

# Is Stress Working for You or *Against* You?

The New Brain Science of Stress and Sustainable Performance



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#### Executive Summary

*For many, stress is considered 'bad'; something to be avoided. In fact, there are ways to approach stress that not only lessen its impact on how we feel but build our brain and lead to long term sustainable performance. To do this, two traps need to be managed: the inability of our brain to distinguish between what is real and what is imagined, and the effect of the self being judged; and two tools need to be built: changing a fixed invisible belief (FIB) to a growth invisible belief (GIB) and building recovery into our lives.*

*While the economic crisis of 2008/09 is indeed a very difficult time for many, a closer look at the science behind stress will readjust our view of stress. It is not something to be avoided; we need it to grow a more robust, connected, adaptable brain. From a bigger perspective (which I understand is not easy to have right now) the current economic crisis could be viewed as not only painful but necessary to get us to a new level of function and sustainable performance.*

David Nelson, an accounting/business student in his senior year at the University of California, Berkeley, needs some cash. It's close to the end of the school year and his rent is soon due, but he knows he can't bother his parents for money since the economic crisis hit. On his way to a freshman class he's taking as an interest course, he sees an ad calling for students to participate in a study being conducted in the department. And the study pays!

David quickly gets on the phone and registers to be a subject. He shows up at the appointed time, in the appointed building, and is met by a rather attractive female graduate student. Bonus! After filling out all the requisite paperwork, he's brought into a room by another equally attractive young woman, who attaches electrodes to his head and chest and a galvanic skin recorder to his hands. While he waits in the room alone, he has two thoughts: why didn't I major in psychology? And, more importantly, what exactly have I signed up for?! Feeling a lot like a human guinea pig, twenty minutes later, David is led into another room where a

stern group of people sit behind a desk waiting for him, one of whom is the attractive graduate student he met earlier. He is told to sit down and review a 3-page document on the major regulatory bodies of the mortgage industry: the Federal Reserve, the F.D.I.C., the Office of the Comptroller of the Currency and the Office of Thrift Supervision and the Treasury Department. He does this while the group waits impatiently.

Four minutes later, our study participant is told to finish reading the document, and take one minute to prepare a presentation to the 'panel' about which group he thinks is best suited to lead the regulation of the financial markets and why. He is told he is to be graded by all present and given a score out of ten. What? Two other people arrive to observe as his minute comes to a close and he is expected to make his presentation.... David's heart starts to race, his skin glistens, his breathing quickens, and he thinks, "Why didn't I hit up the parents for money one last time?!"



## What this Study is About

What exactly had this innocent business student signed up for? Was it to test his knowledge of regulation in the financial markets? No, this story represents a classic experimental design in the study of stress of cortisol. It plays on the two key variables at the heart of why we feel stress:

1. the inability of our brains to distinguish between what is real and what is imagined, and;
2. the corrosive nature of judgment

In this white paper, we will examine how these two variables act as traps to sabotage our best intention, and we will present a different way to approach stress and uncertainty. We will explore the effects of two of the most important stress hormones—cortisol and BDNF—that David experienced in the study and how, if not managed, they can lead us to behave in ways that not only exacerbate stress but diminish our brain's ability to perform well over time. We will outline two tools to help manage stress and uncertainty as a way to enhance both our performance in the moment and our ability to sustain performance over time.

Back to David. What does he do as he faces this difficult presentation and what can we learn from his response?

## It Starts With Appraisal

At the heart of responding to stress is *appraisal*. As humans, we engage in two basic cognitive appraisals for each stimulus we face. When we first look at a situation, we ask ourselves the question: “Am I in control?” That is, do I have the skills to

handle the situation? This is the first dimension. The second dimension is especially critical in the release of cortisol (one of the most important stress hormones) and all of its adverse effects. In this case, we ask ourselves: “Am I being negatively judged by others?”

