U.S. NEWS & WORLD REPORT
Science & Society

CONQUERING OUR PHOBIAS

THE BIOLOGICAL UNDERPINNINGS OF PARALYZING FEARS

BY MARIANNE SZEGEDY-MASZAK

High places should be easy to avoid. There is no compelling reason to climb a tree, for example, or to ride a roller coaster. But somehow, when Beth Cox was driving her daughter from their Atlanta home to Oklahoma two years ago, she found herself crossing the Mississippi River, over the truly terrifying Hernando de Soto Bridge in Memphis. "I started hyperventilating. I started going hysterical. I thought we were going to die," she recalls, describing the experience with rueful humor and lingering embarrassment.

Not that her reaction came as a complete surprise. Indeed, it was unhappily familiar. Cox is, by her own description, "fearless" in all other parts of her life. A beloved reading and math teacher in a suburban Atlanta elementary school, she projects the calm competence of the woman you would immediately turn to in a crisis. So her fear of heights seems incongruous. But for most of her 51 years, especially after she had children, acrophobia (as it's technically known) has been the uninvited guest at too many events in her life. On a family vacation on Pikes Peak four years ago, her husband and two teenage daughters stood outside, exhilarated by the panoramic view, while Cox huddled in the back seat

of their rental car, hyperventilating, crying, and trembling.

Cox is one of approximately 14.8 million American adults who suffer from irrational fears of a particular situation, object, or experience. Today, anxiety disorders are the most common mental illness in the United States, afflicting 13.3 percent of adults. And the nature of these disorders seems to reflect the landscape of worry and stress of 21st-century life: Overdue bills and Code Orange terrorism alerts merely top the list of worries stressing people out. But for some people, they trigger or fuel a host of anxiety disorders. Obsessive-compulsive disorder, for example, in which men and women become enslaved to elaborate and sometimes painful rituals: Hands are washed until they are raw and bleeding; pockets are jammed with tiny talismans that seem to be essential for life itself; food cannot be eaten unless a specific place setting is arranged in a precise way. After 9/11, post-traumatic stress disorder seemed to become as common as the cold in day care, with flashbacks, bad dreams, and sleepless nights afflicting thousands and thousands of people. Then there are phobias, like social phobia, where a conversation with a neighbor can cause a paralyzing sense of dread, or specific phobias like Beth Cox's acrophobia. Agoraphobia translates literally as fear of the marketplace (which today might be called fear of the mall). Some who suffer from agoraphobia panic when they're in public places; others simply become paralyzed, unable to leave their homes.

COMPTON-TEKLI / ROYAL / THE KOBAL COLLECTION

IN *REPULSION*, CATHERINE DENEUVE'S TRAUMA BECOMES A PHOBIA.

SPECIFIC PHOBIAS. Officially, about 8 percent of adults suffer from one or more phobias. The real number is probably higher.

Like many psychiatric disorders, anxiety disorders in general, and phobias in particular, vary wildly in degree. Some phobias are so mild they could hardly be considered real psychiatric disorders. As Emory University psychiatrist Charles Nemeroff puts it, "Very few people actually seek treatment for them. It's not as if people who are terrified of snakes come into my office because it is the only thing standing in the way of a career as a herpetologist." Other phobias, however, can dominate people's lives. One woman, who suffered from agoraphobia, refused to leave her house for 18 years. A New York man who suffered from panic disorder ran off the Staten Island Ferry moments before it left the dock, never to get back on it again. A teenager in New Jersey with social phobia missed months of school because of wild fears that she might vomit or blush uncontrollably.

Everyone who suffers from a phobia has a slightly different story, but Cox shares many experiences and traits with other phobic adults. The similarities include a long history of suffering—often extending back to adolescence—from fear, panic, and avoidance. And, sometimes, even genes: Cox's father acknowledges that he "never liked heights much either."

