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CHAPTER 11: "You Forgot to Deliver the Twin"

> It is an old maxim of mine that when you have excluded the impossible, whatever remains, however improbable, must be the truth. SHERLOCK HOLMES

Mary Knight, age thirty-two, bright red hair pinned neatly in a bun, walked into Dr. Monroe's office, sat down and grinned. She was nine months pregnant and so far everything seemed to be going well. This was a long-awaited, much desired pregnancy, but it was also her first visit to Dr. Monroe. The year was 1932 and money was tight. Mary's husband did not have steady work, and so Mary had only talked to a midwife down the street, on an informal basis.

But today was different. Mary had felt the baby kicking for some time and suspected that labor was about to begin. She wanted Dr. Monroe to check her over, to make sure that the baby was in the right position to coach her through this last stage of pregnancy. It was time to prepare for birth.

Dr. Monroe examined the young woman. Her abdomen was vastly enlarged and low, suggesting that the fetus had dropped. Her breasts were swollen, the nipples mottled.

But something was not right. The stethoscope was not picking up a clear fetal heartbeat. Maybe the baby was turned in a funny way, or perhaps it was in trouble, but, no, that wasn't it. Mary Knight's navel was ll wrong. One sure sign of pregnancy is an everted or pushed-out belly button. Mary's was inverted, in the normal fashion. She had an "innie" rather than an "outie."

Dr. Monroe whistled softly. He'd learned about pseudocyesis or false pregnancy in medical school. Some women who desperately want to be pregnant—and occasionally some who deeply dread pregnancy—develop all the signs and symptoms of true pregnancy. Their abdomens swell to enormous proportions, aided by a sway back posture and the mysterious deposition of abdominal fat. Their nipples become pigmented, as happens in pregnant women. They stop menstruating, lactate, have morning sickness and sense fetal movements. Everything seems normal except for one thing: There is no baby.

Dr. Monroe knew that Mary Knight was suffering from pseudocyesis, but how would he tell her? How could he explain that it was all in her head, that the dramatic change in her body was caused by a delusion?

"Mary," he said softly, "the baby is coming now. It will be born this afternoon. I'm going to give you ether so that you won't be in pain. But labor has begun and we can proceed."

Mary was elated and submitted to the anesthesia. Ether was given routinely during labor and she'd expected it.

A little later, as Mary woke up, Dr. Monroe took her hand and stroked it gently. He gave her a few minutes to compose herself and then said, "Mary, I'm so sorry to have to tell you this. It's terrible news. The baby was stillborn. I did everything I could but it was no use. I'm so, so sorry."

Mary broke down crying, but she accepted Dr. Monroe's news. Right there, on the table, her abdomen began to subside. The baby was gone and she was devastated. She'd have to go home and tell her husband and mother. What a terrible disappointment this would be for the entire family.
A week passed. And then, to Dr. Monroe's astonishment, Mary burst into his office with her belly protruding, as huge as ever. "Doctor!" she shouted. "I've come back! You forgot to deliver the twin! I can feel him kicking in there!"[1]

About three years ago, I came across Mary Knight's story in a crumbling 1930s medical monograph. The report was by Dr. Silas Weir Mitchell, the same Philadelphia physician who coined the term "phantom limb." Not surprisingly, he referred to Mary's condition as phantom pregnancy and coined the term "pseudocyesis" (false swelling). Had the story come from almost any other person I might have dismissed it as rubbish, but Weir Mitchell was an astute clinical obsener, and over the years I have learned to pay careful attention to his writings. I was struck especially by the relevance of his report to contemporary debates on how the mind influences the body, and vice versa.
Because I was born and raised in India, people often ask me whether I believe there are connections between the mind and body that Western cultures don't comprehend. How do yogis exert control over their blood pressure, heart rate and respiration? Is it true that the most skilled among them can reverse their peristalsis (leaving aside the question of why anyone would ever want to)? Does illness result from chronic stress? Will meditation make you live longer?
If you'd asked me those questions five years ago, I'd have conceded grudgingly, "Sure, obviously the mind can affect the body. A cheerful attitude might help accelerate your recovery from an illness by enhancing your immune system. There's also the so-called placebo effect we don't understand completely—merely believing in a therapy seems to improve one's well-being, if not actual physical health."
But as to notions of the mind curing the incurable, I've tended to be deeply skeptical. It's not just my training in Western medicine; I also find many of the empirical claims unconvincing. So what if breast cancer patients with more positive attitudes live, on average, two months longer than patients who deny their illness? To be sure, two months is better than nothing, but compared to the effects of an antibiotic like penicillin in improving the survival rates of pneumonia patients, this is hardly anything to boast about. (I know it's not fashionable to praise antibiotics these days, but one only has to see a single child saved from pneumonia or diphtheria by a few shots of penicillin to be convinced that antibiotics really are wonder drugs.)
But as a student I was also taught that a certain proportion of incurable cancers—a very tiny fraction, to be sure—disappear mysteriously without any treatment and that "many a patient with a tumor pronounced malignant has outlived his physician." I still remember my skepticism when my professor explained to me that such occurrences were known as "spontaneous remissions." For how can any phenomenon in science, which is all about cause and effect, occur spontaneously—especially something as dramatic as the dissolution of a malignant cancer?