As Margaret Kemeny, a researcher from the University of California, Los Angeles, found in a review of over 200 studies examining stress and cortisol, being negatively evaluated, especially by someone of importance or interest to you (remember the relative ‘importance’ of the female lab assistant in the study) is the most important variable that elevates cortisol in our blood during a stressful event.<sup>1</sup>

In other words, what causes our greatest increase in cortisol release is not having too much to do, or feeling the pressure of deadlines, but how negatively judged we feel by others. When we fear that our identity or sense of self is at stake, a chemical cascade takes place in our brains, leading to cortisol being released into the blood stream. This type of appraisal is more an unconscious process that occurs in the amygdala (the emotional part of our brain), which preferentially tunes more strongly into negative than positive stimuli as a way to protect us from harm.

Put another way, we as human beings tend to amplify the negative. We pay more attention to what is potentially harmful to us - especially to our sense of ‘self’ - causing a chemical cascade in our brain. For example, when an important client looks less than thrilled in the middle of a big presentation, our mind races with all sorts of potential negative outcomes for the project, our job,

**The Two Traps of the Mind**  
*The corrosive nature of judgment and; The inability of our brains to distinguish between what is real and what is imagined.*

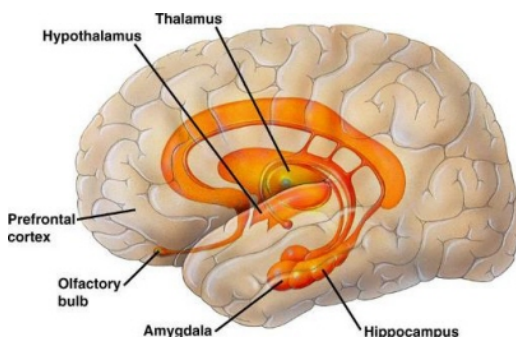


our career and which college we can afford for our kids. We call this 'awfulizing.'

### Amygdala and the HPA Axis

When we are under stress and we feel out of control and/or judged negatively, an alarm is set off in our amygdala which presses the panic button of the HPA axis (HPA: hypothalamus, pituitary gland, adrenal gland). This results in cortisol being released by our pituitary gland.

The amygdala is known as the 'seat' of our emotions, and while there are actually two amygdalas - one on each side of the brain - they essentially function as one. In a challenging situation, the amygdala, sensitive to the emotional content (mainly fear) of the situation, sounds the alarm in order for us to react and protect ourselves.



### What Does Cortisol Do?

Within the neural networks necessary for normal functioning, the hypothalamic-pituitary-adrenal (HPA) axis is an essential regulatory system for digestion, immune system, mood, emotions, sexuality and energy storage/expenditure. In response to our appraisal, the HPA axis is activated and cortisol is released.

The classic fight, flight or freeze response to an unexpected change stimulates the

release of neurochemicals in the brain. These in turn cause physiological changes in the body that make adaptation to a dangerous situation possible. For example, the sudden release of adrenaline and cortisol means that if you encounter a swarm of killer bees, you'll be able to run as fast as you can. They also act to stimulate your immune system, attention and energy.

### The Negative Impact of Cortisol

When we appraise that we are not able to control the situation or we feel as if we are being negatively judged over an extended period of time, our body goes into overload. We start to feel the negative effects of increased stress-related chemicals in the blood stream. It is no small wonder that chronic stress includes symptoms such as heart palpitations, loss of sleep, decreased immune function, and changes in mood. All of these outcomes of chronic stress can lead to heart disease, anxiety and depression.

Stress, irrespective of the amount, can produce both negative behavioral and physical changes in us. In this current climate, many of us are experiencing this type of ongoing threat and it would not be surprising if you are feeling some of the following:

- increased irritability, annoyance and/or anger;
- a need to withdraw from friends, colleagues and social events;
- decreased happiness, enthusiasm, and energy – replaced by mood changes (often ending in chronic anxiety, and/or depression and



- lethargy);
- a lack of concentration, and increased restlessness and indecision;
- dependence on drugs/alcohol to alleviate stress; and
- insomnia.

