FLIGHTS OF MEMORY

Kandel, Eric. (1994). “Flights of Memory”. *Discover Magazine, May 1994*

Jennifer H., a professional musician, was 23 when she sought help because she was having problems with sexual intimacy. While in therapy, she also began exploring the unexplained feelings of panic that had haunted her daily since early childhood. Gradually, she says, she traced her feelings of terror to their source, recalling memories she'd repressed since leaving home. She remembered her father first molesting her and then raping her from the time she was 4 until she moved out at 17. She recalled that he had throttled her, threatening to kill her if she told anyone. As these memories resurfaced, her panic attacks and other symptoms receded. But when she confronted her father, a mechanical engineer at a prominent northeastern university, he flatly denied abusing her.

Other family members remembered Jennifer's father grabbing her breasts. Jennifer herself had a memory--never forgotten--of his staring at her chest and making crude sexual remarks. Concerned that her father would abuse other children unless he acknowledged his problem, Jennifer turned to the courts, hoping a lawsuit might prod her father into treatment. The statute of limitations on filing criminal charges had expired, but in 1988 Jennifer brought a personal-injury suit against her father. In addition to her own testimony, the court heard her mother--by then divorced--testify to having seen Jennifer's father lying on top of Jennifer's 14-year-old sister; she also said he'd fondled a baby-sitter in her early teens. Jennifer's father's sister recalled his making sexual passes at young girls. In 1993 a Massachusetts jury ordered him to pay Jennifer $500,000 in damages. (Civil juries can't order people into treatment as part of a judgment.) Although Jennifer's father admitted to fondling the baby-sitter, he maintains to this day that he never abused his daughter.

Jennifer H.'s case is one of several recent cases at the heart of a fierce controversy over recovered memories--memories of sexual abuse that come back after a period of repression. It was only in the 1980s that adults who'd been molested as children began to press their claims in court, publicly confronting their abusers in the hope of forcing them to acknowledge their guilt. But as the number of cases has risen, a growing number of parents, researchers, and academics have begun to speak out about the dangers of false accusations. They question in particular whether it's psychologically possible to repress traumatic childhood memories and then recover them. And they suggest that some people, egged on by therapists or self-help books, are fabricating memories of incidents that never occurred. So far, people on both sides of the debate have relied on psychological, rather than biological, insights into how memory works to make their case.

Can biology in fact shed any light on whether and how memories might be repressed and recovered? Perhaps--but to appreciate the debate fully, we first need to put it in its sociological context.

Until the early 1970s the sexual abuse of children was largely ignored; their stories were doubted and minimized, or they were blamed for encouraging their molestation. But research within the past 15 years or so suggests that child molesting is far from rare. Depending on who is asked and how abuse is defined, studies find that between 8 and 38 percent of women say they were abused as children, while figures for men range from 3 to 16 percent. (The 38 percent figure is from a random survey in 1978 of 930 women in San Francisco that defined abuse as any unwanted sexual activity with a relative before age 18; fondling, rape, or attempted rape by a nonrelative of children under 14; and attempted or completed forcible rape by a nonrelative of children ages 14 to 17--descriptions consistent with criminal law definitions of child molestation.)

Many adults who were abused as children clearly remember the experience all too well. But studies by Harvard psychiatrist Judith Herman and others also suggest that temporarily repressing such memories may not be uncommon. In 1987 Herman found that of 53 women attending incest survivor groups, almost two-thirds reported partial or complete memory lapses at some point after the abuse occurred. These findings have since been echoed in a larger survey of men as well as women led by psychiatrist John Briere at the University Of Southern California School Of Medicine. The earlier the abuse occurred, and the more violent or persistent it was, the more likely victims were to block the memory for long periods--a finding that gels with the clinical studies of Lenore Terr, a psychiatrist at the University of California at San Francisco, who finds that children exposed to repeated traumas are more likely to repress them than children suffering a one-time traumatic event.

One of the most systematic efforts to track memory repression was recently conducted by Linda Meyer Williams, a sociologist at the University of New Hampshire. Williams interviewed 129 women who were treated for sexual abuse when they were young girls in the mid-1970s. More than one- third had no memory of, or chose not to

report, the molestation documented in their medical records. Since over half of these women discussed other incidents of sexual abuse, selective amnesia is a more likely explanation for their response (or lack of it) than any unwillingness to discuss sex.