When I raised this objection, I was reminded of the basic fact of "biological variability"—that cumulative effects of small individual differences can account for myriad, unexpected responses. But saying that tumor regression arises from variability is not saying a hell of a lot; it's hardly an explanation. Even if it is due to variability, surely we must ask the question, What is the critical variable that causes the regression in any particular patient? For if we could solve that, then we would have ipso facto discovered a cure for cancer! Of course, it may turn out that the remission is the result of a fortuitous combination of several variables, but that doesn't make the problem insoluble; it merely makes it more difficult. So why isn't much more attention being paid by the cancer establishment to these very cases, instead of regarding them as curiosities? Couldn't one study these rare survivors in detail, looking for dues that confer resistance to virulent agents or reapply the brakes to renegade tumor suppressor genes? This strategy has been applied successfully to acquired immunodeficiency syndrome (AIDS) research. The finding that some long-term survivors carry a gene mutation that prevents the virus from invading their immune cells is now being exploited in the clinic.

But now let us return to mind-body medicine. The observation that some cancers occasionally regress spontaneously doesn't necessarily prove that hypnosis or a positive attitude can induce such remissions. We must not commit the blunder of lumping all mysterious phenomena together simply because they are mysterious, for that may be all they have in common. What I need to be convinced is a single proven example of one's mind's directly influencing one's bodily processes, an example that is clear-cut and repeatable.

When I stumbled across the case of Mary Knight, it occurred to me that pseudocyesis or phantom pregnancy might be an example of the kind of connection I was looking for. If the human mind can conjure up something as complex as pregnancy, what else can the brain do to or for the body? What are the limits to mind-body interactions and what pathways mediate these strange phenomena? Remarkably, the delusion of phantom pregnancy is associated with a whole gamut of physiological changes associated with pregnancy—cessation of menstruation, breast enlargement, nipple pigmentation, pica (the desire for strange foods), morning sickness and most remarkable of all—progressive abdominal enlargement and "quickening" culminating in actual labor pains! Sometimes, but not always, there is enlargement of the uterus and cervix, but the radiological signs are negative. As a medical student I learned that even experienced obstetricians can be fooled[2] by the clinical picture unless they are careful and that in the past many a C-section was performed on a patient with pseudocyesis. As Dr. Monroe detected in Mary, the telltale diagnostic sign lies in the belly button. Modern physicians who are familiar with pseudocyesis assume it results from a pituitary or ovarian tumor that causes hormones to be released, mimicking the signs of pregnancy. Tiny, clinically undetectable prolactin secreting tumors (adenomas) of the pituitary could suppress ovulation and menstruation and lead to the other symptoms. But if that were true, why is the condition sometimes reversible? What kind of tumor could explain what happened to Mary Knight? She goes into "labor" and her abdomen shrinks. Then her abdomen gets big again because of the "twin." If a tumor could do all that, it would present an even greater mystery than pseudocyesis.

So what causes pseudocyesis? Cultural factors undoubtedly play a major role[3] and may explain the decline of pseudocyesis from an incidence of one in two hundred in the late 1700s to about one in ten

