

NOISE

The Profile of a Cultural Disorder

By Jacob Burak

Translated from the Hebrew by Evan Fallenberg

"...some emotions don't make a lot of noise. It's hard to hear pride. Caring is real faint - like a heartbeat. And pure love - why, some days it's so quiet, you don't even know it's there."

- from an Irish proverb

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Prologue

Several years ago I underwent psychological counseling as I suspected that my subconscious was conspiring against me in a certain matter. I hoped that the skilled eye of a professional would see things from the side and introduce a welcome detachment – though not empathy-free – that would enlighten the complexity of the problem at hand. Indeed, with both of us pooling our resources, this troubling issue was solved in just a matter of weeks, leaving me with a free hour in my schedule. At the time I felt that continuing my sessions with the psychologist would be the right choice, and my reward would be improved quality of life. I tried to define for her what expectations I had for the process we were about to embark on. I thought long and hard about how to express in words what I was feeling so clearly in my heart. And then, suddenly, as if from out of the blue, I said, "I would like to reduce the amount of noise in my life." "Noise?" the psychologist asked, perplexed, as if we had failed to pick up on a common disorder that characterizes schizophrenics. I made it clear that it wasn't voices I was hearing, but other kinds of noises, which I began to list, hesitantly: the incessant buzz of to-do lists that pop into my head at the least opportune moments; the noise certain people generate even if they have not uttered a single word; even the sound of an apology made too late. After that I was unstoppable: I told her about the noise of opportunities I have been toying with for years that are about to disappear, and the noise of envy that puts an end to anything good, and the noises that come from comparing myself to others, and competing with them, the noise of being unable to say 'no' even to myself, the noise of dashed expectations, and the awful noise of loneliness and the desire to belong. "And of course," I added, by now breathless, "the ceaseless noise of useless information."

"All the noises you mentioned," my analyst was quick to observe, "are first and foremost disturbances. Disturbances of our daily schedule, disturbances of our thought process and our peace of mind and disturbances of our ability to make good use of our talents and strengths." In the silence that ensued, I had an insight about the manner I had chosen to describe my distress as the start of a journey to the most common element of our world.

Ladies and gentlemen, I give you NOISE.

"The stars make no noise," says an Irish expression, but the scientific facts say otherwise. Noise is everywhere, even in space, that cosmic noise whose source is in the big bang that created the universe some 13.5 billion years ago. Certain noises are indeed external, but the source of many – as I learned on the analyst's couch – is inside us. These are the noises usually created in our attempts at evaluating our relationships and our place in the world. This surplus of noise is liable to distance us from who we really are and who we could be, though its complete absence is not necessarily an ideal situation. Absolute silence, as we will see, seems to dilute the reality in which we live and impoverishes it.

Are you able to identify the 'noises' in your life? I'm talking about that ceaseless rumble of intrusive thoughts, like the question of how other perceive you, or the noise that enters your life along with indecisiveness, and of course the bothersome clatter of the media, always trying to capture our minds and our purses. This book defines these and many others as noise.

Every one of us has his or her own noise profile, that unique combination of noises we are willing and even happy to allow into our lives, but no less, the noises we prefer not to hear. Our quality of life is the result of the delicate balance between these different types of noises. The problem begins when the majority of these noises appear before us in disguise and we are unable to recognize them at first. We are tormented by social noises that give cover, for example, to the noise of the fear of loneliness; we thirst after news in hopes of introducing order into a world that is in fact not controllable; and we are willing to listen to the nonsense espoused by experts only because they are cloaked in authority. In order to assess the amount of noise in your life you need to adopt a new outlook and try to identify your own private noises. This book will help by mapping reality through the unique perspective of a new tool: the prism of noise.

From the moment I understood that my life was a collection of noises to which I am exposed – some by my own choosing – I realized that I have a certain amount of influence over the selection process. I have spent the past few years trying to put together a "noise profile" more suited to me. I filtered out many noises that sullied my quality of life and changed quite a few of my habits in the process.

At the same time, I learned that our noise profile changes even if we do nothing about it. The loud rhythms I favored in my twenties have been replaced by quieter music, and sometimes by no music at all. My thirst for commentary in the media has evolved into a loathing of all punditry that has led to a radical cutting back on all my news consumption.

Noise-generating people I accepted into my life because they served different purposes of belonging and security were banished from my world once I grew stronger.

Have you given thought to what your world would look like if you were only more in control of the noises to which you choose to expose yourself? Who of the people surrounding you would disappear from your life? Which habits would you try to change? And the biggest question of all: are you capable of standing face to face with the same silence you worked so hard to push from your life?

As used in this book, the word 'noise' describes a wide variety of social conditionings, personality disorders and distractions, all brought about by culture in general and the information culture and consumerism in particular. These stand between us and the peace of mind we are dying to achieve but are not always capable of realizing, even when given the opportunity. The British writer Susan Ertz captured this sentiment perfectly when she said, "Millions long for immortality who do not know what to do with themselves on a rainy Sunday afternoon."

The first part of this book deals with internal noise, beginning with the most terrible of them all: the fear of death. While writing I had the opportunity to interview one of the world's most respected researchers in this field. I told him about the topics I would be covering and informed him that I was planning to open the book with the end – of life, that is. His response was underwhelming, a surprise: "I am over sixty years old," he told me, "but thoughts of my own death practically do not occur to me." Was this repression, I wondered, or are my own thoughts the exception to the rule? Don't we encounter death every day, all the more so in cases where people we know fall prey to nature, often before we have prepared ourselves for their demise? I know that even though the subject does not obsessively preoccupy my thoughts it is still always there in my subconscious, waiting for the chance to float into my consciousness. Have you found yourself contemplating your own death? Have you managed to retain these thoughts for more than an instant before your attention is diverted, as if by coincidence?

As the only species in nature aware both of its own existence and its own demise, we are condemned to facing this painful awareness our entire lives, leading us to adopt a variety of strategies designed to help us deal with this terrible conflict that other species have been spared. One accepted method is distraction, though most of the strategies we

use for dealing with the bitter truth are in fact culture-based. Some people believe that the whole purpose of culture is that it enables us to accept that our lives are limited. Culture helps us defy death by bestowing meaning on our lives and allowing us to believe that our lives will continue to be meaningful even after our deaths. Religious faith is the most common tool in culture's tool kit – though not the only one – available to humans. Collecting and amassing (money, for example, or property), artistic self-expression, and even our dietary and fitness habits are other facets of this same meaningfulness that we wish to adopt as a human protest to our own deaths. Even children become nothing but "the living message we send to a time we will not see," according to the American media theorist and culture critic Neil Postman.

The anthropologist and sociologist Ernest Becker was the first to offer a structured theory of death that explains the central place of culture in the denial of death. His book on this topic won him the Pulitzer Prize, but more importantly earned him the ongoing scientific following of a group of researchers in behavioral sciences who provided his original thinking with the underpinnings of research that were missing from his theoretical writings. The chapter entitled "The Most Awful Noise of All," which opens this book and provides the framework and the context for some of the other chapters, describes the work of Becker and several prominent researchers in the new scientific field of Terror Management Theory, which is a sterile, scientific euphemism for death anxiety.

All living entities in our world obey the commands of nature with regard to survival and reproduction, but humans are also the only species whose mental development leaves behind many traces from childhood. We continue to be focused on ourselves as though we were still children, and as such we tend to position ourselves in the center of the world, exposed without emotional sunscreen to every reflection of reality that offers a different perspective. As children we have no tools for understanding the 'other,' those people who are different from us, so we are condemned to absorbing the noise that 'others' make in our presence even when we are no longer children. The chapter "Us and Them" deals with the question of who those 'others' really are and how they infiltrate our consciousness. Thus, parents, teachers, politicians and people with commercial interests take pains to place people who generate noise in the position of the 'other,' those perceived as threatening – too often, members of other religions or nations or cultures. But the authority that these noise-agents represent for us offers only partial explanation for their success. The matter becomes more complicated when we realize that we collaborate with them as a response to our own evolutionary needs, which spring from the vigilance necessary to fend off existential

threats. They are the main reason for our willingness to give our attention to 'others' who threaten us, as it were, now and again.

Societal affiliation is one way that is efficient – culturally and evolutionarily – of coping with the 'other.' But it is a mixed blessing. The meeting point between the needs of the individual and the demands of society is a constant source of internal noise. And if that were not enough, different individuals – even those in close geographical proximity – adopt different socio-cultural values in defining themselves. As a result, we cast a critical eye on 'others' who threaten the important values of our culture. Concurrently, in a process that is meant to strengthen our cultural identities, we are prepared to make substantial sacrifices for our desperate aspirations to belong to 'our' group. These sacrifices are reflected in our willingness to put up with the meddlesome noise that has infiltrated our lives when we fail in realizing our aspirations for belonging. This failure gives rise to loneliness, and that, as is known, produces particularly loud noise, almost as loud as that of the fear of death. The noisy encounter between the needs of the individual and the demands of society can be found at the center of the chapter entitled "Societal Noises."

The second section of the book reviews the noise amplifiers in our lives. These are the biases and distortions that make it difficult for us to perceive reality as it is and cause us to amplify even the most innocent of noises to the level of a bothersome din. A large number of the behavioral biases we are exposed to today hark back to the period of time in which survival was the crux of life. However, not all of them – for a change.

Noise amplifiers possess the key to unlocking the mystery of the 'paradox of fear,' the phenomenon that causes us – the healthiest, longest living and wealthiest people in history – to live in fear as though our demise lies just behind every newspaper headline. Each of us has our own noise amplifiers, as personalized and individualized as our fingerprints, but what we have in common is that they tend to wreak havoc on all of our lives. Like a viral infection, they attack the weakest part of our brain, destroying the delicate mechanism that links our perception of risk to our fears, the natural reaction to threatening risks. When noise amplifiers are functioning, the brain errs in its assessment of risk and we are condemned to experiencing that useless feeling of fear, the ultimate noise generator. This part of the book examines the various ways that noise amplifiers cause us to exaggerate our risk assessments.

As slaves to our evolutionary roots we are still acutely sensitive to warning signs no longer relevant in our modern world. Evolutionary psychology explains the refinement process of our primitive noise amplifiers, which rush to turn up the volume even on weak signals if they are perceived as a threat. What is most important about amplifiers is that they trigger our particularly speedy emotional systems instead of our rational decision-making systems – which reside side by side in our brains – without our even being aware of it. But even people capable of keeping control of the damaging effects of their emotional systems fail when it comes to the noise amplifier that stems from our inborn blindness to probability. What truly is the level of risk of death involved for people contracting West Nile fever? Forty-five percent of those asked this question in a study done by the Harvard School of Public Health thought there was a one in ten chance of dying, whereas the actual number is less than one in a hundred. Are you capable of adjusting your fear to a change in the level of risk? And let's be honest here – do you, like most people, think of a one in five risk as being greater than twenty percent? If you answered in the affirmative you have fallen victim to the very oldest type of noise amplifier.

The second kind of amplifier is based on so great a lack of familiarity with the scientific tools that enable quantitative risk assessment that it borders on ignorance. Is the late arrival (mid-seventeenth century) of the field of statistics on the scene a sufficient explanation? I doubt it. We have a few good reasons not to acquire the tools that this important discipline provides. As with many other instances, lack of knowledge allows us to long for ideas, feelings and desires that perhaps satisfy our emotional needs but distance us from intellectual integrity, which is an extremely efficient noise-suppressor, though one that is insufficiently widespread.

The well-known statement that there exist "lies, damned lies, and statistics" reflects a state of mind popular with a public that feels it has been exploited by various interested parties constantly peppering it with numbers, tables, graphs and charts designed to win its support. These interested parties would be shocked to discover how huge the sector of the population is that finds basic multiplication difficult. Most regular citizens actually feel less clever in expressing their resentment in words after trying to comprehend such graphs and charts, and this feeling is often directed at statistics (as in the above quote) instead of against those who make cynical use of it.

In the Biblical book of Ezekiel it is written that man will "Eat thy bread with noise [quaking]," which is explained elsewhere as fear. Fear of the unknown. But in the modern world we fear the known as well as the unknown when it is erroneously interpreted,

especially when it is presented almost intentionally as threatening and usually in service to some interest that is not necessarily our own. The media-savvy produce such information morning, noon and night, and the noise amplifiers implanted in us evolutionarily complete the job. Will we manage to identify them in the future? I hope that the chapter on noise amplifiers will provide you with some insight on the different models of amplifiers in use.

The third part of the book deals in general with external noises (including physical noise) and specifically with information noise. Comprehensive research shows that the average American consumes twelve hours of communication media a day. Information sciences define irrelevant or meaningless information as noise. And in life? How much of the information we consume in fact serves our purposes? And what is the price we pay for this gluttony, this need to be updated all the time? Think about our consumption habits. We place an angry phone call to the newspaper we subscribed to when it appears on our doorsteps half an hour late, but are willing to forgo reading the fascinating articles buried in the pages of the ten thousand newspapers that serve a worldwide readership of some 450 million people. Moreover, how many of the articles we read are actually important? Or, in other words, how many will still be relevant and meaningful in a week's time, or a month, or – more significantly – a year? How many thousands of words more will we need to read before we understand that except for the headlines and the weather forecasts, newspapers could be produced by computers? Once a year it will print the story of an airplane that miraculously avoided crashing after its flight crew fell ill with stomach poisoning and a passenger who served as a fighter pilot in a World War – past or future – landed it without incident. Does it matter whether this plane was part of the Indonesia Air fleet? The computer will also randomly select the airline, as long as it is not the national carrier of the newspaper printing the story. A fairly simple process, just a few lines at most in programming language.

The computer can also use a different program to determine the sum of money involved in this week's (month's, year's) government corruption scandal. Is it really important to know who is doing the bribing and who is being bribed? The news draws its reliability from our familiarity with human nature, so in this sense no names need be given – initials will do, as long as the newspaper's editorial board remembers to attach a few suspicious-looking photos to the articles. What the reading public really wants to know is

whether any friends or neighbors are among the greedy perpetrators, maybe even so they can gloat. But this thrifty system will not become reality, not even the expected lull for those who have come to terms with the fact that there is no getting around all the global verbiage produced by ten thousand newspapers that they cannot get their hands on.

How can we explain the enigma according to which the number of incidents that occur daily matches exactly, precisely, the space available in tomorrow's newspaper? Is it not strange that one of the world's most respected newspapers, The New York Times, makes that very claim by its banner, 'All the News That's Fit to Print'? And where are the readers in this equation? After all, the source of more than half the articles that appear in newspapers – even the most respected among them – is the news releases sent by the companies and individuals that appear in these articles. What is the mechanism that produces our addiction to consuming useless information that not only fails to improve our mental welfare but demands ironclad discipline if we wish to wean ourselves from it? How important can a newspaper article be if a computer program could produce the same thing? One of my friends has been hard of hearing since the time of his service as a commander in the Artillery Corps. He is nonetheless capable of understanding perfectly what a flight attendant is asking him, or a waiter in a restaurant. They are playing roles in a ceremony he knows and recognizes from prior experience. Doesn't most news fall into the same category?

Imagine a gadget that could filter television noise, a little black box that could identify empty words, events that a computer could generate, and forecasts that will never come true. And of course advertizing, both the obvious and subliminal varieties. Use of this gadget would reduce every television program from sixty minutes to four. First, all the advertizing would disappear. Next, the 20/80 rule would be applied, whereby 20 percent of the broadcast contains 80 percent of the important matters. And then, the content filter would further reduce the verbiage that contains no new or meaningful information. If indeed you are convinced that noise controls your life, then the important question posed by this book is: Do you have a good way of filling the time that will free up once you have rid yourself of unnecessary noise, or will you simply fill it with some other noise?

This part of the book also deals with the noise of health information and offers some hope to all those who are in despair of ever muddling through all the medical details at their disposal. Some readers may even find the strength to change their information consumption habits. A person who chooses to ignore the numbers and endless, numbing details in which he is drowning is like someone exposed to sunlight: limited exposure is healthy but unlimited exposure becomes a health hazard.

The fourth and last part of the book discusses several of the most effective noise suppressors available. One obvious option is meditation. Trusting others can neutralize all the noises that derive from social suspicion and mistrust. Knowledge is a calming element since it quells the wild growls of ignorance. Knowledge in general, and statistics in particular, are very effective tools for dealing with the noise of randomness, the sound of nature and man-made phenomena speaking to us from unexpected places. But self-esteem is the most important noise-suppressor. Self-esteem, the most evasive treasure of them all, is the fortified wall we can erect against the fear of death, and this wall will serve us in good stead against the many engines of noise based on our vulnerability and the doubts that eat away at us. Indeed, the noise suppressors we decide to adopt for ourselves are the most important personal choice this book has to offer.

The complex relationship between the principal engines of noise in our lives and the noise suppressors is what this book refers to as the Four Rules of Noise. These laws make it clear why it is that we allow these harmful noises to infiltrate our lives, how we make them even louder without being aware of it and what price we pay. The Rules of Noise seem to provide a scientific framework for the chapters of this book, while in fact they are really a personal attempt to impose order on the workings, often hidden, of the world's most common elements. When you finish reading you can even add a few rules of your own to the list. Should you be interested in doing so or in passing along any other remarks, you can do that on the book's website: www.jacobburak.com.

The Irish, in whose culture the issue of noise plays an oddly prominent role, are the ones who said, "Quality is like a river – the deeper it is, the quieter it is." Actress Shelly Winters would agree. She said, "If the mind can get quiet enough, something sacred will be revealed. Every now and then, when you're on stage, you hear the best sound a player can hear. It's a sound you can't get in movies or in television. It is the sound of a wonderful, deep silence that means you've hit them where they live." Silence has a quality about it that both imbues us with magic and threatens us, all at once.

Like its predecessor, my book *Do Chimpanzees Dream of Retirement?*, *Noise* is based on the newest data available. Unlike it, however, *Noise* interweaves interviews with researchers, thinkers and others whose vocations put in them in regular contact with the different engines of noise. Their thoughts were an abundant source of inspiration for many

of the ideas presented in this book. The acknowledgments at the end of the book list their contributions.

PART I: INTERNAL NOISES

The First Rule of Noise:

We always prefer the noise that diverts our attention to the noise that is more bothersome.
"God pours life into death and death into life without a drop being spilled."

-Anonymous

In March 2008 I attended, as I do every year, the Maastricht Art Fair in Holland. I had no clear purchasing objectives, but art fairs – and this one more than any of them – are designed for exactly that purpose.

In the evening I returned to my hotel and showered quickly so as to be on time for my annual supper with Thomas, a friend and art dealer from Munich who has a keen appreciation for my taste in art. This year's meeting carried a certain excitement with it; earlier in the day Thomas had told me that over our meal he would show me a piece of art that would truly grab me. I was not particularly surprised that this work of art was not displayed in his booth, since I had already learned that the considerations of an art dealer are far more complex than meets the eye. He might have obtained the work from a private collector and was trying to prevent other dealers from discovering that this collector had begun to sell.

On my way out of the shower I caught a glimpse of my body in the mirror. Just half a year before my sixtieth birthday, I was forced to admit that the thatch of white hairs on my chest was there to stay and that the bald patch cut away by a nurse at the Heart Institute was unfortunately growing back in the same shade. I wondered whether my hair was the first part of my body over which I was about to lose control. I banished this bothersome thought and got out of the room as quickly as I could.

Thomas was there waiting at the restaurant when I arrived. After we had each ordered what we always do, we became engaged in a pleasant conversation. Once finished with our hors d'oeuvres, Thomas turned his attention to the brown satchel he keeps with him at all times, which had been sitting from the beginning of the evening at the foot of the table like a guide dog, and opened it.

Chronos, a drawing by Adolph Menzel from 1895, was in perfect condition. The paper had never been treated, and, truth be told, did not need any treatment. But in fact it was the subject of the drawing itself that left me in awe, as though someone had read my mind. Genius, the recognizable symbol of human intellect – pictured here in the form of a

winged angel – is grasping the hair of Chronos, the original Father Time. Winged Genius is trying to stop Chronos from the work he is engaged in – sharpening his scythe – thereby possibly putting a stop to the march of time. While this was technically a drawing, it was a painting in every other way, the talents of one of the great German artists of the nineteenth century apparent in every line.

The price of this drawing was quite a bit higher than the limit I had set for my spending at the fair. *Chronos* would no doubt be my most expensive purchase if I did indeed decide to purchase it. The way the artist deals with the eternal question of the relationship between body and spirit – does the human intellect continue to survive even as Father Time hacks away at the body in which it is wrapped? – is masterful. The muscled body of Chronos fills the frame, his left hand resting on the blade of the scythe while his right grasps the grindstone he is using to sharpen his tool. His face is framed in a woolly beard and his giant wings take up nearly a quarter of the drawing. His massive body stands immobile for a moment, his hands idle, his head turned sideways and his chin slightly raised as he encounters with a surprised look on his face the genius fluttering above him, holding tightly to locks of his hair. Thomas explained that the background of this drawing was the shock that gripped Menzel in 1882 when confronted with the destruction rampant in Alexandria as a result of an attempt by the British naval forces to quell the Urabi Revolt. Menzel suddenly understood that his body of work, which was already recognized and appreciated during his lifetime, was not immune to the ravages of time and the malice of human beings. Thomas informed me that there had been an earlier version of this work, which had been presented as a gift to Chancellor Otto von Bismarck, the father of modern Germany.

It was the troubling memory of the body that peered out at me from the mirror in my hotel room that finally dispelled any hesitations I had about this wonderful work by Menzel, which now hangs in my study. Still, one question has been bothering me ever since: is the act of collecting – art or other assets – a form of human defiance of our inevitable demise? And if so, where else in our lives do we meet up with the long arm of Chronos?

[*Chronos*, 1895. Drawing by Adolph Menzel (1815-1905)]

The Most Awful Noise of Them All

I chose to open with the story of Chronos since it deals with what is arguably the most important noise of them all, that of our inescapable demise. Years after I was able to define the principal noises of my life and overcome most of them I understood that no one is equipped with the tools for stopping Chronos in his labors and all that is left to us is to cope with this most terrible noise, each of us in his or her own way. This is the noise considered by philosopher Bertrand Russell, as expounded in his 1935 collection of essays *In Praise of Idleness*, to be the driving force of our culture. The excessive industriousness prevalent in our culture is designed to divert our attention from preoccupations with death, thereby allowing us to invite other noises to invade our lives, if only to keep us from hearing the sole noise that links us with all the other forms of life in our world.

Bertrand Russell was neither the first philosopher nor the last to address the topic. Death has always been a topic of inspiration for philosophers. Epicurus (342 BCE to 270 BCE) turned the fear of death into the central issue of his theory. He understood that "It is possible to provide security against other ills, but as far as death is concerned, we men live in a city without walls." Edgar Morin, a contemporary French philosopher and sociologist, reached the roots of the existential challenge when he said, "The certainty of death and the uncertainty of the hour of death is a source of grief throughout our life."

Ludwig Wittgenstein, the father of modern language theory and one of the most important philosophers of the twentieth century, created his monumental theory under the influence of the fear of death and suicidal tendencies that were an undercurrent of his life.

