A State of Military Mind

by Brian Mockenhaupt

As the foot patrol snaked into the mock Afghan town in the foothills of Camp Pendleton, just north of San Diego, the marines scanned courtyards, rooftops, and the crowd of locals milling around the market. A simulated improvised explosive device, or IED, exploded in a trash pile and shook the ground. The role players—Afghans hired to play street vendors, teachers, village officials—shouted and scattered, leaving the streets empty save for two marines lying in the street, deemed wounded for the exercise. One lay motionless. The other writhed and screamed for help. “Get the casualties back here,” a marine yelled from the cover of an empty building. “Let’s go!” As his comrades frantically tried to evacuate their wounded, a second fake IED exploded in the town square.

Afterward, the platoon leader, First Lieutenant Giles Royster, gathered his marines, two-thirds of whom had never been in combat. “We’re giving you these emotions now so when it happens for real, you won’t be acting so crazy,” he told them. “You’ll be able to calm yourself down.”

This village—complete with plastic fruits and vegetables in the market stalls, scent machines that can pump out the stench of singed hair and rotting trash, and bomb victims gushing fake blood—represents one of the most noticeable shifts in military training over the past decade. By running mock scenarios that introduce mental and physiological strain, trainers can help troops adjust faster and perform better in the real situation, and make them less likely to be overwhelmed by chaotic or ambiguous events. This is inoculation, same as a flu shot: a dose of stress now can stave off more-severe effects later.

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And the benefits may go further: the military is trying to understand what’s happening in soldiers’ brains in moments of extreme duress, then train their minds to perform better. “It’s less about how we can mitigate stress and more about how they can learn to learn under stress,” Douglas C. Johnson told me from the rooftop of the mock town’s police station, as we watched another squad of marines hunt for an insurgent sniper.

For the past year, Johnson, a psychologist at the Naval Health Research Center’s Warfighter Performance Lab, in San Diego, has gathered blood and saliva samples from marines before and after they went through training, scanned their brains, recorded their heart rate and respiration, and given them cognitive and behavioral tests. Using this data, Johnson and his colleagues can adjust training to make troops more effective and limit the negative impacts of combat. They can also explain to the marines how their bodies will react—from accelerated heart rate and shortness of breath to nausea and loss of motor control—and teach them techniques for controlling these reactions, like breathing exercises to regain focus and to calm their minds and bodies.

Military indoctrination has always had a powerful mental component, as soldiers learn to follow orders without question and withstand painful or mentally taxing situations. But the military has largely ignored the brain as a shapeable muscle that can improve performance on the battlefield and limit the negative effects of what a soldier experiences there. I deployed twice to Iraq as an Army infantryman early in the war, and although we hardened our bodies, shot thousands of rounds of ammunition, memorized Arabic phrases, and practiced putting tourniquets on each other, we didn’t learn much about what combat would be like—how our bodies would respond to it, how we could stay on an even keel.

This is changing fast. Most of the military brain research over the past decade of war has studied aftereffects, to develop treatments for post-traumatic stress disorder and traumatic brain injuries. However, as
more and more troops have served multiple deployments and the rates of physical and mental injuries, suicides, and divorces have climbed ever higher, the Pentagon has realized that it needs to put more effort into treating causes rather than primarily focusing on symptoms. So the military has pumped massive resources into psychological health, giving service members and their families better tools to withstand the pressures of combat and repeated deployments.

The new buzzword is “resiliency”—what used to be called “psychological hardiness” or “mental toughness”—a person’s ability to cope with stress and anxiety and bounce back when confronted with hardship. A concept barely mentioned in the military just a few years ago, resiliency is now being embraced with zeal. The Army’s Comprehensive Soldier Fitness program promotes emotional health by reframing thoughts and experiences in a positive light. Two years ago, the Pentagon introduced Total Force Fitness, a services-wide program that splits overall fitness into eight categories: psychological, social, spiritual, environmental, behavioral, medical, physical, and nutritional. Deficiencies in one area presumably degrade a person’s overall ability to cope. Deployment stress can be driven as much by the mundane—credit-card debt, cheating spouses, sick parents, kids in trouble at school—as by the horrific. So household-budgeting classes, anger-management training, and marriage retreats might be as necessary as grief counseling.