thousand pregnancies today. In the past, many women felt extreme social pressure to have a baby, and when they felt they were pregnant, there was no ultrasound to disprove the diagnosis. No one could say with certainty, "Look here, there's no foetus." Conversely, pregnant women today submit to round after round of evaluations leaving little room for ambigiuty; confronting the patient with physical evidence of an ultrasound is usually sufficient to dispel the delusion and associated physical changes. The influence of culture on the incidence of pseudocyesis cannot be denied, but what causes the actual physical changes? According to the few studies carried out on this curious affliction of mind and body, the abdominal swelling itself is usually caused by a combination of five factors: an accumulation of intestinal gas, a lowering of the diaphragm, a pushing forward of the pelvic portion of the spine, a dramatic growth of the greater omentum—a pendulous apron of fat that hangs loose in front of the intestines—and in rare cases an actual uterine enlargement. The hypothalamus—a part of the brain that regulates endocrine secretions— may also go awry, producing profound hormonal shifts that mimic nearly all the signs of pregnancy. Furthermore, it's a two-way street: The body's effects on the mind are just as profound as those of the mind on the body, giving rise to complex feedback loops involved in generating and maintaining false pregnancy. For instance, the abdominal distension produced by gas and the woman's "pregnant body posture" might be explained, in part, by classic operant conditioning. When Mary, who wants to be pregnant, sees her abdomen enlarge and feels her diaphragm fall, she learns unconsciously that the lower it falls, the more pregnant she looks. Likewise, a combination of air swallowing (aerophagia) and autonomic constriction of the gastrointestinal sphincters that would increase gas retention could also probably be learned unconsciously. In this manner, Mary's "baby" and its "missing twin" are literally conjured out of thin air through a process of unconscious learning.

So much for the abdominal swelling. But what about the breast, nipple and other changes? The most parsimonious explanation for the whole spectrum of clinical signs you see in pseudocyesis would be that the intense longing for a child and associated depression might reduce levels of dopamine and norepinephrine—the "joy transmitters" in the brain. This in turn could reduce the production of both follicle-stimulating hormone (FSH), which causes ovulation, and a substance called prolactin-inhibition factor.[4] Low levels of these hormones would lead to a cessation of ovulation and menstruation and an elevation of the level of prolactin (the maternal hormone), which causes breast enlargement and lactation, nipple tingling and maternal behavior (although this has yet to be proved in humans), along with an increased production of estrogen and progesterone by the ovaries, contributing to the overall impression of pregnancy. This notion is consistent with the well-known clinical observation that severe depression can stop menstruation—an evolutionary strategy for avoiding a waste of precious resources on ovulation and pregnancy when you are disabled and depressed.

But the cessation of menstruation during depression is common, whereas pseudocyesis is very rare. Perhaps there's something special about the depression of being childless in a child-obsessed culture. If the syndrome occurs only when the depression is associated with fantasies about pregnancy, it raises a fascinating question: How does a highly specific wish or delusion originating in the neocortex get translated by the hypothalamus to induce FSH reduction and prolactin elevation—if that is indeed the cause? And even more puzzling, how do you explain the observation that some patients with

pseudocyesis do not have an elevated prolactin level or that in many patients labor pains begin at exactly nine months? What triggers the labor contractions if there is no growing fetus?
Whatever the ultimate answer to these questions, pseudocyesis provides a valuable opportunity for exploring the mysterious no-man's-land between mind and body.
False pregnancy and labor in women are surprising enough, but there are even a few recorded instances of pseudocyesis in men! The whole gamut of changes—including abdominal swelling, lactation, craving for strange foods, nausea, even labor pains—can occur as an isolated syndrome in some men. But more commonly it is seen in men who empathize deeply with their pregnant spouse, producing the so-called sympathetic pregnancy or couvade syndrome. I have often wondered whether the man's emotional empathy with the pregnant woman (or perhaps pheromones from her) somehow releases prolactin—a key pregnancy hormone—in her husband's brain, causing some of these changes to emerge. (This hypothesis is not as outlandish as it seems; male tamarin marmosets develop an elevated prolactin level when in close proximity to nursing mothers, and this may encourage paternal or filial affection and reduce infanticide.) I am tempted to interview men participating in Lamaze classes and to measure prolactin levels in those who experience some of these couvade-like signs.