The fear of death is an outcome of several factors. First, the fear of the unknown: what happens to us when we die and what meaning – if any –our lives will have. Further, there is the inevitable anxiety about pain and torment that may be part of our death. And finally, there is our desperate desire for stability, balance and, especially, meaning – all of which end with our death. Still, it is worthwhile remembering that death is what gives meaning to life. Without it, no book would ever have been written, no painting or sculpture created, no musical composition composed. Our desire to leave our mark would not exist since it would have no meaning.

Sigmund Freud also devoted significant space to death in his work. He claimed that we are obsessed with the need to perceive death as a random event – the result of an accident, illness, infection, old age. In this way we expose our wish to remove from death all its most important components, thus turning it into a chance event. Freud succeeded in

discerning that in the face of fear of death, man is desperate for diversions that will enable him to ignore both the fear and death itself.

Indeed, one of the most interesting definitions of humankind is that we are the species that cannot accept its own death. According to this definition, our culture, the multistoried buildings in which we live and work, and our capricious games have all been devised in order to distract us from the flickering knowledge – however random – of the fact that our fate as individuals and as part of the collective is to return to ash and dust.

Although human beings inherited their fear of death as part of our evolutionary development, human intelligence allows us to feel the presence of death and not just directly. The many hints provided to us by our environment through wars or accidents that result in the deaths of others pass along this message very effectively. Thus, we humans are condemned to managing our irrational thoughts in the hopes of keeping our fear of death at bay as much as possible.

In general we do not experience fear of death in a cognizant manner and we are not constantly aware of its presence in our lives. However, it seems we fail to give proper attention to the enormous influence that death has over us. Researchers claim that our unconscious fear of death is a great force in shaping our thoughts.

Our fear of death can be assessed by using a scientific scale called the Multidimensional Fear of Death Scale (MFODS), which was developed in the 1970s by Joe Hoelter. This research tool is based on a 42-item scale to measure fear of death and subdivided into eight categories ranging from fear of early death ("I am afraid I will not have time to experience everything I want to" – agree/disagree) to the fear of bodily vivisection ("I do not want to donate my eyes after I die" – agree/disagree). Applying this scale to people of different ages has shown that fear of death is greater among young people, and declines with age. It is stable between the ages of 60 and 87; surprisingly, people of advanced age no longer fear death even if they fear the process that accompanies it.

The simple fact that humans find it difficult to think about their own death is evident in the low percentage of people with wills, and in the failure to purchase life insurance policies among those who should. Indeed, when was the last time you thought about your own death?

Fight or Flight

The Freudian psychologist Ernest Becker had a uniquely original way of dealing with this topic. His viewpoint emphasizes first and foremost the social and cultural dimensions of the fear of death. Becker disseminated his theory in *The Denial of Death*, which won the Pulitzer Prize for 1973. Following the writings of the Danish philosopher Søren Kierkegaard, Becker claimed that the self-awareness imprinted in humans (unlike animals) together with the ability to imagine the future create a unique existential situation for human beings which is at the same time heroic and hellish. Only humankind, able to recognize both aspects, is alive and aware of the fact simultaneously. Still, since the natural end of all life is death, Becker believed that awareness of death and along with it the awareness of the fear of death makes death the most important event in the evolutionary development of the human species. This theory is based on the assumption that the unique human capacity for self-observation and the awareness of our own demise is an ongoing source of suffering whose foundation is the clash between the will to preserve life (which is common to humans and animals) and the knowledge – available only to human beings – that this is not possible.

According to Becker, human culture in its entirety is a multifaceted defense mechanism designed to aid us in coping with our inevitable death. He believed that all our psychological distress stems from the failure of our heroic defiance of death and the awareness of our inalterable future.

Our cultural world becomes a retaining wall between the reality of life and inevitable death. Culture, in this context, is defined as a collection of beliefs on the nature of reality that have evolved mainly in order to help us cope with the anxiety of our own death. Culture assists us in feeling secure in an uncertain world. As human beings we crave meaning, and the role of culture is to provide an answer to the important question "How were we created and what are the circumstances of the creation of the world in which we live?" Indeed, all cultures provide their adherents with an explanation of the source of the universe, a recipe for acceptable behavior for different social roles and, usually, some indication of what they can expect to happen to them after they die. Most cultures also offer the hope of immortality through the signs of acts of valor, monuments that will last many years past their creators, artwork, large and extended families, identification with social institutions or the amassing of property and assets. Each culture places a different emphasis on the choices of its symbols for eternity. And of course, nearly every culture promises life after death as well, by taking part in the religions associated with it.

In that way, culture deals with the fear of death by providing meaning, order and continuation in people's lives. Trust in the logic of the social mechanism and its rules is the source of a feeling of an individual's security, since it makes the world a stable and organized place. In this sort of world, status, wealth and children all serve as defiant hopes of immortality as does, quite naturally, belief in life after death. The way in which culture reduces the anxiety surrounding death is the possibility offered to the individual to see himself as a worthwhile person in a meaningful world. According to this approach, when we advance our careers, establish a family or firm up our position in society, we are doing nothing more than fulfilling the dictates of the culture we sought to be part of. We do this in order to grant meaning to our lives, thereby coping with the fact that our existence is fleeting. Anyone who has seen the film *Blade Runner* can appreciate the frustration of the humanlike creatures whose lives are only four years long, a period too short for any kind of real meaning.

The need for self-appreciation and meaning as a stopgap for anxiety is universal, though the method for obtaining them is different depending on the cultural context and the period of time. Human history is replete with examples, from the ancient Sumerian epos that tells the tale of Gilgamesh mourning the death of his friend Enkidu and trying to achieve immortal life, to the Chinese emperors who buried their family members along with their servants while they were still alive so that they could serve them even after their deaths, to ancient Egypt, where the pharaohs denied death by means of advanced embalming technology and buildings strong enough to withstand the ravages of time.

In addition to the defenses against the fear of death that we take on ourselves as individuals, society provides us with an additional cultural line of defense by means of an ethos of heroics that is unique to this specific culture. We reach immortality by sacrificing ourselves for our homelands or by donating a new wing of a museum or university. Since the main objective of an individual is to overcome death, every society must provide its members with a complex system of heroes and heroism, which in most cases is religious. If we adopt Becker's worldview then we must admit that ideological confrontations among established cultures occur in large part between their symbols of heroism.

The natural difficulty in accepting Becker's approach stems from the nature of the theory itself. If indeed a person does not waste a single moment thinking about his own death then how can he counter the claim that this is in fact eternal proof of the efficacy of the cultural mechanism that is supposed to assure the denial of death? In other words, if Becker was right then if you are not thinking about death then it is only because you have

managed to suppress these thoughts. Confused? This is the time to fortify theory with a little research.

Immortality Begins with Death

Terror Management Theory (TMT) is a developing field of psychology that deals with the emotional reaction of people's fear in the face of awareness of their own death. The theory was first developed in the 1980s by researchers Sheldon Solomon, Tom Pyszczynski, and Jeff Greenberg. They attempted to deal with the paradox that while humankind has the technological knowledge necessary for taking care of its material needs without annihilating or plundering others, human violence continues to thrive in modern culture.

The primary influence on Solomon, Pyszczynski and Greenberg was that of Becker's theories. More than three hundred studies carried out by them and others in seventeen countries over the course of more than twenty years have enabled the grounding of Becker's theories in terms of research.

According to the model set up by Solomon and his colleagues, cultural perceptions of reality are always based on a social consensus. Thus, the more individuals in a society believe in a certain perception of reality, even if it is not grounded in reality, the easier it is for each individual to adopt the proscribed social modes of behavior. The feeling of the individual that he has succeeded in adhering to the values and the moral standards of the cultural world to which he has chosen to belong becomes the basis for his own self worth. Therefore, everything that threatens his universe and the value system that stands at its core also undermines the power of the cultural values to which he adheres, including the mechanism for denying death as one of those values. As individuals we then tend to attack verbally anyone who threatens the feeling of self worth or the cultural beliefs upon which we have based these feelings of self worth.

Solomon and his colleagues believe that this simple dynamic can explain incidents of interpersonal violence but is even more useful in understanding aggressive behavior between different cultural groups. The biggest threat to a group's cultural worldview is when another group chooses a different cultural outlook. If we give up our own cultural perception for an alternative worldview we will shake up the important defense that our own cultural worldview has provided against the anxiety that derives from the fear of death.

The approach taken by Solomon and his colleagues provides a unique perspective for understanding the lengthy historical path taken by cultures and peoples in disabusing other peoples and cultures of their cultural perspectives and worldviews and persuading

them by political, financial and military means to adopt an alternative perception of reality. According to this model, the main reason for the difficulty in settling armed conflicts is cultural-psychological and ultimately stems from the inability of humankind to accept people who have a differing mechanism for denying death from their own.

Dr. Gilad Hirschberger of the New School of Psychology at the Interdisciplinary Center of Herzliya, Israel, knows this theory well and has even participated in some of the studies done by the three leaders in this field. Hirschberger does not take lightly the influence of coping with the fear of death on our cultural symbols: "We develop around us an entire fictitious symbolic reality that includes creation stories and reasons for our own existence, an explanation for what happens to us after we die. And of course we believe that the world is not a random place devoid of meaning but rather is managed by an omniscient presence with a huge plan far beyond our capacity for comprehension. In addition, our belief in our own cultural worldview gives us the feeling that we are connected to something other than our physical selves, which is large and eternal. Thus, for example, a Jew can feel he is part of the Eternal People, an ancient people, so that in spite of daily tribulations he feels his future is still ahead of him."

The challenge facing the researchers in this field is to create under lab conditions the situation they term 'mortality salience.' Using a common research technique for simulating mortality salience, participants in the research are asked to write down the feelings that arise when they think about death or when they consider what will happen to their bodies when they die. When they have finished, they are given a break, after which the researchers continue the experiment. Other approaches present the word 'death' to the participants subliminally, while a control group is shown a neutral word or even another negative word not necessarily associated with death, like 'pain.' It appears that such simple methods indeed succeed in making participants aware of their own deaths.

When death becomes more prominent in the experiments we become more patriotic. We prefer those who praise our home and our country and feel less comfortable with disrespect toward the flag or other national symbols. We are inclined to compensate heroes and punish prostitution. We try to divert attention from our less complimentary traits and we believe more in the supernatural. A reminder of death causes us to treat ethnic groups and the religious in stereotypical terms. Comparative research carried out by Sheldon Solomon and his colleagues details the findings but also offers an important byproduct of the research: it appears that those who are less influenced by the presence of death and show higher levels of immunity to the phenomenon are also the people who have

managed to assign much meaning to their lives (as measured by accepted psychological questionnaires), thus enjoying a great sense of self esteem, exactly as suggested by Becker's theory.

Terror Management Theory attempts to make a connection between human behavioral characteristics and fear of death. According to this approach, the source of all our fears is the instinct to preserve our own existence and the fear of death that threatens it. This is also the meeting point between the theory propounded by Solomon and his colleagues, and evolutionary psychology. In fact, 'preserving existence' and survival are two different names for the same thing, though we humans are the only species equipped to react to future threats and not only those looming; only humans are capable of envisioning events yet to take place. This is also the reason that fear of death, even if it is not immediate or pending, is treated by our brains as an actual threat.

Fear is the basic feeling that often provokes reactions of fight or flight that our brains offer in opposition to perceived threats. When the brain identifies a threat that it is unlikely to beat it sends blood to the legs for the purpose of helping them escape. When the brain estimates that direct confrontation is preferable, then it sends blood to the arms so they may help fight. Terror Management Theory offers a similar mechanism for coping with the fear of death but the strategies in this case are based on cultural characteristics. If an individual 'fights' fear he tends to emphasize the commonality between himself and the cultural group to which he belongs as part of his religion or nationality, while at the same time expressing enmity toward whoever is perceived as different from the group he belongs to – the 'others.' When the individual flees from the existential threat he finds so difficult to cope with he tends to suppress its existence and adopts a whole range of distracting activities designed to divert attention to it. This is a subconscious process, fast and automatic. Cultures of consumption and information provide, as detailed below, many such opportunities for distraction. A person's career is one of them. Infomania – unbridled addiction to information consumption – is another.

Becker's theory did not achieve scientific resonance commensurate with the daring and innovation it contains. Although the studies made by Solomon, Pyszczynski, Greenberg and others supported the theory that there exists a cultural component in the way we relate to the fear of death, the field did not draw the central thinkers of behavioral science. Do they, too, feel ill at ease dealing with this morbid subject? And if so, what does that say? Not much, apparently, if Becker is right; all in all they are just denying their feelings. If he is wrong, by the nature of the matter, we have no way of proving it.

Becker and the Terror Management Theory play an important role in consolidating the framework of this book as it exposes the desperate need we have for social belonging and the variety of noises made by every small doubt in our attempts at reaching it. This approach also firms up the immediate connection with the enmity we feel toward the 'others,' members of a different culture or subculture from our own. Anxieties are the source of most of our internal noises and the most difficult anxiety of them all – that of the fear of death – is also the source of the First Rule of Noise: We always prefer the noise that diverts our attention to the noise that is more bothersome.

"Us" and "Them" – the noise made by others

All good people agree
And all good people say
All nice people, like us, are we
And everyone else is they.
-Rudyard Kipling, *A Friend of the Family*, 1924

There are no windows in the devil's room. It is the only room in which four walls add up to more than a single room. It is painted in bold colors only a child would dare use, especially when you think of identity-defining real estate meant for an entire lifetime. The devil's room is always occupied; even when emptiness prevails in one of the other rooms you can clearly hear the sounds emanating from the devil's room. In truth, it seems that the noise from his room grows louder the more that emptiness suffuses the rooms in the vicinity. The design of the devil's room was carried out by parents, teachers, friends, commanding officers and, of course, politicians.

Sometimes the devil is one and sometimes many. Sometimes it is a man, sometimes a woman. Black or white, healthy or terminally ill, the devil is always making noise.

The devil's rental contract may be particularly short – lasting only days – or long, lasting for years. Excessive noise from his room does not constitute grounds for terminating his contract and turning him out. On the contrary, an intelligent devil understands that if he does not make the appropriate noises he will be shamefacedly expelled and replaced by a more vociferous devil. His room is located in our brains and he is so essential to us that we do not even charge him rent.

When the devil is many, the nameplate on his room reads THEM.

Galton on a mission

Sir Francis Galton, an exceptionally productive researcher and cousin of Charles Darwin, published in his lifetime no fewer than 240 different articles. His fields of interest represent an amazing scientific and intellectual breadth of knowledge. For example, he was a pioneer in the field of statistical correlation, was the first to use questionnaires for collecting data, created the concept of 'nature versus nurture' and laid the foundations of modern psychometrics. Sir Galton sincerely believed that all the world's ills could be solved through quantitative measurements and calculations. But be not mistaken about Galton: he was far from naïve. His work helped perfect fingerprinting as a tool in the emerging science of forensics and led to its adoption by Scotland Yard.

In the 1870s Galton initiated a project that was overly ambitious, even for him: the classification of the human race. He photographed a great number of individuals belonging to various distinct groups in identical poses. That way he was convinced he had succeeded in finding the character profiles of criminals of the Victorian age. As an excellent disseminator of his own ideas, he managed, through his lectures and articles, to convince thousands of his countrymen to photograph their relatives, who came from different professions (including prostitutes), sects, tribes and races, in the hopes of finding common denominators between different sectors of the human population. Some of these photographs can still be found in museums around the United Kingdom today.

Galton saw no problem in this system of generalization that he had developed. As far as he was concerned, the process was based on objective criteria and mathematical rules that had been applied according to the most advanced technologies of the day, recently imported from the fields of astronomy and physics. To the extent that he had control over the matter, he was prepared for the state coffers to finance people considered 'successful' so that they might intermarry. Galton, as is already clear, believed wholeheartedly in his scientific methodology and path.

However, as one who was already reading Shakespeare at the age of five for pleasure, Galton in fact failed where Shakespeare succeeded. Like many before (and after) him, Galton was not blessed with the basic understanding that humans, in all their shapes and varieties, are far more complex and multidimensional than any system of measurement can hope to capture. Humans share so many characteristics while at the same time are so vastly different that it is possible to draw a line between any two groups of people with regard to nearly every characteristic, from their biological compositions to their political ideologies. With Shakespeare, the master of human insight, that could never happen.

If you assume that there is a connection between religious faith and one's driving skills, for example, you will obviously find measurable differences between these different groups. If you assume that there is a difference between blacks and whites you will find that, too, and so forth, so that you will find connections between fair hair – not to mention blonde! – and intelligence. Galton missed by a few years the theory proposed by mathematician and philosopher Frank Ramsey, that if a system was large enough, even if it seemed to be disorderly to an arbitrary degree, it was bound to contain pockets of order from which information about the system could be gleaned. The signs of the zodiac are composed precisely of the lines used by our early predecessors to connect the stars in a universe deemed large enough.

Today we understand that the reassurance we feel when we identify a familiar pattern is one of the chief rewards offered to us by evolutionary psychology. Still, it is important to remember that man's ability to identify and process quickly potential threats and dangers – beasts of prey, drought-heralding plants – means the difference between life and death.

What, then, brought Galton, the anthropologist steeped in science, to spend so much energy on a model he later acknowledged had failed? Was it the evolutionary temptation to organize a world filled with threats? Or perhaps the desire for comfort, brought on by a worldview based on clear and simple lawfulness? Or maybe, quite simply, it was the belief shared by many scientists that science alone is able to provide solutions for all the world's ills.

In a book edited by American intellectual John Brockman in 2007, an impressive lineup of scientists and philosophers were asked to relate briefly to one topic that fills them with optimism. Among others contributors, Stanford University professor Robert Spolsky submitted a piece on why he is relatively optimistic that the need for differentiating between ourselves and others will dissipate in the future. As a neurobiologist, Spolsky attributes his optimism to the recent findings in brain research. One of the earliest parts of the brain to develop was the amygdala, a region responsible for reactions of fear, anxiety and aggression, which are among the most rudimentary of human responses. Imaging studies conducted using functional MRI technology show that the amygdala springs into action when we gaze at a frightening face, even when it passes by in a flash without our being aware of it. According to a recent study, the amygdala may also react when we look at the face of a member of a race other than our own. This disturbing discovery becomes less disturbing when we learn from this study that the amygdala is not activated when we choose to relate to the other as a distinguishable individual as opposed to as a member of a group.

Thus, it seems that while we are indeed evolutionarily hardwired to distinguish between ourselves and 'others,' we are ill-equipped to deal with defining who 'we' are as opposed to 'them.' This is why changing definitions often become fodder for political, religious and cultural manipulations.

Spolsky is optimistic because he believes in our capacity for reassessing our moral priorities and changing our definitions for 'us' and 'them.' It is hard not to smile when considering that Spolsky may be dead right when he claims that several scientific theories

carried forth by Sir Francis Galton for the purpose of substantiating the differences between human beings will actually be the ones that ultimately free us from themselves.

As if fulfilling Spolsky's prophecy, in August 2008 The Guardian published a classified report prepared by the behavioral sciences department of MI5, Britain's secret service. The report deals with the ultimate devil of the modern world, extremist terror, and tries to find common denominators between all those liable to be involved in terrorism in the UK in the coming years. The report is based on hundreds of instances of people known by the secret services to be connected to terrorist activity, but it was unsuccessful in identifying a direct path that leads to terrorist activity and even unintentionally refutes many of the stereotypes associated with terrorism in the UK. For example, most of those involved in terrorism are British-born citizens distanced from fundamentalist Islam, and not illegal immigrants. Many are late-comers to religion and defy the descriptions of evil and insanity ascribed to them. Their mental health is similar to that of the general population. In contrast to the conventional wisdom that potential terrorists are frustrated bachelors with relationship issues, it turns out that the majority are over thirty years of age and have a stable family life that includes children.

The secret service has also downgraded the importance attached to the influence of fanatical religious leaders. The MI5 has gone so far as to claim that there is proof that an established religious identity develops values inimical to violent extremism. The report also makes it clear that there are no grounds for suspicion based on a suspect's skin color, ethnic identity or nationality.

The people who prepared the report sum up by claiming that the findings challenge many of the stereotypical assumptions about what type of person becomes a terrorist. Rather, it seems that this 'group' is really an assorted collection of individuals for whom no profile can be drawn up. Not in England, anyway.

Culture Out of Africa

The English science writer Matt Ridley has several interesting insights into the circumstances in which we are forced to distinguish between different groups of people, especially if one of the groups includes us. We are all tribal creatures, he says, a fact there is no escaping; the descendants of the Scottish clans MacDonald and Campbell hated one another long before the Massacre of Glencoe, which took place on the thirteenth of February 1692, provided them with an excuse. Today, cultural sublimation has succeeded – at least in Scotland – in trading in the bloodshed of previous centuries for tribal loyalty to rival soccer clubs (in this

case the Rangers and the Celts). The Montagues and the Capulets (the families of Romeo and Juliet), Google and Microsoft, Sunnis and Shiites, evolutionists and creationists – they are all sad examples of the division between 'us' and 'them.' Argentines and Chileans loathe one another only because there do not seem to be any other objects of hatred in the area.

Tribal thinking is, in Ridley's opinion, a consequence of our legacy. As with primates living in herds and skilled at coalition building, male humans sought out renown and status from time immemorial by means of battles waged against other groups. High status meant important fringe benefits: the right to distribute food, the right to disseminate one's genes via the females of the flock under his authority. However, it seems that the distinction between us and them serves more than just a primitive tribal need. Classifying the 'other' enables us to try to relate to those we cannot possibly meet personally. Classifying people helps us define a potential threat in terms of evolution while at the same time preserving our precious mental resources. According to this approach, the decision to classify people is a thrifty choice that allows us to view the individual as part of a group, all of whose members share more or less the same characteristics. The alternative – relating to each individual separately – would involve the expenditure of tremendous amounts of emotional energy as we got to know each one in turn. By defining the individual as part of a group we can therefore channel our stored energy for more existential matters. This approach has clear evolutionary backing: any expenditure of energy that does not serve the interest of survival becomes a waste.

In a book with a title that could not be more direct – *Us and Them* – author David Berreby concurs that we are tribal creatures and that the sense we have for classifying people is deeply imprinted on us and is apparent in every aspect of our lives. This is what we do every time we must decide whom to invite to dinner, whom to marry, and – on the national level – against whom to go to war. In every one of those decisions we are guided by internal criteria that are with us at all times – who belongs to whom and what is the meaning of this belonging.

These criteria are what dictates who we are and how we are to behave. Tribal affiliation frees us from the narrow boundaries of our own selves and links us to others from the past and future in the deepest sense. Berreby's words would have been like music to the ears of Ernest Becker had he only been alive to read Berreby's book. It was after all Becker who claimed that cultural affiliation is what gives meaning to our lives. However, on our way to achieving our own cultural identity we classify others according to their actions,

their beliefs, their origins and, in some cases, their looks, as in the chilling example of mass murders of civilians by the Khmer Rouge in Cambodia simply because they wore glasses.