Most clinical psychologists believe that children can learn to block memories as a survival mechanism: if physical escape from their tormentors is impossible, psychological escape may become crucial. When children can't avoid abuse and know it's going to be repeated, some children cope by tuning out--mentally dissociating themselves from the abuse while it's occurring--or by repressing the memory afterward.

But repression, according to this school of thought, may cease to be helpful in adult life. Away from the traumatic environment, adults may find their memories resurfacing, either gradually in fragments, or suddenly in vivid flashbacks. As in Jennifer H.'s case, these memories may return during therapy, but that's by no means always the case. Frank Fitzpatrick was 38, married, and securely employed as an insurance adjuster in Rhode Island when he spontaneously recalled being molested by Father James Porter 26 years earlier. Since being confronted by Fitzpatrick in 1990, the Roman Catholic priest has admitted to molesting dozens of boys and girls. When the news became public, 68 men and women said that they too had been assaulted by Father Porter. At least half a dozen recalled the abuse only after news reports triggered the return of their childhood memories.

> *But people accused of abuse don't often confess--and their accusers' stories can't easily be corroborated. That leaves memory as the basis of many criminal and civil cases and makes determining the accuracy of people's memories of paramount importance. Because child molestation is so abhorrent, the mere taint of suspicion can ruin lives. Those accused risk losing their families, careers, and reputations; they face high legal costs and potentially prison if criminal charges are pressed. According to the False Memory Syndrome Foundation, over 9,500 U.S. families now claim that their adult children have tarred them with abuses that never occurred. (The foundation was established in 1992 by Pamela and Peter Freyd after their daughter Jennifer, now a professor of psychology at the University of Oregon, confronted them with accusations of abuse by her father--an allegation they have energetically disputed.) Many of these families blame zealous therapists and popular self-help books for encouraging their children's "false memories."*

Some researchers--among them psychologists Elizabeth Loftus of the University of Washington and Richard Ofshe of the University of California at Berkeley--have joined them in casting doubt on the believability of repressed memories. Publicity about child abuse, they argue, has fostered a climate in which it's all too tempting to believe that hidden abuse is the cause of many people's ill-defined symptoms of distress.

Loftus and Ofshe think that, consciously or carelessly, some therapists are seeding ideas into vulnerable patients' minds. Fictitious memories, they point out, can be implanted with hypnosis--or even without. Loftus cites a study in which five people were told a false story by an older relative about how they'd gotten lost in a mall or apartment complex as children. When they were later asked to recall further details, they related elaborate memories of the fictitious incident. Is it as easy to implant something as traumatic as being repeatedly raped by someone in your family? There may indeed be powerful disincentives to admitting to false memories. Nevertheless it's still striking how very few cases come to light.

As further evidence of the malleability of memory, Loftus and Ofshe cite the sensational case of Paul Ingram, a deputy sheriff in Washington State whose two daughters accused him of sexually abusing them as part of a Satanic cult. Ingram, a fundamentalist Christian, denied the charge. In jail, though, he was repeatedly questioned about the alleged incidents by the police and a minister, and was asked to visualize them by a psychologist--until he finally came up with lurid memories of the incidents. Ofshe was originally hired to interview Ingram by the prosecution, not the defense. To test Ingram's suggestibility, Ofshe asked him about a scene--entirely invented--in which Ingram forced his son and daughter to have sex. At first Ingram recalled nothing. Then Ofshe encouraged Ingram to imagine the scene and to "pray on the image," as Ingram had done before. Ingram subsequently developed detailed memories about the invented scenario, casting doubt on all of his previous confessions.

The Ingram case suggests some conditions that might facilitate the creation of entirely false memories: institutionalization or religious pressure. Of ten "recanters" whose cases have come to light, one woman acquired her memories of abuse in the isolation unit of a private hospital. Another was hospitalized in a program run by a Christian organization. Two other recanters have accused their therapists of using powerful psychotropic drugs, which, like hypnosis, can increase susceptibility to suggestion. That false memories occur and that some people are unjustly accused can't be denied, but Ofshe and other skeptics seize on such cases to cast doubt on all repressed memories. In a 1993 article in Society, Ofshe concludes: "Only pre-therapy accounts of a person's history can be treated as a normal memory with only the ordinary component of error." In his view memory repression is no more than "unsubstantiated speculation."

What, then, can biology contribute to this difficult debate? Over the past 20 years neuroscientists have made considerable strides in understanding the workings of memory. Can science also explain the delayed recall of sexual trauma? The rigorous answer is no. There is, as yet, no proper understanding of what might happen in human brains when memories are repressed, or when they are recovered. However, biology can provide insights into how a memory is stored, how that storage is regulated, and whether this regulation is compatible with repression and with a later return of memory.