Pseudocyesis is dramatic. But is it an isolated, exceptional example of mind-body medicine? I think not. Other stories come to mind, including one I first heard in medical school. A friend said, "Did you know that according to Lewis Thomas you can hypnotizc someone and eliminate their warts?"
"Rubbish," I scoffed.
"No, it's true," she said. "There are documented cases.[5] You get hypnotized and the warts disappear in a few days or sometimes overnight."
Now on the face of it this sounds very silly, but if it's true, it would have far-reaching implications for modern science. A wart is essentially a tumor (a benign cancer) produced by the papilloma virus. If that can be eliminated by hypnotic suggestion, why not cancer of the cervix, which is also produced by the papilloma virus (albeit a different strain)? I am not claiming that this will work—perhaps nerve pathways influenced by hypnosis reach the skin but not the lining of the cervix—but unless we do the relevant experiment, we will never know.
Assuming, for the sake of argument, that warts can be eliminated by hypnosis, the question arises, How can a person simply "think away" a tumor? There are at least two possibilities. One involves the autonomic nervous system—the pathways of nerves that help control blood pressure, sweating, heart rate, urine output, erections and other physiological phenomena not under direct control of conscious thought. These nerves form specialized circuits that service distinct functions in various body segments. Thus some nerves control hair standing on end, others cause sweating and some generate the local constriction of blood vessels. Is it possible that the mind, acting through the autonomic nervous system, could literally asphyxiate the wart by constricting blood vessels in its immediate vicinity, making it shrivel up and wither away? This explanation implies an unexpected degree of precise control by the autonomic nervous system and also implies that the hypnotic suggestion can be "understood" by the autonomic nervous system and transferred to the region of the wart.

The second possibility is that the hypnotic suggestion somehow kick starts the immune system, thereby eliminating the virus. But this would not explain at least one recorded case involving a hypnotized person whose warts vanished on just one side of his body. Why or how the immune system could selectively eliminate warts on one side over another is a mystery that invites further flights of speculation.

A more common example of mind-body interaction involves the interplay between the immune system and perceptual cues from the world around us. Over three decades ago, medical students were often told that an asthmatic attack could be provoked not only by inhaling pollen from a rose but sometimes by merely seeing a rose, even a plastic rose, prompting a so-called conditioned allergic response. In other words, exposure to a real rose and pollen sets up a "learned" association in the brain between the mere visual appearance of a rose and bronchial constriction. How exactly does this conditioning work? How does the message get from the brain's visual areas all the way down to the mast cells lining the bronchi of the lungs? What are the actual pathways involved? Despite three decades of mind-body medicine, we still have no clear answers.

When I was a medical student in the late 1960s, I asked a visiting professor of physiology from Oxford about this conditioning process and whether the conditioned association could be put to clinical use. "If it's possible to provoke an asthmatic attack through conditioning merely by showing a plastic rose to a patient, then theoretically it ought to be possible to abort or neutralize the attack through conditioning as well. For example, say you suffer from asthma and I give you a bronchodilator such as norepinephrine (or perhaps an antihistamine or a steroid) every time I show you a plastic sunflower. You might begin associating the sunflower image with relief from asthma. After some time you could simply carry around a sunflower in your pocket and pull it out to look at when you felt an attack coming on."

At the time, this professor (who later became my mentor) thought this was an ingenious but silly idea, and we both had a good laugh. It seemed far-fetched and whimsical. Thus chastised, I kept my thoughts to myself, wondering privately whether you really could condition an immune response and, if so, how selective this conditioning process could be. For instance, we know that if you inject a person with denatured tetanus bacilli he will soon develop immunity to tetanus, but to keep the immunity "alive" the person needs booster shots every few years. But what would happen if you rang a bell or flashed a green light every time these booster shots were administered? Would the brain learn the association? Could you eventually dispense with the boosters and simply ring a bell and flash a light to stimulate thc selective proliferation of immunologically competent cells, thereby reviving a person's immunity to tetanus? The implications of such a finding for clinical medicine would be enormous.

To this day I curse myself for not trying this experiment. The ideas remained tucked away in my mind until a few years ago, when, as happens so often in science, someone made an accidental discovery, proving that I had missed the boat. Dr. Ralph Ader of McMaster University was exploring food aversion in mice. To induce nausea in the animals, he gave them a nausea-inducing drug, cyclophosphamide, along with saccharin, wondering whether they would display signs of nausea the

next time he gave them the saccharin alone. It worked. As expected, the animals did show food aversion, in this case an aversion to saccharin. But surprisingly, the mice also fell seriously ill, developing all sorts of infections. It is known that the drug cyclophosphamide, in addition to producing nausea, profoundly suppresses the immune system, but why should saccharin alone have this effect? Ader reasoned correctly that the mere pairing of the innocuous saccharin with the immunosuppressive drug caused the mouse immune system to "learn" the association. Once this association is established, every time the mouse encounters the sugar substitute, its immune system will nose-dive, making it vulnerable to infections. Here again is a powerful example of mind affecting body, one that is hailed as a landmark in the history of medicine and immunology.[6]

