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WHERE DOES THE POWER IN
WILLPOWER COME FROM?

Whether or not ingestion of food stuffs with preservatives and sugar in high content causes you to alter your personality somehow, or causes you to act in an aggressive manner, I don't know. I'm not going to suggest to you for a minute that that occurs. But there is a minority opinion in psychiatric fields that there is some connection.

—Defense's closing argument in the trial of Dan White, the murderer whose taste for junk food inspired the term "Twinkie defense"

I have terrible PMS, so I just went a little crazy.

—Actress Melanie Griffith, explaining why she had filed for divorce from Don Johnson only to immediately withdraw it

If willpower isn't just a metaphor, if there is a power driving this virtue, where does it come from? The answer emerged by accident from a failed experiment inspired by Mardi Gras and the other carnivals held on the eve of Lent. Mardi Gras means Fat Tuesday, the

day before Ash Wednesday, when people prepare for a season of fasting and self-sacrifice by shamelessly indulging their desires. In some places it's known as Pancake Day and begins with all-you-can-eat flapjack breakfasts at churches. Bakers honor the occasion by producing special treats—the names of the delicacies vary from culture to culture, but the recipes generally involve gargantuan quantities of sugar, eggs, flour, butter, and lard. And the gluttony is just the beginning.

From Venice to New Orleans to Rio de Janeiro, revelers move on to more interesting vices, sometimes under the cover of traditional masks, but often just letting it all hang out. It's the one day you can strut down the street with a beaded headdress and nothing else, proudly parading to cheers from drunks. Losing self-control becomes a virtue. In Mexico, married men are officially granted one day of liberty from their obligations on what's called *El Día del Marido Oprimido*—the day of the oppressed husband. On the eve of Lent, even the sternest Anglo-Saxon churchgoers are in a forgiving mood. They call it Shrove Tuesday, derived from the verb *shrive*, which means "to receive absolution for sins."

It's all rather confusing from a theological standpoint. Why would the clergy encourage public vice with a package of preapproved absolution? Why reward premeditated sinning? Why would a merciful, benevolent god encourage so many already overweight mortals to stuff themselves with deep-fried dough?

But to psychologists there was a certain logic to it: By relaxing before Lent, perhaps people could store up the willpower necessary to sustain themselves through weeks of self-denial. The Mardi Gras theory, as it was known, was never as popular with scientists as it was with pancake eaters in peacock headdresses, but it seemed worth an experiment. In place of a Fat Tuesday breakfast, the chefs in Baumeister's lab whipped up lusciously thick ice cream milkshakes for a group of subjects who were resting in between two laboratory tasks requiring willpower. Meanwhile, the less fortunate subjects in other

groups had to spend the interval reading dull, out-of-date magazines or drinking a large, tasteless concoction of low-fat dairy glop that was rated even less enjoyable than the old magazines.

Just as predicted by the Mardi Gras theory, the ice cream did seem to strengthen willpower by helping people perform better than expected on the next task. Fortified by the milkshake, they had more self-control than did the unlucky subjects who'd been stuck reading the old magazines. So far, so good. But it turned out that the joyless drink of glop worked just as well, which meant that building willpower didn't require happy self-indulgence. The Mardi Gras theory looked wrong. Besides tragically removing an excuse for romping through the streets of New Orleans, the result was embarrassing for the researchers. Matthew Gailiot, the graduate student who had run the study, stood looking glumly at his shoes as he told Baumeister about the fiasco.

Baumeister tried to be optimistic. Maybe the study wasn't a failure. Something *had* happened, after all. They'd succeeded in eliminating the ego-depletion effect. The problem was that they'd succeeded too well. Even the tasteless milkshake had done the job, but how? The researchers began to consider another possible explanation for the boost in self-control. If it wasn't the pleasure, could it be the calories?

At first the idea seemed a bit daft. Why should drinking some low-fat dairy concoction improve performance on a lab task? For decades, psychologists had been studying performance on mental tasks without worrying about its being affected by a glass of milk. They liked to envision the human mind as a computer, focusing on the way it processed information. In their eagerness to chart the human equivalent of the computer's chips and circuits, most psychologists neglected one mundane but essential part of the machine: the power cord.

Chips and circuit boards are useless without a source of energy. So is the brain. It took psychologists a while to realize this, and the

realization came not from computer models but from biology. The transformation of psychology based on ideas from biology was one of the major developments of the late twentieth century. Some researchers found that genes had important effects on personality and intelligence. Others began to show that sexual and romantic behavior conformed to predictions from evolutionary theory and resembled aspects of behavior in many animal species. Neuroscientists began to map out brain processes. Others found out how hormones altered behavior. Psychologists were reminded over and over that the human mind exists in a biological body.

This newly emerging emphasis on biology made the milkshake experimenters think twice before dismissing their results. Before writing off that dairy glop, they figured, maybe they should take a look at its ingredients, and start paying attention to stories from people like Jim Turner.

Brain Fuel

The comedian Jim Turner has played dozens of roles in films and television series, like the football-star-turned-sports-agent on HBO's *Arli\$* series, but his most dramatic performance was reserved for his wife. It occurred the night he had a dream in which he was responsible for righting all the world's wrongs. It was an exhausting duty, even in a dream, but then he discovered teleportation. To travel anywhere, all he had to do was think of the place, and he'd magically appear there. He went back to his old home in Iowa, to New York, to Greece, even to the moon. When he woke up, he was convinced he still possessed this power. He generously tried to teach it to his wife by shouting over and over, "You think it, you go there and you be there!"

His wife had a better plan. Knowing he was diabetic, she tried to get him to drink some fruit juice. He was still so crazed that he poured some of it over his face, got up, and then demonstrated his

power by doing a somersault in the air and landing back on the bed. Finally, much to her relief, the juice kicked in, and he calmed down—or at least that was how it looked to his wife, as if the manic frenzy had subsided. But in fact he hadn't been sedated. Quite the reverse: The juice's sugar had given him extra energy.

More precisely, the energy in the juice was converted to glucose, the simple sugar manufactured in the body from all kinds of foods, not just sweet ones. The glucose produced by digestion goes into the bloodstream and is pumped throughout the body. The muscles, not surprisingly, use plenty of glucose, as do the heart and liver. The immune system uses large quantities, but only sporadically. When you're relatively healthy, your immune system may use only a relatively small amount of glucose. But when your body is fighting off a cold, it may consume gobs of it. That's why sick people sleep so much: The body uses all the energy it can to fight the disease, and it can't spare much for exercising, making love, or arguing. It can't even do much thinking, a process that requires plentiful glucose in the bloodstream. The glucose itself doesn't enter the brain, but it's converted into neurotransmitters, which are the chemicals that your brain cells use to send signals. If you ran out of neurotransmitters, you'd stop thinking.

The link between glucose and self-control appeared in studies of people with hypoglycemia, the tendency to have low blood sugar. Researchers noted that hypoglycemics were more likely than the average person to have trouble concentrating and controlling their negative emotions when provoked. Overall, they tended to be more anxious and less happy than average. Hypoglycemia was also reported to be unusually prevalent among criminals and other violent persons, and some creative defense attorneys brought the low-blood-sugar research into court.

The issue became notorious during the 1979 trial of Dan White for the assassination of two city officials in San Francisco, Mayor George Moscone and Harvey Milk, a member of the board of supervi-

sors and the most prominent openly gay politician in America. When a psychiatrist testifying for the defense cited White's consumption of Twinkies and other junk food in the days before the murders, journalists mocked White for trying to excuse himself with a "Twinkie defense." In fact, White's chief defense wasn't based on the argument that the Twinkies turned him murderous by causing his blood-sugar levels to quickly spike and then crash. His attorneys argued that he deserved mercy because he suffered from "diminished capacity" due to severe depression, and they presented his junk-food consumption (along with other changes in habits) as evidence of his depression, not as the cause of it. But when White received a relatively light sentence, the popular wisdom became that the Twinkie defense had worked, and the public was understandably outraged.

Other defense attorneys actually did argue, with limited success, that their clients' blood-sugar problems should be taken into account. Whatever the legal or moral merits of that argument, there certainly was scientific data showing a correlation between blood sugar and criminal behavior. One study found below-average glucose levels in 90 percent of the juvenile delinquents recently taken into custody. Other studies reported that people with hypoglycemia were more likely to be convicted of a wide variety of offenses: traffic violations, public profanity, shoplifting, destruction of property, exhibitionism, public masturbation, embezzlement, arson, spouse abuse, and child abuse.

