on the comparatively trivial routines of the work or school day; for the clinically depressed, thoughts of self-pity and despair, hopelessness and helplessness, override all others.

When emotions overwhelm concentration, what is being swamped is the mental capacity cognitive scientists call “working memory,” the ability to hold in mind all information relevant to the task at hand. What occupies working memory can be as mundane as the digits that compose a telephone number or as complicated as the intricate plot lines a novelist is trying to weave together. Working memory is an executive function par excellence in mental life, making possible all other intellectual efforts, from speaking a sentence to tackling a knotty logical proposition.[2] The prefrontal cortex executes working memory—and, remember, is where feelings and emotions meet.[3] When the limbic circuitry that converges on the prefrontal cortex is in the thrall of emotional distress, one cost is in the effectiveness of working memory: we can’t think straight, as I discovered during that dread calculus exam.

On the other hand, consider the role of positive motivation—the marshaling of feelings like enthusiasm and confidence to enhance achievement. Studies of Olympic athletes, world-class musicians, and chess grand masters find their unifying trait is the ability to motivate themselves to pursue relentless training routines.[4] And, with a steady rise in the degree of excellence required to be a world-class performer, these rigorous training routines now increasingly must begin in childhood. At the 1992 Olympics, twelve-year-old members of the Chinese diving team had put in as many total lifetime practice dives as had members of the American team in their early twenties—the Chinese divers started their rigorous training at age four. Likewise, the best violin virtuosos of the twentieth century began studying their instrument at around age five; international chess champions started on the game at an average age of seven, while those who rose only to national prominence started at ten. Starting earlier offers a lifetime edge: the top violin students at the best music academy in Berlin, all in their early twenties, had put in ten thousand total hours’ lifetime practice, while the second-tier students averaged around seventy-five hundred hours.

What seems to set apart those at the very top of competitive pursuits from others of roughly equal ability is the degree to which, beginning early in life, they can pursue an arduous practice routine for years and years. And that doggedness depends on emotional traits

—enthusiasm and persistence in the face of setbacks—above all else.

The added payoff for life success from motivation, apart from other innate abilities, can be seen in the remarkable performance of Asian students in American schools and professions. One thorough review of the evidence suggests that Asian-American children may have an average IQ advantage over whites of just two or three points.[5] Yet on the basis of the professions, such as law and medicine, that many Asian-Americans end up in, as a group they behave as though their IQ were much higher—the equivalent of an IQ of 110 for Japanese-Americans and of 120 for Chinese-Americans.[6] The reason seems to be that from the earliest years of school, Asian children work harder than whites. Sanford Dorenbusch, a Stanford sociologist who studied more than ten thousand high-school students, found that Asian-Americans spent 40 percent more time doing homework than did other students. "While most American parents are willing to accept a child's weak areas and emphasize the strengths, for Asians, the attitude is that if you're not doing well, the answer is to study later at night, and if you still don't do well, to get up and study earlier in the morning. They believe that anyone can do well in school with the right effort." In short, a strong cultural work ethic translates into higher motivation, zeal, and persistence—an emotional edge.

To the degree that our emotions get in the way of or enhance our ability to think and plan, to pursue training for a distant goal, to solve problems and the like, they define the limits of our capacity to use our innate mental abilities, and so determine how we do in life. And to the degree to which we are motivated by feelings of enthusiasm and pleasure in what we do—or even by an optimal degree of anxiety—they propel us to accomplishment. It is in this sense that emotional intelligence is a master aptitude, a capacity that profoundly affects all other abilities, either facilitating or interfering with them.

IMPULSE CONTROL: THE MARSHMALLOW TEST

Just imagine you're four years old, and someone makes the following proposal: If you'll wait until after he runs an errand, you can have two marshmallows for a treat. If you can't wait until then, you can have only one—but you can have it right now. It is a challenge sure to try the soul of any four-year-old, a microcosm of the eternal battle between impulse and restraint, id and ego, desire and self-control,

gratification and delay. Which of these choices a child makes is a telling test; it offers a quick reading not just of character, but of the trajectory that child will probably take through life.