The fact that most classifications are based on social and cultural characteristics should not surprise us. This stems from the simple fact that a large portion of our reality is based on the effects of cultural symbols, as discussed in the previous chapter. Thus, Berreby claims, a real scientific and humanistic breakthrough will only take place when it is accompanied by the understanding that natural tribal identity occurs only in our heads and can be defined only in a social or psychological context. According to Berreby, the field of genetics no longer supports any ideas or theories based on race. The reaction of our brains to the frequently changing flow of experiences is changing itself. Thus, the feeling that we classify the 'other' according to established rules is an illusion; the classification according to which we sort others is the result of the chance encounter between our thoughts and external reality, just like all our other ideas and approaches. That is why certain initiatives for classifying populations gain support – occasionally fateful – when they encounter the social and cultural reality that suits their dissemination. For example, the first use of the word 'Aryan' (Sanskrit for 'nobleman') as a race was done so naively by the German intellectual Max Müller in the mid-nineteenth century. He was using the word to attempt to describe an entire family of ancient languages, but the term was appropriated by the Nazi party in the early twentieth century to connote the pure German race. Another allegedly scientific accepted method of classification in the nineteenth century divided creatures into phlegmatic, melancholic, sanguine and choleric. This classification disappeared with the advent of the twentieth century.

Indeed, research into the brain and thought strengthen Berreby's claim that we classify people according to mental experience that reacts to changing reality and not in some predetermined manner. Still, it will be a long time before we understand this completely. Over a cup of coffee a black person and a white person can agree, according to Berreby, that racial classification exists only in our heads. But when they leave the café and try to catch a taxi, the first will stop for the white person.

In order to demonstrate the cultural context underlying human classification, Berreby compares it to paper currency. He claims that racial and ethnic groups are only as real as paper currency, which requires social acceptance of these colorful pieces of paper as being worth something of value. However, the moment this acceptance is in place it is very difficult to shake, and ultimately we act according to it.

Indeed, if I light the one hundred dollar bill in my pocket on fire it will burn up into lots of carbon atoms which are really no different from the carbon atoms that would float about if I burned yen or euros. Chemistry and physics are not affected by the fact that these carbon atoms belonged to bills of differing values and used by different economies. Under such circumstances it is not a good idea to apply scientific concepts to terms normally used for political or social agreement. While blacks and whites cannot and should not be thought of as a collection of identical genes, there is no point in marshaling science to prove the differences either, just as it cannot distinguish between the makeup of the different paper currency used in difference countries.

Mirror, mirror on the wall

Although our daily reality is mostly random, we seem hard-pressed to accept it. We are slaves to the evolutionary dictate that leads us to find lawfulness in reality and helps us refrain from meeting with unpredictable threats to our existence. As a result, we tend to identify behavioral trends and patterns even where they do not exist and classify people and groups even where there is no justification for such. The reality in which we live today is more complex than ever and we are nostalgic for the days when we could distinguish between the good guys (us) and the bad guys (them) according to the color of the hero's hat or horse in a western. Our need for order is primordial; whoever can control this need, even a little, in the swift flow of stimuli that regularly bombards us, is destined to become an instant cultural and social guru.

Whether the source of this classification is in evolutionary needs or in the daily social reality, it is clear that the new field of political psychology has an important role to play in 'us' and 'them.' Political psychology claims that there is no longer an 'us' without a 'them' for contrast, i.e. someone to loathe. We need the bad guys, the ones who possess all those qualities of which we want to rid ourselves – greed, aggression, covetousness, to name a few. Professor Samuel Huntington, a political science researcher at Harvard and the author of *Clash of Civilizations*, explains that for self-validation and motivation we need enemies, business competitors, political rivals and others who threaten our chances for success. While the solving of a conflict or the disappearance of an enemy nearly always brings about personal, political or social gain, these in turn lead to the creation of a new enemy.

It becomes readily apparent that the little room in our heads in which the devil resides plays a central role in consolidating our psychological and cultural existence. Its

importance in shaping our identity is so great that the very fact of its existence is more important than the identity of those who reside therein and who trade places now and again. In fact, it is so important that we are willing to put up with the constant noise that arises from this room while imaginary threats strive to bring about our demise.

Apparently, the devil's room works in the national consciousness in the same way it works in the mind of the individual; there is no other way to explain the sensitivity of the most powerful nation in the world in terms of security during a period in which its chief rival – the former Soviet Union – dissolved, leaving their world hegemony unchallenged. This cyclical phenomenon has characterized American policy since its inception and is in direct proportion to the economic wellbeing of its citizens. The room belonging to the head of the evil axis is always there; it is only the nameplate on the door that changes with every economic cycle.

Hell is the 'other'

The most interesting contribution to understanding our psychological need for others in order to define ourselves was provided, in my opinion, by Carl Jung. Jung believed that the similarity between us and the other is far greater than what we surmised. If we take a risk and explore inside ourselves we will find that this similarity is liable to overwhelm us. Jung claimed that those same characteristics we despise in others are precisely the characteristics that we suppress to our subconscious and are not proud of. These are our 'shadow' characteristics, the weaknesses, fears and character traits that we would prefer not to display. Sometimes the shadow also contains positive traits that demonstrate behavioral development.

Psychological projection is a defense mechanism where a person's personal attributes, unacceptable or unwanted thoughts, and/or emotions are ascribed onto another person or people. Freud was the first to coin the phrase, which Jung adopted for describing the reverse process by which the 'others' become the image of that undeveloped part of ourselves, the part we do not know and even deny – the part we would prefer to leave in the shadow. Every one of us carries his or her own shadow in our souls, those unpleasant, contemptible aspects of our mental states. The less one is aware of these aspects, the darker and thicker this shadow becomes. According to this psychological dynamic, it becomes clear that we need 'them' in order for us to feel complete, since without 'them' there is no 'us.' Further, defining someone as 'the other' is an important part of what shapes and defines us.

The idea that the 'I' needs the 'other' to define itself is hardly new and can be found in the writings of many philosophers, the most famous among them being Hegel and Jean-Paul Sartre, who gave us the saying, "Hell is other people." French philosopher Jacques Lacan has weighed in on the topic as well, providing Jung with unexpected intellectual support when he claimed "the unconscious is structured as a language" of the other.

Especially interesting in this context is the opinion of French-Jewish philosopher Emmanuel Levinas. Known primarily as a philosopher of the 'other' – which holds a place of prominence in his writings – Levinas describes the default option of human existence as a situation in which no objects appear in our consciousness. Perhaps this is absolute silence, but it is exceedingly difficult to attain. Internal noises interfere, as well as unfamiliar and unexpected elements like storms, other natural phenomena, and people who behave in ways we wish they would not; this is 'otherness,' and otherness is noisy. Its very unfamiliar and unexpected nature turns otherness into something threatening. The accepted approach in philosophy (and psychology) to dispelling these threats is linked to understanding the phenomenon. Unlike traditional Western philosophy, which tries to neutralize otherness and turn it into something known, Levinas suggests accepting it from the start as different and giving up on the attempt to understand it. Levinas took a further step and coined the expression 'absolute other,' the other that cannot, by nature, be turned into the knowable. Levinas calls the pursuit of knowledge and understanding a violent attempt at conquering the 'other.' But according to Levinas, the 'absolute other' can never be conquered or understood. Whereas philosophy by its very nature tries to hide otherness, Levinas actually identifies the other that cannot be hidden. This is the true otherness that cannot and need not be known.

According to Levinas, the other is revealed by his 'face'; not necessarily his physical face, but his naïveté, his weaknesses, his vulnerability. The 'faces' of other people are, for Levinas, the outline of God's commands for all humans: "The face of the other presents me with a responsibility that cannot be denied." Thus, the other becomes less noisy when we give up the need to become familiar with it.

One hundred happy 'others'

I recalled Levinas' teachings during a visit to the Tate Modern in London in early 2008, which was staging a retrospective of the work of the Spanish sculptor Juan Muñoz. Muñoz died in 2001 at the age of only forty-eight. It was there that I got a strong dose of switching roles according to 'us' and 'them' in reference to Westerners vis-à-vis Asians.

Among Muñoz's impressive works was one, in Room 10, that stood out. 'Many Times,' executed in 1999, was comprised of one hundred figures dressed in identical clothing and wearing the same expression on their Asian faces, each one smiling excessively, nearly laughing. The figures were placed in pairs or small groups and 'spoke' to one another in a lively fashion. The space between the static figures created a sense of tension in the gallery.

It could be that Muñoz thought the monochromatic faces with the Asian looks would best demonstrate to European eyes the feeling of otherness. But the scope of the work and the great number of figures left the viewer actually feeling that he was the alien among these wildly happy figures so preoccupied with one another.

What was it that so amused the hundred figures gathered in the gallery? Why is the spectator not part of the self-assurance that each figure –and the group as a whole – is so clearly enjoying, as evidenced in their smiles? And who exactly are the 'others' in the gallery? The brilliantly designed figures, or we, the viewers?

SOCIAL NOISES

"Very few of us are what we seem."

– Agatha Christie

The Bible's Book of Exodus warns against "following the multitudes," but does that refer merely to the well-known phenomenon of behaving like sheep, or could this be a reference to the terrible noise of loneliness as well? It is hard sometimes to imagine just how far we are willing to go to feel as if we belong, even if only to a group with whom we share a very low common denominator, like having stayed once in the same hotel. Even harder to describe is the malaise (noise, in fact) that we are willing to put up with in order to bridge the gap between the place we feel is ours in society and our actual standing in society.

I can still recall trying to choose a cover for my first book, *Do Chimpanzees Dream of Retirement?*, from among seven options prepared by the publishers' talented designer. I found two of the designs particularly impressive, but since at the time the decision seemed huge and fateful, I decided to ask the opinion of several friends whose aesthetic sense I respected. Their responses surprised me: I received as many different responses as people I asked. I had been convinced that their choices would match my own favorites, but they thought differently. Nearly every one of them made a different suggestion. That was the first in a long line of lessons I learned from publishing the book.

The next lesson taught me that what I had learned about different opinions in graphic style was not a fluke. This came from the readers themselves. I was graced with the good fortune to receive many positive responses, but here, too, with a wide variety of comments. While one woman from the north wrote that the book had offered her a new path to balance in her life, someone else mentioned finding important shortcuts in his entrepreneurial style. One seventy year old reader located echoes of his own life experiences in the book and another discovered he was in the wrong profession. I read these letters and many others like them in awe at the vast array of human variance. But then I would think, Wait: I know better than all these people what I wrote, right? Well, no. And even if so, it's not at all important. As the senior editor once told me, a book is written many times: once by the author and all the other times by thousands of readers, all of whom understand it differently.

Proust for sale

If we picture the central noise engine of our lives as a machine with many pistons and valves then a special place is reserved in the combustion compartment for high-octane gas distilled from the gap between how we grasp reality and ourselves in it and how others who are important to us do. A large part of the difference stems from an egocentric bias – our tendency to put ourselves in the center of matters and to attach far greater importance to our own actions than would an outside observer. But it appears there are other reasons as well.

In May 2007 I was offered a rare glimpse into the vulnerability of historical figures to this egocentric bias, at the public auction of a document penned by the French writer Marcel Proust in 1890 and rediscovered in 1924. The document, known as the Proust Questionnaire is, in effect, a personal questionnaire filled in by the famed French author of *Remembrance of Things Past* when he was thirteen years old. He had found the questionnaire, popular among the British upper classes at the end of the nineteenth century, in a book for learning English.

The rather tiresome questionnaire comprises twenty questions which, if answered forthrightly, are supposed to provide a fair picture of the respondent's personality, dreams and tastes. French television host Bernard Pivot would give out the questionnaire to the guests at the end of his popular show *Apostrophes*, and, taking his lead, James Lipton used the questionnaire with his guests on *Inside the Actor's Studio*.

Proust filled in the questionnaire twice in his life: first, as stated, when he was thirteen, and then again at twenty. The differences are quite noticeable, but most striking is his answer to the question, 'What would you like to be?': 'Myself - as those whom I admire would like me to be.' Perhaps a very accurate definition from the mouth of the great French writer describing the distance between who we are and who we wish to be, but rather depressing if we understand that who we wish to be is determined by others, admired though they may be.

I would like to devote the following chapters to a series of social, human biases that share a common denominator: they portray the difference between how we perceive social reality and our place in this reality, and the manner in which others do. Most of these biases fall into the category of egocentric bias which in turn is part of the First Rule of Noise, according to which we always prefer the noise that diverts our attention to the noise that is

more bothersome. In this instance, the noise that is more bothersome is the noise of loneliness.

Don't get lost, kid

Don't get lost, kid, is the name of a beautiful poem written by Israeli poet Eli Netzer. At the back of his book he explains the inspiration for the poem. An Israeli family from a kibbutz was on a trip to Holland. The parents left their three children for a few moments to look for postcards at a fair. When they returned, only the two older children were there; their four-year-old son was missing. They looked everywhere, called his name, retraced their steps, but the boy was gone. After a few long and tense minutes they heard over a loudspeaker that a four-year-old child had been found and was waiting at the entrance. "We ran there," the parents related, "and found our son in the arms of the guard on duty, crying quietly." After thanking the man and calming their son, they asked how he had gotten lost. "I was walking and looking at the garden and all of a sudden I couldn't see you," he explained. "I kept walking and then I started to cry. A lady came up to me and took my hand and said, 'Don't cry, little boy, your parents will find you in just a minute.' And she took me to the guard and you found me." His parents asked, "What language was the lady speaking?" "Dutch, I guess," the boy answered. "But you don't speak Dutch," they told him, amazed. "That's right," their son answered, "but I knew she was telling me 'don't cry little boy, your parents will find you in just a minute.'"

Which leads us to the question of at what age a child learns to distinguish between his own thoughts and desires and those of others. True, a child attains some level of separation between himself and the world by the age of two, but a long time passes before he stops believing that the moon can be seen from everywhere because he, by walking, causes it to move. A long time until he stops believing that what was said to him in an incomprehensible language matches perfectly his needs. At a later age he can even develop empathy, that ability to step into the shoes of other people, to understand their needs and identify with them. We would expect that as we mature and know more we would succeed in distancing ourselves from the child's viewpoint, in which he sees himself as the center of the world. But do we really?

In 1990, Elizabeth Newton received a doctorate in psychology from Stanford University. Her thesis was based on an experiment in which she asked a test group to tap a melody chosen from a list of twenty-five popular songs. Another group was asked to be the

listeners who would try to identify the songs being tapped. In actual fact, the listeners managed to identify only three melodies from among one hundred and twenty that were tapped for them.

However, what made the experiment truly interesting was the fact that before the experiment began, Newton asked the tappers to predict how many songs the listeners would manage to identify. Their answer? One of every two, a far cry from the truth, one in forty. The tappers wondered how these songs, so clear in their heads and so perfectly executed by their fingers, could not have been easily identified by those 'losers' in the other group!

Despite their impressive efforts, most listeners were unable to hear anything but a meaningless string of taps that sounded more like Morse code than anything else. It turns out that being a tapper in an experiment is not as easy as it sounds, precisely because the tappers had a crucial bit of information: the name of the song. The phenomenon known as 'the curse of knowledge' prevented the tappers from assessing the behavior of those lacking in knowledge – in this case, the listeners. When they tapped, they could not imagine what these taps would sound like to the listeners – those lacking knowledge – nor could they comprehend their difficulty in connecting them to a melody.

This surprising experiment repeats itself many times daily around the world. The tappers and the listeners are managers and workers, teachers and pupils, politicians and voters, marketers and clients, writers and readers. All these relationships are based on ongoing communication but, like the experiment conducted by Elizabeth Newton, they suffer from a deep imbalance between the levels of knowledge of both sides of the dialogue.

The engineer who designs a remote control with dozens of buttons in an array of colors is certain that the user understands exactly the role of each button and color. When a CEO discusses unlocking value for the investors, he hears a melody in his head that the people attending the shareholders' meeting do not recognize. The curse of knowledge is what ensures that the child inside us will remain in the center of the world and will never, ever get lost.

Do favors work like bread or like wine?

Another fascinating example of the egocentric bias is that of a favor that we do or receive from someone. It turns out that with favors as well, the gap between the way we relate to these favors and the way others do is an inexhaustible source of noise.

A long time ago, when I was still actively managing investments, I brought a colleague from another venture capital fund in for an investment opportunity. This investment paid off particularly well and we all reaped the benefits, even the investors.

I expected this colleague's gratitude in the form of investment opportunities that he would offer in return. So certain was I that these opportunities would shortly appear that I very nearly rented larger premises in order to house all the employees I would need to analyze all the potential new investment opportunities. One or two did, indeed, come my way in the first year, but after that, nothing at all. Was my colleague behaving ungraciously and ungratefully, or were my expectations unrealistic? Was François de la Rochefoucauld right when he said, "Gratitude is merely the secret hope of further favors"? And do favors works like bread, that grows stale with time, or like wine, whose value increases with the years?

To find an answer to those questions it is necessary to take a close look at the modern organization. In an era in which the level of personal freedom of the employee is high, and the importance of status or one's place in a hierarchy is waning, the organization becomes a field ripe for social interaction, and the exchange of favors becomes an important part of the cooperation between employees. Unsurprisingly, however, the recipient of a favor and the donor tend to point up its different characteristics, thus perceiving the favor differently from one another.

Several researchers – most prominently among them Francis Flynn of Stanford University – have turned the field of favors into the principal focus of their work. Their research has strengthened the understanding that favors granted by one employee to another do not, like hard currency, have a certain set value that allows for them to be exchanged easily; rather, the behavior expressed in granting a favor is a subjective experience that different people perceive and appreciate in different ways.

The attitude of a recipient of a favor to the person who granted it is influenced first and foremost by the intentions of the donor according to the way in which the recipient perceives him or her. Was the favor granted from feelings of human kindness? Was it granted because it was part of the donor's job? Or was the motivation for granting the favor nothing more than a calculated practicality, the anticipation of a returned favor in the

future? Not unsurprisingly, the smaller the favor, the greater the negative effect of anticipated reciprocity. After all, who would want to be indebted to someone for a marginal favor given in a spirit of cold-hearted practicality?

Here too, it appears that the main difference between the behavior of the recipients of favors and those granting them stems from differing perceptions. While the donors base their expectations for gratitude on the value they place on the level of gratification (material or otherwise) enjoyed by the recipient, the recipients are actually more influenced by the integrity and fairness of the process, the level of respect and decency displayed by the donor. Employees who encounter particularly developed awareness to their social status refrain from asking favors since it will weaken their image but will take care to groom their public image to show they are worthy of being asked to do favors.

In a particularly interesting study whose results were published in 2002, Flynn set out to investigate another element in the mix: the link between favors that workers have done or received as related to the time that has passed. The study was carried out on 128 ground crew employees working in the customer service department of a large American air carrier. All the employees in the study worked at a single airport, and the airline allowed its employees to swap shifts easily, simply by asking a coworker to trade places. In fact, many of the employees were involved in schedule-swapping every week. This study is interesting because the favors swapped were similar in nature to one another.

The researchers asked half of the workers to recall when they had last granted a favor to one of their fellow employees. The other half was asked to recall the last favor they had been granted. All employees in the study were asked to evaluate the favor and note when it had taken place. The value of these favors was translated into monetary value in a scale created by the researchers. The results of the study showed that the recipients of favors appreciated the favors closer to the time they were granted and less so as time passed. On the other hand, the favor-granters thought less of favors granted recently than favors granted some time in the past.

Results of the study once again proved our difficulty in relating to others, always assuming that they will react just like we do. This phenomenon has become one of the most active noise engines of them all. The importance of the experiment planned by Flynn is that it succeeded in introducing an element of time to egocentric bias.

One possible explanation for this phenomenon is that with the passing of time one's memory distorts, and since people tend to see themselves in the best possible light, the recipients of favors would like to picture themselves without needing assistance while the

granters of favors believe they have made truly valiant efforts. In any event, the favor-granters are lacking the empathy necessary for understanding what the recipients feel, and in all other aspects of favor-granting it seems that the egocentric bias grows with time. Thus, if you are angry with someone who failed to appreciate a favor you did for her you should check the expiration date on the package.

The story of favors once again confirms the claim made by French philosopher Emmanuel Levinas that there is no true possibility of understanding others or how they think.

The futile attempt at doing so, and the frustrating revelation that the other is different from us, are an abundant source of noise.

Oops, I made a mistake

Apologies, too, that gesture unique to human culture, are not free from egocentric biases. Try for a moment to recall: have you offended anyone lately? Forgotten some important date? Has your significant other been giving you the "look" or maybe the silent treatment? Or perhaps someone owes *you* an apology. Are these noises familiar to you?

If you have been offended then you may be surprised to learn that you will not be able to tell the difference between a real apology and a forced one. Jane Reisman of Cornell University is responsible for the research behind this sad truth, which she published in a series of five articles in the March 2007 issue of the Journal of Personality and Social Psychology.

For one of her studies, Reisman asked sixty-five pairs of students to come to her lab. One of the members of each couple was joined by "Andrew," who was collaborating with Reisman, and the two were asked to work together on a puzzle. For each piece successfully put in its place the two were awarded 25¢. The other member of the pair was joined by another collaborator by the name of "Lynn," and they were assigned to watch Andrew and the other person complete the puzzle. A few minutes into the task, Andrew received a phone call and immersed himself in a gossipy chat instead of helping work on the puzzle. Even after finishing his conversation, Andrew continued to undermine the work of his partner in different ways.

When their time was up, Andrew apologized spontaneously in one-third of the cases. In another third he only apologized after being scolded by Lynn. And in a third of the cases he did not offer an apology at all.

When the experiment was completed, the true participants were asked to fill in a questionnaire indicating how they thought the money earned in completing the puzzle should be divided. The observers gave 34 percent to Andrew in cases where he apologized spontaneously; 31 percent when he did not apologize at all; and even less than that – 19 percent – when he apologized only after being scolded. Surprisingly, Andrew's puzzle partners (the ones most affected by his behavior) were more charitable: they gave him 36 percent when he did not apologize. Moreover, they were unable to differentiate between a true apology and a forced one. In two cases, Andrew was even awarded 40 percent of the total sum.

A follow-up study conducted by Reisman provides an interesting answer to this phenomenon. Participants were asked to read the description of an event in which an employee was late for work, leaving his colleagues in the lurch. In half of the cases the tardy employee apologized right away and in the other half he did so only after being forced. The participants were asked to think about whether they would accept or reject his apology and then rank their feelings about it. Participants who accepted the apology tended to rate themselves in a more positive manner than those who rejected the apology. Apparently, the main factor affecting those who were offended (and therefore suffered directly) and those who merely observed in the first experiment, was the same – both wanted to perceive themselves and be perceived by others in as positive a light as possible. The ones who suffered wished to be thought of as benevolent and forgiving while the observers wished to denounce the forced apologizers in order to show how they identify with the sufferers.

In England, where the word "sorry" is used 368 million times a day, one is told that this is a social expectation. In this context, an apology provides confirmation that social rules were indeed broken and this is the way in which the victim's status can be restored and social interaction can return to normal. It is interesting to note whether there is a difference between the behavior of individuals and companies regarding apologies.