The gateway to understanding much of this is the brain, and how it reacts to stress—whether from a traffic jam or from machine-gun fire during an ambush. Using a mixture of new technologies unavailable in past wars like real-time brain scans and neurofeedback that can rewire the brain, and centuries-old techniques like yoga and meditation, the military is trying to hone soldiers’ minds, arm them against psychological injury during combat, and even prevent traumatic situations through cognitive training that might, say, allow for an extra fraction of a second in which a soldier discerns that a car approaching a checkpoint isn’t a threat.

Many within the defense community are just starting to consider the role of neuroscience in war. As the community begins to embrace the notion of the brain as a weapon, neuroscience will change how troops prepare for war, how they perform in battle, how they are affected by
their experiences, and how quickly they recover from physical injuries and psychic wounds.

U.S. Navy SEAL candidates hit the beach during Hell Week at the Naval Special Warfare Center near San Diego. (Department of Defense photo by Cherie Cullen)

On a brilliant early-spring day, blue skies and 70 degrees, the trainees of Class 287 clustered on a sand berm as waves crashed on the beach 100 meters away. The trainees were dry—a rarity, having just finished medical checks, a morning ritual to ensure they’re healthy enough to continue training at the Naval Special Warfare Center, on Coronado Island, California, where recruits undergo the initial selection and training to become Navy SEALs (Sea, Air, Land). Some looked alert. But most stared ahead, unfocused. They teetered and staggered, joints and muscles stiff. Many nursed minor injuries. They hadn’t slept in three days. Over the next three days, they’d get two two-hour naps.

Class 287 had begun with 180 students. Three weeks later, at the start of Hell Week, the height of physical and mental stress, 91 remained. Three days into Hell Week, there were 48. One-third of those who leave are injured; the other two-thirds leave by choice, announced when a trainee rings a bell hanging from a wooden frame and turns in his green helmet. On an asphalt courtyard where the trainees assemble for exercise every morning, a long line of helmets stretches along the eastern wall—a daily reminder of the fine line between success and failure.

Indeed, SEAL training offers a remarkable petri dish for observing a person’s tolerance for stress and his breaking point. The process is brutal—physically, emotionally, and psychologically. Specialized schooling in scuba diving, parachuting, and small-unit tactics comes later; the first several weeks are all about relentless physical activity meant to cull the weak. Trainees, mostly 20 or 21 years old, spend hours swimming in the ocean, paddling eight-man rafts through pounding surf, and running down the beach with 270-pound rafts held overhead.

“There’s not a guy who went through this training who didn’t at one point think, ‘I’ve had enough,’” Terry Moy told me. He trained recruits from 1966 to 1971 and retired in 1979, but was brought back as a
consultant to help motivate trainees. He wore the same black combat boots, tan shorts, and blue T-shirt as the other instructors. They work in eight-hour shifts, but Moy had been awake with the trainees for three days. At 72, he is still thick with muscle and speaks in a low growl. This initial training has changed little since he went through it, nearly 50 years ago. “I’ve put 2,200 students through,” he said, “and I can’t look at them today and say ‘This guy’s going to make it and this guy isn’t.’” He pointed to his heart. “It’s something in here.

“If we could put a finger on it, we’d save a lot of money.”

The military prizes uniformity, and the promotion of the group over the individual. That’s good for maintaining order and accomplishing missions. But stress responses are highly individualized. Two people can be exposed to the same event but have very different reactions, with one debilitated by the experience and the other carrying few lasting negative effects. Some people are genetically harder than others. Those who experienced a childhood trauma or have never dealt with hardships at all are more likely to have adverse effects. Spiritual beliefs, physical fitness, and friendships all play a part.