In addition to behavioral changes, some physical indicators of stress include:

- an increased heart rate;
- chronic back and neck pain;
- sweaty palms and/or increased perspiration;
- weight and appetite changes;
- loss of sleep and chronic fatigue;
- difficulty breathing; and
- overwhelming anxiety or panic attacks.

### Cortisol and the Brain

While the body begins to deteriorate in form and function, the negative effects of stress impinge on the brain as well. The region most vulnerable to stress is the hippocampus, a limbic area important in dealing with emotions and with the consolidation of memories. The hippocampus is important because it provides the *context* for situations based on a memory of what has happened in the past. So while the amygdala sounds the alarm, the hippocampus, with help from the pre-frontal cortex (a region higher up in the brain where executive function like planning occur), can compare memories and say, “Don’t worry, it’s just your boss overreacting as usual. It’s nothing to get worried about,” and has the capacity to shut off the HPA axis and to dampen the release of cortisol.

Unfortunately, numerous studies have shown that sustained exposure to cortisol

results in the pruning back of the number of branches and synaptic connections of neurons in this specific region.<sup>ii</sup> Recent research has shown that continued exposure to a stressful situation or experience results in anxiety and depression and its related chemicals (known as allostatic load), leading to weakened neurogenesis in the hippocampus.<sup>iii</sup> Importantly, this leads to the decrease in size and influence of the hippocampus, which has effects on our ability to maintain *context* about the situation.

At the same time, the amygdala grows significantly larger in size and influence. It starts the size of a pea but with repeated appraisals and reactions, grows much bigger. Compared with control subjects, depressive subjects, for instance, had significantly larger (+13%) amygdala volumes and significantly smaller (-12%) hippocampal volumes.<sup>iv</sup>

When our amygdala is more in control and the hippocampus and pre-frontal cortex less in control, we are more apt to lose perspective, get overwhelmed and fall into the traps that sabotage performance. We have trouble distinguishing between what is real and what is imagined.

### Trap 1: Is it Real or Imagined?

Did you know that more heart attacks occur on Monday morning at 9 a.m. than at any other time of the week?<sup>v</sup> This phenomenon, known as Black Monday, occurs because our brain, though an amazing machine, has trouble *distinguishing between what is real and what is imagined*. It builds a story around the imagined and starts to react to this story as if it were true.

*The Amygdala starts the size of a pea and grows or shrinks based on how well we control cortisol in our body.*

*The Hippocampus Provides context for a situation and has the power to turn the HPA axis off, decreasing cortisol output.*

*Cortisol impacts our ability to adapt, retain information, and function cognitively.*



Merely imagining the *threat* of a downsizing in today's economy can cause the brain to believe it will actually happen. For example, an indecipherable look from our manager returning from a meeting with senior leaders can substantially increase cortisol in our bodies depending on how we appraise it. The same is true of hearing about our main competitor laying off another thousand people.

In the current economic crisis, it is critical for you to understand that it is uncertainty—not the actual reality—that we might get laid off which triggers a release of cortisol. We are actually quite effective when it comes to adapting to challenging circumstances. 9/11 is probably one of the best examples of this. Think of the way in which New Yorkers and others throughout the US and the world responded to the tragic and shocking events. So many people were heroic in their responses when faced with a real, rather than perceived, threat. Think of your own example and consider the last real setback you faced. Chances are that as you look back now, the thought of what was going to happen at the onset was likely far worse than what actually happened. You found it in you to respond in a way that took care of the situation and helped you grow. Unfortunately, it might also have taken you longer to effectively respond than it could have because of your initial cognitive and emotional reaction to the event.

### **Trap 2: What Does It Mean For Me?**

Our initial cognitive and emotional reaction to an event is directly linked to how the uncertainty '*reflects*' on us. How

will we look to our families, friends, community if we lose our jobs? What will it say about us if we are unemployed? This perceived judgment by others is the root cause of the release of cortisol in our blood and its impact on our behaviour and performance.

