain limits. Body temperature is regulated in this way, as are the concentrations of oxygen and glucose in the blood.

We have evolved drives and instincts that support homeostasis by directing our behavior to satisfy our body's needs. In this category are instincts such as thirst when the body needs water and hunger when the body needs food. Of course we can also regulate our physiological state to some extent through our own conscious actions, such as putting on or taking off clothes depending on the outside temperature or opening a window to cool things off.

So while constant change is the hallmark of the world outside the individual organism, including both the natural and the social environment, to a large extent our bodies are protected and buffered from outside changes. We have built-in mechanisms for stabilizing our "inner chemistry" in order to increase our chances of survival under changing conditions. We also have built-in repair

mechanisms that allow biological mistakes to be recognized and corrected, cancer cells to be detected and neutralized, broken bones to mend, blood to clot over a wound, and wounds to seal over and heal.

These regulatory pathways function in response to specific signals within the organism, our body's inner chemical language. We never have to think about our liver chemistry. Fortunately for us it self-regulates. We never have to think about taking the next breath; it takes care of itself. We don't have to remind the pituitary to secrete growth hormone on a certain schedule so that we grow to be the right size in adulthood. And when we are cut or injured, we don't have to think about making the blood clot to form a scab or making the skin heal underneath.

On the other hand, if we abuse the system too much, say by drinking more alcohol than the body can tolerate, then later on we may wind up having to give some thought to our liver. But by that point it may be disregulated beyond repair. The same goes for smoking and the lungs. Even with elaborate repair capabilities and built-in protective and purifying systems, the body can take only so much abuse before it is overwhelmed.



We may find it comforting to know that our bodies have very robust and resilient built-in mechanisms, developed over millions of years of evolution, for maintaining stability and vitality in the face of constant change. This biological resilience and stability is a major ally when it comes to facing stress and change in our lives. It helps us to remember that we have every reason to trust our bodies and to work in harmony with them and not against them.

As we have seen, Hans Selye emphasized that a stress-free life is impossible, that the very process of being alive means that there will be wear and tear associated with the need to adapt to a changing outer and inner environment. The question that concerns us is, How much wear and tear does there have to be?

In the 1960s researchers began to investigate whether there was a relationship between how much change a person goes through in a year and what happens to his or her health at later times. Drs. Thomas Holmes and Richard Rahe of the University of Washington Medical School listed a number of life changes, including the death of a spouse, divorce, imprisonment, personal injury or illness, getting married, getting fired from work, retirement, pregnancy,

sexual problems, death of a family member or close friend, change in line of work or work responsibilities, taking out a mortgage, outstanding personal achievement, change in living conditions, change of personal habits, going on vacation, and getting a traffic ticket. They ordered these "life events" in terms of what they thought was the degree of adjustment they would require and gave them arbitrary numerical values, starting with 100 for death of a spouse and going down to 11 for a minor violation of the law. They found that a high score on their life-change index was associated with a higher probability of illness in the following year than a low score. This suggested that change itself could predispose a person to illness.

Many of the life changes on their list, such as getting married, getting promoted, or having an outstanding personal achievement, are usually considered "happy" occasions. They are included because even events that may appear "positive" are nevertheless profound life changes that require adaptation and are therefore stressful. In Selye's terminology they are examples of *eustress*, or "good stress." Whether they later lead to *distress* depends in large measure on how you adapt to them, which hinges on what they really mean to you and whether that meaning changes over time. If you adjust easily, then the eustress is relatively harmless and benign; it does not threaten to tax or overwhelm your ability to handle the changes. But it is all too easy to see how a positive life change might turn from eustress to distress if you have a hard time adjusting to your new circumstances.

For instance, you may have been looking forward to retirement for years and be happy at first when it comes and you can finally stop getting up early and going to work. But after a while you may not know what to do with all the time you have. You may come to miss the connectedness you felt when you were working. Unless you are forming new connections and finding new opportunities for meaning in your life, you may be failing to *adapt* to this major life change and it could wind up being a source of stress for you even though you couldn't wait for it to happen.