I mention these examples for three reasons. First, don't listen to your professors—even if they are from Oxford (or as my colleague Semir Zeki would say, especially if they are from Oxford). Second, they illustrate our ignorance and illuminate the need for conducting experiments on topics that most people have ignored for no obvious reason; patients who manifest odd clinical phenomena are only one example. Third, perhaps it's time to recognize that the division between mind and body may be no more than a pedagogic device for instructing medical students—and not a useful construct for understanding human health, disease and behavior. Contrary to what many of my colleagues believe, the message preached by physicians like Deepak Chopra and Andrew Weil is not just New Age psychobabble. It contains important insights into the human organism— ones that deserve serious scientific scrutiny.

People have become increasingly impatient with Western medicine's sterility and lack of compassion, and this would explain the current resurgence of "alternative medicine." But unfortunately, even though the remedies touted by New Age gurus have a ring of plausibility, they are rarely subjected to rigorous tests.[7] We have no idea which ones (if any) work and which ones do not, although even the hardened skeptic would agree that there is probably something interesting going on. If we are to make any headway, we need to test these claims carefully and explore the brain mechanisms that underlie such effects. The general principle of immune conditioning has been clearly established, but can you pair different sensory stimuli with different types of immune responses (for example, a bell with a response to typhoid and a whistle to cholera), or is the phenomenon more diffuse—involving only a general boosting of all your immune functions? Does the conditioning affect the immunity itself or only the subsequent inflammatory response to the provoking agent? Does hypnosis tap into the same pathway as placebos?[8] Until we have clear answers to these questions, Western medicine and alternative medicine will always remain parallel enterprises with no points of contact between them.

So with all this evidence staring them in the face, why do practitioners of Western medicine continue to ignore the many striking examples of direct links between mind and body?

To understand why, it helps to have a feel for how scientific knowledge progresses. Most of the day-to-day progress of science depends on simply adding another brick to the great edifice—a rather humdrum activity that the late historian Thomas Kuhn called "normal science." This corpus of knowledge, incorporating a number of widely accepted beliefs, is, in each instance, called a "paradigm." Year after year new observations come along and are assimilated into an existing standard

model. Most scientists are bricklayers, not architects; they are happy simply adding another stone to the cathedral.

But sometimes the new observation simply doesn't fit. It is an "anomaly," inconsistent with the existing structure. The scientist can then do one of three things. First, he can ignore the anomaly, sweeping it under the carpet—a form of psychological "denial" that is surprisingly common even among eminent researchers.

Second, scientists can make minor adjustments to the paradigm, trying to fit the anomaly into their worldview, and this would still be a form of normal science. Or they can generate ad hoc auxiliary hypotheses that sprout like so many branches from a single tree. But soon these branches become so thick and numerous that they threaten to topple the tree itself.

Finally, they can tear down the edifice and create a completely new one that bears very little resemblance to the original. This is what Kuhn called a "paradigm shift" or scientific revolution.

Now, there are many examples in the history of science of anomalies that were originally ignored as being trivial or even fraudulent but later turned out to be of fundamental importance. This is because the vast majority of scientists are conservative by temperament and when a new fact emerges that threatens to topple the great edifice, the initial reaction is to ignore or deny it. This is not as silly as it seems. Since most anomalies turn out to be false alarms, it is not a bad strategy to play it safe and ignore them. If we tried to accommodate every report of alien abduction or spoon bending into our framework, science would not have evolved into the immensely successful and internally consistent body of beliefs that it is today. Skepticism is as much a vital part of the whole enterprise as the revolutions that make newspaper headlines.

Consider the periodic table of elements, for example. When Mendeleyev arranged elements sequentially according to their atomic weights to create the periodic table, he found that some elements didn't quite "fit"—their atomic weights seemed wrong. But instead of discarding his model, he chose to ignore the anomalous weights, concluding instead that perhaps they had been measured incorrectly to begin with. And sure enough, it was later discovered that the accepted atomic weights were wrong because the presence of certain isotopes distorted the measurements. There is much truth to Sir Arthur Eddington's famously paradoxical remark "Don't believe the results of experiments until they're confirmed by theory."