Most people exposed to combat have symptoms of stress, but most of them recover fairly quickly, just as most people bounce back after a rough breakup or the death of a loved one. A subset won’t fare as well. Recent studies suggest that about 20 percent of troops experience more major depression and severe PTSD, characterized by feelings of helplessness and horror, intrusive thoughts, flashbacks, nightmares, social withdrawal, and hypervigilance.

The medical community’s focus on this small group seemed upside-down to Martin Paulus, who collaborates with Douglas C. Johnson at the Navy’s Warfighter Performance Lab. “As a psychiatrist, I’m always looking at how to make people less bad,” he says. “Really the fundamental question should be: How do I make the person better? How do I make them optimal?”

Instead of identifying deficiencies in those who don’t cope well, on the left side of the bell curve, Paulus studies the brains of the minority at the other end—elite performers like Olympic athletes and Navy SEALs. The SEALs are a natural study group: highly motivated, in excellent physical condition, and trained to operate in the most dangerous and
physically and mentally taxing environments the military faces. Though the formula is unique for each person—that strange mix of genetics, environment, and learned behavior—the SEALs as a group are different, and their brains are different. Having identified the neural regions that light up during critical tasks, Paulus believes the process can be reverse-engineered, using training regimens that build networks in the identified areas of the brain, which can raise average and substandard performers to a higher level. “Once we understand how these people are different,” Paulus says, “we can begin to develop ways of improving people who are not at that level.”

Navy psychologists say that despite having more exposure to intense combat, SEALs have lower levels of combat stress than the general military population, which is likely thanks to a mixture of genetics, learned confidence through success, and better-than-average coping skills and psychological health. They still might have disturbing thoughts, irritability, emotional numbness, or trouble sleeping, but at lesser rates.

“Often people think we just have to build robots who don’t have any fear or anything,” Paulus says. “But that’s far from being the truth.”

Up on the sand berm, the trainees slipped on their orange life preservers, picked up their paddles—they take them everywhere—and trotted down to the 58-degree water. Wearing fatigues and combat boots, they rolled in the surf, jogged back to the berm, and flopped down face-first. They scooped sand and dumped it over their heads, making sure their bodies were thoroughly coated. These are Beach Games, busywork to keep the trainees awake and in the default condition of SEAL training: cold, wet, and sandy. They staggered down to the beach again and plunged into the water. Some were slow to get up. They were halfway to the berm when an instructor sent them back. One trainee wasn’t sandy enough, so into the water and then back to the berm they all went—their sixth trip in 15 minutes. At any moment, a man might stop and ring the bell. Four trainees had quit over the past 12 hours.

After Hell Week, the relentless physical intensity tapers, but the program usually loses a few more during the pool-competency test. Trainees jump into the pool wearing goggles and an oxygen tank and must remain calm while instructors rip their regulator from their
mouth, spin them around, tear off their goggles, and disconnect their oxygen line. They feel as though they'll drown, a primal fear. While the experience could help them one day deal with malfunctioning dive equipment, the purpose of the test is more elemental. This is stress inoculation in the extreme, teaching trainees to control fear and think clearly during moments of chaos and uncertainty. “A guy who can do that can run into a house in the middle of the night and not shoot the wrong person,” Captain Bill Wilson, the school’s commanding officer, told me.