In one remarkable study, researchers in Finland went into a prison to measure the glucose tolerance of convicts who were about to be released. Then the scientists kept track of which ones went on to commit new crimes. Obviously there are many factors that can influence whether an ex-con goes straight: peer pressure, marriage, employment prospects, drug use. Yet just by looking at the response to the glucose test, the researchers were able to predict with greater than 80 percent accuracy which convicts would go on to commit violent crimes. These men apparently had less self-control because of

their impaired glucose tolerance, a condition in which the body has trouble converting food into usable energy. The food gets converted into glucose, but the glucose in the bloodstream doesn't get absorbed as it circulates. The result is often a surplus of glucose in the bloodstream, which might sound beneficial, but it's like having plenty of firewood and no matches. The glucose remains there uselessly, rather than being converted into brain and muscle activity. If the excess glucose reaches a sufficiently high level, the condition is labeled diabetes.

Most diabetics aren't criminals, obviously. Most keep themselves and their glucose levels under control by monitoring themselves and using insulin when necessary. Like Jim Turner, one of the rare actors to make a good living in Hollywood, they can succeed in the most difficult endeavors. But they do face above-average challenges, particularly if they don't monitor themselves carefully. Researchers testing personality have found that diabetics tend to be more impulsive and have more explosive temperaments than other people their age. They're more likely to get distracted while working on a time-consuming task. They have more problems with alcohol abuse, anxiety, and depression. In hospitals and other institutions, diabetics throw more tantrums than other patients. In everyday life, stressful conditions seem to be harder on diabetics. Coping with stress typically takes self-control, and that's difficult if your body isn't providing your brain with enough fuel.

Jim Turner deals with his self-control problems directly—and hilariously—in a one-man show titled “Diabetes: My Struggles with Jim Turner.” He recalls moments like the argument with his teenage son that ended with him, ostensibly the adult, getting so mad that he went outside and kicked a permanent dent into the family car. “There are many times,” Turner says, “when my son can see that I am not in control, when he has to force me to drink some juice, when he is afraid that I am just not there.”

Turner doesn't use any version of the Twinkie defense to excuse

the dent, and he doesn't feel sorry for himself, either. On the whole, he keeps his diabetes under control, and says the disease hasn't stopped him from being happy and fulfilling his dreams (except for that one about teleportation). But he also recognizes the emotional consequences of glucose. “There are so many little moments of connection that I have missed,” he says, “that I wasn't available to my son because I was busy dealing with a low-blood-sugar episode and too overwhelmed trying to figure out what was going on. It's the single biggest heartbreak of this disease.”

What exactly happens to Turner during those moments? You can't draw definitive conclusions from any anecdote or even from the large studies showing above-average problems with self-control among diabetics and other groups of people. Correlation is not causation. In social science, the strongest conclusions are permitted only when researchers use experiments that randomly assign people among different treatment conditions, so that individual differences even out. Some people arrive at the experiment happier than others, or more aggressive, or more preoccupied and distracted. There is no way to guarantee that the average person in one experimental condition is the same as the average person in another experimental condition, except by counting on the law of averages. If the researchers randomly assign people among treatment and control groups, the differences tend to average out.

For example, if you wanted to test the effects of glucose on aggression, you would have to consider that some people are already aggressive while others are peaceful and gentle. To show that glucose caused the aggressiveness, you'd want about an equal number of aggressive people in the glucose and in the no-glucose conditions, and also equal numbers of pacifists. Random assignment usually does this pretty well. Once you've got representative groups of people, you can see how they're affected by different treatments.

Nutritionists used this method during food experiments at elementary schools. All the children in a class were told to skip

breakfast one morning, and then, by random assignment, half of the children were given a good breakfast at school. The others got nothing. During the first part of the morning, the children who got breakfast learned more and misbehaved less (as judged by monitors who didn't know which children had eaten). Then, after all the students were given a healthy snack in the middle of the morning, the differences disappeared as if by magic.

The magic ingredient was isolated in other experiments by measuring glucose levels in people before and after doing simple tasks, like watching a video in which a series of words flashed at the bottom of the screen. Some people were told to ignore the words; others were free to relax and watch however they wanted. Afterward, glucose levels were measured again, and there was a big difference: Levels remained constant in the relaxed viewers but dropped significantly in the people who'd been trying to avoid the words. That seemingly small exercise of self-control was associated with a big drop in the brain's fuel of glucose.

To establish cause and effect, the researchers tried refueling the brain in a series of experiments involving lemonade mixed either with sugar or with a diet sweetener. The strong taste of the lemon made it hard for the tasters to know whether real sugar or diet sweetener was used. The sugar gave them a quick burst of glucose (though not for long, so the experimenters needed to get to the point pretty soon). The diet sweetener didn't furnish any glucose or, indeed, any nutrition at all.

The effects of the drinks showed up clearly in a study of aggression among people playing a computer game. At first, the game seemed reasonable, but it soon became impossibly difficult. Everyone got frustrated as the game went on, but the one who got a sugar-filled drink managed to grumble quietly and keep playing. The others started cursing aloud and banging the computer. And when by prearranged script the experimenter made an insulting remark about their

performance, the glucose-deprived people were much more likely to get angry.

No glucose, no willpower: The pattern showed up time and again as researchers tested more people in more situations. They even tested dogs. While self-control is a distinctively human trait, in the sense that we've developed it so extensively in the process of becoming cultural animals, it's not unique to our species. Other social animals require at least some degree of self-control to get along with one another. And dogs, because they live with humans, must often learn to bring their behavior into line with what must seem to them to be absurd and arbitrary rules, like the ban on sniffing the crotches of houseguests (at least the human ones).

To mimic the human studies, the experimenters first depleted the willpower of one group of dogs by having each dog obey "sit" and "stay" commands from its owner for ten minutes. A control group of dogs was simply left alone for ten minutes in cages, where they had no choice but to remain and therefore didn't have to exercise any self-control. Then all the dogs were given a familiar toy with a sausage treat inside it. All the dogs had played with this toy in the past and successfully extracted the treat, but for the experiment the toy was rigged so that the sausage could not be extracted. The control group of dogs spent several minutes trying to extract it, but the dogs who'd had to obey the commands gave up in less than a minute. It was the familiar ego-depletion effect, and the canine cure turned out to be familiar, too. In a follow-up study, when the dogs were given different drinks, the drinks with sugar restored the willpower of the dogs who'd had to obey the commands. Newly fortified, they persisted with the toy just as long as the dogs who'd been in cages. The artificially sweetened drink had no effect, as usual.

Despite all these findings, the growing community of brain researchers still had some reservations about the glucose connection. Some skeptics pointed out that the brain's overall use of energy

remains about the same regardless of what one is doing, which doesn't square easily with the notion of depleted energy. Among the skeptics was Todd Heatherton, who had worked with Baumeister early in his career and eventually wound up at Dartmouth, where he became a pioneer of what is called social neuroscience: the study of links between brain processes and social behavior. He believed in ego depletion, but the glucose findings just didn't seem to add up.

Heatherton decided on an ambitious test of the theory. He and his colleagues recruited dieters and measured their reactions to pictures of food. Then ego depletion was induced by asking everyone to refrain from laughing while watching a comedy video. After that, the researchers again tested how their brains reacted to pictures of food (as compared with nonfood pictures). Earlier work by Heatherton and Kare Demos had shown that these pictures produce various reactions in key brain sites, such as the nucleus accumbens and the amygdala. These same reactions were found again. Among dieters, depletion caused an increase in activity in the nucleus accumbens and a corresponding decrease in the amygdala. The crucial change in this experiment involved a manipulation of glucose. Some people drank lemonade sweetened with sugar, which sent glucose flooding through the bloodstream and presumably into the brain.

Dramatically, Heatherton announced the results during his speech accepting the leadership of the Society for Personality and Social Psychology, the world's largest group of social psychologists. In his presidential address at the annual meeting in 2011 in San Antonio, Heatherton reported that the glucose reversed the brain changes wrought by depletion—a finding, he said, that thoroughly surprised him. (Baumeister, sitting in the audience to watch his protégé enjoy the moment of glory as society president, recalled his own surprise when his own lab had first found the links to glucose.) Heatherton's results did much more than provide additional confirmation that glucose is a vital part of willpower. They helped resolve the puzzle over how glucose could work without global changes in the brain's total

energy use. Apparently ego depletion shifts activity from one part of the brain to another. Your brain does not stop working when glucose is low. It stops doing some things and starts doing others. That may help explain why depleted people feel things more intensely than normal: Certain parts of the brain go into high gear just as others taper off.