### **Consequences of Appraisal**

Excessive cortisol in our blood has significant consequences on our behaviour and performance at work. The most important is a decrease in our ability to adapt, retain information, and function cognitively; the second is avoidance.

### **Cognitive Function**

The first consequence, a *decrease in cognitive function*, impacts our very ability to deal with the situation we are facing in the moment. We are unable to see things clearly or act decisively. We lose our self confidence and second guess ourselves. We have trouble grasping complexity.

*The question at the heart of the uncertainty we feel: how will it reflect on us if we get laid off?*

Cognitive function includes seeing patterns in complexity, being able to hold two divergent ideas simultaneously, being adaptable, and making good decisions; these are all critically important today. In his usually brilliant way, David Brooks of the *NY Times* describes cognition, as opposed to globalization, as the far more critical variable in shaping the larger global world.

*"The central process driving this [the economy today] is not globalization. It's the skills revolution. We're moving into a more demanding cognitive age. In order to thrive,*



*people are compelled to become better at absorbing, processing and combining information. This is happening in localized and globalized sectors, and it would be happening even if you tore up every free trade deal ever inked. The globalization paradigm emphasizes the fact that information can now travel 15,000 miles in an instant. But the most important part of information's journey is the last few inches — the space between a person's eyes or ears and the various regions of the brain. Does the individual have the capacity to understand the information? Does he or she have the training to exploit it?"*

*As far as our brain is concerned, social pain is just as harmful as physical pain.*

Cognitive function is directly correlated with our capacity to manage cortisol. It is difficult to be flexible and adaptable and respond to new information, such as the turbulence we are currently facing in the economy, if critical brain regions are diminished by a chronic cortisol state. When cortisol is rampant in our blood stream we literally lose working memory (think of it as the 'white board in the brain' where we hold onto key ideas for a short time in order to process the information, plan and make decisions). We lose 'the last few inches — the space between a person's eyes or ears and the various regions of the brain.' This is the differentiator to our long term global economic performance and our personal performance. Innovation only occurs in an organization when two elements are present: people have full use of their working memory, and they are not in an environment where they feel they will be overly judged for taking risks. Feeling judged stops us from taking risks and causes us to fall into the second trap,

*avoidance.*

## **Avoidance**

Return to David Nelson for a moment. David, requiring more money than what the original experiment paid, bravely looked for another experiment in which to participate. This one was much easier than the first one and paid more, thankfully, because he really needed the cash. When he arrived at the Berkeley lab this time, he was asked to come into a room and perform a relatively simple cognitive task. "Easy," he thinks to himself. "And I get paid for this?"

When he returns the next day, six other people are present in the room. Unbeknownst to David, these other people in the room are what are known as 'confederates.' They are part of the experiment ('planted' by the scientist). Over the course of the next fifteen minutes, David, along with the majority of other people who come in over the course of the day, will respond to a series of questions in a startling way. They will agree with the confederate choices, even though—and this is the amazing part of the study—they are clearly *the wrong answers*. These answers are visibly wrong to the naked eye and, when independently compared to their judgments from a day earlier, are their exact opposites! How can this be?

In his work on social influence, Solomon Ash found these startling results: individuals often react to the judgment of others to such a significant degree that they change their opinions from a day earlier, even when they are clearly wrong. The research showed that their first answers were correct 99% of the time. But being judged by others



affected them to such a degree that they answered incorrectly the majority of the time in 12 of 18 studies (and 36% of the time across all studies).<sup>vi</sup>

Why? The appraisal of being judged triggers the HPA axis and cortisol, causing us to feel ‘at risk.’ We literally feel actual ‘pain.’ According to the *pain overlap theory*, social pain—being rejected or berated—lights up the same regions of the brain as physical pain. As far as our brain is concerned, social pain is just as harmful as physical pain.<sup>vii</sup> The pain is intense enough, in fact, for David and others to do everything within their power to avoid being singled out in a group. In this case, it would have involved opposing others and answering in a way that was different from the rest of the group even though it was very clearly a correct answer. Maybe being in business doesn’t make David so smart after all!