But finding that guy isn’t easy. To meet increasing demand spurred by the wars in Iraq and Afghanistan, the Navy wanted to graduate more SEALs without lowering the training standard. In 2006, psychologists wrote a multiple-choice test for potential recruits to determine their likelihood of success, based on skills long taught by sports psychologists: do they break down problems into achievable goals? Do they visualize themselves succeeding? Can they control the little voice that floods the mind with negative thoughts? Traditionally, fewer than three percent of test takers who scored in the bottom fifth passed SEAL training. Now, those who score that low aren’t given a training slot. The Navy also implemented an eight-week physical-preparation course and started teaching sports-psychology skills during training. The personality test, physical-preparation class, and lessons in mental toughness have boosted the average pass rate for the grueling initial SEAL training from 25 to 32 percent. Constant training and regular deployments further develop SEALs’ tolerance for adversity. And they have a strong support network within their tight-knit community—a factor that, research suggests, can be more powerful than genetics.

These are the brains that Martin Paulus tests, with the weak recruits long ago weeded out and the remaining SEALs' survival skills honed and enhanced. Using functional magnetic resonance imaging, or fMRI, Paulus takes snapshots of SEALs’ brains as they judge facial expressions in photographs and perform tasks that test reaction time. Compared with a control group of healthy males, the SEALs show more activation in the insula—prune-size areas on the right and left sides of the brain that play a role in self-awareness, pain sensation, and emotion. The insula also anticipate stress and prepare the body for dangerous situations; higher activity here helps explain why SEALs are better at threat detection and can think faster, more clearly, and more deliberately in complex or chaotic moments.
The seemingly disparate categories of the Pentagon's resiliency model have commonalities. The key, Paulus says, is understanding how critical brain structures respond to stress. "They kick in no matter what the stressor is, whether you're having a family problem or your buddy just got blown up," he says. "The brain only has so many ways of organizing a reasonable response." The goal, Paulus says, is to develop a complete neural model of how stress manifests across the brain, and how the brain responds. This could one day be used for brain-enhancement regimens highly specific to individuals, and for predictions about who can handle the stresses of certain military jobs—a more elaborate version of the multiple-choice test given to SEAL hopefuls. "We're at the edge of this," Paulus says. "We're very early in the game." For now, he is focusing on spots already known to be critical in mitigating and managing stress, like the insula. Developing a workout for this one area is profoundly difficult, but a method far from the world of modern medical interventions has been shown to enhance the insula—meditation.

In 1985, the Army launched a tiny pilot project to build holistic soldiers, not just physically strong and technically proficient but mentally agile. Today they'd be called resilient. Richard Strozzi-Heckler, a psychologist and Vietnam veteran who had been meditating since the late 1960s, worked for six months with a small group of Special Forces soldiers at Fort Devens in Massachusetts. In one of the military's first organized forays into meditation, he took the men on a ten-day silent retreat, then guided them through daily meditation sessions during their regular training. Two other members of Strozzi-Heckler's team worked with the soldiers on physical conditioning and martial arts.

The 25 soldiers in the Trojan Warrior Project became known as the Jedi Knights, in part because they wore T-shirts with "May the force be with you" written in Latin—but also because they performed so much better than their peers. In biofeedback tests, the soldiers had more control over their muscular and neurological systems and performed well on psychological evaluations. "They were able to learn Russian faster, they were able to learn a weapons system faster, they were able to prove their marksmanship faster, they were calmer under pressure," says Strozzi-Heckler, who now teaches at leadership retreats in California.
Despite this success, interest faded, and the Army kept its focus on building muscle and specific skills, like shooting rifles, bandaging wounds, and raiding buildings. But in recent years, faced with an onslaught of PTSD cases, the Pentagon and the Department of Veterans Affairs have studied the benefits of meditation for quieting minds jostled by disturbing wartime experiences. And meditation is being used to prepare soldiers’ minds for the battlefield, giving them mental tools to stay focused in combat, cut through the fog of war, and perhaps limit psychic damage.

As Class 287 flopped in the surf, cold, wet, and sandy, Ilene Gregorian led a small group of sailors, spouses, and retirees in her weekly informal mind-training class in a nearby gym at Coronado naval base. The class was built around attention training—focusing on a song, maybe even a specific instrument in the music, and bringing the mind back after attention wanders. Mindfulness techniques vary: some focus on breathing, others on sensations within the body. But the intent is the same—controlling attention and clearing the mind of distractions. “You can take yourself down with your thoughts faster than any enemy can,” she told them. “Your thoughts are secondary. That’s just chatter. Your attention and awareness are primary. This will help you put a spam filter in your head.”