Although logic tells us that any apology – whether partial or incomplete – should be better than no apology at all, research proves the contrary. Jennifer Robbennolt of the University of Illinois studied 145 responses made by professionals to situations that included some form of apology in reaching insurance settlements following accidents. Where there was a full apology and the assuming of responsibility, agreements were reached in 73 percent of the cases, and with partial apologies there was a 35 percent success rate. But the surprising statistic is that 52 percent of the claimants were willing to settle for no apology at all. The moral of the story is that in business, unlike with individuals, a lack of apology is

closer to a spontaneous apology than a forced apology. So it is preferable not to apologize at all than to do so under duress.

The 2008 winner of the "perfect apologizer" award goes to David Neeleman, founder and chairman of JetBlue Airways. Neeleman wrote a personal letter to the thousands of travelers who were stranded for long hours in airports across the country due to snowstorms. A filmed apology made it to YouTube as well. He offered no excuses or defenses; he merely acknowledged the discomfort of his passengers and made a credible promise to fix what could be fixed by presenting a list of practical measures he had taken and by offering travel vouchers according to the JetBlue Airways Customer Bill of Rights that he wrote in the wake of this occurrence.

It is hard to believe, but thanks to the egocentric inclination we can apologize from the bottom of our hearts without the recipients of our apologies ever knowing it.

The Spotlight Effect – social embarrassment

From the time I peed in the local swimming pool at age six, I have been certain that everyone is looking at me. When I left out a section of my speech at the annual conference for Evergreen, the venture capital fund I founded, that feeling I developed back in the cool waters of the pool came rushing back at me. And as if I needed further confirmation, there was recently the invitation I misread, and I showed up tieless for a dressy event. All those years of grooming, all those years of understanding the intricacies of social situations went down the drain, drowned in my shame.

Perhaps you, too, are tense before a social or business event, imagining some physical or verbal stumble that shows you up as a schlemiel – a bungler, a loser – and making you feel that only death would be better. If a standard reception becomes, for you too, a test of your social skills then you will find consolation in a series of studies conducted by psychologists Thomas Gilovich and Kenneth Savitsky and their colleagues, the results of which were published in 2000.

If you think that your boss is dissatisfied with your work, your child is making things up just to get you mad or the people you call your friends are saying nasty things about you behind your back, you can relax. Not to say that everyone thinks wonderful thoughts about you, but they are probably not thinking about you at all, mostly because they are too busy worrying about what others are saying about them. It turns out that in general we are

pretty bad at assessing what goes on in other people's heads, and we tend to think that we occupy more space in their minds than we really do.

The first all-clear signal on that matter was sounded by Thomas Gilovich in an article whose name says it all – The spotlight effect in social judgment: an egocentric bias in estimates of the salience of one's own actions and appearance. The vast majority of us, claim the researchers, are preoccupied with ourselves, and because of this, we have difficulty in assessing just how much attention our behavior merits. A flash of brilliance at a management meeting, a well-crafted goal during a local soccer game, or, on the other hand, a paragraph dropped from an important speech – all these seem very meaningful to us. But that's just it: they are important chiefly to us and only us.

In the first of the studies carried out by Gilovich and his colleagues, participants were asked to wear t-shirts printed boldly with a picture of Barry Manilow, a singer who, at the time of the study (late 1990s) was held in contempt by students everywhere on North American campuses. The people wearing these t-shirts were brought one at a time into a room where a second group was busy filling in questionnaires, and were seated in front of them for a short time. The study set out to determine how many of those filling in the questionnaires actually noticed the embarrassing t-shirt, and, of no less importance, how many of them were thought by the t-shirt wearers to have noticed what was printed there. The result was that the t-shirt wearers thought that twice as many of the people in the room would notice their t-shirts than actually did. Then, when the researchers allowed them to wear t-shirts emblazoned with faces more popular at the time (Jerry Seinfeld, Martin Luther King, Bob Marley), those being tested failed once again in their estimates, this time by an even wider margin.

Although adults, unlike children, are more aware of the fact that not everyone shares their own worldview, it appears that even the adjustments we make to accommodate this reality are not enough, and we still tend to place ourselves in the center of things and distort reality.

All of us, it appears from the research, tend to overestimate the attention others pay to our appearance and actions, both good and bad. We believe we are in the spotlights when we may merely be at the edge of the stage. A new haircut, a new article of clothing, a terrific answer in a discussion or a great move on the field garner far less interest to others than they do to ourselves. It turns out that this phenomenon has a direct effect on the things we regret at a later age. People refrain from doing something they have regrets about out of fear of looking ridiculous to others, even though only they perceive their

failures as such. And anyway, in an earlier study Gilovich found that people regret more the things they did not do than the things they did, like not inviting someone to dance, or not daring to approach that certain special someone.

The spotlight effect explains why we are more willing to dance privately in our homes or sing in the shower than with friends. But there is some consolation in all this: if we manage to free ourselves from this limiting effect we can laugh more freely and loudly, wear brighter clothes, connect better with people and express our opinions more aggressively. And as a bonus we will discover that the people around us feel more comfortable behaving the same way.

Masquerade

An acquaintance of mine – a successful businesswoman – admitted to me once, in a rare moment of frankness, that in spite of her success she often feels like an imposter. Over several glasses of wine I discovered that this acquaintance went about her daily activities like the rest of us but all the while with a feeling that she is hiding behind a mask.

Even the rapid rise she made to vice-president of marketing in a major firm did nothing to alter these basic feelings. She is constantly in the grips of panic that someone – at work or elsewhere – will rip the mask from her face and expose her true self, that of a weak, unconfident, doubt-ridden woman.

If you identify with my acquaintance's story then perhaps you, too, suffer from the Imposter Syndrome. In psychological terms, the Imposter Syndrome is a cognitive disturbance that prevents the sufferer from internalizing his or her successes and achievements and serves as a constant source of internal noise.

My acquaintance acknowledges that she has a very strange order of preferences for feedback she receives. Negative feedback, for example, is seared onto her consciousness while positive feedback almost never leaves an impression on her. She relates to every one of her failures as an absence of talent, but every success as a matter of chance, timing, hard work or the ability to lead others to believe that she is more talented than she really is. Do you know this phenomenon from your own experience? You are not alone.

The Imposter Syndrome was first identified in 1978 by psychologists Susan Imes and Pauline Clance of the University of Georgia. At the outset, the two hypothesized that this was some sort of anxiety that characterized successful women in particular. Further studies conducted since then have revealed that the phenomenon is far broader than originally

perceived, and that fully 90 percent of the participants – men and women in many different professions – have experienced the Imposter Syndrome at one stage or another in their careers.

A sample tested by Imes and Clance of one hundred and seventy women in different phases of their academic careers and from differing fields showed that in spite of their illustrious academic careers and personal achievements, women who experience the Imposter Syndrome cling to the belief that they are not truly successful and that they are perceived as such only because they have managed to deceive people. Achievements that were meant to provide decisive, objective proof of their intellectual capacities did not factor in to their feelings of being imposters.

Brilliant female students often imagined that they had only been admitted to university as the result of some mistake made by the admissions committee and that they performed exceedingly well on tests thanks to luck or the bad judgment of their teachers.

One doctoral candidate said she had been certain she would be exposed as a fraud while defending her thesis. "Strangely enough," she said, "I felt a relief just imagining that the tension involved in keeping up appearances was finally going to end. So I was absolutely stunned when the chairman of the committee informed me that my responses had been outstanding and that my work was among the best he had encountered during his long teaching career."

As befitting the period in which the study was conducted (1970s), the researchers explained that the phenomenon had much to do with the low self-esteem they had adopted as a result of the low expectations for women's success in society. This in turn explains their need to find explanations for their success that have nothing to do with their abilities, like misleading others or the bad judgment of teachers and bosses. Unlike men, who are more self-assured about their capabilities, women tend to link their successes to external circumstances (luck) or as a passing phenomenon (hard work), and not to their own abilities constructed from their personalities.

While it is clear that there are various degrees of severity to the Imposter Syndrome, and that we all fall under its influence at one point or another in our lives, it is also clear that women suffer from it more often than men. Already at a young age boys tend to blame external factors when things go wrong: "The other team cheated." "The ump wasn't fair." "The teacher didn't give us enough time to study." Women, on the other hand, tend to blame themselves when things do not go well. When sales are sluggish they do not think

that the product is not suited to the customer; instead, they think that they themselves are not suited to the job.

Dr. Valerie Young, who was greatly influenced by the pioneering work of Clance and Imes, and who calls herself a "recovered imposter," speaks widely on the topic and has an Internet site (www.impostersyndrome.com) that offers, among other things, a quick diagnostic test for the Imposter Syndrome with the following questions:

Yes or No

Do you secretly worry that others will find out that you're not as bright and capable as they *think* you are?

Do you sometimes shy away from challenges because of nagging self-doubt?

Do you tend to chalk your accomplishments up to being a "fluke," "no big deal" or the fact that people just "like" you?

Do you hate making a mistake, being less than fully prepared or not doing things perfectly?

Do you tend to feel crushed by even constructive criticism, seeing it as evidence of your "ineptness?"

When you do succeed, do you think, "Phew, I fooled 'em this time but I may not be so lucky next time."

Do you believe that other people (students, colleagues, competitors) are smarter and more capable than you are?

Do you live in fear of being found out, discovered, unmasked?

If you answered yes to even one of these questions you are invited to a masked ball for all the Imposter Syndrome sufferers. The researchers have also provided signs for those suffering from the syndrome. Can you see yourself or anyone you know in this list?

Feeling like a fake: the belief that one does not deserve his or her success or professional position and that somehow others have been deceived into thinking otherwise. This goes together with a fear of being, "found out", discovered or "unmasked". People who feel this way would identify with statements such as: "I can give the impression that I am more competent than I really am." "I am often afraid that others will discover how much knowledge I really lack".

Attributing success to luck: Another aspect of the imposter syndrome is the tendency to attribute success to luck or to other external reasons and not to your own internal abilities. Someone with such feeling would refer to an achievement by saying, "I just got lucky this time" "it was a fluke" and with fear that they will not be able to succeed the next time.

Discounting Success: The third aspect is a tendency to downplay success and discount it. One with such feelings would discount an achievement by saying, "it is not a big deal," "it was not important." One example of this is discounting the fact that they made it here, which is really a big success. Or saying, "I did well because it is an easy class etc." Having a hard time accepting compliments.

It is important to understand that the Imposter Syndrome is not a case of all or nothing and, as I have already mentioned, we are all affected by it at one stage or another in our lives.

While the phenomenon manifests itself among the successful, the achievers, it is important to remember that it is different from another noise syndrome – a lack of self-esteem. The Imposter Syndrome stems from the gap between real achievements and the ability to internalize them, a feeling that does not necessarily exist in people suffering from a lack of self-esteem. Apparently, the source of the Imposter Syndrome is the direct or indirect messages we receive from our parents or other meaningful people during the early stages of our lives. A family dynamic that is likely to contribute to the Imposter Syndrome develops when our aspirations are not commensurate with family expectations connected to birth order, sex, religious faith, age or any other characteristic trait as it perceived by our family members. The children of families in which the bar for success is placed high, or families that are particularly critical are natural candidates for disaster. A good example of this can be found in two family dynamic models identified by Clance and Imes. One is the tendency of families to adhere personality labels to different children: The Intellectual, The Sensitive, The Down-to-Earth. In many cases these children grow up and away from these labels while the family still perceives them in these roles. So, even when the Sensitive child excels with grades or achievements he will not be recast as The Intellectual.

A different family dynamic that supports and encourages the Imposter Syndrome is a message of perfection. Some families offer unwavering support of the kind that casts their children as nothing short of perfect. When the child grows up and is faced with inevitable difficulties, he begins to doubt his parents' perception of him and may hide his problems from them in order to avoid damaging his image in their eyes. In such circumstances a child tends to think that he is failing to live up to expectations; thus his parents' definition of perfection becomes nothing but a mask.

Sufferers of Imposter Syndrome are miserable with success and failure alike. They fear success due to the responsibility and public visibility that come along with it. Their success is accompanied by the tension that arises from the friction between their inner feelings and the way they believe they are perceived by the external world. The noise they

hear stems from this tension; the more they succeed, the greater the gap and the noise. However, another noise that sullies their spirits is created by the pressure not to fail. Imposter Syndrome victims will do anything not to fail since they equate failure to the worst of all: ripping the mask from their faces.

People who opt to work hard in order to hide the fact that they are 'imposters' are, ironically, in danger of exposing themselves to praise for their hard work and successes, which leads to a twisted circle of positive feedback that is never properly internalized, only strengthening the feeling that they are imposters afraid of being exposed.

Women who exploit their feminine attributes for the purpose of receiving positive attention from their superiors dig themselves a particularly deep psychological hole. When the praise eventually comes, they feel their charms and not their abilities are what brought about their superiors' appreciation.

I have heard entrepreneurs who are ostensibly at the height of inner strength and self-confidence talk aloud about feeling that their success is coincidental. They claim that even when they know their project inside and out they are doomed to failure if they move on to some other project, since they are certain they will not possess the skills necessary for undertaking something outside their particular area of specialization.

Other entrepreneurs I have met abstain from giving interviews about their businesses, and others carry this one step further and appoint someone else to serve as the face of the company just to avoid endangering the alleged randomness of their success by exposing it.

For entrepreneurs who believe "I succeed only because I devote eighty hours a week to work and if I give even an hour less, the company will collapse," Manfred Kets De Vries, clinical professor of leadership development at INSEAD in France, has a solution. He estimates that those people who feel like frauds are more likely to take on a partner for leading the organization he or she has created.

Just like the spotlight effect and other noises, the light at the end of the tunnel for those who feel they are imposters shines on those who succeed in distinguishing between their feelings and reality. Whoever finds himself thinking that he is a jerk may be rescued only if he is capable of replacing this with a different way of thinking: Just because I feel like a jerk doesn't mean that I am.

Chambermaids as research assistants

If you have spent as much time as I have in hotel rooms then you are very familiar with the little postcards found next to sinks in hotels the world over requesting guests to reuse their towels for ecological reasons. Indeed, most hotel guests comply for at least part of their stay. Noah J. Goldstein and Steve J. Martin, authors of the bestselling *Yes! 50 Secrets from the Science of Persuasion*, set out to see whether this reminder actually influences guests in hotels. For purposes of their experiment they prepared two signs that they placed in a certain hotel, with the help of the manager. One sign was designed to emphasize the basic issue of maintaining the environment and requested that guests hang their used towels in such a way that the chambermaids would understand they would be reusing them, thus saving on energy and detergents. The other sign added another, social element, reporting that most of the guests reused their towels at least once during their stay. The signs were distributed randomly among the rooms. The chambermaids became unwitting research assistants as they reported on the towel use of the anonymous guests in the rooms they cleaned.

The result was that the guests who were exposed to the second sign were 25 percent more likely to reuse their towels than those who read the first sign. Considering that the signs were not so very different, the gap in the results is impressive, emphasizing the effect that the behavior of our peers has on us.

This phenomenon is at the heart of the various sales sites on the Internet eager to update you about others who purchased what you just did, and what else those other people are buying. If you have encountered this sort of choice-making noise then you will not be surprised at the salespeople in shops who always make sure to tell you that "we sell lots of this item" because they know that social affirmation is a major sales factor.

If we are so affected by the behavior of others to the point that we are prepared to think of them as "us" simply because we have stayed in the same hotel, then the question that begs answering is how far we are willing to stretch this weak common denominator. For example, how should we relate to a request that we reuse our towels because that is what the people who stayed in this very room have done in the past? In actuality, the people stayed previously in the room are those most likely to have damaged it. Further, there is no reason to think that the behavior of those who stayed previously in the same room is more meaningful than those who stayed in other rooms. Does our need to belong expose us to the strange influence of prior guests? In a second stage of the experiment, the researchers added to the sign the fact that most guests who stayed in this particular room

reused their towels during their stay. This time, the results jumped to a 33 percent increase in those willing to reuse their towels. In other words, a senseless, meaningless group (people who stayed in this room before you), which could be made up of dental technicians, marketers, maybe even a bank robber on the run, is important enough in our eyes to turn them into a group worthy of our imitation simply because we all coincidentally stayed in the same room at a certain hotel.

If you are wondering what else we are willing to do for total strangers that we perceive as similar to ourselves, then here are a few examples. It turns out that humans are more likely to respond to the request of a stranger who happens to have been born on the same day as they were. Randy Garner of the University of Houston sent out questionnaires to two groups of people he did not know. At the end of the questionnaire there appeared a request to fill it in and return it to someone whose name was quite similar to the person filling in the questionnaire, or someone whose name was in no way similar. For example, a woman named Cynthia Johnston would receive a questionnaire from someone named Cindy Johansson. The other names were chosen randomly from among the five research assistants conducting the experiment.

Fifty percent of those who received a questionnaire with a name similar to theirs filled theirs in and returned them to the researchers, while only thirty percent of the other group did. Once again it turns out that we are prepared to go nearly twice as far out of our way to help someone whom we perceive to be part of a group to which we belong, even if the common denominator is terribly weak. In this case the similarity is in the name. For the same reason, apparently, we tend to answer email from people whose initials are the same as ours.

The Parrot Effect

Rick van Baaren, a social psychologist at the Radboud University of Nijmegen in the Netherlands, conducted one of the strangest experiments ever in an attempt at tracing the most feeble common denominators possible that still satisfy our terrible thirst for belonging. He tested the link between different behaviors of restaurant servers and the size of the tips they earn. The study showed that waiters who took care to repeat the customer's order exactly as it was given – even when not asked to do so – raised their tips by seventy percent. Not surprisingly, this study became known as the Parrot Effect.

The researchers believe that this is none other than our tendency to prefer those who are similar to us, expressed here in the strange ritual of waiters repeating food orders. This proved to be enough to include the waiter in 'our group' and earn him a large tip. In another experiment, conducted by Jessica L. Lakin and her colleagues, it was discovered that imitating the body movements of the other person – crossing one's legs or fiddling with one's hair in a similar fashion – is enough to make the person being tested feel comfortable and familiar with the other, no matter how random their connection is otherwise.

The Parrot Effect is a well-known accessory in our social toolkit and it is used to enhance our feelings of belonging, thus decreasing the social noises that stem from a lack of this feeling. It turns out that this characteristic, with which successful marketers have long been familiar, occurs subconsciously even between total strangers. The variety of behaviors that are imitated is vast, and includes accent, pauses in conversations, speed of conversations, syntax and even gestures and feelings. Imitation sometimes takes place automatically, and in one study it became apparent that prior acquaintance between the person being imitated and the one doing the imitating was inconsequential. Studies of the brain confirm this phenomenon as well. It turns out that there is a close connection in our brains between observing a certain action and carrying it out.

The source of this tendency to imitate is the obvious influence on increasing the empathy and sympathy between the imitator and the imitated. In a series of experiments conducted by van Baaren and his colleagues it became apparent that imitation increases social behavior, and not just toward the imitator. In an experiment carried out in 2004, university students were asked to express their opinions on a number of advertisements they were shown in a lab. The researcher imitated half of those being tested while they spoke. He tried to copy their gestures, the way they moved their hands and feet, all the while trying not to be too obvious about it.

A few minutes later the researcher dropped six pens on the floor as if by mistake. In different versions of this simple experiment, the participants who had been imitated were two or three times as likely to help him gather them from the floor than those who had not been paid special attention by him.

But imitation did not merely increase their good will toward the tester; within minutes, a general feeling of comfort and support had been established. The people who had been imitated were more generous when asked to contribute to charity. It appears that imitation increases the feeling of belonging and that, as is known, serves as an effective barrier against the noises of loneliness.

We are familiar with this societal waltz from our own personal experience. Smiles are, as we know, catchy. So are accents, often automatically, depending on our dependence on the person we are speaking with. A heavy Irish accent is likely to find its way into a New Yorker's speech within ten minutes over the phone. Jeremy Bailenson, a psychologist in the Department of Communication at Stanford University, tested the influence of different types of imitation when he programmed a virtual figure, an avatar, which imitated the movements and gestures of the people taking place in the study. He found that the participants responded to imitation when it was immediate and precise. On the other hand, if the avatar fell out of sync with the people he was imitating, or several seconds passed before he reacted, then the imitation went unnoticed and had no effect. When the virtual figure was precise in its mimicry then it was perceived as warm and humanlike, as if standing in for a different (real) person. Beilinson's experiment supports the evidence for the existence of the delicate mechanisms in our brains that react to imitation as part of our desire to belong.

American social writer and philosopher Eric Hoffer put it best when he said, "When people are free to do as they please, they usually imitate each other."

From Russia with Love

In the October 2007 issue of Scientific American Mind, Robert Epstein, the former editor of Psychology Today, tells the story of being deceived by a virtual person who imitated a real one so well that Epstein was oblivious. Epstein's story, ironic as it may be, is a sad echo of the noise of loneliness that stands at the foundation of many of society's noises.

It all began on an Internet dating website. Like all men, Epstein says, he made his choice based on photos displayed on the site, which – after the fact – he admits are not the most reliable or true to life.

The photo that caught his attention was that of a captivating young dark-haired woman who lived – or so he thought – not far away from him. The verbal description was quite brief but it was enough to make Epstein believe that the young lady had arrived in the US not long before.

Epstein wrote to her and she answered with obvious affection, eventually revealing to him that her name was Ivana and that she lived in Russia. However, the combination of her photograph and the warmth of her letters convinced Epstein to keep up the correspondence.

If you have read Jonathan Safran Foer's wonderful novel *Everything is Illuminated* then you will immediately pick up on Ivana's flawed English. A typical email message of hers went like this: "I have told to mine close friends about you and to my parents and them happy that I really interested someone and regardless of the fact that not here in Russia and all from them happy for me, that I have met you. I have very special feelings about you... it – in the same way as the beautiful flower blossoming in mine soul...I only cannot explain...but I confident, that you will understand me so I wish to know what makes you, think, and I shall wait your answer, holding my fingers crossed..."

After months of corresponding, Epstein had some doubts, but not real suspicions. Internet relationships can be slow and frustrating, though his 'affair' with Ivana was proceeding particularly slowly, without a single phone call or even the faintest hint on her part at a possible meeting.

Epstein also noticed that Ivana's letters were repetitive and dealt with a limited number of topics. Again and again she wrote about her relationship with her mother and her girlfriends. Nothing about cultural events, films or books; even when Epstein offered an interpretation of recent political events in Russia, she failed to respond.

After a number of months, in January of that year, Ivana wrote Epstein about telling her girlfriend all sorts of wonderful things about him as they strolled around the park

together. At last, Epstein's suspicions were fully alerted. He asked himself, "Do people really go for walks in Nizhniy Novgorod – a large city about 200 miles from Moscow – in the dead of winter?"

A website informed him that on that day there was heavy snowfall and the temperature was -12°F. He asked her about this but she did not answer.

Epstein looked carefully back through all their correspondence, and indeed came up with some suspicious finds. The contents of Ivana's letters were always vague and general and only marginally responded to Epstein's questions. He never received specific answers to his questions.