But we must not ignore every anomaly, since some of them have the potential for driving paradigm shifts. Our wisdom lies in being able to tell which anomaly is trivial and which one is a potential gold mine. Unfortunately, there's no simple formula for distingiushing trivia from gold, but as a rule of thumb, if an odd, inconsistent observation has been lying around for ages and has not been empirically confirmed despite repeated honest attempts, then it is probably a trivial one. (I regard telepathy and repeated Elvis sightings as belonging to this category.) On the other hand, if the observation in question has resisted several attempts at disproof and is regarded as an oddity *solely* because it resists explanation in terms of our current conceptual scheme, then you are probably looking at a genuine anomaly.

One famous example is continental drift. Around the turn of this century (1912), the German meteorologist Alfred Wegener noticed that the east coast of South America and the west coast of

Africa "fit" neatly together like the pieces of a giant jigsaw puzzle. He also noticed that fossils of a small freshwater reptile "mesosaurus" were found in only two parts of the earth—in Brazil and in West Africa. How could a freshwater lizard swim across the Atlantic, he wondered? Is it conceivable that in the distant past these two continents were in fact parts of a single large landmass that had subsequently split and drifted apart? Obsessed with this idea, he sought additional evidence and found it in the form of dinosaur fossils scattered in identical rock strata, again in the west coast of Africa and the east coast of Brazil. This was compelling evidence indeed, but surprisingly it was rejected by the entire geological establishment, who argued that the dinosaurs must have walked across an ancient and now submerged land bridge connecting the two continents. As recently as 1974, at St. John's College in Cambridge, England, a professor of geology shook his head when I mentioned Wegener. "A lot of rot," he said with exasperation in his voice.

Yet we now know that Wegener was right. His idea was rejected simply because there was no mechanism that people could conceive of that would cause whole continents to drift. If there's one thing we all regard as axiomatic, it is the stability of terra firma. But once plate tectonics—the study of rigid plates moving about on a hot gooey mantle below—was discovered, Wegener's idea became credible and won universal acceptance.

The moral of this tale is that you should not reject an idea as outlandish simply because you can't think of a mechanism that explains it. And this argument is valid whether you are talking about continents, heredity, warts or pseudocyesis. After all, Darwin's theory of evolution was proposed and widely accepted long before the mechanisms of heredity were clearly understood.

A second example of a genuine anomaly is multiple personality disorder or MPD, which in my view may turn out to be just as important for medicine as continental drift was for geology. To this day MPD continues to be ignored by the medical community even though it provides a valuable testing ground for the claims of mind-body medicine. In this syndrome—immortalized by Robert Louis Stevenson in Dr. Jekyll and Mr. Hyde—a person can assume two or more distinct personalities, each of which is completely unaware, or only dimly aware, of the others. Again, there have been occasional reports in the clinical literature that one personality can be diabetic while the other is not, or that various vital signs and hormone profiles can be different in the two personalities. There is even a claim that one personality can be allergic to a substance while the other is not and that one might be myopic—or nearsighted— whereas the other has 20/20 vision.[9]

MPD defies common sense. How can two personalities dwell in one body? In Chapter 7, we learned that the mind is constantly struggling to create a coherent belief system from a multiplicity of life experiences. When there are minor discrepancies, you usually readjust your beliefs or engage in the kinds of denials and rationalizations that Sigmund Freud talked about. But consider what might happen if you held two sets of beliefs—each internally consistent and rational—but these two sets were completely in conflict with one another? The best solution might be to balkanize the beliefs, to wall them off from each other by creating two personalities.

There is of course an element of this "syndrome" in all of us. We talk about whore/madonna fantasies and say things like "I was of two minds," "I'm not feeling myself today" or "He's a different person when you're around." But in some rare instances, it's possible that this schism becomes literal so that

you end up with two "separate minds." Assume that one set of beliefs says, "I am Sue, the sexy woman who lives on 123 Elm Street in Boston, goes to bars at night to pick up studs, drinks straight shots of Wild Turkey and has never bothered to get an AIDS test." Another says, "I arn Peggy, the bored housewife who lives on 123 Elm Street in Boston, watches TV at night, drinks nothing stronger than herbal tea and goes to the doctor for every minor ailment." These two stories are so different that they obviously refer to two different people. But Peggy Sue has a problem: She is both of these people. She occupies one body, indeed one brain! Perhaps the only way for her to avoid internal civil war is to "split" her beliefs into two clusters, like soap bubbles, resulting in the strange phenomenon of multiple personalities.