Unlike Cox, who has a specific phobia, those who are afflicted with panic disorder cannot predict when it will strike, so its unpredictability adds to the fear. Even so, new understanding of the biology of fear has led to new treatments and new strategies for unlearning and managing fear that were unimaginable just a few years ago.

Where fear lives. The new treatments are important because the cost of fear to society, in terms of medical costs and lost productivity, is staggering. A 1999 study documented that the annual cost of anxiety disorders in the United States (in 1990, the most recent numbers available) was about $42.3 billion, or $1,542 per American. An estimated $22.8 billion of that went for nonpsychiatric medical treatment.

Because anxiety disorders so frequently involve physical symptoms, victims often believe that this time they really *are* having a heart attack, a brain tumor, or a stroke. "People with panic disorder come in and say, Doc, I feel this or that," says psychiatrist Barbara Milrod of Weill Medical College. So the doctor gives them a complete physical and perhaps even says that anxiety is the cause. But they don't believe it, Milrod explains, "so they decide they need an MRI just to make sure they don't have a brain tumor. People go through this over and over again." And the healthcare costs keep rising. People with an anxiety disorder are three to five times as likely

GAMOPHOBIA Fear of marriage. **RHYTIPHOBIA** Fear of getting wrinkles. **ARACHIBUTYROPHOBIA** Fear of peanut butter's

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THE BLACK CAT, A 1934 FILM IN WHICH THERE WAS MUCH MORE TO FEAR THAN MERE CATS

ANIMAL PHOBIAS. Fear of snakes and spiders makes evolutionary sense. We couldn't survive as a species without fear.

to go to the doctor and six times as likely to be hospitalized for psychiatric disorders as those who don't have them.

As agonizing as irrational fear can be for the afflicted, it has been a gold mine for researchers. Most diseases, from cancer to depression, involve a complex interaction of genes and physiology, but doctors typically know something about their physical location in the patient's body. Not so for illnesses of the mind like depression or bipolar disorder. But fear is different. Nobel Prize winner and Columbia University professor Eric Kandel describes it as "the one, the only area in psychiatry in which we have an anatomical substrate." We know, in other words, where fear lives.

And we know this largely because of the lowly rat. For years, researchers have explored the brains of rats, and they finally identified the place where fear lodges in the neurons. According to New York University psychologist Joseph LeDoux, "The hub in the wheel of fear" is the small, almond-shaped brain structure called the amygdala. While it is extremely important in terms of regulating all sorts of emotions, the amygdala has long been recognized as being the air traffic controller of the fear response in mammals.

Chicken Little. Animals can be conditioned to be fearful. In simple experiments that couple a tone with a mild shock, the amygdala is activated by the tone, sending alert signals to all parts of the body. This conditioned response tells the heart to beat faster, blood pressure to elevate, sweat glands to start sweating, and, often, the stomach to start churning. Even without the actual shock, the body acts as if it has been shocked because the amygdala sends out the alert signals at the sound of the tone. The amygdala, it seems, can play two very different roles: one as the responsible adult organizing the body to respond well to a disaster, the other as Chicken Little.

While the amygdala organizes the fear response, its neighboring brain structure, the sea-horse-shaped hippocampus, plays its part in storing memories of the shock and reminding the rat that it was shocked when a particular tone was played. A feedback loop is created so that even the memory of the shock will stress the rat and activate the amygdala. Stress, says LeDoux, can

sticking to the roof of one's mouth. HOMILOPHOBIA Fear of sermons. ONOMATOPHOBIA Fear of hearing certain words.

spark all kinds of fears and phobias.

These are the primitive, unconscious fear responses deeply wired into our brains, and only after they occur does the cortex get involved—the conscious part of our brains that can rationalize, explain, and inform. The prefrontal cortex could have told Cox that the likelihood of driving off the Hernando de Soto Bridge was slim, but it was too late. By the time the cortex comprehended what was happening, the hippocampus and the amygdala had taken charge, illustrating that gut-level fear is far more potent than our intellectual analysis.