At this point, Epstein tried the ultimate test and wrote a letter that was complete gibberish, except for the salutation and closing (Dear Ivana/Love, Robert).

Ivana responded with a long letter about her mother. At long last, Epstein understood that he had been writing for four months to a computer program that had been programmed specially for interpersonal Internet communication.

Epstein admits that he was a victim of this deceit because he had wanted to believe with all his heart that a young and attractive woman could actually want him. How much more computer noise will we be willing to let into our lives simply because of our vulnerability and our desire to belong – in society, or to someone good-looking and supportive?

The success of the program that Epstein encountered had a lot to do with the low expectations that Ivana engendered with her poor English. Epstein's imagination filled in the rest.

Other computer programs that manage to deceive the correspondent for longer than a few minutes make use of the Parrot Effect. They repeat part of what was written to them and the writers, feeling flattered, once again squelch their warning systems and fail to notice that something is awry.

Epstein, who launched an artificial intelligence competition in 1990 – in which judges try to identify between human and computer-generated behavior – and who edited the book *Parsing the Turing Test* (used for identifying computers acting like people), adopts a tone of healthy self-deprecation with regard to the story of Ivana. Still, an important question remains: why we are willing to let societal messages penetrate our consciousness even when all signs point to computer-generated noise?

OCPD NOISE

"No one is perfect... that's why pencils have erasers."

-Anonymous

Obsessive-compulsive personality disorder (OCPD) is relatively well-known and well-documented. Nearly all of us are familiar with it at one level or another in ourselves or the people around us. When manifested simply we find ourselves exposed to an unending buzz in our heads that is anchored in obsessively reviewing decisions that we have already made or need to make, even if they are relatively marginal. We go over them again and again, trying to assess the possible outcomes, though mainly it appears that we wish to abstain from making mistakes that lead to failure and criticism. When manifested more extremely, OCPD can disrupt everyday life for an entire lifetime. I have decided to focus on it here because with regard to internal noises this has the potential to be particularly troublesome. Believe me, I have spent a lot of good money trying to get rid of it.

Closing doors

On my personal journey mapping the noises of my life there is a special place for the continuous murmur of the need to keep all my options open. Like the juggler who keeps five balls in the air I found myself exerting tremendous mental energy in to keep from falling to the ground, no matter how unlikely that was to happen. My guiding principle was contained in a sentiment expressed by the writer Paul Theroux: On rare occasion I heard the noise of a train on which I did not wish to be riding. This matter took on new significance when one day I missed a train but had the opportunity to read a book – Dan Ariely's *Irrational Predictability*. This is the story of what happened.

London, February 2008. The train on the Piccadilly Line roars into the station. As I skip down the escalator in a very un-British fashion I catch sight of the first passengers stepping from the train. I have only seconds to make the train. I run, and manage to jump into the carriage a split second before the doors close behind me. I feel like the bad guy in a crime thriller who has managed to leave the good and frustrated cop behind on the platform. I take a deep breath when suddenly I realize the embarrassing truth: I have taken the wrong train. I am in no terrible rush and this is not a big deal; I will switch trains in the next station. In fact, I now have three full minutes for reflecting on the connection between this mistake I have just made and the fact that the train was about to depart the station.

And more generally, where else in my life am I expending energy simply because some option – not even one that is necessarily important – is about to disappear?

I first felt the magic spell of disappearing options at a special exhibition in a shop specializing in African objets d'art that I visited last year. Some of the merchandise carried round red tags, a sign understood the world over to mean that a piece of art has been sold. I was not surprised: these were the most beautiful objects in the shop, and there was nothing for me to do but feel sorry that I had not come earlier to secure for myself some of the precious objects on the shelves that had not been snatched up by others with refined taste. Each and every object that had been affixed with a sticker was wonderful in my eyes. On my way out of the shop and feeling quite dejected, I stopped to congratulate the saleswoman on the success of the exhibition, as was clear from the abundance of red stickers. She smiled and explained that I was mistaken: the red stickers in fact signified all the items in the shop that had been significantly discounted for sale. All at once I completely lost interest in purchasing anything. From the moment they went from being a lost option – since others had selected them – to a real possibility, they lost their magic.

That was how I came to understand that when I am in doubt over a purchase or who to call or which career path to take, I should keep the example of Xiang Yu in mind. This Chinese warlord led his soldiers across the Yangtze River to enemy territory three centuries before the Common Era. In what seemed to be a bizarre move, he ordered his men to smash all their cooking pots along with the ships that were to ferry them back home across the river. He explained to his stunned soldiers that this was meant to force their attention to the task ahead. While this was quite unpopular with his men, who watched as their only means of retreat went up in flames, the move was justified in terms of the battlefield and for the annals of history and social science research.

In the above example, Xiang Yu exhibited clearly rational behavior, unlike the way most of us act in the face of too many options. The great majority of people cannot make a decision that involves a painful relinquishing of options, even students at hallowed MIT. In a series of experiments carried out there by behavioral economist Dan Ariely (whose book includes the story of Xiang Yu), hundreds of student participants proved themselves incapable of taking those painful decisions, even in those instances where this was clearly a desirable option.

In these experiments, Ariely and his colleague Jiwoong Shin programmed a computer screen to show three doors. A participant in the experiment who knocked at any door by using the mouse would open it and enter the room behind it. Once inside the room

he could either click on the room or on the door of another room. Each click inside a room brought with it a cash reward. Each room had its own pricing distribution so that one room was clearly preferable to the other two. The participant could click on a different door any time he wanted to, thereby entering a different room. Knocking at a door brought no financial reward. The participants had a clicking budget they could use as will. When they finished their allotment the game was over and they received their payment according to the rooms in which they clicked.

In one of the more interesting versions of the experiment, each time one of the participants clicked on a certain door or the room behind it the other doors gradually shrank, and disappeared entirely if not selected within fifteen consecutive clicks. One click on the shrinking door was enough to return it to its original dimensions. Quite a number of the participants in the experiment could not stand the sight of the disappearing door (and with it the option to enter the room behind it) and so they clicked it even though that action directly harmed their income.

Xiang Yu would have ignored the other doors, but the MIT students were not so disciplined. They used up so many clicks trying to save the vanishing door that their revenues fell by fifteen percent. Even when the fine for changing doors grew, the students continued obstinately to try to keep all the doors open.

The analogy to the example mentioned above is clear: the three doors represent three options in a study program for a future career, or three possible candidates for romantic involvement. When an option shrinks because we do not invest our attention in it, its existence is threatened. Furthermore, due to a certain level of neglect, and even on a daily level, options disappear without the possibility of returning, a situation that is intolerable for us – after all, we are likely to cut off an interesting conversation in order to answer a call from an unidentified party, simply because we cannot stand to miss the wonderful opportunities that await us on the other end of the line.

The last in the series of experiments with disappearing doors took place under similar circumstances, but this time the participant could bring back a door that had already disappeared simply by clicking on the spot where the door had stood. Surprisingly, the behavior of the participants did not change significantly and they continued to pass on fruitful, revenue-producing clicks in favor of stopping the disappearance of doors that they knew they could revive at any time later. Shin and Ariely estimate that the pain of loss hidden in giving up the disappearing option clouds the participants' ability to behave logically. Can you identify the doors in your life that you should let disappear or close? A

personal relationship kept alive artificially that you revive time and again? Or perhaps unrealistic career paths you keep grooming yourself for? "Closing a door on an option is experienced as a loss, and people are willing to pay ... and remember the lessons of door closers," says Ariely. In these experiments it was easy to estimate the price: the cash that the participant did not win. In life, however, the price is less clear – wasted time, missed opportunities, and especially the bothersome murmur of unselected options waiting to be chosen, though it appears they never will be. How much of the revenue of fitness centers is based on members who have stopped working out but who maintain their memberships in order to hang on to the healthy option of renewed activity?

According to Ariely, marriage is a good example of the kind of situation we create with our own hands in which both sides give up their options. "We close doors and announce to others we've closed doors," he says. But as we know, even this is unlikely to be enough in the face of nature. Ariely brings as an example projects that he has passed on and urges all of us to resign from different committees, reconsider some of our hobbies and remember the lessons that the Chinese warlord Xiang Yu taught us.

As someone who spent the better part of his life investing in technology firms, I often wondered if the most problematic company in the investment portfolio of a venture capital fund should be allowed to disappear. I have always believed that removing a company from the books is a better strategy than originally meets the eye. It keeps more money in our hands for other (better) investments and, more importantly, it leaves us with more of the managerial energy that is so very important for the other start-ups whose chances of succeeding are greater. So why do we still insist on holding on to the problematic company? Perhaps it is a lack of investment discipline, or, quite simply, as suggested by Shin and Ariely, in order to avoid the pain of giving up an option.

Let us admit that we are prepared to expose ourselves to the ongoing noise of imaginary doors that are about to close if only to retain the dream that one day we will step over the threshold into the room that will turn our lives around all at once, whether because we will receive the magic word that will cause all the others to fall in line or because in that room we will find the person who will cast a shadow over all the others or because it will provide us with a simple, straightforward formula for attaining happiness (or at least wealth) that much quicker.

Perfectionism

Who takes a nap every day between 11:30am and 1:00pm, eats chicken with rice at exactly 2:30, does stretching exercises in the gym at 3:45, shaves his head at 4:30 and only then gets out to the basketball court, his ironed t-shirt tucked into his shorts and his socks drawn up to the exact same height on each calf?

Why that's Ray Allen of the Boston Celtics. My heart goes out to him. Allen, viewed by many as the greatest shooter in the history of the game and presently ranked second in all-time three-point shots made (the first is Reggie Miller), is still in his early thirties, and if he keeps healthy should manage to break the record.

Allen cannot stand the sight of a piece of paper on the floor of his room without picking it up; otherwise, he says, that piece of paper will stick in his head and bother him until he gets up and tosses it out. Allen's obsession for routine during training began when he was still a boy. At the age of eight, when he played with other children, he would always be sure to shoot five times from the right and then five times from the left.

Ray Allen is capable of casting a searing gaze at a teammate who dares park in his space, even if the parking lot is empty. Allen is a prime example of a hopeless perfectionist who expects no less from the people around him.

And what about you? Are you capable of spending an entire day writing a simple five-hundred word report in which you weigh every one of those words and rearrange every paragraph, and all that only after having put off doing the job in every manner possible?

In terms of evolution, the survival of perfectionists is an enigma. In a world that demands adaptation and conformance more than ever, the obstinacy of perfectionists stands out. But the people who aspire to perfection, as researchers now know, are not born that way. They are created, usually at an early age. Researchers also know that the dimensions of the phenomenon grow in proportion to the amount of pressure applied by parents for their children to succeed, to achieve. In an age in which many parents think of their own status in terms of their children's achievements, parental control has become a widespread phenomenon.

Perfectionists tend to confuse mistakes with failure. The noise they hear is that of their own fear that failure will lead them to a loss of respect by others. The setting of high standards is not in and of itself a problem, claims Randy Frost, a professor at Smith College, and it characterizes many successful, happy people. The problem begins when high standards are coupled with a fear of making mistakes. And that is how perfectionists are born. They are pursued by noisy doubts, so that whenever they finish a task they are

tortured by the question of whether they have done it properly. Thus, they find it difficult to declare the task completed. Their intolerance for uncertainty and a lack of clarity is one of the most prominent signs of perfectionism. And there are few people as qualified professionally to make that determination as Frost, who, for the past two decades, has made it his business to define the dimensions of perfectionism and has developed the professional tools for its assessment.

In Frost's opinion the source of the problem is parents who make exceedingly high demands on their children and are exaggeratedly critical of them when they fail to achieve them. Unsurprisingly, it is often parents who are fearful of making mistakes that tend to raise children characterized by this same anxiety.

The fear of making mistakes is the main source of noise for perfectionists, the anxiety that springs to life in the mind of a child raised to feel that parental acceptance comes as a result of his ability to perform. If a child's self-image is based on never making mistakes then it is obvious he will grow up thinking that he is all right only when he succeeds. It is only then a short distance between that and meek obedience and egocentrism.

Writing in *A Nation of Wimps*, which plumbs that very subject, Hara Estroff Marano, a senior editor of the journal *Psychology Today*, makes the claim that the price of this phenomenon is very heavy, that perfectionism, driven by parental behavior, permeates a person's life and prevents the development of identity. The fear of failure reduces the willingness to take risks, which leads to a lack of creativity and renewal. Furthermore, perfectionism is an ongoing source of negative feelings, since perfectionists are wrapped up in their own desperate attempts at preventing what is for them the worst: failure, and the subsequent poor evaluation. Perfectionism is a never-ending report card that enforces a continual cycle of self-assessment, frustration, anxiety and occasionally depression.

Anyone wondering about the difference between perfectionism and excellence should read *Perfectionism: What's Bad About Being Too Good* by Miriam Adderholdt and Jan Goldberg, which provides an excellent answer that is not perfect. Excellence, the reader learns, provides a person with a pleasant feeling derived from his or her actions, along with satisfaction with what has been learned and an ensuing sense of self-assurance. Perfectionism, on the other hand, involves hard feelings about most accomplishments and a focus on mistakes no matter how successfully a person completes a task.

Adderholdt and Goldberg claim that the main issue with perfectionists is their endless effort at concealing their mistakes. This attitude prevents them from accepting the

criticism that is essential for growth and development. The phenomenon is well-known among competitive athletes who attain a certain level of success and then drop out completely because they are incapable of handling the failures inherent in competition at a higher level. A different study shows that the more preoccupied an athlete is with the mistakes he fears making, the more likely he is to make them. This is reflected in a certain period in Israel Defense Force history during which the accidental firing of a bullet by a person in Officer Training School led to his immediate dismissal from the course. Naturally, the accidental firing of bullets in this particular course was the highest in the entire IDF.

However, if the main cause for the growth of perfectionists is the attempt at absolute control by parents over their children's lives, it is clear that the drive for success does not meet the goal. From my own experience I can say that success in life depends less on the ability to perform every task perfectly than on the ability to endure failure. Built-in optimism, passion, creativity and most of all perseverance are the true keys to success, even more than talent.

In contrast to the blurbs and catchy phrases that jump out at us from the jackets of nearly every business self-help book there is a growing body of scientific study proving that overachievement is a serious problem. Perfectionism, one of the behavioral characteristics of an achievement-oriented culture, becomes a window of insight into a variety of psychological disturbances, from depression to compulsive behavior to addiction. Perfectionism is an excellent example of the noise that is born from the sin of out of control overachievement.

Gordon Flett, a professor of psychology at York University and the author of many studies in this field, separates perfectionists into several categories based on a standard questionnaire he has developed. The first type of perfectionist is full of ambition and very self-involved, always fighting to attain his own high standards even at the risk of depression stemming from his excessive self-criticism. The second type includes those who demand perfection from others, even at the cost of jeopardizing relationships. And the third comprises people who try to live up to an image of perfection that they believe others see in them and expect from them, leading to a real danger of suicidal thoughts and eating disorders.

In one of the studies conducted by Flett and his colleague Paul Hewitt, the connection between perfectionism, self-acceptance and depression was studied in ninety-four student participants. The participants were asked to fill in questionnaires assessing their levels of perfectionism, self-acceptance and depression.

An analysis of the findings showed a negative correlation between the three types of perfectionism – self-motivated, aimed at others, or based on others' expectations – and self-acceptance. In other words, the higher the participants ranked on the scale of perfectionism, the less likely they were to be accepting of themselves. As has been documented, there is a correlation between depression and low self-esteem, which is the mitigating factor here. Those who adopt perfectionist behaviors as a result of what they perceive to be others' expectations are more likely to pay a particularly heavy price in regard to self acceptance, and the resulting depression. The findings show that perfectionists are very dependent on their self-esteem and as such are particularly vulnerable to psychological distress when something negative happens to them.

A study recently carried out at the Curtin University of Technology in Australia came up with a very clear indicator that perfectionists are likely to slip into serious psychological distress. The researchers had 252 participants fill out questionnaires rating their level of agreement with 16 statements like "I think of myself as either in control or out of control" and "I either get on very well with people or not at all." It turned out that the level of "all or nothing" thinking predicted how well perfectionists navigated their lives. The more strongly participants in the study thought in this either-or fashion, the more likely they were to display the kind of extreme perfectionism that can lead to mental health problems.

Unlike people labeled as psychotics, perfectionists do not struggle with stigmas or see themselves as problematic people. In truth, in our achievement-oriented culture a large number of perfectionists are even proud of being such. A study based on questionnaires and interviews conducted with nine thousand people in management over a ten year period revealed that eighteen percent of managers in the United States define themselves as perfectionists, many of them proudly so. Another finding presented an even more distressing picture: perfectionists are seventy-five percent more likely than the rest of the population to fall ill with heart disease, depression and intestinal problems.

Perfectionists are often characterized by obsessive-compulsive personality disorder (OCPD). They cannot stand a disorderly desk, they cannot leave off finishing a task and many of them spend futile hours polishing a job to a level that no one but they can appreciate. OCPD sufferers hoard money for future use, keep their houses excessively neat and both praise and fear the delegation of authority since nothing is ever carried out to their satisfaction. In their world, actions and beliefs are either completely justifiable or absolutely wrongheaded. Gray areas do not exist in their moral world. Predictably, their relationships are fraught with complications due to the excessive demands and standards they expect

from friends, partners and children. The DSM-IV-TR (Diagnostic and Statistical Manual of Mental Disorders) defines sufferers of OCPD as those who answer at least four of the following in the affirmative:

- Is preoccupied with details, rules, lists, order, organization, or schedules to the extent that the major point of the activity is lost.
- Shows perfectionism that interferes with task completion (e.g., is unable to complete a project because his or her own overly strict standards are not met)
- Is excessively devoted to work and productivity to the exclusion of leisure activities and friendships (not accounted for by obvious economic necessity)
- Is over conscientious, scrupulous, and inflexible about matters of morality, ethics, or values (not accounted for by cultural or religious identification)
- Is unable to discard worn-out or worthless objects even when they have no sentimental value
- Is reluctant to delegate tasks or to work with others unless they submit to exactly his or her way of doing things
- Adopts a miserly spending style toward both self and others; money is viewed as something to be hoarded for future catastrophes
- Shows rigidity and stubbornness

If you are characterized by four or more of the descriptions above then you can join the Ray Allen Perfectionists' Club. Still, it is important to note that even if you do display a significant number of these behaviors, you will not be defined as disturbed unless you prove yourself incapable of living a normal life due to these behaviors. Even if the tendency to perfectionism in certain situations is natural and accepted in our culture, the problem begins when we import this destructive tendency into other aspects of our lives, such as the home, hobbies and personal appearance.

OCPD sufferers often experience distress associated with a difficulty in expressing emotions and a depressive state of mind. A difficulty in expressing emotions is the result of the enormous importance an OCPD person places on control. And since emotionality is usually linked to spontaneity and psychological turbulence and instability – in other words, a loss of control – the emotional reaction creates a lot of noise in the life of OCPD sufferers. The only emotion they are capable of releasing freely is that of anger. On the other hand, they enlist their emotional reserves in order to ensure that they do not make themselves openly vulnerable, since that could lead to rejection.

Another inexhaustible source of noise is the high level of indecision and the prevalent tendency to procrastinate among OCPD sufferers. The roots of this dynamic lie in the supreme importance that OCPD people attach to each and every decision, even when it is trifling. For them, the need to make the right decision is uncontested. Under these

circumstances, even a relatively simple choice can become a nightmare. The pressure not to err is immense, even though wrong decisions are part of life – a fact that condemns OCPD sufferers to ongoing suffering, the source of which is the noise that comes from an unavoidable error.

The need to make perfect decisions is a direct cause of the tendency of OCPD personalities to defer making decisions and taking action. Even getting started can be threatening, since the need to ensure that the list of priorities is established correctly is paralyzing.

If these exhausting experiences were not enough, OCPD sufferers are themselves a tremendous source of noise to the family members or colleagues in their lives. Subordinates are afraid to express their opinions freely unless they can be sure they have found the exact way to state their positions. Life with OCPD sufferers can often feel like walking in a minefield. The constant feeling of impending doom in the shadow of a person with this type of disorder leads to anxiety, resentment and terrible strain. In this sort of atmosphere, the growth of creativity and the willingness to take risks is a rare phenomenon.

Within a family, the combination of exacting and uncompromising standards on the one hand and a difficulty in expressing emotions – not to mention generosity – on the other is the main cause for crises among couples. In all interpersonal relationships we expect to be given a little room for making mistakes, but OCPD sufferers are incapable of giving it; their social skills are too limited. Their ability to listen falls prey to their feeling that their way is the right one. They are likely to share their opinions, extreme and off-putting though they may be, with perfect strangers, since they believe that being "open with everyone always" is the only possible way, and if someone is hurt it is that person's own fault.

Is this terrible inner noise that OCPD sufferers endure a requisite for the process of their cultural and scientific creativity, as many assume, even at the cost of their own personal suffering?

In his book *Self-Help Stuff that Works*, Adam Khan presents two people whose contributions to humanity were great despite the fact that they were far from perfect.

In the early years of the eighteenth century, seamen could determine the latitude at which they were sailing but not the longitude, that is, the easterly and westerly movements of their ships. Tens of thousands of lives were lost at sea as a result of unavoidable navigational errors. On one particular evening – October 22, 1707 – four different British ships sank due to navigational errors, killing thousands of soldiers.

Since the British navy was at the time engaged in transporting merchandise, researchers and travelers around the globe, the problem could no longer be ignored. Parliament offered a prize worth – in today's terms – some one million dollars for the person who could devise a system for determining longitude.

At the time, the only device capable of determining the time on land with any precision was the pendulum clock. But pendulum clocks were of no use at sea, since the sea is unstable. Further, temperature changes could alter the viscosity of the lubricants used between the parts of the clock, adversely affecting its precision.

In that period, clocks were reliable only to the minute per month. During sojourns lasting two or three years this accruing lack of precision would become problematic. Scientists from around the world competed for the big prize. In the end, it went to one John Harrison, an uneducated clockmaker who succeeded, as a result of forty years of work, in creating a clock that deviated only one second per month and could be used on board a ship. The full story can be read in Dava Sobel's wonderful bestseller, *Longitude*.

Harrison, however, was far from perfect. He was incapable of expressing himself in writing; the opening sentence of his last published work runs to twenty-five pages, with no punctuation. Was this of any importance, asks author Khan? No, not at all, in light of his achievement. He accomplished the impossible and won the prize.

Khan mentions another figure, that of Ludwig van Beethoven, who was living proof of the popular saying, "A clean house is a sign of a wasted life." His gloomy house sported moldy ceilings, thick dust on the piano and chamber pots left unemptied. Bits of the previous day's meals lay everywhere. But if Beethoven had spent more time cleaning his house, we might not have the ethereal music he left behind.

PART II: NOISE AMPLIFIERS

The Second Rule of Noise:

Each of us carries his/her own personal noise amplifiers. The level of noise we eventually experience is the outcome of the noise input after it has been processed by our personal amplifiers.

Fear is the lengthened shadow of ignorance.