Gregorian was teaching meditation in San Diego in 2005 when a Marine and a sailor attending the class asked if she’d teach at the nearby Marine Corps Air Station Miramar. To appeal to a military audience, she and a colleague, Sarah Ernst, renamed the class Warrior Mind Training and described the practice as mental hygiene—a workout for the brain. With a small group of volunteers, they now teach weekly classes at several military and veteran facilities, where they draw clear connections to other military cultures that have used meditation, particularly the Samurai. “They represent the stereotypical image of an elite warrior, a real badass with a sword and strategy,” Ernst says. “But they cultivated the elite warrior mind, spending hours and hours focusing their minds so that when it was time to go into battle, they knew how to turn off their thoughts and have razor-sharp attention in which there weren’t any thoughts or doubts that would cause them to hesitate—especially in the most critical moments, when it could be a life-or-death situation.”
Gregorian cued up an electronica song on her iPod and told the group to notice each thought and let it slip by, like watching a leaf float down a stream. For beginners, this is difficult and exhausting work. Chatter builds in the mind, as thoughts swirl and linger—leaves caught in an eddy. But this becomes easier and more effective with practice. “Your mind is like a muscle,” Gregorian says. “The more you’re able to train it, the more you’re able to hold your attention and keep it from wandering.”

Soldiers from Fort Bragg, North Carolina, take part in a Warrior Mind Training Course, a practice that has been called ‘mental hygiene’ or ‘a workout for the brain.’

John Way, an Army Special Forces soldier, started Warrior Mind Training classes in 2006 at a weekly meeting taught by Ernst near Fort Bragg, North Carolina, after returning from his first Iraq deployment. Now, for ten minutes in the morning and for up to half an hour at night, Way uses music—Miles Davis, Joe Satriani, Mozart—as a meditation tool. On his second Iraq tour, he could man a machine gun on guard for hours, refocusing his attention when his mind strayed. During ambushes and firefights, he found a clarity that had been absent before. “You see an explosion, and you don’t let the overwhelming experience of the explosion get to you,” he says. “You’ve got other stuff going on. Okay, those are explosions, but who’s shooting and where’s he at? You see the problem and you see the solution. You’re able to break it down and focus, instead of everything just coming at you at once.” He compares it to his current work as a medic, identifying and treating the severest injuries without being distracted by lesser wounds.

After a pilot program with the SEALs last year, the Naval Special Warfare Center decided that in bringing mind training to its special operators, it would pursue a program with a robust curriculum based on rigorous scientific study, rather than collect anecdotal evidence from soldiers about how training had sharpened their minds. And now those studies have begun, aiming to prove for military personnel what has already been seen among civilian populations: meditation reduces heart rate and lowers blood pressure, and it strengthens the brains neural pathways, improving the flow of information.

Specifically, meditation has been shown to increase gray-matter volume and bolster synapses in the brain’s pre-frontal cortex, which hones
attention and helps put an event in context, rather than letting the amygdala, the brain’s fight-or-flight center, hijack the body’s reaction to stressful situations.

Major Jeffrey Davis’s elite Marine unit was trained in meditation before its 2008 Iraq deployment, in one of the first scientific studies of meditation within the military. Davis became a quick believer. “We look at all of these weapons systems around us as necessary for war,” he says. “But it’s the human mind that operates all these things. If I can find a better way to train a Marine—if I can teach him to react quicker, to think quicker, to learn quicker, to act wiser in an ambiguous situation—the better off we are.”