A rose is a rose. Why do our amygdalas react to one stimulus and not another? Why is the fear of heights or snakes or spiders so common while the fear of, say, rain isn't? Some clue can be found in evolution. In one experiment, laboratory baby monkeys were shown a tape of adult female monkeys acting fearfully with a snake. When snakes were brought into the lab, even plastic ones, the monkeys panicked. Then the same baby monkeys were shown doctored tapes, in which roses were spliced in where the snakes used to be, and the mother monkeys looked as if they were acting fearfully with a rose. When presented with roses, however, the babies could not have cared less. Findings like this lead many researchers to conclude that "one reason there is a limited number of phobias is because we have preserved a genetically hard-wired disposition to be frightened of certain things and not the others," says Ned Kalin, chair of psychiatry at the University of Wisconsin Medical School.

In a small white house on Seaview Avenue on Staten Island last month, five men and five women sat in an office describing their own experiences with fears and phobias. Ranging in age from 16 to over 60, they explained in painful detail how fear, panic, and anxiety had governed their lives. A white-haired basketball coach named Matt (all asked that their last names not be used) recalled his 24th birthday, on Sept. 10, 1959. He got on the ferry from Brooklyn to Staten Island, as he had done countless times before. But this time, he was overwhelmed by panic that would be part of the rest of his life. He raced off the ferry and did not get back on for 32 years. Over the years the panic descended without warning: He couldn't travel for some games with his team; he suffered on the subway, fearful that he would get stuck. He sought treatment time and again, including 11 shock-therapy sessions, but the disorder was so poorly understood, until recently, that he was unable to get relief.

Helen is a psychiatric nurse, and she, too, remembers the exact moment that fear took control of her life. She was 16 years old, riding on a local bus—one she had ridden many times before—when suddenly she was overwhelmed by "an out-of-the-blue panic attack." That was enough for her to start walking wherever she went. She became a nurse but eventually was unable to even cross the street from the parking lot to the hospital alone, waiting in her car until she saw someone with whom she could walk. In the hospital, Helen clung to the walls, brushing against them because she was so fearful of the open spaces of the hall. Finally, she had to live on disability payments for two years.

Tony, who paints beautiful watercolors of Staten Island scenes, remembers always being fearful and shy. Despite that, he remembers his childhood as happy. But when he was 12, in 1952, his family went on vacation to Florida, and while on a beach in St. Petersburg, he was overwhelmed by "this weird feeling, spacey, frightened." He ran into the shade and tried to get control of himself, but somehow the switch had been flipped; for the rest of his life he was plagued by fear. He couldn't go to school without his mother. In high school his mother would sit in the attendance coordinator's office while he went to class. "I was fearful of everything," he says. Today,

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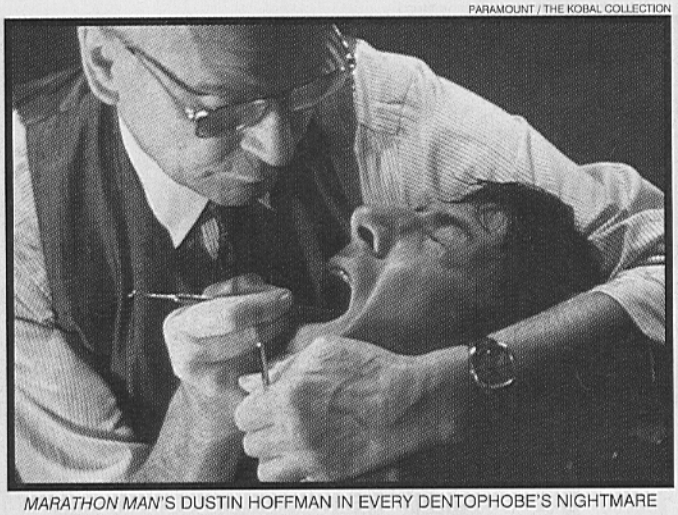
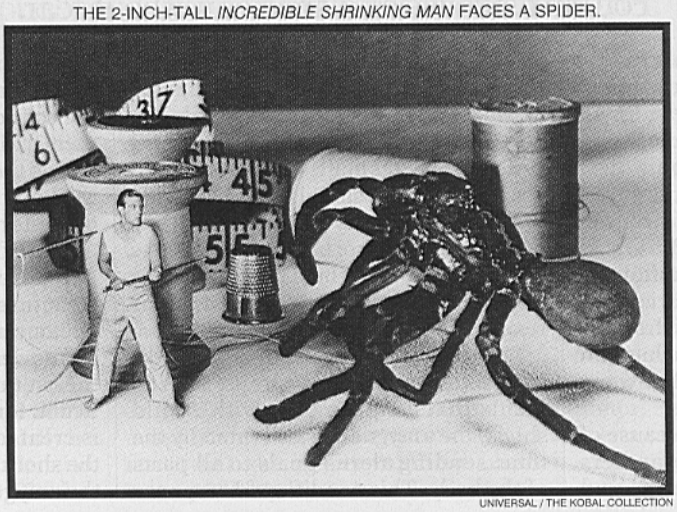