- Arnold Glasow, American humorist, 1905-1998

On the tenth of September 2008 the largest scientific experiment in the history of humankind was about to take place. On that same Wednesday morning at 8:45am, Joe the electrician showed up at my house, a quarter of an hour earlier than when we had planned. Joe rarely arrives at the appointed hour (and sometimes, for that matter, on the appointed day), and he had certainly never come early before. He was visibly shaken. Even before I could point out signs of the latest mix-up caused by the 'smart electricity' system in our house, Joe was anxious to ask a question: Was it true that I am a graduate of the Technion Israel Institute of Technology. I told him I was, expecting him then to hit me with a special rise in his rates for college grads. But the sincere panic in the veteran electrician's eyes made it clear that he was in true distress. "What do you think about the experiment they're doing in Geneva?" he asked me in a choked voice. "And what do you reckon the chances are that we'll be sucked into a black hole in that particle accelerator they've got over there?" Joe, never a big fan of nuclear physics, had learned in the previous few days more about elementary particles than he had learned in his entire life, and he was upset.

That morning, the work of eight thousand scientists in eighty countries was reaching a climax as part of the most ambitious scientific experiment in history. Proton beams were going to be accelerated to a speed nearly equal to the speed of light in the world's largest particle accelerator, which was built in a twenty-seven kilometer underground tunnel near Geneva. The experiment aimed to recreate the conditions in the split second after the Big Bang, when our universe was formed. Researchers, aware of the public disquiet regarding the project, calculated the risk of catastrophe at less than one in fifty million, which they made known. But Joe was inconsolable, along with many other citizens, including terrified schoolchildren interviewed in the media. There was even one reported case of a sixteen-year-old girl in central India who committed suicide after hearing about the chance that the experiment might lead to the end of the world.

I tried calming Joe down, but only after ten-thirty, when it was clear that the experiment had begun without incident, did Joe manage to return to his senses. In fact, he suddenly remembered another job he had to attend to that would keep him away until the following week.

Joe is not the only who worries like this. He is part of a large and frightened public that has been misled to think of information as a calming factor. My only problem is not knowing when I am going to see him again to have a chance to tell him so!

The Paradox of Fear

Information is the main connection between us and the world outside our direct line of vision and hearing. Information is also the most common weapon in the arsenal of noise generators. The combination of the evolutionary curiosity that lies deep inside us and the tension we feel in the face of existential threats are the fertile ground on which the weeds of informational noise grow best. But that is only the beginning of the story. It is impossible to explain the full extent of the damage done without first understanding the nature of the personal noise amplifiers we carry with us as part of our most basic equipment. These ensure that even relevant, inoffensive, harmless information is liable to shake up our peace of mind.

The way in which the brain alerts us to potential danger is the feeling of fear it creates through a variety of chemicals it releases throughout our bodies. Fear and risk have been linked forever. Fear is a warning signal that the brain transmits for the purpose of helping us refrain from taking risks that might harm us. However, if our brain errs in calculating the risk then we are likely to tense up for no good reason and become unnecessarily fearful – an emotion that produces an enormous amount of noise of its own. So then what is the dynamic that explains the connection between amplifiers and the misperception of risk, fear and information that enable us to assess risks? And how do we assess risk, anyway?

News items often give the impression that the end of life as we know it is near, though the nature of the threat is always in flux: sometimes it is a plague, sometimes a rise in the water level or an approaching asteroid or an insect immune to every pesticide – fill in the correct answer. The phenomenon is not new; even before the advent of modern science the world was frightened by existential threats, like witches.

The public appetite for stories that are effective in creating fear has not changed since then, nor has the media changed in its desire to provide us with such stories. The big change is with the eroding ability of governing institutions to reassure citizens that they are sufficiently protected. And as if that were not enough, government representatives and other politicians like to add fuel to the fire of fear so that even if they are caught off guard for a moment they can rely on some doctor or scientist to fan the flames.

The media has also become renowned for its comprehensive role in ranking potential threats. We are more afraid of fire than we are of drowning, even though our chances of drowning are greater. But fire, it turns out, looks better on camera.

Human life expectancy and quality of life have never been better. A person born in Europe in 1900 could not expect to live longer than forty-six years, but his grandchild born in 1980 should see her seventy-fifth birthday and his great-grandson, born in 2008, enjoys a life expectancy of eighty-three years. Chronic maladies like heart and lung diseases are less common and occur later in life and with less intensity. The infant mortality rate in the West – a true cause for worry among parents throughout history – has become insignificant. Our bodies are larger and more physically capable. The number of democracies in the world has increased sixfold since 1950, from twenty-two to one hundred and twenty by the turn of the century. And in spite of the volume of reports filed about wars around the world, their numbers have in fact decreased, and the chance of war between two neighboring countries is lower than ever. The economic interests that encouraged nations to make war in the past have become the very reason for military restraint in an era of global economics.

In his book *Risk: The Science and Politics of Fear*, which provided me with many insights, Canadian author and journalist Dan Gardner defines the 'paradox of fear' by asking how it is possible to explain the phenomenon whereby the healthiest, wealthiest, longest living people in history fall victim to our fears and the noise that accompanies them, causing fatal wounds to our quality of life. And as if that were not enough, we have become desperate consumers of information that mostly does not serve our interests in any way. Some of it (quantitatively) we are unable to make sense of and the rest frightens us and undermines our security in everything we have already achieved: health, education, welfare, and unprecedented scientific achievement.

The explanation for this paradox can be found in the lethal combination of several factors, not the least of which is human evolution. While our tendency toward too much information may be familiar to everyone, few people understand the evolutionary needs we have for gathering information and the system that translates it into an idle threat against

our physical and mental wellbeing. This system is as old as humankind itself and idle threats are nothing but another way of talking about the existential noise we ourselves are guilty of making.

Simon Briscoe and Hugh Aldersey-Williams have collected in their book *Panicology* an impressive collection of incidents of panic that have been brought to light in various media outlets around the world. They categorize each story according to a number of criteria. The first is the level of excitement it brought about ; the second, how realistic the threat was; and third, what – if anything – we could do as individuals.

There is no doubt about the fact that reading dozens of scary stories is reassuring, since you cannot possibly be wary of everything. Here, too, the great paradox of modern life is exposed: on the one hand, it has drastically reduced the dangers for humans and on the other, has brought about most of the fears common today.

The 9/11 disaster provides an additional opportunity for testing the strange ways that fear dictates behavior that does not necessarily serve our most important existential interests. In the wake of the attacks, the American government assumed that many citizens would prefer driving to flying after having been exposed to the chilling sight of skyscrapers collapsing, thereby harming the air transportation sector so central to the economy. But no one bothered to figure the danger involved in driving as opposed to flying before taking such a stance. In fact, air travel is quite a bit safer than traveling in a car. So much so that the most dangerous part of air travel is actually getting to and from the airport.

One American professor did bother to do a calculation proving that if terrorists managed to hijack a plane a week in the United States then over the course of a year a person who traveled by air once a month would have a one in 135,000 chance of being killed. Compare that to a one in 6000 chance of dying in your car. That's a little food for thought for all those people afraid of flying.

But road accidents and probability studies do not interest the media like airplane crashes, collapsing skyscrapers, anthrax-laced envelopes and dirty bombs. That is how hundreds of frightened potential air travelers have come to die on the roads, well out of the blinding spotlights of the media. A German researcher calculates that there were 1595 such deaths in the year following 9/11.

On snake oil and snakes

Explaining it all away by culture does not seem to get to the root of the problem. So the question remains: How has fear come to play such a central role in our lives? Dan Gardner has a few interesting answers to that as well. He has analyzed among other things the source of our fear of snakes and attributes it to our evolutionary roots. Throughout the long evolution of mankind, snakes have been an ongoing threat to our lives. The evolutionary lesson is clearly imprinted deep in our brains: Snakes are dangerous and we must beware of them. People who missed this evolutionary lesson did not remain alive to pass on their irresponsible genes; those who took caution ensured that the message would be passed on to future generations. Being cautious around snakes is a universal trait shared by people the world over, even in areas of the globe where there are no snakes. Our cousins the monkeys fear snakes as well, even monkeys raised in captivity who have never been faced with a snake. Tenacious psychologists are often capable of successfully treating people with fears of dogs or other common phobias, but not so with snakes. This fear was seared onto our brains hundreds of thousands of years ago and will remain with us for hundreds of thousands more.

Fear plays an essential role in keeping us safe. When we are worried about something particular we take more precaution and, where necessary, we take action to reduce contact with the problem. The human race owes its very existence to its fears and worries and those of its forefathers. An experiment that examined the stream of consciousness of those being tested showed that it is fifty percent more likely for our brains to fixate on a negative thought than a positive or neutral one. That is how nature created us in order to protect us. You can do this experiment yourself: follow your thought-process and try to identify the last thought that passed through your head before the stream was interrupted. Were you thinking about a romantic cottage in the Alps or about what might go wrong at the family reunion you are in charge of planning?

Still, unjustified fear can be very problematic when it causes us to take unnecessary risks when driving (which is, incidentally, one of the most dangerous activities we engage in), or fail to get an x-ray for fear of radiation, or refrain from taking a family trip due to fear of terrorism.

Every year has its special fear, along with an out and out panic once a decade. But even these great panics do not last for more than a few months, before something else comes along. Does anyone still recall Y2K? Salmonella? How about the avian flu scare of

the 2005-2006 winter season that was supposed to decimate huge swaths of the population around the globe?

According to Gardner, unjustified fear has indeed become a major source of noise in Western society. There is no avoiding the fact that our lives are saturated with fear, even if the threats themselves change daily: terrorism, bird flu, ultraviolet rays, crib death, malnutrition, global warming, the disappearance of tuna, financial collapse, killer viruses, mad cow disease, lack of exercise, too much exercise. We can only guess what is next on the list. The most effective way to combat fear is by objective, quantitative assessment of the true risks involved in various threats. But those are exactly the feeding grounds for noise amplifiers.

Noise Amplifiers on the Shelf

The first type is evolutionary noise amplifiers that our brains adopted hundreds of thousands of years ago for the purpose of warning us of imminent dangers and existential threats. In fact, our brains have apparently not adjusted to today's reality, as they continue to provide us with these warnings even when they pose no threat. The two principal noise amplifiers in this category are those based on our emotional systems and those based on our blindness to probability.

The second type is modern noise amplifiers, the kind that stems from too little familiarity with the scientific tools – especially statistics – that determine our ability to assess the dangers facing us quantitatively and objectively. This is the amplifying apparatus of statistical ignorance.

The emotional noise amplifier is based on an erroneous perception of the way our brains react to various stimuli, including information. Though we believe ourselves to be reacting rationally, our brains at times trick us in order to protect us. Most stimuli, and especially those that threaten us, are reacted upon by the particularly speedy emotional system that lives in tandem with the rational system. This more immediate system works quickly and automatically, reacting to situations and events before the rational system kicks in. The efficiency of the emotional system is rooted in the development of the brain, which always favors existential, real-time issues over the satisfaction that comes from complex analytical maneuvering. Problems start to arise when we are certain we have made a rational decision when really it was our emotional systems that determined our reaction. This system is particularly fond of identifying threats, even those highly unlikely to be

realized. It warns us of these potential threats through fear, which enables us to defend ourselves. This is how fear turns into a major source of noise. Fear is thus the Trojan horse inside which crouches the media, ready to infiltrate our brains with its messages packaged as threats.

Another noise amplifier – the one based on our blindness to probability – makes this system even more efficient. The source of this tendency is, as with the emotional system, a remnant of our more primitive selves, and a period during which survival took precedence over everything. With the intention to protect our existence at all costs, our brains are wired first and foremost to confront all threats (even those that are unreal) and only then, if at all, to calculate the actual danger. Complex calculations of risk and probability were never thought of as part of the elementary equipment we need to survive threats to our existence. Nature demanded speedy response time to potential threats, with no connection to the chances that these threats would actually be carried out. However, our reactions contain some element of this response system, now outdated and out-of-touch with the relatively safe and highly complex reality of today. It has become a major source of incessant noise in our lives.

Furthermore, these two noise amplifiers have a direct influence on our quality of life and the noises we are exposed to. If we do not learn to quell them, as least part of the time, or lower their volume, we are condemning ourselves to a life full of tension in which every piece of information that is presented as a threat creates an enormous amount of noise in our heads. So the true question becomes that of how we can remove these noise amplifiers or at least reduce their volume, and the answer, as in any case in which we act unconsciously, is to float the process to the realm of consciousness. This is not a simple matter (don't forget: we're dealing with our evolutionary heritage here) and it is nearly impossible to silence our internal noise amplifiers completely. Still, since setting out on this journey to remove excess noise from my life, I have learned from experience that understanding the way in which noise amplifiers work can lead to significant success and bring about change. Most are based on early identification of the major 'pollutants' in our lives and reducing our exposure to them. As an example of the results of the lessons I have learned, I no longer watch television (except for sports...) and I derive particular pleasure from recognizing the fear tactics employed in news headlines, which are particularly noisy. It is my hope that by the time you finish reading this chapter, you too will have developed a certain immunity to noises from the media.

Still, neutralizing the emotional noise amplifier and the noise amplifier based on our blindness to probability may not be enough. It appears that even when we manage to reduce the effect of the emotional system and make use of the rational system for analyzing the data we confront, we are exposed to yet another noise amplifier: the one based on statistical ignorance. Statistics is a branch of science that developed fairly late (seventeenth century) but which offers a comprehensive language and well-ordered theory for dealing with phenomena based on quantifiable data. However, relatively few people are familiar with the vocabulary that makes up this important language. This state of affairs leads to frequent misinterpretation of the information presented to us by the media and by others. Don't tear your hair out when you read a few examples of situations familiar to you from personal experience. It is true that the misinterpretation of quantitative expressions of reality serves the information agents well, but all too often it serves us as well, as you will see.

Our internal noise amplifiers are as personalized as fingerprints. Each and every one of us has a unique combination of noise amplifiers that derive from our parents, our teachers, our personal experience and our personalities. The good news is that unlike fingerprints, the effects of noise amplifiers can perhaps be moderated, if not completely silenced. The Second Rule of Noise expresses the importance of amplifiers in determining the subjective level of noise we experience. Due to the fact that our noise amplifiers are tailored specifically to our own particular measurements, we should not be surprised to discover that a noise amplifier that preoccupies one person will have no effect on another. Therefore, the Second Rule of Noise is as follows: Each of us carries his/her own personal noise amplifiers. The level of noise we eventually experience is the outcome of the noise input after it has been processed by our personal amplifiers.

Emotion over mind

A groundbreaking study conducted by Robert Zajonc of Stanford University has contributed significant understanding of the duality that exists between the emotional system and the rational. Published in 1980 under the title *Feeling and Thinking: Preferences Need No Inferences*, the work laid the foundations for what has become an accepted theory in human behavior analysis and is largely responsible for the avalanche of studies on the topic that appeared in the 1980s. Until Zajonc's study came out, it was generally believed that feelings only came in the wake of consciousness or, in other words, a person can only develop

affection for something once he is aware of its existence and has assessed its essential characteristics. Zajonc's study, along with research by others that followed, was able to establish that in the human brain there are two main systems for determining reactions. One is rational and operates on a thorough and relatively slow basis. This system checks data and makes decisions that are often easily put into words. The second system is emotional. It works on a level at which we have no awareness; thus, we cannot recreate its operations. It is quite a bit faster than the rational system and is responsible for everything we call emotions, intuitions and gut feelings. This system's evolutionary role is to react to threats, and it is also the mechanism responsible for awakening fear in us. The last thing that this system pays attention to is the laws of probability or complex calculations like percentages.

Professor Paul Slovic of the University of Oregon, whose work will be given more attention later in this book, discovered that although the expressions 'one percent' and 'one in a hundred' mean the same thing, our emotional system assesses the chances embodied in 'one in a hundred' as greater than 'one percent.' If our (slower) rational systems were given the chance to assess and decide we would come to the conclusion that these two are the same. But threats, as already stated, are dealt with by the emotional system, which is blind to probability and percentages.

Whether we like it or not, emotions are a major component in human interaction and we must acknowledge the fact that the social interpretation of this interaction is not only expressed in words. People react to tones of voice more than they do to the actual words being spoken, and are even capable of identifying doctors who have been sued for malpractice simply by listening to their voices for a very short time. Emotions are the first link in the evolutionary chain that distinguishes between plants and animals. One can refrain from making cognitive choices but not from feelings. People can control the expression of their emotions but not the emotions themselves. And in general – let's admit it – people tend to recall more what they felt than what they thought.

Furthermore, once we have determined our feelings on a matter we tend not to alter them with ease; even when the circumstances leading to these feelings have disappeared we change them only rarely, since we trust our non-intellectual reactions.

Although we are not accustomed to thinking that the source of our conscious decisions is based in emotions, the research leaves no doubt whatsoever that our emotional system is one of the most efficient noise amplifiers. Here are a few examples of the special way our emotions affect our perception of risk.

The psychologists Amos Tversky and Eric Johnson asked students at Stanford University to read three versions of a story that ends in death by one of the following: leukemia, fire or murder. Afterwards, the students were asked to rank the severity of the risk of the event that takes place in the story, as well as ranking a list of twelve other risks. As expected, whoever read the story that ended with leukemia ranked leukemia higher than those in the other groups. This phenomenon repeated itself among readers who read the stories ending with fire or murder. What was surprising, however, was that reading these stories – any of them – caused the readers to raise their assessments with regard to all risks, and not just the one appearing in that particular story. The story ending with murder topped them all, leading to an increase of 144 percent for all risks. This phenomenon is the basis for some of the noise created by the news.

In another experiment, Paul Slovic showed that even minor changes in a text can have a tremendous emotional impact on our perception of risk. He presented a group of psychiatrists with a clinical assessment of a patient at a mental institution. On the basis of this assessment the psychiatrists were asked whether they would release the patient. Half of the assessments were worded thus: "There is a 20 percent chance that Mr. Jones will commit an act of violence once released." Twenty-one percent of the psychiatrists who read this version of the text said they would refuse to release the patient. The second version of the text differed only in that it read 'twenty of every one hundred patients similar to Mr. Jones will be violent once released.' This time, forty-one percent of the psychiatrists said they would recommend the patient be detained even though 'twenty percent' and 'twenty of every one hundred' are identical. So what exactly is going on here? The explanation is buried deep in the emotional baggage that is stirred up by the expression 'twenty percent.' This is an empty, abstract formulation that presents a statistical estimation not easily understood. How tangible are percentages to us, anyway? 'Twenty of every one hundred,' on the other hand, is tangible. We are capable of picturing that one particular man becoming violent.

When sparrows play dominoes

The probability of the appearance of vastly threatening events is, by nature, low. But such events are exactly what precipitates the involvement of our emotional system. Still, as shown, even when we manage to enlist logic it does not particularly excel at processing low probabilities. The primitive wiring of our brains deals problematically with probability (preferring, as stated, events that are presented in terms of relative frequency) and is even less effective in the realm of law. The source of the majority of our mistakes in assessment comes from the fact that we are certain that it is our logical system operating when in fact it is our emotions reacting. This phenomenon is the main explanation for the power of the media in linking up to our noise amplifiers without our understanding even the way in which our emotions work.

When the media shows a victim of some exotic debacle it will try – if this is at all possible – to add a photograph to the article that documents the human suffering of the victim or his family, for the purpose of activating our emotions. Rarely, the article will specify the chances that the average reader has in encountering this debacle himself, and even more rarely will note the chances of avoiding it. Under such circumstances, our logical system has no chance of assessing the situation and all our reactions are affected by the emotional system – our most reliable noise generator.

Another favorite method the media has for engaging our emotional mechanisms is by presenting a worrisome change in some trend without letting us see the whole picture. If a study reveals that the chance of contracting a certain illness is twice as great when we eat red meat, for example, then it is important to note what the chances were of succumbing to this illness in the first place. If they are minimal, as is usually the case with this kind of news, then even double the chances are negligible.

Bad news in general, and fear in particular, are well calibrated to the primitive brain, in which locating threats was one of its main responsibilities. Thus, the bearer of frightening news is assured the immediate attention of the emotional system, which hastens to respond. It serves anyone who wishes to pass along a commercial, political or social message and who knows how to present it as a powerful threat. Furthermore, an entire industry makes a living from providing solutions to all kinds of fears – real and otherwise – that pop up now and again. Fear is good for the economy. The defense and insurance industries are among the biggest reapers of the fruits of fear, along with the politicians who promise that their particular talents will put an end to what is causing the fear.

One repercussion of this state of affairs is that the ability of the 'experts' in easing the fear of potential dangers through data is very limited. I remember that during the first Gulf War, experts estimated that in Israel the chance of being hit by a rocket was one in a million. But this made no impression on all the tens of thousands of Tel Aviv residents who fled the city. It is only our intelligence that relates to risks, but, as we have learned, for most people, subordinating emotion to intelligence is an effort few are accustomed to making.

Not long ago I was asked to speak at a reception for the non-profit organization Maaleh, the mission of which is to raise awareness among businesses to their social responsibility. I chose to talk about a topic that bothers me and many others engaged in social activism: the tendency to entrust our contributions of money and time to our emotions instead of to logic, even though it is clear that our intelligence mechanism is better equipped to deal with decisions involving philanthropy and assisting populations in distress. Since at the time I was already writing this book, I was able to see the potential for noise and the bias toward the emotional system in this field as well. Here are some of the stories that I included in my speech:

On November 19th, 2005, a sparrow entered a hall in which a prestigious domino championship was taking place in Holland. The miserable creature knocked down 23,000 dominoes before dying. A website set up in the wake of this event attracted tens of thousands of visitors.

In October 1987 the world held its breath while a rescue team worked diligently for two days to save Jessica McClure, a small child who had fallen into an abandoned well in Texas. Jessica, unlike the sparrow, was rescued, but the question that arises from these tales and many others like them is why stories about a single victim – identified by a name and a photograph – raise such compassion and interest in the media and touch us so deeply when millions of other nameless, faceless human beings are slaughtered, drowned or felled by diseases the world over but strike no chord in our hearts.

Nobel Prize winner Mother Teresa said, "If I look at the mass I will never act. If I look at the one, I will." Are her words a worrisome insight into human nature?

Many researchers relate to the "duet between emotion and logic" when they describe the decision-making process. Although rational analysis is important in assessing a situation, it turns out that our initial reaction, as we have already seen, comes from the part of our

brains that is responsible for our emotional activities. Evolutionarily, it is the part that developed earliest, and its response time is fast and immediate. Our ability to intuit will always kick in before our power to judge.

In this context it is important to understand that in evolutionary terms our cognitive and perceptive systems were designed to make us sensitive to the minor changes in our environment, especially those that present a potential threat – apparently, at the expense of our ability to discern major changes and respond to them.

Behavioral theories and a growing body of research support the notion that numerical representation of human life is incapable of describing its importance, and that statistics about disasters on a global scale – as huge as they may be – cannot convey the true meaning of the horror and the distress or awaken our emotive mechanisms. Yet without this emotional reaction our logic has no chance of taking action.