Unfortunately, it’s not just David.

Think of the number of people who refused to speak up during the Enron affair or at NASA during the Challenger incident. When the housing market became overheated and people sold subprime mortgages to individuals who couldn’t afford them, who spoke out?

At IHHP, we have data suggesting that while over 85% of people see short cuts being taken at work, only 14 % are willing to actually have the difficult conversation required to address these potentially harmful impacts on an organization. (IHHP white paper: *What’s Happening at Your Hospital?*)

Think of the times in meetings when you

felt it was a risk to communicate a different idea because it went against a team’s current thinking. One study at a high tech multinational company found that over half the employees believed it was unsafe to say what was on their minds—not only bad news but also new ideas; both seemed risky because of higher ups.<sup>viii</sup>

### What to Do, Where to Start?

*“I no longer think that learning how to manage other people, especially subordinates, is the most important thing for executives to learn. I am teaching, above all, how to manage oneself.”*

Peter Drucker

First of all, if you are feeling overwhelmed by the current financial situation, you are not alone. In recent data compiled from over 2,300 individuals from organizations around the world, we found that over 50% feel overwhelmed by the current financial crisis. What is more, 49% of people wish they ‘had better tools to deal with stress more effectively’ (IHHP data February, 2009). When facing stress and uncertainty, there are two tools that you will want to consider. The research is clear that each of these strategies can be powerful in making a big difference. They are useless, however, unless you actually use them rather than just read about them.

### It Starts with Judgement

If the most corrosive part of a stressor—being judged—is so highly correlated to the amount of cortisol being pumped into our blood stream, then it makes sense to try to understand judgement and why it impacts us the way it does. And, why are some people less sensitive to judgement than others?

*People with a GIB appraise events much less personally—they don’t brand themselves failures when faced with a setback or when they make a mistake.*

*Imperfect feedback implies a permanent lack of talent or ability.*





Let's face it, some environments are so toxic that few, if any, can escape their negative impacts, and they will cause the majority of us to be affected. In our work with organizations from different continents across the world, we have witnessed some truly dysfunctional organizational cultures. However, even in these difficult environments, it is possible to find people less affected by judgment than others. Understanding what differentiates them is important if we are going to find a tool the rest of us can use.

### **Tool 1: GIB (or Does Failure Brand You?)**

The question we ask leaders is: "Is it more important to you to look good or learn?" Or put another way: "*Does failure brand you?*"

What we are asking about is a leader's 'invisible belief.' Each of us carries around a set of beliefs about whether we can learn or not. Ask most people the question and you will get the answer, "Of course I can learn." But when you delve deeper into the question you find that some people carry something called a *Fixed Invisible Belief (FIB)*. They believe that *their talents and abilities are fixed traits*. They believe that they have a limited or fixed amount of talent or ability and nothing can be done to significantly change it. The issue with a FIB is that it not only sabotages our actual learning; it also prejudices our thinking.

### *Does failure brand you?*

People who believe that traits are fixed have been shown to process information differently than others. Imperfect feedback, for them, implies a *permanent lack of talent or ability*. Proving talents & abilities and hiding deficiencies becomes all important for

someone with a FIB. They pass up valuable opportunities to learn and grow if there is a risk of unmasking weaknesses. They react defensively to mistakes or setbacks.

Research is clear that having a FIB makes it much more likely that an individual will react more helplessly in the face of achievement setbacks than will others.<sup>ix</sup> That is, they are not only more likely to make negative judgments about themselves or their intelligence from the failures, but also more likely to show negative affect and debilitation. People with FIBs are more sensitive to what uncertainty (and the potential of a job loss) means *about them*. What it means about *who they are*.