MARATHON MAN'S DUSTIN HOFFMAN IN EVERY DENTOPHOBE'S NIGHTMARE

PANIC DISORDER. People afflicted cannot predict when the next wave of agony will occur, so the cycle of avoidance begins.

EXPOSURE THERAPY. Coming face to face with your deepest fear, over and over again, can eventually help to extinguish it.

THE 2-INCH-TALL *INCREDIBLE SHRINKING MAN* FACES A SPIDER.



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EPHEBIPHOBIA Fear of teenagers. GENUPHOBIA Fear of knees. NECROPHOBIA Fear of death. SCOLECIPHOBIA Fear o

while he has managed to conquer much of his fear, he still cannot go to New York City alone.

Mary Guardino founded Freedom From Fear, the treatment center where the group meeting was held, in 1984. "It was really based on my own intense suffering from panic and anxiety disorders and depression since I was a little kid," she says. As committed as an evangelical in her mission to change fearful lives, Guardino once had a vanity license plate that said PHOBIC. After founding Freedom From Fear, Guardino forged partnerships with Columbia University, where researchers in anxiety disorders work with her clients. A combination of therapy, support groups, and medicine has permitted Matt, Helen, and Tony, among countless others, to get on with their lives. Drugs—whether antianxiety pills or antidepressants—are never the only answer, says Guardino. In fact, she says, they are often "the biggest barrier to treatment." People are afraid the medicine will change their personalities, or even that the pills will get stuck in their throat. For people with anxiety disorders, medicine sometimes turns into another source of anxiety. That is where therapy comes in, exposing yourself to the fear, feeling the wave of panic and learning how to handle it, gradually changing the amygdala and the hippocampus through the heroic efforts of the prefrontal cortex.

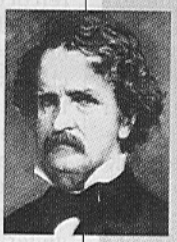
Unlearning. Exposure therapy and cognitive behavioral therapy have been used successfully in reducing and even eliminating fears and phobias. Since the dread of feeling fear reinforces the phobia—if the bridge or the tunnel or the snake is avoided, so are the feelings of panic—the challenge of therapy is to make that feeling less frightening. Over and over again, patients are put in situations that catalyze the pounding heart and dripping sweat, and they are taught that those feelings need not exert such a powerful influence in their lives. They are learning new ways of coping. But what if there were a way to learn more quickly? During his work with rats, Michael Davis at Emory University found that some proteins in the amygdala called NMDA receptors may actually speed up the process of unlearn-

FAMOUS PEOPLE AND FAMOUS FEARS

NAPOLEON BONAPARTE conquered Europe but was crippled throughout his life by ailurophobia, the fear of cats.

QUEEN ELIZABETH I is said to have been terrorized by roses, a subcategory of anthophobia, a generalized fear of flowers.