The high divorce rate in our society attests to the fact that the happy occasion of marriage can also lead to major distress and suffering. This is particularly so if the initial match was less than compatible or if the individuals are unable to adjust to the changes associated with living together, including, of course, allowing for your own and the other person's growth and change. The stress on a marriage is compounded if the couple is unable to adjust to the

enormous demands of parenthood and the changes in roles and lifestyle that it brings. The eustress of having children can easily turn to distress and worse. The same is true of job promotions, graduating from school, aging, and all other positive life changes. They require adapting to the change itself.

The meaning that life changes have for you will strongly depend on their total context. If your spouse has been suffering from a long, wasting illness or if your relationship to that person has been one of extended misery or exploitation or alienation, then the meaning of his or her death may be very different and the difficulty of adjusting to it also very different than if the death occurred suddenly and the relationship was extremely close. Assigning "death of a spouse" a score of 100 in all cases, as Drs. Holmes and Rahe did, does not take into account the *meaning* of the experience for the surviving spouse and the degree of adjustment or adaptation that he or she will have to make as a result.

It is not only the major turning points in our lives that require us to adapt. Every day we face a range of moderately important to trivial obstacles and occurrences with which we have to deal, whether we want to or not, and which we may turn into much larger problems than they need to be if we lose our perspective and balance of mind.



The ultimate effect on our health of the total psychological stress we experience depends in large measure on how we come to perceive change itself, in all its various forms, and how skillful we are in adapting to continual change while maintaining our own inner balance and sense of coherence. This in turn depends on the meaning we attribute to events, on our beliefs about life and ourselves, and particularly on how much awareness we can bring to our usually mindless and automatic reactions when our "buttons" are pushed. It is here, in our mind-body reactions to the occurrences in our lives that we find stressful, that mindfulness most needs to be applied and where its power to transform the quality of our lives can best be put to work.

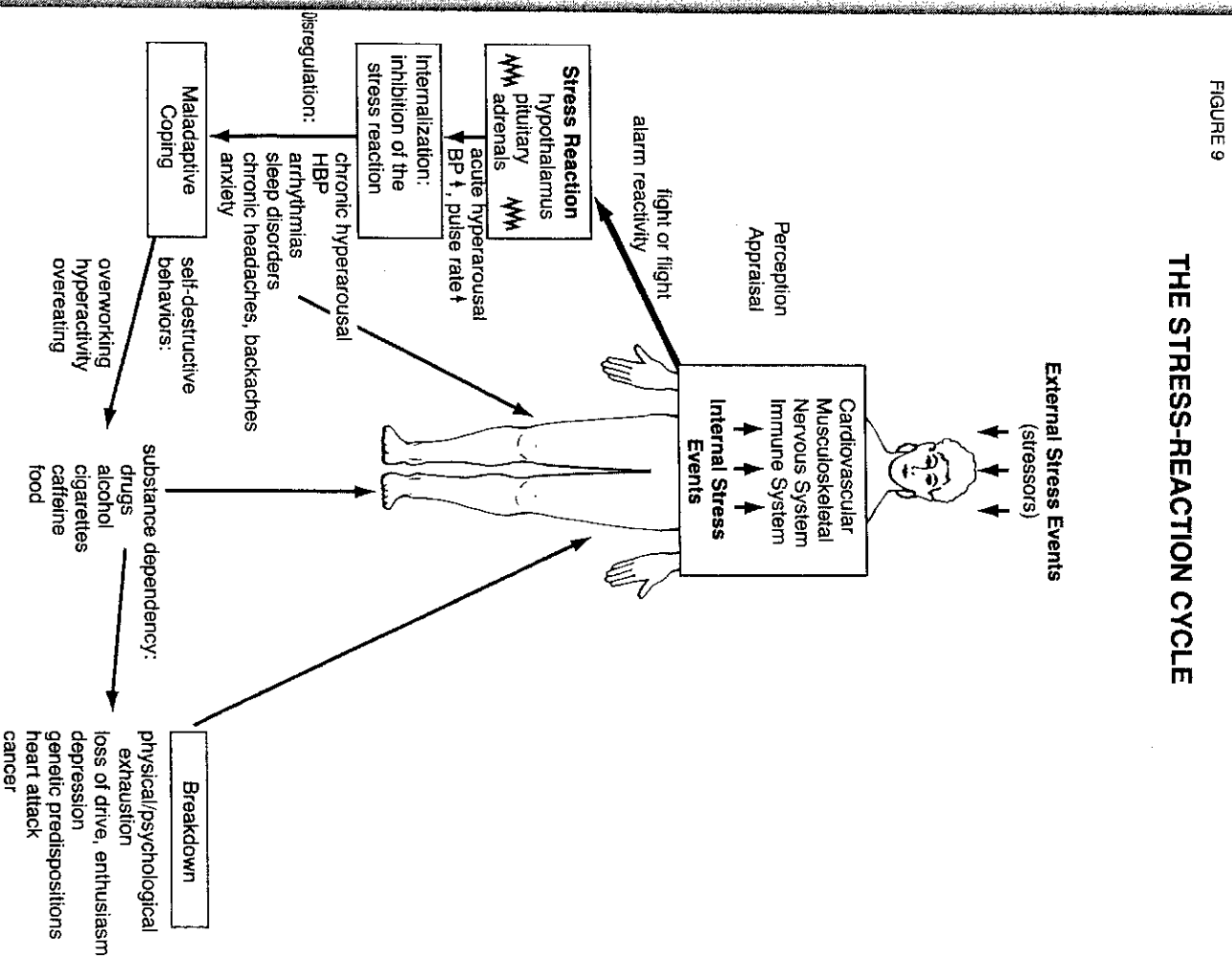
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## Stuck in Stress Reactivity