What are the cellular mechanisms that explain how memories are created? As far as we know, storing our experiences as memories involves altering the strength of connections--known as synapses--between nerve cells in the brain. In its initial phase, which lasts minutes and is commonly called short-term memory, the change is temporary; it doesn't alter the structure of the connections. One or more hours later, though, anatomical changes begin to convert the memory into a longer-lasting form. This consolidation period involves the growth of new connections between nerve cells, or in some cases, the retraction of existing connections.

We also know that both short-term and long-term memories consist of at least two distinct forms: implicit and explicit. Implicit memory deals with our unconscious knowledge of motor or perceptual skills, or "knowing how." Explicit memory deals with our knowledge of facts, people, and places, or "knowing that." Quite different brain systems participate in storing these two forms. Explicit memory is handled by the inside segments of the temporal lobes (the brain lobes located behind our ears) and an underlying region called the hippocampus. Implicit memory, in contrast, involves distinct motor or sensory pathways in the brain, the autonomic nervous system (which regulates involuntary actions such as breathing and heart rate), and two additional brain structures called the amygdala and the cerebellum.

The first evidence that the temporal lobes and hippocampus play a role in explicit memory came in the 1950s from studies of epileptic patients. Brenda Milner, a neuropsychologist at the Montreal Neurological Institute, described the now famous case of H. M., a 27-year-old assembly- line worker who suffered from uncontrollable temporal lobe seizures. To alleviate his seizures, a surgeon removed parts of his temporal lobe, including the hippocampus. This operation left H. M. with a devastating memory deficit: he could no longer form new long-term memories. Yet H. M. still had his store of previously acquired long-term memories. He remembered well events before his surgery, such as his job and his childhood experiences. From the study of H. M. and patients like him, it became apparent that the hippocampus is only an interim depository for long-term memory. The hippocampus processes the newly learned information for a period of weeks to months, then transfers the information up to the cerebral cortex for more permanent storage. Thus, although H. M. still had a perfectly intact short-term memory, he couldn't translate what he learned into long-term memory. He could converse normally with Milner every time he saw her, but he could not remember her from visit to visit.

At first it was thought that this shattering deficit applied to all forms of new learning. But Milner and others soon made a wonderful discovery that revolutionized thinking about memory. Patients with temporal lobe lesions can accomplish certain implicit types of learning tasks involving perceptual and motor skills--and they retain the memory of these tasks perfectly well. H. M., for example, could learn new motor skills, such as mirror drawing (drawing while looking at his hand in a mirror, rather than looking at the paper). Usually there's cross talk between the explicit and implicit memory systems, so that when you learn or experience something new, both systems come into play. In fact, some types of explicit memory can be transformed into implicit memory by constant repetition. Learning to hit a backhand in tennis at first involves deliberate, conscious thought, but hitting good ground strokes becomes almost reflexive with practice. You don't consciously recall what to do--you just know what hitting a backhand feels like.

This cross talk is particularly evident in memories of emotionally charged experiences such as sexual abuse, in which the emotion associated with the event, and the conscious recollection of the event are stored in separate systems. Much of what we know about "emotional memory" comes from work done by neuroscientists Joseph LeDoux at New York University and Michael Davis at Yale. These studies indicate that the conscious component of highly charged memories is initially stored in the hippocampus. But the unconscious, implicit component is probably stored through the amygdala, which links the brain's sensory and motor areas to the autonomic nervous system. In memories of very stressful events, the role of implicit memory may be particularly powerful.

Of course, like all memories, highly charged memories need a period of consolidation to become long-term. But Michela Gallagher at the University of North Carolina and others who study this process have found out something very interesting: the strength of long-term memory can be affected by the context in which the remembered event occurs. Some factors enhance memory consolidation, storage, and recall; others inhibit them.

Working with rats, Gallagher has found that implicit memories of fearful experiences are strengthened when noradrenaline--a neurotransmitter associated with alertness and stress--is released in the amygdala. In contrast, the release of naturally occurring opium-like substances, called endogenous opiates, weakens memory storage. Other researchers have since found that explicit aspects of fear can be similarly modulated. This finding suggests a fascinating possibility. If an incident is so distressing that the brain makes opiates to dull the pain, the opiates may interfere with the memory-storing process. Intriguingly, Gallagher finds that using a drug called nalaxone to block endogenous opiates at the time of consolidation does enhance memory recall in rats. Furthermore, some studies show that a weakly stored memory can be enhanced by injecting a stimulant drug like adrenaline.