According to many psychiatrists, some cases of MPD are a consequence of childhood sexual or physical abuse. The child, growing up finds the abuse so emotionally intolerable that she gradually walls it off into Sue's world, not Peggy's. What is truly remarkable, though, is that to keep the illusion going, she actually invests each personality with different voices, intonations, motivations, mannerisms and even different immune systems—almost two bodies, one is tempted to say. Perhaps she needs such elaborate devices to keep these minds separate and avoid the ever-present danger of having them coalesce and create unbearable internal strife.

I would like to carry out experiments on people like Peggy Sue but have thus far been thwarted by the lack of what I would call a clear-cut case of MPD. When I telephone friends in psychiatry, asking for names of patients, they tell me that they have seen such patients but most of them have several personalities rather than just two. One apparently had nineteen "alters" inside him. Claims of this sort have made me deeply suspicious of the whole phenomenon. Given limited time and resources, a scientist always has to strike a balance between wasting time on tenuous and unrepeatable "effects" (such as cold fusion, poly-water or Kirlian photography) and being open-minded (keeping in mind the lessons from continental drift or asteroid impacts). Perhaps the best strategy is to focus only on claims that are relatively easy to prove or disprove.

If I ever locate an MPD patient with just two personalities, I intend to eliminate doubt by sending the person two bills. If he pays both, I'll know he's for real. If he doesn't, I'll know he's a fake. In either case I can't lose.

On a more serious note, it would be interesting to carry out systematic studies on immune function when the patient is in the two different states by measuring specific aspects of the immune response (such as cytokine production by lymphocytes and monocytes and interleukin production by T cells provoked by mitogens—factors that stimulate cell division). Such experiments may seem tedious and esoteric, but only by doing them can we achieve the right blend of East and West and create a new revolution in medicine. Most of my professors scoffed at ancient “touchy-feely" Hindu practices such as Ayurvedic medicine, Tantra and meditation. Yet ironically, some of the most potent drugs we now use can trace their ancestry to ancient folk remedies such as willow bark (aspirin), digitalis and reserpine. Indeed, it has been estimated that over 30 percent of drugs used in Western medicine are derived from plant products. (If you think of molds—antibiotics—as "herbs," the percentage is even higher. In ancient Chinese medicine, mold was often rubbed into wounds.)

The moral of all this is not that we should have blind faith in the "Wisdom of the East" but that there are sure to be many nuggets of insight in these ancient practices. However, unless we conduct systematic "Western-style" experiments, we'll never know which ones really work (hypnosis and meditation) and which ones don't (crystal healing). Several laboratories throughout the world are poised to launch such experiments, and the first half of the next century will, in my view, be remembered as a golden age of neurology and mind-body medicine. It will be a time of great euphoria and celebration for novice researchers entering the field.

Ramachandran's Footnotes (pp. 294-296)

1. This story is a reconstruction based on a case originally described by Silas Weir Mitchell. See Bivin and Klinger, 1937.
2. Christopher Wills told me the story of an eminent professor of obstetrics who was fooled by a patient sufficiently that he actually presented her as a case of normal pregnancy to his residents and medical students during Grand Rounds. The students promptly elicited all the classic symptoms and signs of pregnancy in the unfortunate lady. They even claimed to hear the fetal heartbeat with their gleaming new stethoscopes—until one student remembered the "protruding umbilicus" sign and risked embarrassing her professor by revealing the correct diagnosis.
3. Pseudocyesis is a fossil disease, so rare that one hardly sees it anymore. The condition was first described by Hippocrates in 300 B.C. It afflicted Mary Tudor, queen of England, who was falsely pregnant twice, with one episode lasting thirteen months. Anna O., one of Freud's most famous patients, suffered through a false pregnancy. And the more recent medical literature even describes two transsexuals who experienced it! For recent work on pseudocyesis, see Brown and Barglow, 1971, and Starkman et al., 1985.
4. Follicle-stimulating hormone (FSH), luteinizing hormone (LH) and prolactin are produced by the anterior pituitary; they regulate the menstrual cycle and ovulation. FSH causes the initial ripening of the ovarian follicle and LH causes ovulation. The combined action of FSH and LH augments the release of estrogen by the ovaries and later of both estrogen and progesterone by the corpus luteum (what remains of the follicle after release of the egg). Last, prolactin also acts on the corpus luteum, causing it to secrete estrogen and progesterone and preventing it from becoming involuted (and therefore preventing subsequent menstruation if the ovum is fertilized).
5. For the effects of suggestion on warts, see Spanos, Stenstrom and Johnston, 1988. For a report on unilateral wart remission, see Sinclair-Gieben and Chalmers, 1959.
6. See Ader, 1981, and Friedman, Klein and Friedman, 1996.
7. Hypnosis is a good example. Its a topic that's sometimes taught even in the most conservative medical establishments, and yet every time the word is mentioned at scientific meetings, there is an uncomfortable shuffling of feet. Even though hypnosis has a venerable tradition going all the way back to one of the founding fathers of modern neurology, Jean Martin Charcot, it seems to enjoy a curious dual reputation, being accepted as real on the one hand and yet also regarded as the orphan child of "fringe medicine." Charcot claimed that if the right side of a normal person's body is temporarily paralyzed as the result of a hypnotic suggestion, then that person also has problems with