As the body uses glucose during self-control, it starts to crave sweet things to eat—which is bad news for people hoping to use their self-control to avoid sweets. When people have more demands for self-control in their daily lives, their hunger for sweets increases. It's not a simple matter of wanting all food more—they seem to be specifically hungry for sweets. In the lab, students who have just performed a self-control task eat more sweet snacks but not other (salty) snacks. Even just expecting to have to exert self-control seems to make people hungry for sweet foods.

All these results don't offer a rationale for providing sugar fixes to anyone, human or canine, outside the laboratory. The body may crave sweets as the quickest way to get energy, but low-sugar, high-protein foods and other nutritious fare work just as well (albeit more slowly). Still, the discovery of the glucose effect does point to some useful techniques for self-control. It also offers a solution to a long-standing human mystery: Why is chocolate so appealing on certain days of the month?

Inner Demons

Whatever you think of Jennifer Love Hewitt's acting ability, you have to give her credit for originality when she was cast in a film version of "The Devil and Daniel Webster." She shared star billing with Anthony Hopkins and Alec Baldwin, which would have been a daunting enough proposition for any young actress, but she also had the challenge of playing the Devil. If your goal, as drama coaches say,

is to "inhabit the character," a demon poses more difficulties than, say, a police officer. You can't do field research by riding around in a squad car with Satan. But Hewitt came up with an alternative method of role prep.

"I started paying close attention to myself and how I felt when I had PMS," she said. "That's what formed my basis for playing Satan."

If that strikes you as a singularly dark view of premenstrual syndrome, you haven't spent much time at PMSCentral.com and the other Web sites where women swap remedies and stories. They joke that PMS stands for Psychotic Mood Shift, or simply Pass My Shotgun. Or they share genuine PMS stories like this one:

It ruins a large portion of my life. I have swollen, puffy eyes, I can't think straight, I make wrong decisions, ugly emotional outbursts, irrational thinking, purchases I have to return, overspending, quit jobs, extremely tired, cranky, crying, extreme emotional sensitivity, body aches all over, nerve pain, blank staring, that "not here" feeling.

PMS has been blamed for everything from chocolate binges (it also stands for Provide Me with Sweets) to murder. After Marg Helgenberger, a star on the *CSI* television show, was photographed at an awards dinner with oddly colored hair, she explained: "That shade was known as 'PMS Pink.' I was totally PMSing that day. I was crazy! What did I think, I was gonna get away with pink hair on *CSI*?" The word *crazy* was also used by Melanie Griffith in diagnosing the PMS stare that drove her to file for divorce and then abruptly change her mind, although her publicist preferred to use more clinical terms, calling it "an impulsive act that occurred during a moment of frustration and anger." Over and over, women describe being mysteriously overcome by impulses that seem weirdly alien.

These dark mood swings have also mystified scientists. To evolutionary psychologists, it seems especially counterproductive for a

woman in her childbearing years not to get along with the people around her. Isn't empathy a crucial skill for raising children? Isn't it useful to maintain good relations with a mate providing child support? Some scientists, noting that a woman reaches this premenstrual phase of the cycle only if she wasn't impregnated during the earlier ovulation phase, have speculated that natural selection favored women who became dissatisfied with infertile men, thereby liberating themselves to seek another mate. That hypothesis certainly jibes with another name that women give to PMS: Pack My Stuff. But it's not clear that the evolutionary benefits would have outweighed the costs, or that such selective pressures even operated on the ancient savanna. For our hunter-gatherer ancestors, PMS was presumably less of a problem because women spent more of their lives either being pregnant or breast-feeding children.

In any case, there's now a solid physiological explanation for PMS that doesn't involve any mysterious alien impulses. During this premenstrual part of the cycle, which is called the luteal phase, the female body starts channeling a high amount of its energy to the ovaries and to related activities, like producing extra quantities of female hormones. As more energy and glucose are diverted to the reproductive system, there's less available for the rest of the body, which responds by craving more fuel. Chocolate and other sweets are immediately appealing because they provide instant glucose, but any kind of food can help, which is why women report more food cravings and tend to eat more. One study found that the average woman eats about 810 calories at lunch during this time, which is about 170 calories more than what she eats at lunch during the rest of the month.

But most women still aren't getting enough extra calories. The typical woman in a modern thin-conscious society like America does not take in enough extra food to supply the body's increased demands for glucose during these few days each month. When there isn't enough energy to go around, the body has to ration it, and

the reproductive system takes priority, leaving less glucose available for willpower. As a general rule, women are less likely than men to suffer from lapses of self-control, but their self-control problems do worsen during the luteal phase, as studies have repeatedly shown.

During this phase, women spend more money and make more impulsive purchases than at other times. They smoke more cigarettes. They drink more alcohol, and not just because they enjoy drinks more. The increase is especially likely for women who have a drinking problem or a family history of alcoholism. During this luteal phase, women are more liable to go on drinking binges or abuse cocaine and other drugs. PMS is not a matter of one specific behavior problem cropping up. Instead, self-control seems to fail across the board, letting all sorts of problems increase.

One drug that isn't used more frequently is marijuana, and that exception is revealing. Unlike cocaine and opiates, marijuana is not a drug of escape or euphoria. Marijuana merely intensifies what you're already feeling. PMS feels bad, and a drug that intensifies the feeling isn't going to be attractive. Moreover, marijuana doesn't produce the same sort of addictive cravings as nicotine, alcohol, cocaine, and other drugs, so a lessening of overall self-control wouldn't make a marijuana user more vulnerable to those kinds of temptations.

Researchers have found that women who are prone to PMS miss twice as many days of work as other women do. Some of those missed days are due, no doubt, to the physical pain associated with PMS, but some of the absenteeism is probably related to self-control. Following rules is harder when your body is short of glucose. Inside women's prisons, disciplinary problems based on breaking prison rules are highest among women who are at the luteal phase of their cycle. Violent, aggressive acts—legal or illegal—reach a peak among PMS sufferers during the luteal phase. To be sure, only a few women turn violent at any time, but many report emotional changes during the luteal phase. Studies have repeatedly documented increases in emotional outbursts and distress at this time. Women have more conflicts

with spouses and other relationship partners, as well as with colleagues at work. They become less sociable and often prefer to be alone—which may be an effective strategy of avoiding conflicts that would arise from interacting.

The standard explanation for PMS has been that the luteal phase directly causes negative emotions, but that explanation doesn't really fit the data. Women aren't uniformly affected by negative emotions. When Amanda Palmer was posing as a living statue in Harvard Square, she found that PMS weakened her self-control because it liberated both positive and negative feelings.

"I'm prone to being way more sensitive and likely to cry when I'm PMSing, and that translated right into my statue work if something emotional happened," Palmer recalls. "Something emotional could be as simple as nobody walked by and looked at me for ten minutes, and therefore the world was a cold and lonely place and no one loved me. The other extreme would be a ninety-five-year-old man hobbling up to me at the rate of one mile per hour and taking five minutes to get a folded five-dollar bill out of his wallet and put it into my can and look up at me with his wizened lonely old eyes. I would just lose it. I would try to transmit the largest concentration of love I could possibly transmit without speaking or moving my face."

Her experience is fairly typical of what other women report during the luteal phase: They're affected by a variety of feelings, and their problems often arise from a strong reaction to some event. They say they don't want to get upset but can't seem to stop themselves from getting worked up over minor things. They're not consciously aware that their body has abruptly cut the fuel supply for self-control, so they're surprised that normal controls don't work as usual.

It feels to many women as if life stresses increase: They report more negative events and fewer positive events occurring during this luteal phase. But the outside world doesn't predictably change for a few days every month. If a woman feels less capable than usual of handling her problems, she'll be more stressed out. If PMS weakens

her control over her emotions, then the same misfortune is more upsetting. The same task at work is more of a challenge if she doesn't have as much energy available to focus her attention. In carefully controlled laboratory tests requiring concentration, women in the luteal phase performed worse than women at other stages of the menstrual cycle, and these effects were found for a general sample of women, not just PMS sufferers. Whether or not they felt the acute symptoms of PMS, their bodies were short of glucose.

We don't want to exaggerate these problems, because most women cope quite well with PMS at work and at home, and we certainly don't want to suggest that women have weaker willpower than men. To repeat, women on the whole have *fewer* problems with self-control than men: They commit fewer violent crimes and are less likely to become alcoholics or drug addicts. Girls' superior self-control is probably one reason they get better grades in school than boys do. The point is only that self-control is tied in to the body's rhythms and the fluctuations in its energy supply. A woman with the self-control of a saint may become a tiny bit less saintly during the luteal phase of PMS, like hypoglycemia and diabetes, makes a conveniently clear-cut example of what happens when the body is short of glucose—and everyone, male or female, diabetic or nondiabetic, runs low on glucose at times. We all succumb to frustration and anger. We all sometimes feel beset by insoluble problems and overcome by impulses that seem alien, if not satanic.