There is perhaps no psychological skill more fundamental than resisting impulse. It is the root of all emotional self-control, since all emotions, by their very nature, lead to one or another impulse to act. The root meaning of the word *emotion*, remember, is "to move." The capacity to resist that impulse to act, to squelch the incipient movement, most likely translates at the level of brain function into inhibition of limbic signals to the motor cortex, though such an interpretation must remain speculative for now.

At any rate, a remarkable study in which the marshmallow challenge was posed to four-year-olds shows just how fundamental is the ability to restrain the emotions and so delay impulse. Begun by psychologist Walter Mischel during the 1960s at a preschool on the Stanford University campus and involving mainly children of Stanford faculty, graduate students, and other employees, the study tracked down the four-year-olds as they were graduating from high school.[7]

Some four-year-olds were able to wait what must surely have seemed an endless fifteen to twenty minutes for the experimenter to return. To sustain themselves in their struggle they covered their eyes so they wouldn't have to stare at temptation, or rested their heads in their arms, talked to themselves, sang, played games with their hands and feet, even tried to go to sleep. These plucky preschoolers got the two-marshmallow reward. But others, more impulsive, grabbed the one marshmallow, almost always within seconds of the experimenter's leaving the room on his "errand."

The diagnostic power of how this moment of impulse was handled became clear some twelve to fourteen years later, when these same children were tracked down as adolescents. The emotional and social difference between the grab-the-marshmallow preschoolers and their gratification-delaying peers was dramatic. Those who had resisted temptation at four were now, as adolescents, more socially competent: personally effective, self-assertive, and better able to cope with the frustrations of life. They were less likely to go to pieces, freeze, or regress under stress, or become rattled and disorganized when pressured; they embraced challenges and pursued them instead of giving up even in the face of difficulties; they were self-reliant and confident, trustworthy and dependable; and they took initiative and plunged into projects. And, more than a decade later, they were still

able to delay gratification in pursuit of their goals.

The third or so who grabbed for the marshmallow, however, tended to have fewer of these qualities, and shared instead a relatively more troubled psychological portrait. In adolescence they were more likely to be seen as shying away from social contacts; to be stubborn and indecisive; to be easily upset by frustrations; to think of themselves as "bad" or unworthy; to regress or become immobilized by stress; to be mistrustful and resentful about not "getting enough"; to be prone to jealousy and envy; to overreact to irritations with a sharp temper, so provoking arguments and fights. And, after all those years, they still were unable to put off gratification.

What shows up in a small way early in life blossoms into a wide range of social and emotional competences as life goes on. The capacity to impose a delay on impulse is at the root of a plethora of efforts, from staying on a diet to pursuing a medical degree. Some children, even at four, had mastered the basics: they were able to read the social situation as one where delay was beneficial, to pry their attention from focusing on the temptation at hand, and to distract themselves while maintaining the necessary perseverance toward their goal—the two marshmallows.

Even more surprising, when the tested children were evaluated again as they were finishing high school, those who had waited patiently at four were far superior *as students* to those who had acted on whim. According to their parents' evaluations, they were more academically competent: better able to put their ideas into words, to use and respond to reason, to concentrate, to make plans and follow through on them, and more eager to learn. Most astonishingly, they had dramatically higher scores on their SAT tests. The third of children who at four grabbed for the marshmallow most eagerly had an average verbal score of 524 and quantitative (or "math") score of 528; the third who waited longest had average scores of 610 and 652, respectively—a 210-point difference in total score.[8]

At age four, how children do on this test of delay of gratification is twice as powerful a predictor of what their SAT scores will be as is IQ at age four; IQ becomes a stronger predictor of SAT only after children learn to read.[9] This suggests that the ability to delay gratification contributes powerfully to intellectual potential quite apart from IQ itself. (Poor impulse control in childhood is also a powerful predictor of later delinquency, again more so than IQ.[10]) As we shall see in Part Five, while some argue that IQ cannot be changed

and so represents an unbendable limitation on a child's life potential, there is ample evidence that emotional skills such as impulse control and accurately reading a social situation *can* be learned.