SIGMUND FREUD, the father of psychoanalysis, who coined the term "anxiety attack," suffered most of his life from agoraphobia, literally the fear of the marketplace, or open or crowded spaces.



EDGAR ALLAN POE suffered for much of his life from claustrophobia, a disorder also endured by **HARRY HOUDINI** and **ADOLF HITLER.**

DONALD TRUMP might not wow a potential boss in a job interview because of his chirophobia: fear of shaking hands.

HOWARD HUGHES, the eccentric billionaire, lived his final years immobilized by mysophobia, or fear of germs. Nonetheless, he lived in squalor.

ANDRE AGASSI may ace many of his serves, and he still boasts a wicked backhand, but if a spider happens to crawl onto the court, his steely composure may crack, as he suffers from arachnophobia.

CHER AND WHOOPI GOLDBERG are unlikely to sit in first class together because of their fear of flying, or aviophobia. Fellow sufferers include former NFL coach **JOHN MADDEN** and songbird **ARETHA FRANKLIN.**

worms. ANUPTAPHOBIA Fear of staying single. MYXOPHOBIA Fear of slime. AMYCHOPHOBIA Fear of being scratched.

CLOCKWISE FROM FROM TOP: MARY EVANS PICTURE LIBRARY; SPENCER PLATT—GETTY IMAGES; EVAN AGOSTINI—GETTY IMAGES; CORBIS (2)

YIPES! HOW ABOUT A FEAR OF EVERYONE?

Imagine a life without friends. A life in which even writing a check at the bank triggers overwhelming anxiety. Ask for a raise at work? Don't be ridiculous. Be grateful someone hired you.

Social phobia, also known as social anxiety disorder, can be devastating. Craig—who asked that his real name not be used—is an attractive and athletic 40-year-old New York executive. He grew up in a family of immigrants with no extended family and few friends. Then Craig's mother became schizophrenic in her early 30s. It was an isolated life.

Craig's natural shyness was exacerbated by his home life, and by the time he was 30 he had no friends, no social life, and a job far below his capabilities. "I have been afraid to do anything," he says. "I have already lost my 20s and 30s. I need to know that I can pull out of this so I don't lose any more time." Craig was so fearful of standing up for himself that he was repeatedly passed over for promotions. Dating, when he summoned the courage, was a disaster: "All I could imagine was the words *Loser, Loser, Loser* stamped on my forehead."

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IN *THE CROWD*, JAMES MURRAY FACES THE TERROR OF THE MASSES.

AGORAPHOBIA. Literally translated from the Greek as the fear of the marketplace, today it might be called the fear of the mall.

Diagnosis. Social phobia is described in the standard psychiatric manual as "a marked and persistent fear of one or more social or performance situations." The disorder has two common patterns: Some people are pathologically shy from infancy, while others—also shy—become pathological when puberty hits. Rarely do social phobics recall a specific humiliating experience or trauma, only the gradual and corrosive inability to function socially.

Most who suffer don't even seek treatment until the disorder has become disabling. Craig first read about this disorder in 1996 but only found the courage to seek treatment seven years later. Although the disorder disproportionately affects women, men are more apt to seek treatment, probably because it affects their ability to earn a living. That was certainly true for Craig. Even with an M.B.A., he was in a job that he was overqualified for. Craig's treatment involved both antidepressant drugs and exposure therapy, in which he acted out all the possible scenarios that had paralyzed him. Says his therapist, Franklin Schneier of Columbia University: "We believe that the problem is sustained by irrational negative thoughts about a social situation." In terms of brain function, the therapy attempts to recruit the rational prefrontal cortex to manage the unruly hippocampus and amygdala.