Usually, though, the problem is within. It's not that the world has suddenly turned cruel. It's not that Lucifer is tormenting us with dark new temptations and impulses. It's that we're less capable of dealing with ordinary impulses and long-standing problems. The provocations can be real enough—you may well have reason to get angry at your boss or reconsider your marriage. (Melanie Griffith eventually did get divorced from Don Johnson.) But you won't make much progress on those other problems until you control your own emotions, and that starts with controlling your glucose.

Eat Your Way to Willpower

Now that we've surveyed the problems caused by lack of glucose, we can turn to solutions and to cheerier topics, like good meals and long naps. Here are some lessons and strategies for putting glucose to work for you:

Feed the beast. By beast, we don't mean Beelzebub. We mean the potential demon inside you or anyone spending time with you. Glucose depletion can turn the most charming companion into a monster. The old advice about eating a good breakfast applies all day long, particularly on days when you're physically or mentally stressed. If you have a test, an important meeting, or a vital project, don't take it on without glucose. Don't get into an argument with your boss four hours after lunch. Don't thrash out serious problems with your partner just *before* dinner. When you're on a romantic trip across Europe, don't drive into a walled medieval town at seven P.M. and try to navigate to your hotel on an empty stomach. Your car can probably survive the cobblestone maze, but your relationship might not.

Above all, don't skimp on calories when you're trying to deal with more serious problems than being overweight. If you're a smoker, don't try quitting while you're also on a diet. In fact, to quit you might even consider adding some calories, because part of what seems to be a craving for a cigarette may actually be a craving for food once you're no longer suppressing your appetite with nicotine. When researchers have given sugar tablets to smokers trying to quit, sometimes the extra glucose has led to higher rates of success, particularly when the sugar tablets were combined with other therapies, like the nicotine patch.

Sugar works in the lab, not in your diet. It's a bit ironic that self-control researchers are so fond of giving sugar to experimental subjects, given how many of those people wish for the willpower to

resist sweets. But the scientists are doing it just for short-term convenience. A sugar-filled drink provides a quick rise in energy that enables experimenters to observe the effects of glucose in a short period of time. Neither the researchers nor their experimental subjects want to wait around an hour for the body to digest something more complex, like protein.

There might be times when you could use sugar to boost your self-control right before a brief challenge, like a math test or a track meet. If you've just quit smoking, you might use a sweet lozenge as an emergency stopgap against a sudden craving for a cigarette. But a sugar spike is promptly followed by a crash that leaves you feeling more depleted, so it's not a good long-term strategy. We're certainly not recommending that you switch from diet sodas to sugar-filled drinks, or to sweet snacks in general. It may be true, as researchers found, that drinks with sugar in them will temporarily diminish the symptoms of PMS. But outside the lab, you're better off heeding the observation made by the singer Mary J. Blige when discussing her PMS and its attendant mood swings and shopping sprees: "Sugar makes it worse."

When you eat, go for the slow burn. The body converts just about all sorts of food into glucose, but at different rates. Foods that are converted quickly are said to have a high glycemic index. These include starchy carbohydrates like white bread, potatoes, white rice, and plenty of offerings on snack racks and fast-food counters. Eating them produces boom-and-bust cycles, leaving you short on glucose and self-control—and too often unable to resist the body's craving for quick hits of starch and sugar from doughnuts and candy. Those all-you-can-eat pancake breakfasts on Fat Tuesday may make for wilder parades, but they're not all that useful the rest of the year.

To maintain steady self-control, you're better off eating foods with a low glycemic index: most vegetables, nuts (like peanuts and cashews), many raw fruits (like apples, blueberries, and pears), cheese, fish, meat, olive oil, and other "good" fats. (These low-glycemic

foods may also help keep you slim.) The benefits of the right diet have shown up in studies of women with PMS, who report fewer symptoms when they're eating healthier food. There has also been a successful series of experiments carried out with thousands of teenagers in correctional institutions. After the institutions replaced some of the sugary foods and refined carbohydrates with fruits, vegetables, and whole grains, there was a sharp decline in escape attempts, violence, and other problems.

When you're sick, save your glucose for your immune system. The next time you're preparing to drag your aching body to work, here's something to consider: Driving a car with a bad cold has been found to be even more dangerous than driving when mildly intoxicated. That's because your immune system is using so much of your glucose to fight the cold that there's not enough left for the brain.

If you're too glucose-deprived to do something as simple as driving a car, how much use are you going to be in the office (assuming you make it there safely)? Sometimes the job has to be muddled through, but don't trust the glucose-deprived brain for anything important. If you simply can't miss a meeting at work, try to avoid any topics that will strain your self-control. If there's a make-or-break project under your supervision, don't make any irrevocable decisions. And don't expect peak performance from others who are under the weather. If your child has a cold the day of the SAT test, reschedule it.

When you're tired, sleep. We shouldn't need to be told something so obvious, but cranky toddlers aren't the only ones who resist much-needed naps. Adults routinely shortchange themselves on sleep, and the result is less self-control. By resting, we reduce the body's demands for glucose, and we also improve its overall ability to make use of the glucose in the bloodstream. Sleep deprivation has been shown to impair the processing of glucose, which produces immediate consequences for self-control—and, over the long term, a higher risk of diabetes.

A recent study found that workers who were not getting enough sleep were more prone than others to engage in unethical conduct on the job, as rated by their supervisors and others. For example, they were more likely than others to take credit for work done by somebody else. In a laboratory experiment offering test takers the chance to win cash, students who had not slept enough were more likely than others to take advantage of an opportunity to cheat. Not getting enough sleep has assorted bad effects on mind and body. Hidden among these is the weakening of self-control and related processes like decision making. To get the most out of your willpower, use it to set aside enough time to sleep. You'll behave better the next day—and sleep more easily the next night.

3.

A BRIEF HISTORY OF THE TO-DO LIST, FROM GOD TO DREW CAREY

In the beginning God created the heavens and the earth;
and the earth was without form and empty,
and darkness was upon the face of the deep;
and the Spirit of God was brooding upon the face of the waters.

—Genesis 1:1

In the beginning was the list.

Creation, as the Bible tells it, was not a simple job, not even for an omnipotent deity. The project required divine brooding, which did not mean that God was unhappily mulling it over. It meant that the heavens and earth, like an egg, required a period of incubation. The project had to be broken down into a schedule of daily tasks, starting with Monday's to-do list:

1. Let there be light.
2. Observe light.

3. Whether you're judging yourself or judging others, never equate being overweight with having weak willpower.

10.

THE PERFECT STORM
OF DIETING

It is a hard matter, my fellow citizens, to argue with the belly, since it has no ears.

—Plutarch

How did I let this happen again?

—Oprah Winfrey

There is nothing so universally desired in rich countries as flat abs. The more money we make, and the more of it we give to the diet industry, the more impossible that ideal seems. Losing weight is the most popular New Year's resolution year after year, diet after forsaken diet. In the long run, the vast majority of dieters fail. Therefore, we are not going to guarantee you an eternally svelte body. But we can tell you which techniques are more likely to help you lose weight, and we'll start with the good news. If you're serious about controlling your weight, you need the discipline to follow these three rules:

1. Never go on a diet.
2. Never vow to give up chocolate or any other food.

You may not have kept your resolution to lose ten pounds this year, but that doesn't mean you should take up a diet or swear off sweets. And you certainly shouldn't lose faith in your ability to accomplish other feats, because being overweight is not a telltale sign of weak willpower, even if most people think so. Ask a few modern Americans what they use self-control for, and dieting is likely to be the first answer. Most experts have made the same assumption for decades. At professional conferences and in scientific journal articles, when researchers have to give an example to illustrate some problem of self-control, they tend to pick dieting more often than any other sort of example.

Recently, though, researchers have found that the relationship between self-control and weight loss is much less direct than everyone thought. They've discovered something we'll call the Oprah Paradox, in honor of the world's most famous dieter. Early in her career, when she was working as a newscaster, Oprah Winfrey's weight rose from 125 to 140 pounds, so she went to a diet doctor and was put on a twelve-hundred-calories-per-day plan. She followed it, lost 7 pounds the first week, and within a month was back down to 125. But then she gradually put it back on. When she hit 212 pounds, she gave up solid food for four months, subsisting on liquid diet supplements, and got back down to 145 pounds. But within a few years she was heavier than ever, at 237 pounds, and her journal was filled with prayers to lose weight. When she was nominated for an Emmy Award, she prayed for her rival talk-show host Phil Donahue to win. That way, as she later recalled, "I wouldn't have to embarrass myself by rolling my fat butt out of my seat and walking down the aisle to the stage." She had just about lost hope when she met Bob Greene, a personal trainer, whereupon the two of them transformed each other's lives.