Can you see how as an individual's situation deteriorates, a FIB 'brands' them and makes the situation more difficult to manage? How it can trigger the HPA axis and cortisol? They define themselves by this situation and feel intense pain. Their FIB makes it more difficult to manage the situation and find a creative way out. How sad to witness the tragic outcomes of the businessmen who have taken their lives in this recent crisis because they were unable to see past their new self-identified 'brand' as bankrupt or a failure. Fortunately, there is another way to view stressful, threatening events and it all starts with something as simple as a sailing maneuver.

### **GIB – Growth Invisible Belief**

No doubt many of you are familiar with the term 'gybe' in sailing. It is a tactical maneuver where a sailing vessel turns its stern through the wind, such that the wind direction changes from one side of the boat to the other. To gybe is to create an *internal response to an external situation*. While it remains one of the most challenging tactics in sailing—even for



the most experienced sailors—and often results in equipment damage or injury, it is a critical maneuver in order to navigate a turbulent environment.

In contrast to those with a fixed invisible belief system, there are other individuals who are able to do the same as experienced sailors. They possess something called a GIB or ‘growth invisible belief’ where they believe that people’s traits are malleable. A GIB in our terms is very much the same thing as the sailing tactic: it is an internal response to an external situation. People with a GIB appraise events much less personally—they don’t brand themselves failures when faced with a setback or when they make a mistake. Because they believe they can learn and grow, all situations are viewed as opportunities to improve and grow. They *use stress* as a way to improve their game. They don’t allow a comment or situation to get under their skin because there is *less on the line* for them. Because the same situation simply doesn’t register in the same way for them, they experience much less cortisol and its damaging effects. In fact, being in an uncertain situation can even cause them to think they must be learning something new, causing them to *move toward* or approach the situation as opposed to avoiding it. (We like to remind our kids; if it’s hard, then your brain must be growing.) In this way, they continue to learn throughout a stressful event and use uncertainty as a way to grow.

A GIB helps us in unsteady seas, like those we are facing today. And the benefit of a GIB doesn’t end with us; it has enormous impact on the people we lead.

### **GIB and Leadership**

In a study of over 6,000 people, IHHP discovered that one of the variables most

highly correlated with career promotion is ‘not being afraid to admit weakness or mistakes.’<sup>x</sup> Unfortunately, many of us have a mistaken belief about what it means to be a strong leader or team member. What we see as a weakness may be seen as a strength by many of the people around us. Think about the last time your leader or manager publically owned their contribution to a mistake or error. What kind of impact did this vulnerability have? Did you see them in a more negative or positive way?

Which belief is behind their willingness to admit a mistake; a FIB or a GIB?

This is a classic example of how the stress of a mistake or a challenging time can actually make us stronger. If we approach the mistake rather than avoid it, we can gain respect in the eyes of our direct reports, team members or manager. In this way, a mistake or setback or a challenging time can act to build trust between team members and enhance long term performance. But it doesn’t happen if failure or making mistakes ‘brands’ us and we move to avoidance.

As Warren Buffet said:

*The big question about how people behave is whether they’ve got an Inner Scorecard or an Outer Scorecard. It helps if you can be satisfied with an Inner Scorecard. I always pose it this way. I say: “Look. Would you rather be the world’s greatest lover, but have everyone think you’re the world’s worst lover? Or would you rather be the world’s worst lover but have everyone think you’re the world’s greatest lover?”*

*The pain (of stress and uncertainty) wakes us up and gives us the opportunity to ask the important questions that we don’t ordinarily ask ourselves.*

Now, that’s an interesting question. Here’s



another one. If the world couldn't see your results, would you rather be thought of as the world's greatest investor but in reality have the world's worst record? Or, be thought of as the world's worst investor when you were actually the best?<sup>xi</sup>

### The Most Important Question to Ask

Warren Buffet asks an important question and it gets at the phenomenon behind why some are not as affected by judgment as others. If your scorecard is internal, it matters less what other people think of you. At IHHP, we are developing a tool to assess for a FIB and a GIB and to determine how each affects our ability to manage uncertainty, have difficult conversations and coach direct reports. In the meantime, here is the question you will want to ask:

*If you could learn something valuable but it would make you look bad, would you do it?*

Be very candid—all of us know what the 'right' answer is, but not all of us are likely to honestly admit our answer. Think of actual situations in which you had the choice to look good or learn something new. What did you do? What will you do? The answer to this question acts as a 'pattern interrupt' by disrupting the HPA axis and the release of cortisol. It makes a situation much less personally critical and unlocks our creativity in dealing with the situation. It loosens the grip of the mind. It allows us to see what we are facing with much less 'what is imagined' and far more 'what is real.' We can handle what is real. We *have* handled what is real. But first we need to tease away how the situation reflects on us so that we can cut off the fuel supply that causes our mind to keep us in its grip.

### Tool 2: Recovery

When there is less on the line for us, we can use stress to our advantage, growing our brain and enhancing long term sustainable performance. Unfortunately, what most people miss is the fact that stress *must* occur for our brain to grow. If we understand the science behind stress, we will see that we absolutely need stress to grow a more robust, connected, adaptable brain. In this way, the current economic crisis could be viewed as partially necessary. From a bigger perspective (which I understand is not easy to have right now) it is actually *required* to get us to a new level of function. It acts as a disruption that challenges us to form a different response. It is the reason that as a coach to Olympic athletes, I insist that the athletes face their most difficult competition whenever possible. It is the only way athletes and other high performers can break through their current level of play to get to the next level.

*BDNF is 'Miracle-Gro' for the brain but only if recovery is present.*

It is the same for us. We need to be challenged or risk continuing on a path that may not be a path we really want to be on—perhaps in jobs we may not especially like, or in relationships where we do not get our needs met, or in businesses that are not profitable. What would Intel look like today had it not been undercut on cost in its core market by the Japanese in the 70's and 80's? Intel might have stayed in a dwindling market and not moved as boldly into the microprocessor market, which turned out to be far more lucrative. This kind of growth doesn't happen if we just go along merrily with situations that are 'okay' but not excellent. However, as with our brain cells, we do require a certain amount of pain in order to get to that level. Understanding the science of cell breakdown will help us makes sense of the need for stress.



## The Science of Stress and Cell Breakdown

In classic studies of the variables that extend life expectancy and speed or slow the ageing process,<sup>xii</sup> three activities were identified that protect and grow the brain: low caloric intake, exercise and novel learning. What is significant about all three? Common amongst each of these is the fact they *all cause stress on the body*.

Low caloric intake causes low level stress on the body because the body is required to adapt to fewer calories. (Of course, this is not our favorite strategy because of our love of food). Novel learning literally breaks down cells in the brain in particularly important regions such as the hippocampus and the pre-frontal cortex. Exercise does more than the commonly accepted adaptation process of increasing circulation and collateral vascular growth for improving brain health: it breaks down cells in our brain (as well as our body). In each situation, cells are being broken down. While this sounds counterproductive, it is not. The effect, especially over the long term, is actually quite the opposite.

The body in its infinite wisdom understands that when stress is present it must get the body ready to restore itself. One of the most important ways it does this is through the release of brain derived neurotropic factor (BDNF). You will be hearing much about BDNF over the next decade because it is clear that this factor is absolutely critical to brain growth and neuroplasticity. Neuroplasticity is the process by which our brain remodels itself.

Every time we engage in a stressful situation—whether at work, or while doing a new job where novel learning is required, or during exercise—BDNF is released and our brain remodels. It gets rewired. Specific parts, the

hippocampus and the pre-frontal cortex, become stronger and more influential. Others, such as the amygdala, become weaker and less influential. The brain literally changes its neuroarchitecture, allowing us to be more in control, enabling us to be calmer in uncertain situations and to see more options available to us. We can manage more uncertainty and not infect the people around us with our panic and distress. We can distinguish between what is real and what is imagined more effectively. We can better use the last “few inches,” as David Brooks describes it, to be innovative and use new information.

