Chapter 4

The Demand of Stress

The technical definition of stress is the amount of energy you need to adjust to the internal and external ***demands*** *of your life in a given amount of time. Stress is the balance between what you have to do and the resources you have to do it with.*
-Frederic Luskin

Stress is a mediational process in which stressors (or ***demands****) trigger an attempt at adaptation or resolution that results in individual distress if the organism is unsuccessful in satisfying the demand.*
- W. Linden

Stress is the non specific response of the body to any ***demand*** *made upon it.*
-Hans Selye

-Difficulties arise when we try to provide a concise and stringent definition that all stress researchers will agree upon. It is even difficult to find a definition that a plurality of researchers will accept.
-S. Levin

What is stress? The short answers are many, and the final answer may be unknown. But the causal variable common to all definitions is a simple metaphor: demand. What is demand? To Hans Selye, the father of stress research, it is a point like stimulus that elicits a 'flight or fight' response. It is not behavioral, and therefore does not imply contingency, or a covert mental representation of behavior and its maintaining or reinforcing consequences. That is, stress occurs as a response or response set to a demand that practically needs no elaboration. But this is incorrect. Demand always represents the apprehension of choice, or a decision between alternative patterns or modalities of behavior and the consequences they predicate. Run fast, run slow, turn right, turn left are simple behaviors that are not blind responses to stimuli, but occur because of anticipated or contingent results.

For demand to occur, the stimulus must have meaning, which means that the context of a stimulus cannot be separated *from* the stimulus, and is just as important as the stimulus

itself. For example, we see an oncoming train, but simultaneously perceive its distance from ourselves, its speed, and our own options to avoid it. We perceive in other words emergent properties from the sensory attributes of train and its environment. These attributes represent the potential future behavior of the train and ourselves that represent alternative expectancies or contingencies. That is, although the train as a stimulus is registered by our eyes, it is immediately processed into a perception by parallel processes in the human brain that are represented by the firing of cascades of brain cells or neurons. These processes associate that stimulus to other events present and past within the context of prior learning, and are projected into the future as alternative behavioral options or response contingencies. That is, we *see* a train, but we *perceive* the train in a context that is shaped by learning, and from that perception are aware of different what-if scenarios for future behavior.

Nonetheless, although demand always implicates expectancy or contingency, or in other words the influence of projected future events, demand is normally used in the literature of stress as a discrete event that like a locomotive or a train pulls out a rapid succession of equally discrete events that constitute a stress response. Although this stimulus-response model coheres to the simple cause and effect chain that we use to account for everyday life, it ignores the most salient fact of human learning, namely that experience always implicates demand, and demand always implicates contingency.

By implying that tension is independent of contingency, tension and the subsequent stress response becomes a mere reflex. Like the flexion of a knee, attentive arousal to the aspect of a female form, or the startle reflex to a sound, the initial consequence of demand, namely muscular tension, is unrelated to its consequences , or contingency. Yet this is clearly false. Indeed, without contingency tension would not occur at all. Remove contingency and choice will not occur, demand will not exist, and with it tension and stress. Indeed, demand without contingency is a cause for hopelessness, helplessness, and a frequent emotional concomitant of depression. Thus a person who is uncertain about the outcome of a football play, a surgical procedure, or a move in chess will feel nervous, but will remain calm if the outcome is settled and will occur independently of his behavior. Even if this knowledge is a matter of life and death, certainty of knowledge bad or good will find tension to be an unknown.

In fact, we model contingency and elicit concurrent emotional behavior in the countless what-if scenarios that populate our thought. For example, tension brews when we think of the many nefarious acts that another could do, and the results good or ill that would follow contingently upon our behavior occurring in response. Moreover, those results themselves may imply contingency, or continually branching 'what-if' scenarios that result in even more options or choices. But again, if we cannot model contingency, tension will

not occur.

Contingency is a better proxy for the cause of tension than demand since it more clearly denotes a functional relationship between behavior and a rewarding or reinforcing event. Yet a contingency rarely represents a certain relationship between behavior and outcome, and alternative contingencies are normally perceived that constitute probabilistic cause-effect or 'what-if' scenarios that we call 'choice'. *Choice* is a mental representation of alternative what-if scenarios or contingencies. *Demand* in turn will be defined as the informative aspect of contingencies that impels deciding between alternatives or making a choice. More specifically, tension occurs because of information that represent *important* choices, and the momentary time frame wherein those choices must occur lest their object be lost or more likely to be lost. Demand is ubiquitous in life, and not just any demand will be stressful, or stressful all the time. At certain occasions during the time line of a demand, there will be no stress, and at others there will be. Thus seeing an oncoming train will not elicit stress if you have plenty of time to get off the train tracks, but it will elicit stress if there is little or no time to spare. *Stressful events represent the moment to moment choices that increase the perceived likelihood of loss*. The greater the loss the greater the tension and thus the greater the stress.

Generally, loss is described through the logical opportunities lost, like losing one's life when avoiding a train, being dunned with monetary penalties for a late income tax return, or missing a question in an important exam. Sometimes loss may be tentative, such as the loss of dignity or status when one suffers an insult, and one becomes tense, anxious, or angry when one faces the prospect that a lack of personal retribution will make that loss permanent. Yet when loss becomes permanent, stress cannot occur. For example, destructive acts of nature are permanent, with no recourse available to the aggrieved party. There is no contingency when it comes to Mother Nature, as only a deranged Captain Ahab would shake his fist at God. And thus we become resigned to the acts of nature, not anxious or angry. Yet if acts of nature become acts of man, then we will become tense because we can model alternative contingencies, however unlikely, that give us retribution. So even though we may not be able to fight city hall, or in this case FEMA, anxiously surveying our options for revenge demonstrates how even unlikely contingencies may impel emotional behavior.