One of the more effective ways of awakening dulled emotions is by adding a "picture" of some sort to the story. And of course the most representative picture of human life is the face. In a world of numbers and charts, it is the photograph of a human face that can make us identify with the downtrodden.

Although this phenomenon is well known in the laboratory, reactions to photographs of Rokia, a malnourished young woman from Mali, astonished even the researchers who made use of them for an experiment. The researchers offered potential donors three options: to donate directly to Rokia, the victim pictured in the photograph; to give money to victims of malnourishment according to statistics detailing the scope of their misery; or, a combination of the two, i.e. contributing to the victim in the photograph where statistics are provided as well. Unsurprisingly, the photo of Rokia brought in twice as many contributions as the second option. Strangely enough, however, adding statistical information to the photograph of Rokia actually reduced willingness to contribute by 35 percent.

Tehila Kogut and Ilana Ritov of the Hebrew University of Jerusalem argue that the dynamics of processing information dealing with a lone victim of hardship are qualitatively different to the path we take in analyzing groups in similar circumstances. In an experiment they conducted, it became clear that willingness to contribute to a single, identifiable child suffering from cancer was greater than willingness to contribute to a group of eight (identifiable!) children suffering from the same disease.

So what number is too large, rendering the "others" as invisible to us? Paul Slovic and other researchers sought to discover the lowest effective number. They added Maussa, a malnourished boy from Mali, to the photograph of Rokia. It turns out that our capacity for developing feelings for more than one person is limited: contributions for each child separately totaled more than the two together! That is how powerful our emotional system really is.

A week without murder

Statistical probability is the quantitative expression of the chance that something specific will happen. It might be based on a complex mathematical calculation or on the results of an experiment or on a subjective assessment. Apparently, we find it difficult to differentiate between these different instances since in these matters, too, our brains are not terribly efficient. Our blindness to probability works in tandem with our emotional amplifiers.

While we are good at relating to new and showy disasters we neglect the traditional causes of mortality. One of the most important reasons for this is the difficulty we have in evaluating the risk in realizing potential threats, and even more so, the risks involved in defending ourselves against them. What is the ideal balance between the risk of a body scan full of harmful radiation that is used to detect signs of illness and the risk of avoiding it altogether and allowing the illness to develop? What is the ideal balance between the anticipated pleasure of a foreign holiday in a remote location and the dangers of that trip? Overestimating the chances of potential disaster is a widespread noise generator among regular news junkies, the kind that will not miss a news broadcast or the daily paper even on their wedding day. But not only them. We are all exposed to the noise amplifiers based on repeated failures in our daily lives that we exhibit while attempting to assess the probability linked to different events in our lives. Unfortunately, our blindness to probability is biased. We tend to overestimate small probabilities (and underestimate high ones) so that blindness to probability becomes the noise amplifier that makes sure that even those low-chance events will find a way to bother our brains.

Evolutionary psychology plays an important role in this instance. As stated, we are hardwired to relate first and foremost to threats, and only later – if at all – to the chance they will be realized. The rustling in the bushes heard by our prehistoric ancestors could have been caused by many things, even a breeze, but it could also have been the forewarning of an encroaching predator. Probability cannot make use of evolution's

toolbox, which in terms of survival was the crux of it all. By the time the primitive statistician had finished assessing the risk contained in the suspicious sound he heard, his potential genetic descendants would have been wiped out by some predator's jaws. That is also the reason that nature does not punish mistaken identification, as long as we promise to identify real threats when they pop up. The problem worsens when we refer to low statistical probability. Here, human blindness to probability is nearly perfect – a trait that insurance and gambling companies exploit well. Under these circumstances, the ability to assess the actual risk involved in frightening stories that appear in the media is limited to the point of nonexistence. Even if the chance of being struck by a fatal virus is only one in ten thousand, we have no intellectual equipment for assessing this probability, and studies prove again and again that we tend to exaggerate in our assessments of small probabilities.

Even when we are not under threat we do not accurately assess probability and risks. People tend to take out more costly insurance on cars they love than on cars they do not love, even when they are identical in value.

Further, we do not relate to identical probability percentages in the same manner. A decline from 100 percent (absolute certainty) to 95 percent is far more meaningful in our eyes than a decline from 60 percent to 55 percent, even though in both cases the change in terms of probability is identical. Likewise, a jump from 0 percent – a different kind of absolute certainty – to 5 percent seems like a much bigger increase than, say, 25 percent to 30 percent. The way we idealize absolute certainty helps explain our lamentable tendency to think in black and white terms. When we are forced to consider how certain something is we fall into the trap of thinking it is completely certain or not certain at all, even though in reality certainty is much grayer.

Paul Slovic asked a group involved in a study whether they agree that a one in a million chance of dying from cancer as a result of exposure to a certain chemical material is small enough not to worry about. Note that this is a far smaller chance than getting hit by lightning once in our lives as well as other dangers that we completely ignore or disregard. Nevertheless, one third of those questioned thought there was cause for worry; this is probability blindness in action. Strangely enough, probability blindness is likely to lead us to undertaking dangerous initiatives for the sole purpose of rescuing ourselves from relatively moderate dangers. Thus, 1500 people lost their lives during the year following 9/11 because they preferred driving to flying, which is in fact relatively safer. So, too, do hypochondriacs expose themselves to quantities of radiation that endanger their health in hopes of preempting some low-probability medical condition. Incidentally, according to another

study, hypochondriacs are responsible for some one fifth of total American health expenditures.

Proof of the human difficulty in dealing with statistical probability can be found in the annals of the development of scientific and philosophical thought as well. Probability theory, which deals analogously with the conditions of uncertainty or incomplete information, is relatively new, newer than one would expect from a scientific theory responsible for a large share of the most important scientific developments (though unfortunately, for the development of the atom bomb as well). Probability theory dates back to 1654, when two mathematicians – Blaise Pascal and Pierre de Fermat – corresponded on 'the problem of points' (also called 'division of the stakes'), which became a cornerstone of modern probability theory. The fact that the term 'mathematical probability' developed so late, later even than most important philosophical theories, is referred to by Ian Hacking, a Canadian philosopher specializing in the philosophy of science, as the 'scandal of philosophy' in his book *The Emergence of Probability*.

The use of percentages, the central pillar of quantitative representation, developed even later, during the course of the nineteenth century, and not before the metric system was first employed in France after the Revolution. Even then, percentages were mainly used for calculating interest rates and taxes. It was only in the second half of the twentieth century that probability and percentages became part of daily conversation as an expression of uncertainty. Throughout the evolutionary history of humankind, probability and percentages were not part of our thought process and were not accessible to us in making risk assessments.

In his book *Struck by Lightning*, Jeffrey S. Rosenthal, a mathematician at the University of Toronto, writes of how five murders that took place in the space of one week in that city evoked a stormy public debate on crime that has spun out of control. But Rosenthal calculated that in Toronto, a metropolis with an average of 1.5 murders each week, there was a 1.4 percent chance of five murders occurring in a single week, purely by chance. Thus, one can expect five murders in a single week once in every 71 weeks, which is to say, a little more than once every year. If this is the measuring stick then clearly there was no justification for the outcry that took place. The very same calculation can be used to determine that the chance of a week of no murders stands at 22 percent, or one per month, more or less. Rosenthal is still waiting to see the newspaper that runs the headline "A Week of No Murders." I will expand on this on the chapter The Noise of Randomness, but already

it is clear that whoever is blind to probability will interpret a distant shadow of mountains as mountains themselves, which is a good visual definition of noise.

Blindness to probability strikes nearly every aspect of our decision making, not only on the personal level but also the national. After all, how else can we explain the fact that although obesity is responsible for the deaths of one hundred thousand Americans every year (and this is information that is comprehensive and well documented), there is no comparison between the federal funds spent on saving the life of someone overweight and protecting lives only vaguely threatened by terrorist attacks.

In his book *Extraordinary Popular Delusions & the Madness of Crowd*, first published in 1841, Charles Mackay wrote that "Men, it has been well said, think in herds; it will be seen that they go mad in herds, while they only recover their senses slowly, and one by one!"

There is no chance that we will return to our senses if we ignore the ability to understand the risk in quantitative terms as opposed to our evolutionary nature, and occasionally the information we are fed as well. If we comprehend this then we will also understand how deaths on the roads, or obesity, are far bigger threats than terrorist attacks. Until then, however, we are doomed to continue pointing our noise amplifiers based on blindness to probability in every direction without knowing whether the noise buffeting us is real or a product of the amplifier itself.

Statistics can even prove the truth

One of the possible definitions of noise is based on the reactions it provokes. According to this criterion, noise is characterized by overreaction that is not suited to the event or meaning it represents. If, for example, we are frightened by an unexpected car horn passing nearby, we do so because our brains identify in this strong and sudden noise a potential threat to our existence, and our bodies respond accordingly. In actuality, this was merely a car passing through an intersection trying to warn off a passerby rashly crossing the street. Our own lives were not in danger, though that is the way we reacted.

A similar phenomenon occurs when we are presented with information that is meant to present a threat to our health or existence and is done so using in bold capital letters in the press, or in the dramatic voice of a news broadcaster. In many cases, the news itself contains no real threat, so it takes on a new spin to enhance the potential threat. In these cases, the importance of statistics becomes truly clear and we are tripped up by the noise amplifier of statistical ignorance. Even those who do not share my opinion that

statistics is an entire worldview cannot ignore the importance of this scientific discipline when attempting to assess information. Statistics grants (or negates) meaning to the gathering of quantitative data that is meant to present a certain reality in the past, the present, and what might threaten us in the future. In such circumstances we expect mastery of the secrets of this complex profession and integrity in presenting the resulting findings.

This hope is not always realized, sometimes due to widespread ignorance of statistics, sometimes because processing the information will detach it from the threat (as with accidents), and even sometimes because the statistical analysis cannot fill the hole created by a bit of reality hidden from the data gatherers.

Following are several common mishaps in adopting statistical tools for the processing of quantitative data. They peer out at us from screens and headlines; some are known to disseminators of information though they insist on ignoring them for the purpose of retaining the current political or social or business agenda, while others are not even known to disseminators of information and he falls victim to them like the rest of us. But all of these have a common denominator: they make lots of noise, otherwise we would not give them our attention.

The average is dead – long live the median!

The most common term used in everyday language taken from statistics is 'average.' But 'we often use it with negative connotations: average performance, an average husband. With regard to wealth, however, 'average' is a welcome guest even if our daily language is not completely suited to statistical truth.

If nine people, each of whose personal assets total around \$100,000, are gathered together in a room, then the average accurately expresses the wealth in the room. But if an excessively wealthy person, in possession of some ten million dollars, then enters the room, the average jumps to more than a million per person, which means that the average no longer represents the wealth of all those present in the room.

In order to show the complexity of relating to the average, I invite you to share the wild visions of Dutch economist Jan Pen. Pen imagined a parade of the world population in which people's height is determined by their wealth. A person of average wealth will also be of average height. The parade starts with the poorest (and shortest) and ends one hour later with the wealthiest and tallest.

Twenty minutes will pass before we can even see anyone in the parade; until that time the procession will consist of people with negative wealth (people who owe more money than they have) and people with no wealth – people of no height. Only at around the thirty minute mark will we see the first half-foot-tall dwarfs and after forty-eight minutes, finally, the people of average height and average wealth – after three-fourths of the world's population have already passed by.

What causes the average people to appear so late in this fanciful parade is what takes place in its final minutes: "In the last few minutes" wrote Pen, "giants loom up... a lawyer, not exceptionally successful, eighteen feet tall. As the hour approaches, the very last people in the procession are so tall we can't see their heads. Last of all, said Pen, we see John Paul Getty. His height is breathtaking, perhaps ten miles, perhaps twice as much."

If Pen's parade were to take place today, in a world in which the inequality of wealth has only deepened, we would have to wait fifty-five minutes before the first 'average' people appeared on the scene. While a single millionaire causes the average to shift by thousands of people, a single billionaire causes it to shift by hundreds of thousands. Eighty percent of the world's population has less than the average, so it is important to remember that with many economic indicators the average does not necessarily represent something typical. When politicians or the media refer to the average, it pays to recall that the average may lie far from where they think it does. However, until someone points out this error, the data continues to stir up a lot of noise.

The Sports Illustrated jinx

Can a drought be stopped by prayers for rain? Can undesirable results of a blood test be bettered by doing a second test? The answer to both these questions is, surprisingly, yes, though that's not the full answer. To get the full answer it is necessary to become familiarized with a highly influential statistical phenomenon with a very modest name: Regression toward the mean. This seemingly innocuous phenomenon has an astonishing ability to make noise among people unaware of its existence.

The phenomenon was first discovered by Francis Galton in 1886. He compared the heights of 930 children to the average heights of their parents and published his findings in the journal of the Royal Anthropological Institute. It was found that Parents of above-average height usually have children who are shorter than themselves, while shorter parents

have taller children. In other words, the tendency in a large population is to move to the mean characteristic.

Philosophically speaking, it is possible to relate to this phenomenon as a measure of caution used by nature to ensure that we will not deteriorate to uncontrollable chaos.

Statistically speaking, the rule is much simpler: regression toward the mean is a phenomenon in which the members of a certain group that produced extreme results in a single measurement will probably yield less extreme results with an additional measurement – from purely statistical reasons with no connection to prayers, medicines or any other sort of human intervention. Furthermore, the more extreme the first measurement, the more the phenomenon will express itself.

In the field of sport, for example, the phenomenon has become known as the Sports Illustrated jinx, since it has been well known among American sports fans for quite some time that when a baseball, basketball or football star is pictured on the cover of America's most popular sports magazine, his or her performance will worsen afterwards. The phenomenon has reached such startling proportions that some excellent athletes have refused to appear on the cover.

Sport Illustrated itself acknowledged the phenomenon in an article published in 2002 in which of the 2456 cover stars' careers that were reviewed it was found that fully 913 had experienced a deterioration in their performance or had been the victims of bad luck in the form of injury or some other mishap. That is a whopping 37.2 percent, which would seem to justify the athletes' superstition about refusing to appear on the cover. But the source of the phenomenon is, of course, the regression toward the mean. An athlete who has drawn the attention of the media is an athlete who has recently been successful, usually exceeding his or her own normal level. If the athlete does not proceed to the next (higher) level it is to be expected that his next appearances will slip back to his own average – and that is precisely what happens. But the readers and the athletes themselves have become convinced that appearing on the Sports Illustrated cover is itself a kiss of death to one's career.

Professor Daniel Kahneman discussed this very subject in a speech he made in Stockholm when being awarded the Nobel Prize in Economics in 2002. "I had the most satisfying Eureka experience of my career while attempting to teach flight instructors that praise is more effective than punishment for promoting skill-learning. When I had finished my enthusiastic speech, one of the most seasoned instructors in the audience raised his hand and made his own short speech, which began by conceding that positive reinforcement

might be good for the birds, but went on to deny that it was optimal for flight cadets. He said, "On many occasions I have praised flight cadets for clean execution of some aerobatic maneuver, and in general when they try it again, they do worse. On the other hand, I have often screamed at cadets for bad execution, and in general they do better the next time. So please don't tell us that reinforcement works and punishment does not, because the opposite is the case." This was a joyous moment, in which I understood an important truth about the world: because we tend to reward others when they do well and punish them when they do badly, and because there is regression to the mean, it is part of the human condition that we are statistically punished for rewarding others and rewarded for punishing them. I immediately arranged a demonstration in which each participant tossed two coins at a target behind his back, without any feedback. We measured the distances from the target and could see that those who had done best the first time had mostly deteriorated on their second try, and vice versa. But I knew that this demonstration would not undo the effects of lifelong exposure to a perverse contingency."

In England, as in many other places, law enforcement agencies support the use of speed cameras on roads and intersections considered to be 'red' – that is, places with a high incidence of accidents. This policy was justified when it was shown to be true that accidents declined at those very spots where the cameras had been installed. A group of British statisticians complained about traffic police policy and claimed that although some of the decline in road accidents could be traced to these cameras, in most cases it was a matter of the influence of the invisible hand of statistics, this time on the roads. The source of the reason was the fact that accidents involving fatalities or severely injured motorists are relatively , and many of them represent an exceptional or irregular statistical distribution that defines their appearance. Thus, a reduction in the number of accidents could be expected to occur precisely at these locations, due to regression toward the mean. This claim is particularly correct for roads on which traffic is relatively light.

In order to illustrate this point, I invite you to play the Red Roads game: any number of players can play but the game is more impressive if ten or more players are involved. Each players selects a section of road in the area; any major thoroughfare will do. Each player then tosses a pair of dice, which will give him or her the number of accidents on that road. Dice that show a ten, eleven or twelve indicate a high level of accidents, 'red' roads where accidents are likely to occur. These roads will be fitted with imaginary speed

cameras, and when the players roll again, it appears that the system is working: almost none of the high results from the previous round are repeated. Is it magic? Not really. It is the regression toward the mean in action. The chance of rolling a ten, eleven or twelve the second time is only one in six, while the chance of rolling a lower combination is five in six. (In actuality, the picture is even more complex.) As a result of the debate between the statisticians and the British law enforcement agencies, the latter conducted an additional study and found that 60 percent of the decline in accidents on 'red' roads was a result of statistics (regression toward the mean); 18 percent had nothing to do with the installation of cameras; and only 22 percent could be said to derive directly from the cameras.

In the medical system, this phenomenon is liable to be a source of error in effectively assessing a certain treatment. It can be said that nearly any treatment intervention designed to treat characteristics that deviate extremely from the average will demonstrate an artificial effectiveness due to regression toward the mean.

When, for example, a new treatment is presented, doctors are likely to be tempted to try it out on their most dramatically ill patients. This understandably tendency to treat those with the most extreme test results will produce in many cases a very positive reaction, but this is due to the regression toward the mean and not necessarily due to the treatment itself. Similarly, hospitals whose results fall below the average are likely to improve with an influx of cash. But here, too, regression toward the mean may provide a better explanation for this phenomenon.

Newspapers are full of headlines about record-breaking phenomena (for better and for worse); that is the editors' livelihood, their source of income. But if we are talking about a phenomenon in which the statistical distribution is normal (a bell curve) you would be well advised to prepare for a change in the trend. You can even stick a frozen chicken under your pillow and claim that that is what brought about the change.

Dead or Alive

Michael Blastland and Andrew Dilnot are the creators of the *More or Less* program broadcast on BBC Radio 4. In a book they published in 2008, *The Tiger that Isn't*, they analyze the most prevalent distortions in quantitative information that is presented to the public at large, from public expenditures to the ranking of schools, from immigration statistics to every aspect of life that can be reduced to numbers. The book provided me with inspiration in several of the biases of statistical ignorance that I have reviewed here. Here is one particularly prickly example.

The Mammal Society of England conducts an annual survey of the number of hedgehogs in the country. The survey is carried out during the months of June through August (and in 2008, September as well), the period when these amiable mammals move from place to place. The impetus for this survey derives from an offputting assumption: that the number of hedgehogs trapped beneath the wheels of cars each year is relative to the general hedgehog population. Thus, if we count what is left of the slow hedgehogs who did not manage to cross the road we should be able to get a relative estimate of the changes in the size of the general hedgehog population (changes in trends are more important here than the relative number). The year 2004 was a particularly bad one; the number of hapless hedgehogs increased by 20 percent.

The method seems logical, since if the general population of hedgehogs is small then there will be few victims of road kill and if it is large, more hedgehogs will be doomed never to step across the road again.

But wait a minute. Does this method measure the number of hedgehogs or the density of traffic? Even if the population of hedgehogs is stable, more cars on the road will produce more dead bodies. And anyway, perhaps the decline in the population of hedgehogs that have been run over can be attributed to the evolutionary development of hedgehogs who proceed cautiously, one step at a time, sidestepping danger, in order to hang on for next year's survey. Or maybe there were climate changes that affected the hedgehog population's migratory experience during those months.

From the time the first survey was carried out in 2001 the population of hedgehogs has been in decline. But the decline in the hedgehog population on the eastern side of the country is greater than that of the southwest, and no one knows why. The lesson learned from the hedgehogs is simple: we are liable to invest energy in gathering data but the results of the sample are still subject to erroneous interpretation or skewed results due to too little data.

The same may be said for election samples, where voters do not necessarily reveal who it is they will actually vote for, or organized voter groups in some countries that are not taken into account. Such samples are based on the answers given to pollsters, and these may be far from reliable. One famous example was the poll that seemed to prove that voters from the Democratic Party were less satisfied with their sex lives than their Republican counterparts. But before you reconsider your party affiliation, you should note that women generally report lower satisfaction with their sex lives than men, and women tend to prefer the Democratic Party.

Pollsters are very familiar with the difficulty that people have in giving them true answers to personal questions, and some have even developed methods for circumventing the problem. But a different and major bias has earned a name that says it all: the non-response bias. In this case, the people responding are truthful but the problem is that many of those polled simply do not respond to the pollsters even though they would have provided answers that were different from the answers provided by others polled. For people expecting good news (their candidate is ahead in the polls) there is greater motivation for responding than for people expecting bad news.

The whole truth and nothing but the truth

When a mobile television crew is sent out to the site where something is taking place in order to report from the field, it usually arrives after the action has concluded. The rescue vehicles have departed and the victims' bodies are draped with sheets that are pulled up right over their bloodied heads. Passerby witnesses become the sole available source of information until official announcements are made. Indeed, human testimonies play an important role in news events that take place outside the television studio. But are they reliable? We can get a pretty good answer to that question if we examine another arena where witnesses play a significant role: the courts. The central role of witnesses has given birth to no fewer than 2000 studies during the period 1974 to 1999, most of which set out to test witness reliability.

In one interesting study, researchers staged an attack on a faculty member at a California state university campus. There were 141 witnesses to the attack but their testimonies revealed major differences with regard to the attacker's appearance, his weight, his clothing and other relevant aspects of the attack. In determining the witnesses' accuracy on a scale of 1 to 100, the average was only 25. In a similar study involving the theft of a

wallet only seven from among fifty-two witnesses were able to identify the attacker in two videotaped lineups. Ten witnesses could make no identification whatsoever while thirty-five made an erroneous selection. A large part of the research in this field is concentrated on the circumstances that make identification difficult, such as poor lighting, tension, anxiety, prejudices, and focusing on the weapons. All these have been found to affect judgment and memory.

A different series of studies tested the capability of witnesses in identifying a criminal by lineup or identikit. Here, too, the number of errors is higher than the legal system can handle, but at least in the courtroom the lawyer for the defense is charged with questioning the competency of the witness.

The last thing that a television reporter covering breaking news wants to do is check the reliability of his witnesses or the accuracy of the information he is receiving. Thus, defenseless against biases of memory and judgment of the witnesses, and lacking a mechanism for filtering noise, television viewers are forced to watch blood-chilling reports that are flawed, most of which begin with that cathartic clutch of words, "Suddenly I heard this boom..."

When doctors strike

The correlation is one of the most common and most useful statistics. A correlation is a single number that describes the degree of relationship between two independent variables. The number runs from 1, signifying a full and positive relationship between the variables, to -1, signifying a full but negative relationship between the two. With the former, a change in the first variable will bring about the same change in the second; with the latter, a change in the first will bring about the same relative change in the second, only the opposite. It is rare that variables are so strongly linked; most correlations fall somewhere inside the 1 to -1 range.