Human beings are actually remarkably resilient to stress. One way or another we manage to persevere, to survive, and to have our moments of pleasure, peace, and fulfillment. We are expert copers and problem solvers. We cope through prayer and religious beliefs, through involvements and diversions that feed our needs for joy and belonging and for stepping outside of ourselves. We cope and are buoyed up by sharing love and by receiving encouragement and support from family and friends.

At the same time, however, our physiological/psychological balance, stable though it is, can be pushed over the edge into disregulation and disorder if it is taxed beyond its limits to respond and adapt. Health can be undermined by a lifetime of ingrained behavior patterns that compound and exacerbate the pressures of living we continually face. Ultimately our automatic reactions to the stressors we encounter determine in large measure how much stress we experience. Automatic reactions, triggered out of unawareness, usually compound and exacerbate stress, making what might have remained basically simple problems into worse ones. They prevent us from seeing clearly, from solving problems creatively, from expressing our emotions effectively when we need to communicate with other people, and ultimately they prevent us from attaining peace of mind. Instead, each time we react, we stress our intrinsic balance even more. A lifetime of unconscious reactivity is likely to increase our risk of eventual breakdown and illness significantly.

Consider yourself for a moment to be the person depicted in the center of Figure 9. External stressors (small arrows on top of the figure) in the form of all the forces—biological, physical, social, economic, and political—that bear on us and that generate changes





in our bodies, our lives, and our social status all impinge upon us from the outside.

From the inside our mind not only changes in response to our perception of these outer forces; it also generates its own reactive energies, producing another whole set of pressures and demands on the organism. In Figure 9 these are labeled "Internal Stress Events" (small arrows inside the box). As we have seen, even our thoughts and feelings can act as major stressors if they tax or exceed our ability to respond effectively. This is true even if the thought or feeling has no correspondence with "reality." For example, the mere *thought* that you have a fatal disease can be the cause of considerable stress and could become disabling, even though it may not be true.

Some stressors affect us over extended periods of time. We call these *chronic stressors*. For instance, taking care of a family member who is disabled is a form of chronic stress. Other stressors come and go over relatively short periods of time. We call these *acute stressors*. Deadlines, such as getting your income taxes done on time, are an example of this kind of pressure.

Some stressors are highly predictable, such as taxes. Others are less predictable, such as accidents or other things that come up unexpectedly that you have to deal with. In Figure 9, the small arrows represent all these internal and external stressors, both acute and chronic, as they are felt *at any moment in time*. The figure of the person stands for all aspects of your being, the totality of your person stands for all aspects of your being, the totality of your organism—body *and* mind. This includes all of your organ systems, of which only a few are labeled, the cardiovascular system, the musculoskeletal system, the nervous system, the immune system, the digestive system, as well as the conventional psychological sense of yourself as a person, including your perceptions, beliefs, thoughts, and feelings.