Such studies give us a biological context for considering how traumatic memories might be suppressed in humans, but what about their retrieval? We can only speculate about how this might work.

Let's suppose that a memory is stored weakly in the explicit system because endogenous opiates interfered with its consolidation--so weakly that the person has no conscious memory of the original wrenching event. That same event, though, might also be captured by the implicit system through a characteristic physical sensation or gesture. Perhaps later the implicit system may provide clues--such as physical sensations-- that help stir the recall of weak explicit memories.

In fact, people who say they were abused as children often do describe their memories returning first as bodily sensations: Jennifer H. was doing exercises to relieve the tension in her neck when she recalled her father's choking her. Sometimes, says Lenore Terr, a victim shows behavioral clues that reflect the traumatic event. Terr cites the case of Eileen Franklin, who said she saw her father rape her best friend and crush the girl's head with a rock. The father was also abusing Franklin, who was 8 at the time. From age 8 to 14, Franklin pulled out the hair from a particular part of her scalp until it bled, re-creating the wound she'd seen inflicted on her friend. Franklin repressed the memory until she was in her late twenties, when its resurgence resulted in her father's conviction.

Indeed, some survivors of abuse describe their recovered memories as qualitatively different from other memories: they feel as if they're actually reexperiencing the event, with all its textures, smells, and physical sensations. This parallels the intensity of flashbacks experienced by combat veterans. As we have seen, Gallagher found that implicit memory can be strengthened by stimulating noradrenaline in the amygdala. And studies at Yale have suggested that noradrenaline released in response to stress contributes to the powerful flashbacks of Vietnam veterans. Perhaps memories that sexual abuse survivors are normally unable to access are retrieved when their noradrenaline system is activated.

All this suggests that the action of endogenous opiates and noradrenaline in the amygdala and hippocampus could begin to provide a biological framework for examining how memories are repressed and later retrieved. It may soon be feasible to examine these ideas directly. Animal studies have already shown that the signature of long-term memory, both implicit and explicit, is anatomical change--the growth or retraction of connections between nerve cells in the brain. Improvements in brain imaging (such as magnetic resonance imaging) may eventually let us examine even small structures in the human brain in a safe, noninvasive way. We may then be able to see whether sexual abuse leads to physical changes in the amygdala that reflect a person's memories of the event--and whether these changes can be modulated by the noradrenergic and opioid systems.

Indeed, existing imaging techniques--PET scans--have already let us glimpse why false memories might seem entirely real to those who experience them. Stephen Kosslyn at Harvard has found that the brain area involved in perceiving an image and storing it as a memory is also involved in imagining that image. For example, when you think about the face of a person you met yesterday, the medial temporal region--the very same region used to perceive that face in the first place--becomes active. Thus an imagined event might be mistaken for a perceived event since both use the same brain architecture. In fact, in many ways memory is like perception. Both are reconstructed events in the brain, creative elaborations that involve filling in details around a few solid visual landmarks. Much as the fine points of perception are fallible to illusion, the details of memory are fallible to suggestion.

Thus, viewed from a biological perspective, there's reason to believe that both sides of the repressed memory debate can be valid. Research in animals suggests that memory storage can be modulated and inhibited, and that once inhibited, memory can nevertheless return. At the same time, we also know that memory can be unreliable and we have an inkling of how fantasy might be mistaken for reality. How, then, to evaluate--right now--the data from any individual case? The answer is clear: ideally, one wants to see independent evidence to corroborate the putative victim's report--for instance, from family members, diaries, photographs, medical and police records. But in reality, given the private nature of child abuse and the threats made to children to prevent them from telling others, independent evidence often isn't available. (Failing independent corroboration, particularly compelling behavioral clues, like those displayed by Eileen Franklin, might sometimes help support a case.)

So the arguments continue. But what's disturbing about the current tone of the debate is the eagerness with which some media and academic critics are using the wedge of doubt to publicly discredit the very existence of delayed memories. Do the questions of the critics reflect a genuine effort to get at the truth, to defend the innocence of the wrongfully accused? Or are we sometimes witnessing a backlash against the struggle to bring child abuse out of the family closet? At an American Psychiatric Association meeting last year, Herman noted: "Until recently the sexual abuse of children was the perfect crime. The perpetrator was fairly guaranteed that he would never be caught or successfully prosecuted. Now women--and men--have begun to use the courts to hold them accountable for the first time, and we see the perpetrators fighting back."