Craig is not particularly interested in the state of his amygdala. But he has joined a choral group, and his social life has improved. More important, he applied for a new job—a supervisory job—and got it. An achievement for anyone, but for Craig a life-changing experience. He says with a rueful smile, "I just wonder why I haven't been doing this for the last 15 years." *–M.S-M*

ing fear and offer an entirely new option for treatment. "Many years ago, we discovered that the NMDA receptor protein in the amygdala was not only necessary to learn to be afraid," Davis says. "It was also necessary to learn *not* to be afraid." If those proteins were blocked in rats, then the extinction process was far more difficult. If these proteins were bolstered somehow—and they could be with a drug called D-Cycloserine (DCS) that had been used for treating tuberculosis but now had a new application—then they facilitated the extinction of fear.

When Beth Cox returned to Atlanta from Oklahoma, using a different bridge in Memphis to avoid the scene of her most frightening panic episode, she realized it was time to finally try to tackle her fears. Back home, she saw an advertisement asking for volunteers who were afraid of heights to be a part of a treatment study. Cox called and soon found herself in Decatur, Ga., in a warren of offices called Virtually Better. Virtually Better is both a virtual-reality laboratory and a treatment center in which clients are able to fly in an airplane, talk to an audience, stand on a wooden bridge hundreds of feet above a ravine—and never leave the office. A helmet with a screen inches away from the eye presents clients with a range of computer-generated experiences. No longer does a therapist need to take a client over a

CHIONOPHOBIA Fear of snow. NOVERCAPHOBIA Fear of your stepmother. COULROPHOBIA Fear of clowns.

CHRIS STANFORD FOR USN&WR

No longer terrified of heights, Beth Cox has faced her fears and conquered them.

bridge or on an elevator. By confronting their fears and phobias this way, many Virtually Better clients, like Cox, can overcome them.

While virtual-reality therapy is becoming mainstream for the treatment of specific phobias, the study that Cox participated in involved the use of DCS. She was one of 27 people with acrophobia who were given two sessions of virtual-reality treatment for height phobia. Afterward, the group was divided into three subgroups: One received a sugar pill, one received a low dose of DCS, and the third received a higher dose of DCS. Fear was measured both through the descriptions of those who participated and through objective measures of the skin to register how agitated the person was. Cox received the higher dose of DCS. The results of the treatment were published last month in the *Archives of General Psychiatry*. Those who received any dose of DCS managed to conquer their fears more effectively than those who got the placebo, and the effects lasted. Three months later, the DCS recipients still felt better. Not only did the drug have no side effects, but it was used only during the learning process. "We have not found that it facilitates fear conditioning itself," Davis says. "For whatever reason, it is just unique to extinction."

Beautiful. For Beth Cox, life has been transformed. A few months after her therapy, she went with her family to a wedding in Miami. They were treated to the best room in the hotel, a corner room on the 26th floor with floor-to-ceiling glass windows and a panoramic view. "Before, I never understood why they built hotels like this," she says. "But now I do, because it's beautiful. It's not like I spend my Saturdays looking for something high. But now when I am there, I know that I can handle it."

The knowledge that fear can be handled contains all the elements for conquering it. Even with all the new understanding of the biology of fear and of new treatments, Columbia's Kandel points out that there is still much to learn: "The human mind is the most complex problem in all of science," he says. "These are complex emotional problems that have intrigued philosophers from time immemorial. Plato and Aristotle struggled with these issues. It's not surprising that they haven't been solved." Clearly, they haven't. But for those who suffer from fear and phobias, the lack of a neat solution no longer means a lack of hope. ●

SOURCES FOR HELP

Freedom From Fear (888) 442-2022; *www.freedomfromfear.org*

Anxiety Disorders Association of America (ADAA) (240) 485-1001; *www.adaa.org*

Virtually Better (virtual-reality therapy) (440) 634-3400; *www.virtuallybetter.com*

Anxiety and Phobia Treatment Center (914) 681-1038; *www.phobia-anxiety.org*

Ross Center for Anxiety (202) 363-1010; *www.rosscenter.com*

CATAGELOPHOBIA Fear of being ridiculed. EUPHOBIA Fear of hearing good news. MYCTOPHOBIA Fear of darkness.

SOURCE: WWW.PHOBIALIST.COM