What Walter Mischel, who did the study, describes with the rather infelicitous phrase "goal-directed self-imposed delay of gratification" is perhaps the essence of emotional self-regulation: the ability to deny impulse in the service of a goal, whether it be building a business, solving an algebraic equation, or pursuing the Stanley Cup. His finding underscores the role of emotional intelligence as a meta-ability, determining how well or how poorly people are able to use their other mental capacities.

FOUL MOODS, FOULED THINKING

> I worry about my son. He just started playing on the varsity football team, so he's bound to get an injury sometime. It's so nerve-wracking to watch him play that I've stopped going to his games. I'm sure my son must be disappointed that I'm not watching him play, but it's simply too much for me to take.

The speaker is in therapy for anxiety; she realizes that her worry is interfering with leading the kind of life she would like.[11] But when it comes time to make a simple decision, such as whether to watch her son play football, her mind floods with thoughts of disaster. She is not free to choose; her worries overwhelm her reason.

As we have seen, worry is the nub of anxiety's damaging effect on mental performance of all kind. Worry, of course, is in one sense a useful response gone awry—an overly zealous mental preparation for an anticipated threat. But such mental rehearsal is disastrous cognitive static when it becomes trapped in a stale routine that captures attention, intruding on all other attempts to focus elsewhere.

Anxiety undermines the intellect. In a complex, intellectually demanding, and high-pressure task such as that of air traffic controllers, for example, having chronically high anxiety is an almost sure predictor that a person will eventually fail in training or in the field. The anxious are more likely to fail even given superior scores on intelligence tests, as a study of 1,790 students in training for air traffic control posts discovered.[12] Anxiety also sabotages academic performance of all kinds: 126 different studies of more than 36,000 people found that the more prone to worries a person is, the poorer

their academic performance, no matter how measured—grades on tests, grade-point average, or achievement tests.[13]

When people who are prone to worry are asked to perform a cognitive task such as sorting ambiguous objects into one of two categories, and narrate what is going through their mind as they do so, it is the negative thoughts—"I won't be able to do this," "I'm just no good at this kind of test," and the like—that are found to most directly disrupt their decision-making. Indeed, when a comparison group of nonworriers was asked to worry on purpose for fifteen minutes, their ability to do the same task deteriorated sharply. And when the worriers were given a fifteen-minute relaxation session—which reduced their level of worrying—before trying the task, they had no problem with it.[14]

Test anxiety was first studied scientifically in the 1960s by Richard Alpert, who confessed to me that his interest was piqued because as a student his nerves often made him do poorly on tests, while his colleague, Ralph Haber, found that the pressure before an exam actually helped him to do better.[15] Their research, among other studies, showed that there are two kinds of anxious students: those whose anxiety undoes their academic performance, and those who are able to do well despite the stress—or, perhaps, because of it.[16] The irony of test anxiety is that the very apprehension about doing well on the test that, ideally, can motivate students like Haber to study hard in preparation and so do well can sabotage success in others. For people who are too anxious, like Alpert, the pretest apprehension interferes with the clear thinking and memory necessary to study effectively, while during the test it disrupts the mental clarity essential for doing well.

The number of worries that people report while taking a test directly predicts how poorly they will do on it.[17] The mental resources expended on one cognitive task—the worrying—simply detract from the resources available for processing other information; if we are preoccupied by worries that we're going to flunk the test we're taking, we have that much less attention to expend on figuring out the answers. Our worries become self-fulfilling prophecies, propelling us toward the very disaster they predict.