He became a bestselling author of training regimens and recipes he used with Winfrey, and began selling his own line of Best Life food. Guided by Greene and her personal chef (who wrote his own bestseller), and by the nutritionists and doctors and other experts on her show, Winfrey changed what she ate, how she exercised, how she lived. She established weekly calendars of all her meals, specifying precisely when she would eat tuna, when salmon, when salad. Her assistants built her schedule around the meals and the workouts. She received emotional counsel from friends like Marianne Williamson, the spiritual writer, who discussed with her the relationship between weight and love.

The result was displayed on the cover of Winfrey's magazine in 2005: a radiant, sleek woman weighing 160 pounds. (Note, though, that this triumph still put her 20 pounds above what she weighed at the start of her first diet.) Winfrey's success story was an inspiration both to her fans and to an anthropologist at Emory University, George Armelagos. He used it to illustrate a historic shift that he dubbed the King Henry VIII and Oprah Winfrey Effect. In Tudor England, it wasn't easy keeping anyone as fat as Henry VIII. His diet required resources and labor from hundreds of farmers, gardeners, fishermen, hunters, butchers, cooks, and other servants. But today even commoners can get as fat as King Henry VIII—in fact, poor people tend to be fatter than the ruling classes. Thinness has become a status symbol because it's so difficult for ordinary people to achieve unless they're genetically lucky. To remain thin, it takes the resources of Oprah Winfrey and a new array of vassals: personal trainer, chef, nutritionist, counselor, assorted assistants.

Yet even that kingdom is no guarantee, as viewers of *Oprah* started to notice, and as Winfrey herself acknowledged in a refreshingly frank article four years after the celebratory cover. This time her magazine's cover showed the old picture of herself, at 160 pounds, next to her current 200-pound self. "I'm mad at myself," Winfrey told

readers. "I'm embarrassed. I can't believe that after all these years, all the things I know how to do, I'm still talking about my weight. I look at my thinner self and think, 'How did I let this happen again?'" She explained it as a combination of overwork and medical problems, both of which could have depleted her willpower, but even then, Oprah Winfrey was obviously someone with self-discipline. She couldn't have kept the rest of her life going so successfully without self-control. She had extraordinary personal willpower, access to the world's finest professional advice, a cadre of dedicated monitors, plus the external pressure of having to appear every day in front of millions of people watching for any sign of weight gain. Yet despite all her strength and motivation and resources, she couldn't keep the pounds off.

That's what we call the Oprah Paradox: Even people with excellent self-control can have a hard time consistently controlling their weight. They can use their willpower to thrive in many ways—at school and work, in personal relationships, in their inner emotional lives—but they're not that much more successful than other people at staying slim. When Baumeister and his colleagues in the Netherlands analyzed dozens of studies of people with high self-control, they found that these self-disciplined people did slightly better than average at controlling their weight, but the difference wasn't as marked as in other areas of their lives. This pattern showed up clearly among the overweight college students in a weight-loss program who were studied by Baumeister along with Joyce Ehrlinger, Will Cressioni, and colleagues at Florida State University. At the outset of the program, the students who scored higher on personality tests of self-control had a slight advantage—they started out weighing a little less and having better exercise habits than the people with lower self-control—and their advantage increased over the course of the twelve-week program because they were better at following the rules to restrict eating and increase exercising. But while their self-

discipline helped them control their weight, it didn't seem to make a huge difference either before or during the study. High self-control was better than low self-control, but not by much.

And if the researchers had tracked the students after the weight-loss program ended, no doubt many of them would have put the pounds right back on, just as Oprah Winfrey and so many other dieters have done. Their self-control would have been useful in helping them keep up the exercise routine, but exercising isn't enough to guarantee weight loss. Even though it seems logical that burning more calories would get rid of pounds, researchers have found that the body responds by craving more food, so increased exercise doesn't necessarily lead to long-term weight loss. (But it's still worthwhile for lots of other reasons.) Whether or not you have good self-control, whether or not you exercise, if you go on a diet, the odds are that you won't permanently lose weight.

One reason is basic biology. When you use self-control to go through your in-box or write a report or go jogging, your body doesn't react viscerally. It's not physically threatened by your decision to pay bills instead of watch television. It doesn't care whether you're writing a report or surfing the Web. The body might send you pain signals when you exercise too strenuously, but it doesn't treat jogging as an existential threat. Dying is different. As the young Oprah Winfrey discovered, the body will go along with a diet once or twice—but then it starts fighting back. When fat lab rats are put on a controlled diet for the first time, they'll lose weight. But if they're then allowed to eat freely again, they'll gradually fatten up, and if they're put on another diet it will take them longer to lose the weight this time. Then, when they once again go off the diet, they'll regain the weight more quickly than the last time. By the third or fourth time they go through this boom-and-bust cycle, the dieting ceases to work; the extra weight stays on even though they're consuming fewer calories.

Evolution favored people who could survive famines, so once a body has gone through the experience of not getting enough to eat, it reacts by fighting to keep all the pounds it has. When you diet, your body assumes there's a famine and hangs on to every fat cell it can. The ability to lose weight through a drastic change in diet ought to be conserved as a precious, one-time capability. Perhaps you'll need it late in life, when your health or your survival will depend on being able to lose weight.

Instead of going for a quick weight loss today, you're better off using your self-control to make gradual changes that will produce lasting effects, and you have to be especially careful in your strategies. You face peculiarly powerful challenges at every stage of the self-control process—from setting a goal to monitoring yourself to strengthening your willpower. When they wheel over the dessert cart, you're not facing an ordinary challenge. It's more like the perfect storm.

The first step in self-control is to establish realistic goals. To lose weight, you could look in the mirror, weigh yourself, and then draw up a sensible plan to end up with a trimmer body. You could do that, but few do. People's goals are so unrealistic that an English bookmaker, the William Hill agency, has a standing offer to bet against anyone who makes a plan to lose weight. The bookmaker, which offers odds of up to 50 to 1, lets the bettors set their own targets of how much weight to lose in how much time. It seems crazy for a bookie to let bettors not only set the terms of the wager but also control its outcome—it's like letting a runner bet on beating a target time he sets himself. Yet despite these advantages, despite the incentive to collect payoffs that have exceeded seven thousand dollars, the bettors lose 80 percent of the time.

Female bettors are especially likely to lose, which isn't surprising considering the unrealistic goals set by so many women. They look in the mirror and dream the impossible dream: a "curvaceously thin"

body, as it's known to researchers who puzzle over these aspirations. The supposed ideal of a 36-24-36 figure translates to someone with size 4 hips, a size 2 waist, and a size 10 bust—someone, that is, with ample breasts but little body fat, who must be either a genetic anomaly or the product of plastic surgery.

With this as the ideal, it's no wonder that so many people set impossible goals. When you detest what you see in the mirror, you need self-control *not* to start a crash diet. You need to remind yourself that dieters typically work at first but fail miserably in the long run. To understand why, let's start with a strange phenomenon observed after the consumption of milkshakes in a laboratory.

The What-the-Hell Effect

The people arrived at the lab in what researchers call a "food-deprived state," which is more commonly known as "hungry." They hadn't eaten for several hours. Some were given a small milkshake to take the edge off; others drank two giant milkshakes with enough calories to leave a normal person feeling stuffed. Then both groups, along with other subjects who hadn't been given any kind of milkshake, were asked to serve as food tasters.

That was a ruse. If research subjects know their food intake is being monitored by someone studying overeating, they suddenly lose their appetite and come across as pillars of virtuous restraint. So the researchers, pretending to be interested only in their opinions about the taste of different snacks, sat each one in a private cubicle with several bowls of crackers and cookies and a rating form. As the people recorded their ratings, they could eat as many from each bowl as they wanted—and if they finished them all, they could always tell themselves they were just trying to do a good, thorough job of rating the crackers and cookies. They didn't realize that the ratings didn't

matter, and that the researchers were just interested in how many cookies and crackers they ate, how the milkshakes affected them, and how the dieters in the group compared with the people who weren't on a diet.

The nondieters reacted predictably enough. Those who had just drunk the two giant milkshakes nibbled at the crackers and quickly filled out their ratings. Those who had drunk the one modest milkshake ate more crackers. And those who were still hungry after not eating for hours went on to chomp through the better part of the cookies and crackers. All perfectly understandable.