But it wasn’t an easy sell. “There was a lot of resistance from the Marines at first,” Davis says. “When we first started, the guys felt a little weird about it.” I can imagine. This probably would have brought snickers and groans among the guys I served with, many of whom joined the infantry for the extreme physical challenge. At first glance, meditation and brain-training exercises don’t seem part of a martial culture. Though participation can be made mandatory, these techniques require significant buy-in, focus, and dedication over an extended period. “This type of training has been considered soft, not hardening,” says Amishi Jha, a cognitive neuroscientist at the University of Miami who has studied the effects of meditation on service members. “That somehow it’s going to weaken instead of toughen, that it’s going to make people less precise and more passive. But it’s not going to the spa and getting a massage. It’s the exact opposite for your mind. It’s being in the most alert and present state that you can imagine.”

For eight weeks, Davis and his troops worked with Elizabeth A. Stanley, a former Army intelligence officer, Georgetown University security-studies professor, and longtime student of meditation. Starting with an explanation of the brain science behind mind fitness and the science and stress of trauma, Stanley taught the marines a regimen inspired by Mindfulness-Based Stress Reduction—a 33-year-old program that had been tweaked to treat everyone from overeaters to cancer patients, but that had never before been used within the military. The techniques taught in Stanley’s course, called Mindfulness-Based Mind Fitness Training, are meant to focus attention, release wandering thoughts, and use awareness to help the body and mind self-regulate during and
after stressful experiences. Jha tested the Marines before and after the
course. She found that those who practiced mindfulness techniques
showed fewer signs of stress leading up to their deployment, and
improvements in concentration and working memory, which helps
people perform complex cognitive tasks. Davis and his Marines
reported an improved ability to handle stress and both retain and
regain focus. Stanley has since taught mindfulness to much larger
groups of Army Infantry and Marines in two randomized controlled
studies, as the Pentagon considers implementing mindfulness
programs on a much larger scale.

In the second study, Johnson scanned the brains of eight platoons of
Marines using fMRI. Stanley then taught four platoons an eight-week
mindfulness course, similar to that used with Davis and his men. All
eight platoons went through combat scenarios at the Infantry
Immersion Trainer, after which Johnson gathered more blood and
saliva samples, submitted them to behavioral and cognitive tests, and
again scanned their brains. The Marines trained in mindfulness
techniques, Johnson says, showed a better recovery from stressful
training, and their brain scans showed similarities with the neural
patterns of the elite performers—the SEALs and Olympians—in the
Paulus and Johnson study. “These results,” Johnson says, “suggest that
mindfulness training can produce changes at the level of brain, biology
and behavior, which is quite provocative.”

“Obviously, this is going to help reduce the harm for our soldiers,”
Stanley says, “in teaching them new skills to cope with this exposure to
trauma and learn new ways to relate to these stressful experiences.”
But the training will also make troops more effective in combat. “When
I say that,” she says, “I sometimes get pushback from people who say
‘Oh, you want to make better baby killers.’ I think that’s a simplistic way
of looking at the situation. This has an immense capacity to improve
their ability to do their jobs in a way that will minimize harm.” Soldiers
who are calm and focused in chaotic moments are less likely to fire out
of fear or frustration—an advantage that’s particularly important in
counterinsurgencies, when killing civilians can erode support among
the very people whose cooperation is most needed. “In that moment,”
Stanley says, “instead of spiraling off into being freaked out, they can
be able to come back to the present moment, assess the situation, and
choose the most appropriate response.”
Though brain-training programs like this are still gaining traction in the military, mental-fitness regimens may soon be as much a part of a soldier’s life as push-ups and running. Every war brings new understanding and medical advances: ambulances, plastic surgery, blood transfusions. In America’s Long War, the new field of discovery is the brain. Like learning a foreign language or mastering a sport, optimizing the brain is slow and tedious work, with results harder to quantify than traditional metrics of military training, such as counting sit-ups or holes in targets at a rifle range. But the potential is profound. This is training that can bring relief for the injured, and more control over chaos for those still fighting.