Besides deciding between logical alternatives, human beings are also driven by non logical demands as well that represent the *affective* aspects of a choice. The pleasurable anticipation of attaining some object, and the pleasure inherent in that object itself represent incentives that are demanding not because they are logical, but because of the hedonic attributes of wanting something (pleasurable anticipation) and liking (i.e. consuming) something. We know this from experience, when we have to decide between logical events and the

affective allure of distractions that represent the transitory pleasures of surfing the web, raiding the refrigerator, or chatting with a friend.

When one does not possess the logical or heuristic (rule of thumb) rules to make a timely and correct decision, then logical and/or affective options conflict and then tension will occur. The more options and the more important they are, the greater the chance that they cannot be reconciled, and the more likely tension will occur. Yet tension can occur not only between events of high importance, as when we are escaping a dangerous threat, but between events that are low to moderate importance. These choices are far more common than the isolated instances of duress that we associate with stress, yet have a cumulative effect that is just as debilitating. This is called the Cinderella Effect.

The Cinderella Effect

As popularly described, stress is an all or nothing response that occurs rapidly, is noticed immediately, and activates hormonal, neural, and neuromuscular systems near simultaneously. Like its alternative namesake, this 'fight or flight' response represents a neural and hormonal response that occurs as rapidly and disconcertingly as a startle response from the brilliant light from the turn of a switch, or reflex if you will. Yet for the day to day stresses that beset us, the onset of stress in nothing like this. It all starts with a whimper, a twitch if you will. As we all can vouch from our private experience and popular description, for our daily stresses tension is not something that just happens, it is something that builds.

Dubbed the 'Cinderella Effect', after the fairy tale character who was first to rise and last to bed, the onset of muscular tension in stress is subtle, hardly noticeable, yet like a fall of dominos, increases gradually and often imperceptibly until we end up the day exhausted. The activity of low threshold muscular or 'motor' units begins with the perception of a 'choice' or 'demand', and this low level muscular activity recruits in time higher threshold units, and all are kept activated even when the original contingencies that activated them are past. In other words, although demands may occur discretely during the day, tension will not immediately cease when the demand is fulfilled. Indeed, unless a person determines to avoid all distraction and attempts to rest, the trace of the demand through memory or it's stimulus context will continue to elicit tension. Thus the environmental context in which demand occurs elicits a state of tension that bridges the gap between each of the many demands or dilemmas one encounters each day. The result is that taking a break from a stressful day will not result in full relaxation because the stimulus context for tension remains unchanged. This explains why a separation from the environmental

context of a demand (as is the case for most relaxation protocols) can be equally as important as avoiding the demand itself.

Because daily life is replete with minor choices that involve some conflict and prospective loss, minor tension occurs and persists during the day. The problem is that we lose the ability to discern the proprioceptive stimuli that as bodily feedback allow us to perceive and control resting states. That is, constant low level tension interferes with our ability to achieve relaxation by reducing our ability to perceive what relaxation is.

But just as the perception of near constant low level dilemmas of choices sustains tension, the radical elimination of those dilemmas will permit and sustain relaxation. That is, by eliminating or radically reducing low level dilemmas or choices tension is reduced, relaxation occurs, and through its association with stimulus context it is sustained even when such choices reappear. Moreover, the ability to perceive relaxation allows one to more easily relax voluntarily, and inhibit prospective tension as well as mitigate or reduce current tension.

Contingency and Tension

If tension is emitted because of behavioral or micro-behavioral choices or contingencies, the question remains why tension occurs in the first place. The answer I propose is because tension provides some function that is useful to an individual. Unlike S-R responses that are functionally determined by hard wired neural structures that are selected in evolution by historical contingencies that span millennia, R-S responses are more plastic, and are functionally determined by conscious or non-conscious events that have a more immediate and informative purpose. Because tension hurts, reducing the pain of tension has value that does not have to be rationally considered, and thus leads us to make faster choices. More specifically, tension acts to bodily or somatically mark value and thus expedite choice or by tagging the importance of a response option before it is rationally appraised. In particular, for choices that cannot be reconciled, decisions are expedited and tension is correspondingly reinforced because it serves this function. It is this key concept that caps our appraisal of the origins of tension and stress and lead to the summary hypotheses that follow below.

Hypotheses

Tension occurs because it covertly and indirectly operates on our environment, or is a

covert operant. It occurs because of contingent events, and recurs because of reinforcement that shapes our perception of future contingencies. Tension is reinforced because it speeds choice our avoidance of moment to moment choices that entail loss. If tension had no positive consequences then contingency would change and tension would fade or extinguish.

Tension occurs most commonly because of micro-behavioral choices, and will be reduced when these choices are eliminated or deferred. When these choices are radically or near completely eliminated, a state of near complete muscular relaxation will ensue.

Relaxation can also be associated with context, which when imagined will elicit relaxation. That is, just as tension may be its associated with its context, so to may the inhibition of tension, or relaxation. Thus the mitigation of the Cinderella Effect will allow one to be continually relaxed, and because we are relaxed continually we have a greater ability to become relaxed and stay relaxed.

These hypotheses, if correct, must cohere with neurologically informed theories of motivation or learning and in turn *extend* from those theories. They must also be readily falsifiable. As I will next discuss, in the last decade such bio-psychological theories have arisen, and are poised to represent the basis for a new revolution in our interpretation of stress, its causes and its cures, as well as complete revision of the economics of social life.