But the dieters reacted in the opposite pattern. The ones who had downed the giant milkshakes actually ate *more* cookies and crackers than the ones who'd had nothing to eat for hours. The results stunned the researchers, who were led by Peter Herman. Incredible, they conducted further experiments, with similar results, until they finally began to see why self-control in eating can fail even among people who are carefully regulating themselves.

The researchers gave it a formal scientific term, *counterregulatory eating*, but in their lab and among colleagues it was known simply as the what-the-hell effect. Dieters have a fixed target in mind for their maximum daily calories, and when they exceed it for some unexpected reason, such as being given a pair of large milkshakes in an experiment, they regard their diet as blown for the day. That day is therefore mentally classified as a failure, regardless of what else happens. Virtue cannot resume until tomorrow. So they think, *What the hell, I might as well enjoy myself today*—and the resulting binge often puts on far more weight than the original lapse. It's not rational, but dieters don't even seem to be aware of how much damage these binges do, as demonstrated in a follow-up experiment by Janet Polivy, Herman's longtime collaborator. Once again, hungry dieters and nondieters were brought into the lab, and some of the dieters were given food with enough calories to put them over their daily

limit. Later, the entire group was served sandwiches cut into quarters. Afterward, and unexpectedly, everyone was asked how many sandwich quarters he or she had eaten.

Most of the people answered the question with no trouble—after all, they'd just finished eating, and they knew how many sandwiches they'd taken. But one group was notably clueless: the dieters who'd been given enough food to exceed their daily limit. Some of them overestimated, and some underestimated. As a result, they were much further off the mark than either the nondieters or the dieters who were still under their daily food limit. As long as the diet wasn't busted for the day, the dieters tracked what they were eating. But once they broke the diet and succumbed to the what-the-hell effect, they stopped counting and became even less aware than nondieters of what they were eating. As we know, monitoring is the next step in self-control after setting a goal, but how can dieters do that if they stop keeping track of what they eat? One possible alternative would be to heed the body's signals that it's had enough sustenance. But for dieters, that turns out to be yet another losing strategy.

The Dieter's Catch-22

Humans are born with an innate gift for eating just the right amount. When an infant's body needs food, it sends a signal through hunger pangs. When the body has had enough food, the infant doesn't want to eat any more. Unfortunately, children start to lose this ability by the time they enter school, and it continues to decline later in life for some people—often the ones who need it the most. Why this occurs has been puzzling scientists for decades, starting with some research in the 1960s that revolutionized the study of eating.

In one experiment, researchers rigged a clock on the wall of a room where people could munch on snacks during the afternoon as they filled out stacks of questionnaires. When the clock ran fast, the

obese people ate more than others, because the clock signaled to them that it must be getting close to dinnertime and therefore they must be hungry. Instead of heeding their body's internal signals, they ate according to external cues from the clock. In another study, researchers varied the kinds of snacks that were offered, sometimes offering shelled peanuts and sometimes whole peanuts. It didn't seem to matter to the normal-weight people, who ate about the same number of nuts either way. But the obese people ate far more when they were offered the shelled nuts, which apparently sent a stronger come-and-get-it message. Once again, the obese people responded more strongly to external cues, and researchers initially hypothesized it was the cause of their problem: They became obese because they ignored their body's internal signals of being full.

It was a reasonable theory, but eventually researchers realized that they were confusing cause and effect. Yes, obese people ignored their inner cues, but that's not why they became obese. It worked the other way: Their obesity made them likely to go on diets, and their diets caused them to rely on external instead of internal cues. For what is a diet but a plan imposing external rules? Dieters learn to eat according to a plan, not to their inner feelings and cravings. Dieting means being hungry a lot of the time (even if the markers of diets are always promising otherwise).

More precisely, dieting means learning not to eat when you are hungry; preferably by learning to ignore those feelings of hunger. You mainly try to tune out the start-eating signal, but the start and stop signals are intertwined, so you typically lose touch with the stop-eating signal, too, particularly if the diet tells you exactly how much to eat. You eat by the rules, which works fine as long as you stick to them. But once you deviate from the rules, as just about everyone does, you have nothing left to guide you. That's why, even after downing a couple of big milkshakes, dieters and obese people not only continue but increase their eating. The milkshakes filled them up, but they still don't feel full. They have only

the one bright line, and once they have passed it, there are no more limits.

Now, you could argue that the real lesson of these experiments is that dieters shouldn't take part in experiments involving milkshakes. If they didn't go into the lab and drink all those calories, then they wouldn't cross the bright line and break their daily diet. So if the dieters could just follow their own rules all the time, if they never exceeded the daily limit, then they'd never succumb to the what-the-hell effect. Sure, they'd feel hungry, but they'd never go on a binge as long as they had the willpower to observe the rules.

All of which makes a certain sense, but only until you actually begin testing those dieters' willpower with movies, ice cream, and M&M's, as Kathleen Vohs and Todd Heatherton did in a series of experiments. The psychologists recruited young women, all chronic dieters, and showed them a classic tearjerker, the scene in *Terms of Endearment* in which the young mother, who is dying of cancer, says good-bye to her two little sons, her husband, and her mother. Half the dieters were instructed to try to suppress their emotional responses, both internally and externally. The other half were told to let their feelings and tears flow naturally. Afterward, all the dieters filled out questionnaires about their mood, and each was taken individually to a different room for what was ostensibly an unrelated task: rating various kinds of ice cream. The ice cream was presented to each dieter in several large and only partly full tubs, which created the impression that the experimenters would not know how much was in there and how much each woman ate.

But, of course, the tubs had been carefully weighed beforehand, and they were weighed again afterward. The researchers found that there was no connection between the women's moods and their eating: The ones who were sadder after the movie didn't eat extra ice cream to drown their sorrows. What mattered was not their mood but rather their will. The dieters who had suppressed emotions during the movie had a much harder time suppressing their appetite.

Having depleted their willpower, they are considerably more ice cream—more than half again as much—as the women who'd been free to cry during the film. This is, of course, just one more demonstration of ego depletion. Still, it bears repeating that eating and dieting can be affected by things that seemingly have no connection to them. Trying to hide your feelings while watching a movie drains your willpower, rendering you more likely to overeat later on in a separate, ostensibly unrelated context.

In another test of the wills of young female dieters, each one was tempted by a bowl brimming with M&M's that was placed in the screening room with her as she watched a nature documentary (a non-tearjerker about bighorn sheep). For some of the women, the bowl was placed nearby, within easy reach, so they had to continually resist the temptation. For other women, the candy bowl was placed on the other side of the room and hence was easier to resist. Later, in a separate room with no food in sight, the women were given impossible puzzles to solve, that standard lab test of self-control. The dieters who had sat within arm's reach of the M&M's gave up sooner on the puzzles, demonstrating that their willpower had been depleted by the effort of resisting temptation. Clearly, if you're a dieter who doesn't want to lose self-control, you shouldn't spend a lot of time sitting right next to a bowl of M&M's. Even if you resist those obvious temptations, you'll deplete your willpower and be prone to overeating other foods later.

But there's also another way to avoid this problem, as illustrated in a third experiment involving young women and food. This time Vohs and Heatherton tested nondieters in addition to dieters, and a clear distinction emerged. It turned out that the nondieters could sit next to an array of snacks—Doritos, Skittles, M&M's, salted peanuts—without using up willpower. Some ate the snacks and some didn't, but either way, they weren't struggling to restrain themselves, so they remained relatively fresh for other tasks. The dieters, meanwhile, gradually depleted their willpower as they fought the urge to

break their diet. They went through the same struggle that you see played out at social events when dieters are confronted with fattening food. The dieters can resist for a while, but each act of resistance further lowers their willpower.

Then, as they're weakening, they face yet another of the peculiarly maddening challenges of controlling eating. To continue resisting temptation, they need to replenish the willpower they've lost. But to resupply that energy, they need to give the body glucose. They're trapped in a nutritional catch-22:

1. In order not to eat, a dieter needs willpower.
2. In order to have willpower, a dieter needs to eat.

Faced with this dilemma of whether to eat or not, a dieter might try telling herself that the best option is to slightly relax the diet. She might reason that it's best to consume a little food and try to salvage her conscience: *Look, I had to break the diet in order to save it.* But once she strays from the diet, we know what she's liable to tell herself: *What the hell.* And then: *Let the binge begin.*

Sweet food becomes especially hard to resist because, as we've already seen, self-control depletes the glucose in the bloodstream. If you've ever been on a diet and found yourself unable to shake those intrusive cravings for chocolate or ice cream, this is more than a matter of repressed desires coming back to haunt you. There is a sound physiological basis. The body "knows" that it has depleted the glucose in its bloodstream by exerting self-control, and it also seems to know that sweet-tasting foods are typically the fastest way to get an infusion of energy-rich glucose. In recent lab studies, college students who performed self-control tasks that had nothing to do with food or dieting found themselves having higher desires for sweet foods. When allowed to snack during the next task, those who had previously exerted self-control ate more sweet snacks, but not other (salty) snacks.