People who are adept at harnessing their emotions, on the other hand, can use anticipatory anxiety—about an upcoming speech or test, say—to motivate themselves to prepare well for it, thereby doing well. The classical literature in psychology describes the relationship

between anxiety and performance, including mental performance, in terms of an upside-down U. At the peak of the inverted U is the optimal relationship between anxiety and performance, with a modicum of nerves propelling outstanding achievement. But too little anxiety—the first side of the U—brings about apathy or too little motivation to try hard enough to do well, while too much anxiety—the other side of the U—sabotages any attempt to do well.

A mildly elated state—*hypomania*, as it is technically called—seems optimal for writers and others in creative callings that demand fluidity and imaginative diversity of thought; it is somewhere toward the peak of that inverted U. But let that euphoria get out of control to become outright mania, as in the mood swings of manic-depressives, and the agitation undermines the ability to think cohesively enough to write well, even though ideas flow freely—indeed, much too freely to pursue any one of them far enough to produce a finished product.

Good moods, while they last, enhance the ability to think flexibly and with more complexity, thus making it easier to find solutions to problems, whether intellectual or interpersonal. This suggests that one way to help someone think through a problem is to tell them a joke. Laughing, like elation, seems to help people think more broadly and associate more freely, noticing relationships that might have eluded them otherwise—a mental skill important not just in creativity, but in recognizing complex relationships and foreseeing the consequences of a given decision.

The intellectual benefits of a good laugh are most striking when it comes to solving a problem that demands a creative solution. One study found that people who had just watched a video of television bloopers were better at solving a puzzle long used by psychologists to test creative thinking.[18] In the test people are given a candle, matches, and a box of tacks and asked to attach the candle to a corkboard wall so it will burn without dripping wax on the floor. Most people given this problem fall into "functional fixedness," thinking about using the objects in the most conventional ways. But those who had just watched the funny film, compared to others who had watched a film on math or who exercised, were more likely to see an alternative use for the box holding the tacks, and so come up with the creative solution: tack the box to the wall and use it as a candleholder.

Even mild mood changes can sway thinking. In making plans or decisions people in good moods have a perceptual bias that leads them to be more expansive and positive in their thinking. This is

partly because memory is state-specific, so that while in a good mood we remember more positive events; as we think over the pros and cons of a course of action while feeling pleasant, memory biases our weighing of evidence in a positive direction, making us more likely to do something slightly adventurous or risky, for example.

By the same token, being in a foul mood biases memory in a negative direction, making us more likely to contract into a fearful, overly cautious decision. Emotions out of control impede the intellect. But, as we saw in Chapter 5, we can bring out-of-control emotions back into line; this emotional competence is the master aptitude, facilitating all other kinds of intelligence. Consider some cases in point: the benefits of hope and optimism, and those soaring moments when people outdo themselves.

PANDORA'S BOX AND POLLYANNA: THE POWER OF POSITIVE THINKING

College students were posed the following hypothetical situation:

> Although you set your goal of getting a B, when your first exam score, worth 30% of your final grade is returned, you have received a D. It is now one week after you have learned about the D grade. What do you do?[19]

Hope made all the difference. The response by students with high levels of hope was to work harder and think of a range of things they might try that could bolster their final grade. Students with moderate levels of hope thought of several ways they might up their grade, but had far less determination to pursue them. And, understandably, students with low levels of hope gave up on both counts, demoralized.

The question is not just theoretical, however. When C. R. Snyder, the University of Kansas psychologist who did this study, compared the actual academic achievement of freshman students high and low on hope, he discovered that hope was a better predictor of their first-semester grades than were their scores on the SAT, a test supposedly able to predict how students will fare in college (and highly correlated with IQ). Again, given roughly the same range of intellectual abilities, emotional aptitudes make the critical difference.