However, it only happens—and this is one of the most important points of this whole paper—if there is a recovery period. BDNF does not work if stress is chronic and unremitting. The brain must have a recovery period for the remodeling and rewiring to take place. Without it, stress does not serve us; instead it starts to use and control us. You need to understand the consequences of not turning off your brain. Of never turning off your blackberry. Of thinking that working longer is the answer. It's not. If you cannot turn off your brain, BDNF—the ‘Miracle-Gro’ of the brain—cannot go to work. One of the most effective ways to do this is to nap. Yes, nap.

## The Power of a ‘NASA Nap’

One of our clients, NASA, has had to take the understanding of cognitive performance under stress very seriously. For them, it can mean the difference between death and survival. They have found that a nap at 3 p.m. is one of the most critical boosters to cognitive performance. Mark Rosekind, the lead researcher in the study, found that a 26 minute nap improved a pilot's performance by



more 34%. A 45 minute nap made the boost last more than 6 hours!<sup>Xiii</sup>

“Most of our data show that when people don't get enough sleep their performance can be degraded literally to the level where it's as if they are drunk,” says Rosekind, who has a PhD from Yale in clinical psychology and psychophysiology.

It is impossible to get this boost in cognitive performance by any other means. Sleep, whether at night or during the day, consolidates our learning. Our brain crackles away using BDNF to grow new neurons and rewiring itself based on the previous hours' learning. We actually replay the learning thousands of times in our brain, causing a new neuroarchitecture to take hold.

Stress, then, is essential for the rewiring of our brain, but it is not sufficient. We also need recovery.

Recovery can come in many different forms: physical - like exercise, or mental/spiritual - like prayer or meditation. It can also come from other people. One of the most effective ways to gain perspective about a difficult situation is to get a coach.

### **Recovery and Coaching**

Having experienced this first hand, I know what a great coach can do—in my case, he helps me regain perspective and gives me much more than an hour of recovery. I leave my sessions with a clear idea of what matters most and how I can get there. Coaching also helps me be clear about what is real and what is imagined.

The feeling of being connected in this way (to our coach or to another human being) stimulates our hippocampus and prefrontal

cortex to be more in control, which turns off our HPA axis, decreasing cortisol in our blood.

### **Summary**

So we need stress. We need to be stretched. Otherwise our brain doesn't grow and we become more susceptible to uncertainty, losing our ability over the long term to perform at a higher level.

In order to do this we need to exchange our FIBs - fixed invisible beliefs, for GIBs - growth invisible beliefs. We need to see a setback or a failure not as somehow 'branding' us but as a way of making us better, of getting us to a different level. We need to choke off the fuel that keeps us turning what is imaginary into what is real: thinking that a job loss or setback is somehow an indictment of who we are. It is not. But that is up to you to decide.

Stress without recovery negates the building effects of stress. We need to have a recovery period within the chaos so that BDNF can go to work and rewire our brain, putting us more in control and able to adapt to the uncertainty before us. We need to connect to other people so that our hippocampus and pre-frontal cortex can turn off the HPA axis and diminish cortisol levels in our blood stream.

Return now to David and his role as a guinea pig from the first study. Can you see how viewing the situation as more of a learning opportunity and less of an indictment of his static ability is David's best strategy to defuse the judgment of the panel in his 'stress test' in the lab? Can you see that, if there is 'less on the line' for him, a situation in which he is being judged becomes less unsettling for him? Can you see how important it is for David to not be too attached to the outcome—to not take the presentation personally?



To the degree that David stays neutral throughout the experiment and doesn't worry too much about others' judgements, or view failure as some indication of his personal worth or value, he will not only perform more effectively on his test in front of the judging panel with increased cognitive function but, ironically, he might even prove to the attractive psychology graduate student that all accountants aren't stressed out nerds.

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References and further reading may be available for this article. To view references and further reading you must purchase this article.

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