If these yearnings seem overpowering, we can suggest a couple of defensive strategies. The first is to use the postponed-pleasure ploy: Tell yourself that you can have a small sweet dessert later if you still want it. (We'll discuss this ploy later, too.) Meanwhile, eat something else. Remember, your body is craving energy because it has used up some of its supply with self-control. The body feels a desire for sweet foods, but that is only because that is a familiar and effective way to restore energy. Healthy foods will also provide the energy it needs. It's not what's on your mind, but it should do the trick.

Remember, too, that the depleted state makes you feel everything more intensely than usual. Desires and cravings are exceptionally intense to the depleted person. Dieting is a frequent drain on your willpower, and so the dieter will frequently be in a depleted state. That will, in effect, turn up the volume on many good and bad things that happen throughout the day. It will also make longings—yes, unfortunately, even the longings for food, which are already there—seem especially intense. This may help explain why, eventually, many dieters seem to cultivate a numbness to their body's wants and feelings about food.

There is no magical solution to the dieter's catch-22. No matter how much willpower you start off with, if you're a dieter and spend enough time sitting near the dessert buffet telling yourself *no*, eventually *no* will probably change to *yes*. You need to avoid the dessert cart—or, better yet, avoid going on a diet in the first place. Instead of squandering your willpower on a strict diet, eat enough glucose to conserve willpower, and use your self-control for more promising long-term strategies.

Planning for Battle

When you're not starving, when you have glucose, you can prepare for the battle of the bulge with some of the classic self-control strat-

egies, starting with precommitment. The ultimate surefire form of precommitment—the true equivalent of Odysseus tying himself to the mast—would be gastric bypass surgery, which would physically prevent you from eating, but there are lots of more modest forms. You can begin by simply keeping fattening food out of reach and out of sight. You'll conserve willpower (as the women in the experiment did when the M&M's were moved out of reach) at the same time that you're avoiding calories. In one experiment, office workers ate a third less candy when it was kept inside a drawer rather than on top of their desks. A simple commitment strategy for avoiding late-night snacking is to brush your teeth early in the evening, while you're still full from dinner and before the late-night-snacking temptation sets in. Although it won't physically prevent you from eating, brushing your teeth is such an ingrained pre-bedtime habit that it unconsciously cues you not to eat anymore. On a conscious level, moreover, it makes snacking seem less attractive: You have to balance your greedy impulse for sugar against your lazy impulse to avoid having to brush your teeth again.

You can consider more elaborate commitment devices, like placing a bet with a bookmaker, or by locking in a weight-loss agreement at Web sites like fatbet.net or stickK.com, which allow you to name your own goals along with penalties. A tough penalty, like committing yourself to donate hundreds or thousands of dollars to a cause you detest, can make a difference, but don't expect money to work miracles when you set an impossible goal. Losing 5 or 10 percent of your weight is a realistic goal, but beyond that it becomes difficult to overcome the body's natural propensities. The typical bettor at the William Hill agency sets a goal of losing nearly three pounds per week for a total of almost eighty pounds—no wonder so many of them fail. The people putting up their money at stickK.com have a much better track record thanks to the Web site's policy of forbidding anyone from setting a goal of losing more than two pounds per week, or 18.5 percent of their body weight. It's possible to lose a lot

of weight quickly by drastically altering your eating, but what good will that do if the regimen is too strict to follow permanently? Better to make smaller changes that can be sustained over the long haul. Take your time reaching your goal, and then don't let up, because the hardest part is keeping the weight off. If you use a system of rewards and penalties to reach your weight-loss goal, keep using the same kinds of incentives to maintain your weight.

You can also try a strategy that psychologists call an "implementation intention," which is a way to reduce the amount of time and effort you spend controlling your thoughts. Instead of making general plans to reduce calories, you make highly specific plans for automatic behavior in certain situations, like what to do when you're tempted by fattening food at a party. An implementation intention takes the form of if-then: If *x* happens, I will do *y*. The more you use this technique to transfer the control of your behavior to automatic processes, the less effort you will expend. This was demonstrated in some experiments involving the classic Stroop test of mental effort that was described in chapter 1: identifying mislabeled colors. If you see the word *green* printed in green ink, you can quickly identify the color of the ink, but it takes longer if the green ink is being used to form the word *blue*. And it takes still longer if your willpower has been depleted beforehand, as English researchers did with the people in one experiment. But they found it was possible to compensate for this weaker willpower by training people to ease the strain on their minds. Before the ink-color-identifying task began, the people would form an implementation plan: *If I see a word, I will ignore its meaning and look only at the second letter and the color of the ink*. This specific if-then plan made their task more automatic, requiring less conscious mental effort, and therefore doable even when their willpower was already weakened.

So before you get tempted by the food at a party, you can prepare yourself with a plan like: *If they serve chips, I will refuse them all*. Or: *If there is a buffet, I will eat only vegetables and lean meat*. It's

a simple but surprisingly effective way to gain self-control. By making the decision to pass up the chips an automatic process, you can do it fairly effortlessly even late in the day, when your supply of willpower is low. And because it's relatively effortless, you can pass up the chips and still have enough willpower to deal with the next temptation at the party.

For a more radical form of precommitment, you could skip the party altogether and seek out gatherings with lower-calorie offerings—and thinner people. We're not suggesting you dump your chubby friends, but there does seem to be a connection between what you weigh and whom you socialize with. Researchers who have analyzed social networks find that obese people tend to cluster together, as do thin people. Social distance seems to matter more than physical distance: Your chances of being obese increase more because your best friend gains weight than because your next-door neighbor gains weight. It's difficult to disentangle cause and effect—no doubt people are seeking out others who share their habits and tastes. But it's also true that people reinforce one another's behavior and standards. One reason why members of Weight Watchers shed pounds (at least for a while) is that they're spending more time with other people who care about losing weight. It's the same phenomenon we noted earlier with smokers, who are more likely to quit if their friends and relatives also quit.

Peer pressure helps explain why people in Europe weigh less than Americans: They follow different social norms, like eating only at mealtimes instead of snacking throughout the day. When European social scientists come to the United States to study eating habits in campus laboratories, they're surprised to discover that they can run experiments whenever they want to because American college students are happy to eat food any time of the morning or afternoon. In France or Italy, it can be hard to find a restaurant open except at mealtimes. Those social norms produce habits that conserve willpower through automatic mental processes. Instead of consciously

trying to decide whether to snack, instead of struggling with temptation, Europeans rely on the equivalent of an implementation plan: *If it's four P.M., then I won't eat anything.*

Let Me Count the Weighs (and the Calories)

If you're trying to lose weight, how often should you weigh yourself? The standard advice used to be to not get on the scale every day, because your weight naturally fluctuates and you'll get discouraged on days it goes up for no apparent reason. If you want to keep up your motivation, the weight-loss experts said, you should weigh yourself just once a week. That advice seemed odd to Baumeister and other self-control researchers, because their work on other problems consistently showed that frequent monitoring improved self-control. Eventually, a careful long-term study tracked people who'd lost weight and were trying not to regain it. Some of these people weighed themselves daily; others didn't. It turned out that the conventional wisdom was wrong.

The people who weighed themselves every day were much more successful at keeping their weight from creeping back up. They were less likely to go on eating binges, and they didn't show any signs of disillusion or other distress from their daily confrontation with the scale. For all the peculiar challenges to losing weight, one of the usual strategies is still effective: The more carefully and frequently you monitor yourself, the better you'll control yourself. If it seems like too much of a chore to write down your weight every day, you can outsource some of the drudgery by using a scale that keeps an electronic record of your weight. Some models will transmit each day's reading to your computer or smartphone, which can then produce a chart for your monitoring pleasure (or displeasure).

Even a very simple form of monitoring can make a big difference,

as researchers discovered when they investigated an odd little mystery: Why do prisoners put on weight? Clearly it's not because of the irresistible prison cuisine. No gourmet chef is ever hired to cook when the clientele consists of customers who are literally captive. Yet men consistently come out of prison fatter than when they went in. The reason, according to Cornell's Brian Wansink, is that prisoners don't wear belts or tight-fitting clothes. In their jumpsuits and loose pants, they don't get the little signals of weight gain that other people get when their pants feel tighter and their belts have to be loosened a notch.