Snyder's explanation: "Students with high hope set themselves higher goals and know how to work hard to attain them. When you

compare students of equivalent intellectual aptitude on their academic achievements, what sets them apart is hope."[20]

As the familiar legend has it, Pandora, a princess of ancient Greece, was given a gift, a mysterious box, by gods jealous of her beauty. She was told she must never open the gift. But one day, overcome by curiosity and temptation, Pandora lifted the lid to peek in, letting loose in the world the grand afflictions—disease, malaise, madness. But a compassionate god let her close the box just in time to capture the one antidote that makes life's misery bearable: hope.

Hope, modern researchers are finding, does more than offer a bit of solace amid affliction; it plays a surprisingly potent role in life, offering an advantage in realms as diverse as school achievement and bearing up in onerous jobs. Hope, in a technical sense, is more than the sunny view that everything will turn out all right. Snyder defines it with more specificity as "believing you have both the will and the way to accomplish your goals, whatever they may be."

People tend to differ in the general degree to which they have hope in this sense. Some typically think of themselves as able to get out of a jam or find ways to solve problems, while others simply do not see themselves as having the energy, ability, or means to accomplish their goals. People with high levels of hope, Snyder finds, share certain traits, among them being able to motivate themselves, feeling resourceful enough to find ways to accomplish their objectives, reassuring themselves when in a tight spot that things will get better, being flexible enough to find different ways to get to their goals or to switch goals if one becomes impossible, and having the sense to break down a formidable task into smaller, manageable pieces.

From the perspective of emotional intelligence, having hope means that one will not give in to overwhelming anxiety, a defeatist attitude, or depression in the face of difficult challenges or setbacks. Indeed, people who are hopeful evidence less depression than others as they maneuver through life in pursuit of their goals, are less anxious in general, and have fewer emotional distresses.

OPTIMISM: THE GREAT MOTIVATOR

Americans who follow swimming had high hopes for Matt Biondi, a member of the U.S. Olympic Team in 1988. Some sportswriters were touting Biondi as likely to match Mark Spitz's 1972 feat of taking

seven gold medals. But Biondi finished a heartbreaking third in his first event, the 200-meter freestyle. In his next event, the 100-meter butterfly, Biondi was inched out for the gold by another swimmer who made a greater effort in the last meter.

Sportscasters speculated that the defeats would dispirit Biondi in his successive events. But Biondi rebounded from defeat and took a gold medal in his next five events. One viewer who was not surprised by Biondi's comeback was Martin Seligman, a psychologist at the University of Pennsylvania, who had tested Biondi for optimism earlier that year. In an experiment done with Seligman, the swimming coach told Biondi during a special event meant to showcase Biondi's best performance that he had a worse time than was actually the case. Despite the downbeat feedback, when Biondi was asked to rest and try again, his performance—actually already very good—was even better. But when other team members who were given a false bad time—and whose test scores showed they were pessimistic—tried again, they did even worse the second time.[21]

Optimism, like hope, means having a strong expectation that, in general, things will turn out all right in life, despite setbacks and frustrations. From the standpoint of emotional intelligence, optimism is an attitude that buffers people against falling into apathy, hopelessness, or depression in the face of tough going. And, as with hope, its near cousin, optimism pays dividends in life (providing, of course, it is a realistic optimism; a too-naive optimism can be disastrous).[22]

Seligman defines optimism in terms of how people explain to themselves their successes and failures. People who are optimistic see a failure as due to something that can be changed so that they can succeed next time around, while pessimists take the blame for failure, ascribing it to some lasting characteristic they are helpless to change. These differing explanations have profound implications for how people respond to life. For example, in reaction to a disappointment such as being turned down for a job, optimists tend to respond actively and hopefully, by formulating a plan of action, say, or seeking out help and advice; they see the setback as something that can be remedied. Pessimists, by contrast, react to such setbacks by assuming there is nothing they can do to make things go better the next time, and so do nothing about the problem; they see the setback as due to some personal deficit that will always plague them.

As with hope, optimism predicts academic success. In a study of five