When you are stressed in some moment to the extent that your mind identifies a threat to your being, whether it is a threat to your physical well-being or to your sense of self, usually you will react in a particular way. If it is a passing threat or turns out to be neutral when reappraised in the next moment, then either there will be no reaction at all or your reaction will be minimal. But if the stressor is highly charged for you emotionally, or if you consider it to be threatening, then you usually go through some kind of an automatic *alarm reaction*.

The alarm reaction is our body's way of clearing the decks for defensive or aggressive action. It can help us in threatening situa-

tions to protect ourselves and to maintain or regain control. Our nervous systems are "wired" up to perform in this way under certain circumstances. The alarm reaction enables us to call on the full power of all our internal resources in life-threatening situations.

Walter B. Cannon, the great American physiologist who worked at the Harvard Medical School in the early part of this century and who coined the term *homeostasis* to describe the internal stability of our physiology, studied the physiology of this alarm reaction in a number of experimental systems. In one he studied what a cat goes through when threatened by a barking dog. Cannon termed the cat's reaction the *fight-or-flight reaction* because the physiological changes the threatened animal goes through are those that mobilize the body for fighting or fleeing.

People go through the same physiological reaction that animals do. When we feel threatened, the fight-or-flight reaction occurs almost instantly. The result is a state of physiological and psychological *hyperarousal*, characterized by a great deal of muscle tension and strong emotions, which may vary from terror, fright, or anxiety to rage and anger. The fight-or-flight reaction involves a very rapid cascade of nervous-system firings and release of stress hormones, the most well known of which is *epinephrine (adrenaline)*, which are unleashed in response to an immediate acute threat. This leads to heightened sense perceptions so that we can take in as much relevant information as possible as quickly as possible: the pupils of our eyes dilate to let in more light, the hair on our body stands erect so that we are more sensitive to vibrations. We become very alert and attentive. The output of the heart jumps by a factor of four or five by increasing the heart rate and the strength of the heart-muscle contractions (and thereby the blood pressure) so that more blood and therefore more energy can be delivered to the large muscles of the arms and legs, which will be called upon if we are to fight or run.

At the same time the blood flow to the digestive system shuts down, as does digestion itself. After all, if you are about to be eaten by a tiger, there is no point in continuing to digest food in your stomach. It will get digested in the tiger's stomach just as well if you are caught. Both fighting and running require that your muscles get as much blood as possible. You may feel this rerouting of your blood flow in times of stress as "butterflies in your stomach."

All these changes in your body and in your emotions come about because of the activation of a particular branch of what is called the *autonomic nervous system (ANS)*. The autonomic nervous

system is that part of your nervous system that regulates the internal states of your body such as your heart rate, blood pressure, and the digestive process. The particular branch of the ANS that is stimulated in the fight-or-flight reaction is known as the *sympathetic branch*. Its function is to speed things up. The other branch, known as the *parasympathetic branch*, acts as a brake. Its function is to slow and calm things down.

The *hypothalamus* controls the activity of both of these branches. It is the master control switch of the autonomic nervous system. The hypothalamus is a gland that is itself part of what is called the *limbic system*, a region located deep within the brain. The limbic system can be thought of as the "seat of our emotions." It has connections, through the hypothalamus, not only to the autonomic nervous system but also to the endocrine system of glands and to our musculoskeletal system. These interconnected pathways allow our emotions and our organ systems to respond in a coordinated and integrated fashion to external events.

The limbic system is responsible for, among other things, the regulation of our internal body states as well as of our emotions and drives. It is one of the major control centers of our biological regulatory mechanisms. When it triggers the sympathetic nervous system via stimulation of specific areas in the hypothalamus, the result is a massive discharge of nervous signals that influence the functioning of every organ system in our body. This is accomplished in two ways; one by direct hard-wire neuron (nerve cell) connections to all the internal organs; the other by the secretion of hormones and neuropeptides into the bloodstream. Some hormones are secreted by glands, others by nerve cells (these are called neuropeptides), others by both. These hormones and neuropeptides are chemical messengers that travel far and wide in the body to transmit information and trigger specific responses from different cell groups and tissues. When they arrive at their targets, they bind to specific receptor molecules and transmit their message. You might think of them as chemical keys, turning on or off specific control switches in the body. It may well be that all of our emotions and feeling states are dependent on the secretion of specific neuropeptide hormones under different conditions.