language, suggesting that the trance is actually inhibiting brain mechanisms in the left hemisphere (recall that language is in the left). A similar trance-induced paralysis of the left side of the body does not produce language problems. We have tried replicating this result in our lab, without success.

The key question about hypnosis is whether it is simply an elaborate form of "role playing" (in which you temporarily suspend disbelief as you do while watching a horror movie) or whether it is a fundamentally different mental state.

Richard Brown, Eric Altschuler, Chris Foster and I have begun to try to answer this question using a technique called Stroop interference. The words "red" and "green" are printed either in the correct color (red ink for the word "red," green for "green") or with the colors reversed (the word "green" in red ink). If a normal subject is asked just to name the color of the ink and ignore the word, he is slowed down considerably if the word and color don't match. He's apparently unable voluntarily to ignore the word, and so the word interferes widh color naming (Stroop interference). Now the question arises, What would happen if you implanted the hypnotic suggestion in the subject's mind that he's a native Chinese who can't read the English alphabet but can still name colors? Would this suddenly eliminate Stroop interference? This test would prove once and for all that hypnosis is real—not play-acting—for there is no way a subject can voluntanly ignore the word. (As a "control" one could simply offer him a large cash reward for voluntarily overcoming the interference.)

8. The placebo response is a much maligned but poorly understood phenomenon. Indeed, the phrase has come to acquire a pejorative connotation in clinical medicine. Imagine that you are testing a new pain-killing drug for back pain. Assume also that no one gets better spontaneously. To determine the efficacy of the drug, you give the pills to one hundred patients and find that, say, ninety patients get better. In a controlled clinical trial, it is customary for the comparison group of one hundred patients to receive a dummy pill—a placebo—(of course, the patient doesn't know this) to see what proportion of them, if any, get better simply as a result of the belief in the drug. If only 50 percent get better (instead of 90 percent), we are justified in concluding that the drug is indeed an effective painkiller.

But now let us turn to the mysterious 50 percent who got better as a result of the "placebo." Why did they get better? It was shown about a decade ago that these patients actually release painkilling chemicals, called endorphins, in their brains (indeed, in some cases the effect of the placebo can be counteracted by naloxone, a drug that blocks endorphins).

A fascinating but largely unexplored question concerns the specificity of the placebo response, and our laboratory has recently become very interested in this issue. Recall that only 50 percent got better from taking the placebo. Is this because there is something special about this group? What if the same one hundred patients (treated with a placebo for pain) went on to develop depression a few months later and you were to give a "new" placebo—telling them that it was a powerful new antidepressant? Would the same fifty patients get better, or would a new set of patients show improvement, overlapping only partially with the first set? In other words, is there such a thing as a "placebo responder"? Is the response specific to the malady, the pill, the person or all three? Indeed, consider what would happen if the same one hundred patients once again developed pain a year later and again you gave them the original placebo "painkiller." Would the same fifty get better or would it be a new group of patients? Dr. Eric Altschuler and I are presently conducting such a study.

Other aspects of placebo specificity also remain to be investigated. Imagine that a patient simultaneously develops a migraine and an ulcer—and you give him a placebo that you tell him is a new "anti-ulcer drug." Then would only the ulcer pain go away (assuming that he is a "placebo responder"), or would his brain become so flushed with endorphins that the migraine pain would also disappear as a bonus? This sounds unlikely, but if anti-pain neurotransmitters, such as endorphins, are released diffusely in his brain, then he may also get relief from his other aches and pains even though his belief pertains only to the ulcer. The question of how sophisticated beliefs are translated and understood by primitive brain mechanisms concerned with pain is a fascinating one.

9. For a review of multiple personality disorders, see Birnbaum and Thompson, 1996.

For ocular changes, see Miller, 1989.