Besides monitoring your body, you can monitor what food you put into it. If you conscientiously keep a record of all the food you eat, you'll probably consume fewer calories. In one study, those who kept a food diary lost twice as much weight as those who used other techniques. It also helps to record how many calories are in the food, although that's notoriously tricky to estimate. All of us, even professional dietitians, tend to underestimate how much food is on a plate, especially when confronted with large portions. We've been further confused by the warnings of nutritionists and the tricks of food companies, who will use a label like "low-fat" or "organic" to create what researchers call a "health halo." Tierney investigated this phenomenon in the nutritionally correct neighborhood of Park Slope, Brooklyn, with an experiment designed by two researchers, Pierre Chandon and Alexander Chernev. Some of the Park Slopes were shown pictures of an Applebee's meal consisting of chicken salad and a Pepsi; others were shown the identical meal plus some crackers prominently labeled "Trans Fat Free." The people were so entranced by the crackers' virtuous label that their estimate for the meal with crackers was *lower* than for the same meal without crackers. The label magically translated into "negative calories," both in the informal experiment in Park Slope and in a formal peer-reviewed study published later by Chernev. Other studies have shown that both laypeople and nutritional experts consistently underestimate

the calories in food labeled "low-fat," and consequently take bigger helpings.

To overcome these problems, you can try paying more attention to the calorie count of food when it's available on a label or a menu, or when you've got a smartphone with an app that monitors calories. When the calorie count is not available, you can at least try to pay attention to the food in front of you, which few people do. The two most common activities that are combined with eating are socializing and watching television—and both are associated with increased calorie consumption. Researchers have repeatedly shown that eating in front of the television increases snacking, and that viewers will eat more when their attention is engaged—as in a well-executed comedy or horror film—than when they're watching something boring. In one study, female dieters tripled the amount of food they ate when they were absorbed in a film.

People tend to eat more at meals with friends and family, when they're paying more attention to the company and less to what they eat. Add wine or beer, and they'll pay still less attention, because alcohol reduces self-awareness and therefore impairs monitoring. Even when they're sober, diners can be so oblivious that they'll go on sipping soup from a bowl that is continuously (and surreptitiously) refilled, as Brian Wansink demonstrated in a famous experiment at Cornell using soup bowls attached to hidden tubes. The people just went on sipping from the bottomless bowl because they were so used to eating whatever was put in front of them. If you're guided by external cues instead of by your own appetite, you're vulnerable to gaining weight whenever you're served large portions, which can easily happen without your being aware of it. When food is served on large plates or when drinks are poured in wide glasses, you tend to underestimate how many extra calories are being added because you don't have a good intuitive sense of three-dimensional volume. If a movie theater simply changed one dimension of a popcorn bag by, say, tripling its height, you could see right away that it holds three

times as much popcorn. But when the bag gets simultaneously wider, deeper, and taller, it can triple in volume without looking three times as big. So you order the large—and then eat the whole thing. You can't control what kind of packaging and plates are used in theaters and restaurants, but at home you can reduce your portions by using small plates and thin glasses.

You can also make it easier to monitor your eating by not clearing the table too quickly. In an experiment at a sports bar, people ate far fewer chicken wings when the waiters left the discarded bones on their plates. At other tables, where the waiters zealously cleared away the bones, people could fool themselves into forgetting how many wings they'd eaten, but that was impossible at the tables still holding the evidence. The bones did the monitoring for them.

Never Say Never

The results of dieting research tend to be depressing, but every now and then there's an exception, and we've saved our favorite cheery finding for last. It's from a dessert-cart experiment conducted by marketing researchers trying to figure out the central problem of self-control: Why is self-denial so difficult? As Mark Twain put it in *The Adventures of Tom Sawyer*: "To promise not to do a thing is the surest way in the world to make a body want to go and do that very thing." That's one of the more frustrating aspects of the human psyche, but the researchers, Nicole Mead and Vanessa Patrick, looked for relief by considering different kinds of self-denial.

They started with some mental experiments using pictures of tasty, appealing foods. The experimental subjects were told to imagine these delicacies being offered on a dessert cart in a restaurant. Some imagined choosing their favorite and eating it. The rest, however, imagined passing up dessert in one of two ways. By random assignment, some imagined that they had decided not to eat these desserts

at all, and the others imagined that they had told themselves not to have any now, but that they would indulge at some later time. It was the difference between pleasure denied and pleasure postponed.

Afterward, the experimenters measured how often the people were troubled or distracted by yearnings for the desserts. These researchers knew that unfinished tasks tend to intrude on the mind (due to the Zeigarnik effect, which we discussed in chapter 3), so they expected the desserts to be especially distracting to the people who had postponed the pleasure. Surprisingly, though, the people who had told themselves *Not now, but later* were less troubled with visions of chocolate cake than the other two groups—both the ones who had imagined eating it and the ones who had flatly denied themselves the pleasure. The researchers had expected the outright denial to cause fewer yearnings because the mind would consider the case closed—no more debate! But the opposite happened. The postponed pleasures did not intrude as much as the foregone ones. When it came to dessert, the mind wouldn't take no for an answer, at least not in this mental experiment.

But what if real food was involved? To find out, the researchers brought people in one at a time to watch a short film while sitting next to a bowl of M&M's (a perpetual favorite in laboratories because they're so easy to work with—no muss, no fuss). Some people were told to imagine they had decided to eat as much as they wanted while watching the movie. Others were told to imagine they had decided not to eat any of the candy. A third group was told to imagine they had decided not to eat the M&M's now but would have them later on. In general, the instructions were effective: The ones told to assume they had decided to eat actually did eat considerably more than the ones told to deny or postpone the pleasure. The study proceeded through some questionnaires, after which the experimenter (falsely) said the experiment was now over. Each person was asked to remain and fill out one more questionnaire, which was ostensibly concerned with the quality of the laboratory setting.

Then, seemingly as an afterthought, the experimenter gave the bowl of M&M's back to the person and said, "You're the last subject we have today, and everyone else is gone, so these are left over. Help yourself." The experimenter exited, leaving the participant alone to fill out the questionnaire and eat his or her fill, apparently without anyone watching or caring. But, as usual, the researchers cared very much. They had weighed the bowl beforehand, and weighed it once again after the participant left.

Left alone in that room with the M&M's, the people who'd told themselves to postpone pleasure had a golden opportunity to indulge themselves. You'd expect them to scarf the M&M's, while the people who'd sworn off the candy would either remain strong or perhaps just nibble. But exactly the opposite occurred. Those in the postponement condition actually ate significantly less than those in the self-denial condition. The findings would have been impressive if people had merely eaten equal amounts in the postponement condition and the refusal condition. After all, the ones in the postponement condition were fully expecting to enjoy the treats later.

The fact that they ate less than the others is remarkable. The result suggests that telling yourself *I can have this later* operates in the mind a bit like having it now. It satisfies the craving to some degree—and can be even more effective at suppressing the appetite than actually eating the treat. During that final part of the experiment, when all the people were left alone with a bowl of M&M's, the ones who'd postponed pleasure ate even less than the people who had earlier allowed themselves to eat the candy at will. Moreover, the suppression effect seemed to last outside the laboratory. The day after the experiment, all the people were sent an e-mail with a question: "How much do you desire M&M candies at this very moment, if someone offered them to you?" Those who had postponed gratification reported less desire to eat the candy than either the people who had refused the pleasure outright or those who had eaten their fill.

It takes willpower to turn down dessert, but apparently it's less

stressful on the mind to say *Later* rather than *Never*. In the long run, you end up wanting less and also consuming less. Plus, you may derive more pleasure because of another effect that was demonstrated in a different sort of experiment: asking people how much they'd be willing to pay to kiss their favorite movie star today, and how much they'd pay for a kiss three days from now. Ordinarily, people will pay more for an immediate pleasure, but in this case they were willing to spend extra money to postpone the kiss, because it would let them spend three days savoring the prospect. Similarly, delaying the gratification of crème brûlée or molten chocolate cake gives time to enjoy the anticipation. As a result of that advance pleasure, when you ultimately do indulge, you may find less of a need to binge and more of an inclination to eat moderately. In contrast, when you swear off something altogether and then finally give in, you say, *What the hell, and gorge yourself*.

So when it comes to food, never say never. When the dessert cart arrives, don't gaze longingly at forbidden treats. Vow that you will eat all of them sooner or later, but just not tonight. In the spirit of Scarlett O'Hara, tell yourself: *Tomorrow is another taste*.