Some of these hormone messengers are released as part of the fight-or-flight reaction. For example, epinephrine and norepinephrine are released into the bloodstream by the *adrenal medulla* (part of the adrenal glands located on top of your kidneys)

when the adrenal glands are stimulated by signals from the hypothalamus via sympathetic nerve pathways. These hormones give you the "rush" and sense of extra power in emergency situations that we have labeled the "Stress Reaction" in Figure 9. In addition, the pituitary gland in the brain is also stimulated when we are stressed. It triggers the release of other hormones (some from a region of the adrenal glands called the *adrenal cortex*) that are also part of the stress reaction.



The story of Arnold Lemerand illustrates the remarkable power inherent in the stress reaction. A news item from the *Boston Globe*, November 1, 1980, read as follows:

Arnold Lemerand, of Southgate, Mich., is 56 years old and had a heart attack six years ago. As a result, he doesn't like to lift heavy objects. But this week, when Philip Toth, age 5, became trapped under a cast iron pipe near a playground, Lemerand easily lifted the pipe and saved the child's life. As he lifted it, Lemerand thought to himself that the pipe must weigh 300 to 400 pounds. It actually weighed 1800 pounds, almost a ton. Afterward, Lemerand, his grown sons, reporters and police tried to lift the pipe but couldn't.

This anecdote illustrates the power of the fight-or-flight reaction and the surge of energy it provides in life-threatening situations. It also demonstrates that in an emergency you really don't stop to think. If Mr. Lemerand had thought about the weight of the pipe before he tried to lift it, or about his own heart condition, he probably would not have been able to lift it. But the necessity of action in the face of a life-threatening situation triggered an immediate state of hyperarousal in which his thinking shut down for a moment and sheer action took over. But when the threat was over, he was unable to perform the same feat, even with lots of help.

It is easy to see how the fight-or-flight reaction would increase an animal's chances of survival in a dangerous and unpredictable environment. It works the same way for us. The fight-or-flight reaction helps us to survive when we find ourselves in life-threatening situations. So it is not at all bad that we have this vital capacity. What is bad is when we can't control it or use it constructively and it starts to control us.

The fight-or-flight reaction can be triggered in animals when they encounter members of another species. It also comes into play when animals are defending their social standing within their own species and when they are challenging the social status of another animal in their group. When an animal's social position is challenged, the fight-or-flight reaction is unleashed and the two animals in question fight until one either submits or runs away. Once an animal submits to another, it "knows its place" and doesn't keep going through the same reaction every time it is challenged. It readily submits.

People have many more choices in situations of social stress and conflict, but often we get stuck in these same patterns of submission, fleeing, or fighting all the same. Our reactions in social situations are often not that different from those of animals. Yet animals of the same species seldom kill each other in social conflicts the way humans do.

Much of our stress comes from threats, real or imagined, to our social status, not to our lives. *But the fight-or-flight reaction kicks in even when there is no life-threatening situation facing us. It is sufficient for us just to feel threatened.*

By causing us to react so quickly and so automatically, the fight-or-flight reaction often creates problems for us in the social domain rather than giving us additional energy for resolving our problems. Anything that threatens our sense of well-being can trigger it to some degree. If our social status is threatened, or our ego, or our strongly held beliefs, or our desire to control things or to have them be a certain way ("my" way, for instance), then the sympathetic nervous system lets loose. We can be catapulted into a state of hyperarousal and fight-or-flight whether we like it or not.



Unfortunately, hyperarousal can become a permanent way of life. Many of our patients start out describing themselves as tense and anxious "all the time." They suffer from chronic muscle tension, usually in the shoulders, the face, the forehead, the jaw, and the hands. Everybody seems to have his or her own special areas that store muscle tension. Heart rate is also frequently elevated in a state of chronic hyperarousal. You can feel shaky inside, feel "butterflies" in your stomach, feel skipped heartbeats or palpitations, or have chronically sweaty palms. The urge to flee may surface fre-

hormones, which are playing havoc with your agitated thoughts and feelings.

We encounter a lot of different people who tell us that they have run out of energy, that they feel exhausted, that they are unable to concentrate, that they are unable to sleep, that they are unable to eat, that they are unable to work, that they are unable to live. We see the results of this in the form of chronic anxiety, depression, and a host of other problems that just feed back on themselves.

This is shown in Figure 9 by the chronic hyperarousal back to back. We see the results of this in the form of chronic anxiety, depression, and a host of other problems that just feed back on themselves.

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We all use various coping strategies to deal with the pressures in our lives. Some people are naturally resilient, some people are not. We all use various coping strategies to deal with the pressures in our lives. Some people are naturally resilient, some people are not.

provides a socially acceptable alibi for not being available for the family, since there is always more work to do than you can possibly get done. Some people drown themselves in their jobs. Most do it unconsciously, with all the best intentions in the world, because deep down they are reluctant to face other aspects of their lives and the need to strike a healthy balance.

Filling up your time with *busyness* is another self-destructive avoidance behavior. Instead of facing up to your problems, you can run around like crazy doing good things until your life is overflowing with commitments and obligations and you can't possibly make time for yourself. For all the running around, you may not really know what you are doing. This kind of hyperactivity sometimes functions as an attempt to hold on to the feeling of control when it seems to be slipping away.

We also love to look outside ourselves for quick fixes when we feel stressed or uncomfortable. One popular way of handling stress is to use *chemicals* to change our body-mind state when we don't like how we are feeling, or just to make our moments "more interesting." To cope with the stress and distress in our lives, we use alcohol, nicotine, caffeine, sugar, and all sorts of over-the-counter and prescription drugs. The impulse to go in this direction usually comes from a strong desire to feel different at a low moment. And we have lots of low moments. The level of substance dependency in our culture is dramatic testimony to our individual pain and our yearning for moments of inner peace.

Many people do not feel that they can get through the day, even the morning, without a cup of coffee (or two or three). Having a cup of coffee becomes a way of taking care of yourself, a way of stopping, of connecting with others or with yourself. People use coffee breaks to pace themselves as they face the demands of the day. Others use cigarettes in the same way. Cigarettes are commonly if unconsciously used to get through moments of stress and anxiety. You light up, take a deep breath, the world stops for a moment, there is a momentary sense of peace, of satisfaction, of relaxation, then you move on. Until the next stressful moment. Alcohol is another chemical means of coping with stress and with emotional pain. It offers the added elements of muscle relaxation and escape from the weight of your problems. With a few drinks inside you, life can seem more tolerable. Many people only feel optimistic, social, self-confident, and hopeful when they have been drinking. The people you drink with are likely to provide emotional and

social comfort and to reinforce the idea that drinking can help you to feel in control.

*Food* can also be used to cope with stress and emotional discomfort in a similar way, almost as if it were a drug. Many people eat whenever they feel anxious or depressed. Food becomes a crutch for getting through uncomfortable moments and a reward for afterward. If you have a feeling of emptiness inside, it's only natural to try to fill it. Eating is an easy way to do it. At least you are literally filling yourself. The fact that it doesn't really make you feel better does not prevent people from continuing to do it. Using food for comfort can be a powerful addiction. As with any addiction it is very hard to break out of, even when you are aware of it, unless you have a strategy for doing so and the strong determination to stick with it.

People are also accustomed to using *drugs* to regulate their levels of psychological well-being. Tranquilizers are the most widely prescribed medication in the United States. They are most often prescribed for women. The message is, If you are feeling some discomfort or having trouble sleeping, or are anxious, or yelling at the kids all the time, or overreacting to little things at home or at work, "take one of these" to take the edge off things, to be your old self, to get things under control. This attitude toward the validity of using drugs as the first line of defense to regulate anxiety reactions and symptoms of stress is very prevalent in medicine. Drugs are convenient and they work. Why not use them? Why not give someone a convenient and effective way of feeling in control?

For the most part this perspective goes unquestioned in medicine. It is a tacit framework within which the daily work of medicine is conducted. Doctors are bombarded with drug advertisements in medical journals and with drug salespeople, who are always dropping off free samples of the latest drugs to try out on their patients as well as notepads, coffee cups, calendars, pens—all covered with drug names. The pharmaceutical companies make sure that medicine is practiced within a sea of highly visible drug messages.

There is nothing wrong with drugs per se. In fact, as we all know, medications play an extremely important role in medicine. But the climate that is created by aggressive advertising and sales tactics can have strong subconscious influences on the practitioners of the art, leading them to think first and foremost about *which* drug they should be prescribing rather than *whether* they should be