In fact, use of the statistical correlation exposes us to a very prevalent bias that serves as a troublesome source of noise. Thanks to our evolutionary bias toward finding patterns, laws and certainty – or at least some sort of meaning – in the world around us, we tend to attach misplaced causality to any positive link between two variables. But correlation and causality are two different terms; the existence of a correlation between two variables has no bearing on whether there exists a causal relation between them. Under

such circumstances, the primal need for causality (which perhaps saved the lives of our ancestors) becomes a source of noise.

The reasons for correlation between two variables might be indirect, and in many cases unknown as well. While it may be true that the number of beds in mental institutions is directly related to the number of computers a country has, the reason is that there is a correlation between these two variables and a third – the size of the population. A German automotive magazine that investigated the sexual habits of its readers discovered that the owners of luxury cars are less sexually active (1.4 times per week) than the overall population of drivers. (Small-car owners were found to be real tomcats.) But it would be wrong to come to the conclusion that there is a causal relation between these two variables, since they are both connected to another variable, that of age. The average age of luxury-car owners is higher, which explains their relatively diminished sexual activity.

The popular belief that storks bring babies has made impressive inroads in Scandinavia, where more storks are spotted on the roofs of large families. The reason is simple: the homes of families with many children are usually more spacious, necessitating larger roofs.

In 1982 my services were hired for an unusual project. The Israel Medical Association sought to improve the conditions of its members and the welfare of patients and planned to strike if its demands were not met by the Ministry of Health. There had been doctors' strikes in the past, but the outcome of most was determined by public pressure applied by the patients, with the encouragement of the government, which came out against the doctors for breaking the Hippocratic Oath. This time, the doctors decided to plan well ahead of time in order to stand their ground over the course of a lengthy strike without it being to the detriment of the patients. A consulting firm I founded in 1975 along with Shalom Spielman was hired by the Association for the purpose of ensuring these very goals. Together with several young doctors we planned the strike, according to which all the doctors in Israel resigned on the same day and were hired by a private medical service that had been established especially for that purpose. The service charged the same nominal fee from every patient; sick people who until then could only have dreamt of being seen by the country's top professionals in their fields could suddenly have a consultation without having to mortgage their homes. The money collected from patients had already reached a sum of fifteen million dollars two weeks into the strike, which paid for the strike and the strikers. The patients were happy and the Finance Ministry needed more than a month before it returned to its senses with regard to negotiations.

One of the side effects of the strike was a decline in hospital mortality rate. The inverse correlation between the timing of the strike and the mortality rate was quite striking. Would it thus have been correct to assume that it was the medical profession that was killing patients (an assumption that would apparently have been true in the nineteenth century)? In other words, is too much medical attention a danger to our health, our lives? Even if we take into consideration a survey done by the AMA in 1999 in which it was found that 5 percent to 10 percent of patients admitted to hospital were the victims of serious medical error, the answer is of course no. The explanation for the surprising find can be found elsewhere: during the strike, all non-emergency operations were postponed, which meant that a whole series of complications was avoided, from infections contracted in the operating room to unpredictable and fatal hemorrhaging. But for a while it was nice to joke that there was a positive correlation between the length of the strike and the life expectancy of the country's citizens.

On the contrary, there seems to be a surprising correlation between body weight and life expectancy. According to recent data, overweight people are apparently living slightly *longer* than others. The causal relation seems groundless even to those of us who have not spent years in medical school.

So what then is it that connects the two? The most likely answer is the cause of death itself. Sick people generally lose weight as their illness progresses, so when they die they are thin, often very thin. So it is not thinness that causes death but the opposite – impending death brings on thinness. Unless of course you are one of the lucky ones to die in the course of an argument with neighbors (one in four million).

There are two main ways to clear up statistical ignorance. First, by learning this special scientific language and gaining the ability to interpret reality by means of a new vocabulary that demystifies the world around us in a way that no other science has succeeded in doing. Those who allow themselves to take advantage of this way will discover that statistics is more than just a language; it is an entire worldview. The second way (for those who have given up on the first) is at least recognition that there are people who can assess scientifically the meaning of facts presented to us that bring out in us particularly emotional responses. Such scientific assessment helps in distinguishing between truly new news and news that only appears as such thanks to the hollow amplifier of statistical ignorance unequipped with the appropriate filters.

Black hole in Geneva

The activity of noise amplifiers distorts our perception of risk. This causes our brains to overestimate risk, setting off our fear mechanisms. Paul Slovic is a pioneer of risk perception research and one of the most important researchers in the field. Slovic is also among the founders of a consulting firm that deals, inter alia, with explaining the gap between actual risk involved in activities like smoking, air travel or driving a car under the influence of alcohol and the biased manner in which the public perceives them. His clients include some of the largest insurance companies in the world.

I called Slovic at his office at the University of Oregon, where he is a professor of psychology. I asked him what he believes to be the main cause of our distorted perception of risk. His answer came without hesitation: "Our emotional system." We could not drive a car if we did not trust our emotional system, which is responsible for our perception. "This is a very sophisticated system that usually serves us quite well," he told me. The problems only begin when the emotional system lets us down, for example when we are required to relate to certain dangers. "We are so comfortable with our emotional perception that we do not feel that our emotions are misleading us," Slovic said.

Distortions of risk perception, according to Slovic and his colleagues, are first and foremost the result of the way our emotional mechanism operates – quickly, automatically, and mainly below the radar of our consciousness so that we are unaware that it is even working.

In the mid 1970s, Slovic and two colleagues – Sarah Lichtenstein and Baruch Fischhoff – began a study meant to research what was then called "cognitive processes and societal risk taking." This was the same period during which Amos Tversky and Daniel Kahneman had begun publishing their research on human biases in probability calculation, and Slovic attests to the fact that these studies were highly relevant in his attempts at explaining people's attitudes toward threats stemming from natural dangers. From the very first studies it was already clear to Slovic and his cohorts that the term "risk" meant different things to different people. When professionals assess risk they base their assessments on the annual rate of loss of life. Is that the way the general public assesses risk as well?

In a series of studies conducted at the end of the 1970s, Slovic and his excellent team set out to research the way in which nonprofessionals assess mortality rates for certain activities, rank them according to their level of risk and detail the associated feelings. Concurrently, the researchers checked the assessments of professionals with regard to the level of risk that characterizes each activity.

Unsurprisingly, there was a noticeable discrepancy between the assessments of those ordinary citizens tested and the professionals regarding a long list of activities. The professionals thought that the discrepancy stemmed from the gap in understanding the actual risk presented by the different topics tested. But Slovic thought otherwise.

The professionals defined mortal risk in the classic manner – the multiple of risk (probability) that a particular event will happen by the extent of the damage incurred in terms of human life. This lead to a close correlation between the assessment made by the professionals as to the scope of loss of human life resulting from certain activities or technologies and the relative ranking of danger that these activities or technologies present.

However, when a nonprofessional public tried to assess the rate of expected damage from impending dangers the results were quite different. Nonprofessionals add other elements into their assessment of risk, like the potential of cataclysmic disaster, the capability of controlling or supervising an element of risk, threat to future generations, ethics and social benefit. As a result, there is a huge discrepancy between the assessments made by professionals and nonprofessionals with regard to risk involved. (Unsurprisingly, newspaper editors tend to adopt those elements that hold sway over the public when they edit their papers.) In general, the participants knew which were the most harmful among the activities on the list but erred in all their other assessments.

Two issues that were of concern to the public back then and are still relevant today were nuclear reactors and the health hazards posed by pollutants emitted by various industries and the chemical composition of various products. Slovic and his team devoted special attention to these issues.

In an age of global warming it is especially interesting to note the reactions of those questioned about the dangers of nuclear power stations. All those asked – professionals and nonprofessionals – agreed that the rate of anticipated mortality inherent in nuclear power stations is the lowest among all the other dangers on Slovic's list. Accordingly, the experts ranked the danger inherent in producing nuclear energy as number twenty on the list of thirty activities and technologies. The other (nonprofessional) participants in the study ranked nuclear power stations as the number one risk. The researchers were convinced that something had gone awry with the risk assessment of those questioned, figuring they had related to the scope and extent of the anticipated damage without taking into consideration the actual chance this event might occur.

Slovic hypothesized that another factor was at work behind the scenes when it comes to the public's assessment of risk. Analysis of the findings shows that people tend to overestimate the actual danger of an activity or technology when these possess certain characteristics. Unsurprisingly, these are the same characteristics that press the buttons on our emotional perception of danger. And nuclear power stations possesses many of those.

The following is a short list of biases compiled by the researchers:

- Catastrophic potential – a risk that kills large numbers of people at once versus a chronic risk that kills people one at a time (a leak at a nuclear reactor)
- Knowledge about the risk – to what extent are the risks known precisely by the persons who are exposed to those risks? To what extent are the risks known to science? Are these risks new, novel ones or old familiar ones? (a black hole created by the particle accelerator in Geneva)
- Control over risk – if you are exposed to the risk of each activity or technology, to what extent can you, by personal skill or diligence, avoid death while engaging in the activity? (air travel is perceived as more dangerous than driving in a car)
- Children - the risk is deemed greater if children are endangered. We worry more if the risk threatens future generations. (contaminants in baby formula)
- Victim identification – we feel more at risk when people we know may be among the victims (a local building is bombed by terrorists)
- Dread – Is this a risk that people have learned to live with and can think about reasonable calmly, or is it one that people have great dread for? (the outbreak of a fatal plague)
- Accident history – an event that came to pass once before is judged to be riskier
- Irreversibility – the risk rises if the effect of something going wrong cannot be reversed
- Man-made or nature-made – man-made risks are perceived as more threatening than those of natural origin

Anyone who wishes to understand the effect of newspaper headlines on our mental health should take another look at the second item in the list of biases above. This finding is a reflection of the necessary mechanism that enables us to focus our attention on details that are as yet unfamiliar to us while at the same time sifting through the barrage of information we are confronted with on a daily basis that contains details already familiar to us. Thus, when we rank the items worthy of our attention, innovation plays a significant role.

Author Dan Gardner claims that innovation is the other side of the coin shared with adaptability. This is the process that ensures that stimuli that affect us on a regular basis, but which do not bring about significant results, dim with time. Adaptability is an efficient way of dealing with risk since risk is everywhere – in driving, eating, crossing the street, on the job, in the rays of the sun. Adaptability is the STOP sign our brains have designed for

dealing with the natural difficulty of being on constant alert. So, a threat presented as new will enjoy our immediate attention – which is the first lesson for all aspiring news editors.

For his part, Slovic continued to seek out ways to refine and perfect his list. He took a large step forward when he came to understand that there is a particularly high correlation between our tendency to overestimate the risk inherent in a given activity and the fear that the activity raises. We are not necessarily afraid of those situations in which our chance of getting hurt is greatest. The situations and issues that most instill fear in us are those that were a danger to us in our evolutionary pasts – snakes, spiders, darkness, being alone or exposed in an open area – even though most of these are not representative of the principal dangers facing our technological culture today.

During our conversation I related to the experiment Slovic carried out (the story of Rokia presented here in the chapter "When sparrows play dominoes") with the intention of getting to the bottom of human numbness in the face of humanitarian fiascos. Slovic, who is not only a groundbreaking scientist but a humanist, explained to me that when we are confronted with particularly large numbers we suddenly nod off, unfeeling even in cases of life and death. We might prefer saving a larger *percentage* of people to an absolute number, even when that number is higher. We have trouble discerning the meaning of a number even if it means that more lives will be saved.

This phenomenon received notable mention in remarks made by Albert von Szent-Györgyi Nagyrapolt, winner of the Nobel Prize in Medicine 1937. He was deeply affected by the sight of the suffering of a single man and claimed he would endanger his life to help him. But then he engages in a rather flippant discussion of "the destruction of our cities, bringing about some one hundred million deaths," and he finds he cannot multiply one man's suffering by one hundred million.

Later studies carried out by Slovic and others made it clear that in addition to the effect of individual psychology on risk perception, this effect plays a role in the societal, political and cultural dimensions as well. The questions raised in this regard include the following: Do different societies relate differently to dangers to which children are exposed as opposed to adults? Are the deaths of fifty people in a series of unrelated car accidents the same as the deaths of fifty people in the crash of a single airplane? It appears that the societal values that affect the answers to these questions are linked to worldview, gender and even interpersonal trust.

In our conversation, Slovic ranked worldview as second only to the emotional system in his list of factors that determine assessment of risk. Thanks to his scientific work

and research and that of others, Slovic is pessimistic with regard to our opportunities for influencing the opinions of people with a well-defined worldview.

External Noises

Our greatest pretenses are built up not to hide the evil and the ugly in us, but our emptiness.

The hardest thing to hide is something that is not there.

- Eric Hoffer, American social writer and philosopher, 1902-1983

The Third Rule of Noise:

A lack of information is preferable to a surplus because information comes with a price tag – noise.

From the moment the first glimmer of the idea to map the noises in my life popped into my head I have been unable to stop noticing them everywhere. From the 'ping' of the computer every time I get an email to the cell phone conversation of the diner at the table next to mine, to the blood-curdling shrieks of Russian tennis star Maria Sharapova. In a noise-stricken world there is almost no room for personal noises, so it seems to me that we are doomed to be the noise-makers or the noise-sufferers. In spite of the Irish proverb that tells us "Where the river is deepest, it makes least noise," we live in a culture in which few people have the patience to deepen the riverbed in which our lives flow.

As external noises I chose to include all those noises that do not originate in our souls tormented by social rejection, hatred of 'the other' or hopeless perfectionism. The source of these noises is outside of us – in the needs of others and the tumultuous lifestyle we have chosen for ourselves.

"Noise," said philosopher Arthur Schopenhauer, "is the most impertinent of all forms of interruption. It is not only an interruption, but also a disruption of thought."

Indeed, as I have already learned, 'interruption' is the widest possible definition for describing external noise. An interruption of one's daily routine, one's thoughts, one's peace of mind, one's ability to realize potential and attain the balance in our lives we so crave. Some new and unknown angle of the interruption peers at us every day in the routine of meetings we schedule. But are the meetings themselves a source of noise? The chapter on noise on the job attempts to provide an answer.

Randomness is a particularly cunning implement in the creator's toolbox as he tests his subjects' resistance to noise. Under the influence of an event that captures our attention, either because we experienced it ourselves or because someone (a journalist?) brought it to our attention, we reflect upon our fate, and all too often about the threatening

meaning of this event in our lives. But an important truth escapes us: the event we experienced obeys a far less frightening set of laws with which we are simply unfamiliar, so that we find ourselves as agitated as those African tribes experiencing a solar eclipse predicted by the wizened tribal wizard who has learned a little something about the ways of the heavens.

External noises exist for the purpose of disturbing all of us; unfortunately, they become personal depending on the level of reception of each of our own private noise amplifiers. A person who has immunized himself against misperceiving risk may nonetheless over-amplify an innocent piece of information presented not so innocently. A person who has managed to learn that not everything frightening is also dangerous is still liable to fall for the noisy self-confidence of 'experts' who express their opinions on everyday matters. In fact, the different varieties of informational noises are the central issue of this chapter: information that drives us to consume, medical information or information that is supposed to improve our economic decision-making. The wealth of studies presented here will convince you as they did me that "A lack of information is preferable to a surplus because information comes with a price tag – noise."

Sharapova takes off

Physical noises are the key to understanding the role of noise in our lives. Physical noises are in many cases the first warning of encroaching danger and our sense of hearing is usually clued in to potential threats long before other senses are triggered. But physical noises and the ability to process them also stand at the focal point of the ability of the human race to develop the particularity of their details and preserve them.

Professor Yoram Barak, director of the psychiatric unit at Abarbanel Hospital in Israel, knows that three-month-old babies are capable of recognizing a word uttered clearly by their mothers from among other human words spoken unclearly. In his opinion, this ability is at the foundation of human normality and its absence would inhibit the development of language acquisition. Thus, according to Professor Barak, the ability to discern particular noises is one of the foundations of human interconnectedness.

What would a world of no noise look like? Is there a difference between menace caused by noises that are similar in volume but different in the circumstances of their appearance? For example, is the shrieking of Russian tennis star Maria Sharapova more unpleasant to our ears than the noise made by the engines of a departing jet, even though

they are similar in volume? (In 2007, Sharapova was clocked on the courts at Wimbledon at 103.7 decibels, which The Guardian called "the yell from hell.") Physical noises can provide the answer to these important questions. First, because their obvious advantage is that they are measurable. Second, because people do not hesitate to complain about noise that disturbs their tranquility, and these complaints can be analyzed.

I prepared a few questions on this subject and appealed to a source of authority.

John Stewart, who serves as chairman of the UK Noise Association, is one of the few people who cannot hide his glee when the price of oil rises. To him, there is nothing like high gas prices for trimming the noise made by air and land transportation systems. Even London taxi drivers find it hard to locate the Association's modest offices in East London, on the Thames, and it took several cell phone conversations to set me straight and help me reach this organization, of which visual indicators in the form of signs are not part of the charter.

"While it's true," says Stewart, "that cars today, along with the newer jets, are quieter, the volume of travel has increased dramatically, and with noise, it's the volume that counts." If Stewart were put in charge of transportation in the UK, speed limits would be reduced by twenty kilometers per hour, roads would be coated with sound absorbers and foliage would be planted along busy British roads for the purpose of isolating excess noise. If Stewart were responsible for the nation's finances he would slap a huge tax on powerful stereo systems, especially the ones that bring out the bass notes.

While traffic garners the most complaints about noise, neighbors complaining about loud music and barking dogs take a close second. Freight trains draw more complaints than passenger trains. For a noise to be defined as a disturbance there needs to be a certain combination of strength in decibels and frequency of the noise produced. A frequency of less than 100 hertz is particularly disruptive, and it is this frequency that characterizes jet engines, wind turbines used to produce solar energy, freight trains and the bass notes used in modern music.

A study done among 4,861 people living near six busy European airports concluded that their chances of developing high blood pressure were 40 percent greater than the average population, especially with regard to night flights. The disturbance caused by a departing jet, like that of a motorbike on the streets of Paris at midnight, is the result of the difference in decibels between the noise made by these modes of transportation and background noise. It is more difficult for the human ear to adjust to noise that interrupts silence than noise heard against a backdrop of other noise. That is why two million British

citizens awaken at 5:30 each morning to the noise of British Airways flight 026 arriving from Hong Kong.

"Another element that determines the level of disturbance is irregularity," Stewart tells me, solving the Sharapova mystery. While the tennis star's shouts reach more than one hundred decibels they are at least anticipated. Each time she hits the ball she screams, so that every eye keeping track of the ball prepares the ears for the terrible noise to follow. If that noise were to reach the stands in an unexpected manner, the crowds and her opponents would be far less forgiving. Stewart adds that sensitivity to noise differs from person to person and is even likely to change in one person at different times of the same day. People who grew up around noise, say, near an airport, have far greater tolerance for noise. "Older people," he says, regarding me with compassion, "are more sensitive to noise."

I ask Stewart if it is possible that our threshold of sensitivity to noise lowers the hungrier we are. For the first time during our meeting Stewart seems to lose his sense of humor. I explain that I am more sensitive to the noise in restaurants while I am reading the menu than when I have finished dessert. My theory is that hunger triggers an evolutionary system that increases our sensitivity to external stimuli in the hopes that one such stimulus will represent potential food. According to this logic, when we have finished eating and are sated, the noise that disturbed us at the beginning of the meal no longer makes an impression. Stewart flips through his notepad. Could he be trying to find the code for a fast-track noise complaint against people who visit his office and ask silly questions?

A bee in the bonnet

According to the World Health Organization, one sixth of the population of the developed world suffers from hearing impairment. Those who have not lost their hearing due to their genes, their age or certain antibiotic medicines have usually been the victims of overexposure to noise (about one-fourth of those affected). Exposure to noise above 85 decibels, even for a limited number of hours, can cause irreparable loss of hearing. Normal conversation takes place at 60 decibels and more than fifteen minutes of listening to music (even an iPod) at 100 decibels is a recipe for serious hearing impairment. As with sight and other senses, one's sense of hearing weakens with age and 40 percent of all sixty-year-olds suffer from hearing loss (they do not hear under 25 decibels).

The most common disturbance caused by external noise is called tinnitus, the scientific term for what is known as ringing in the ears. Tinnitus begins with a defect in the inner ear, the snail-shaped organ containing some 13,000 microscopic hair follicles. When some of these are damaged, instead of standing up straight they lie flat and rub against one another, causing an unbalanced flow of neural messages to the brain, which mistakenly interprets them as external noise. The noise of tinnitus.

Tinnitus in its simple form is a very common syndrome. Nearly all of us experience a ringing in the ears after listening to especially loud noise, like a jackhammer or certain music. The more advanced form of tinnitus, which makes the lives of tinnitus sufferers pure torture, occurs at a rate of five per thousand of the population.

Experts believe that when a loss of certain hearing frequencies occurs due to damage to the ear or as a result of aging, the brain overreacts and doubles its efforts at accessing the missing vocal information. A brain that has adjusted to receiving signals that have suddenly vanished needs those missing signals and so begins to increase the strength of the frequencies that have been disrupted. Is this a clue into what our world would look like without sound? Have I missed an important rule of noise according to which each of us has a predetermined noise tolerance and set of sensors that process at any given moment all of the external and internal noises that a person is exposed to in order to ensure that the sum total does not reach one's personal maximum tolerance? After all, for quite some time it has been clear to me that although music plays an important role in my life, I cannot write and listen to music at the same time. If we are talking about a balance of noise here (and the stimuli involved in writing are a form of noise, albeit positive), then we await a cruel fate if we manage to reduce the amount of noise we are exposed to to a particularly silent murmur. Our brains, which have become accustomed to noise, will have trouble functioning in the vocal darkness that we thrust them into and will bring on tinnitus that will make us long for departing jets, lawnmowers and shrieking tennis players.

An example of what we have been spared can be found in the bleak story of music critic Nick Coleman, who suddenly lost his hearing in one ear. From the time he left the hospital and until today, his brain has refused to accept the loss and fills his head with a rustling that reminds him of the sound of compressed air being forcibly emitted from the valve on a central heating system. But at night, Coleman revealed in an interview in The Guardian, he can hear a light layer of different noise beneath this constant, disruptive noise. "In the dead of night, when my wife is breathing silently and there is no other sound going in my good ear, I can hear beneath the pfffff a strange polyphony of whistles and cries, like a

drowning choir, accompanied by a tiny monkey playing a teeny pipe organ. It can be quite soothing. But if my wife suddenly exhales through her nose, or rustles the duvet by moving her head slightly, then all hell breaks loose. I hear gasping cats and boiling kettles."

When two voices or more converge in pleasant conversation, Coleman hears the sound of trains entering a tube station.

While he is absolutely affected by what his good ear hears, this is not normative tinnitus. Rather, it is the hearing equivalent of the phantom illusion familiar to amputees who feel as if their severed limb is still attached to their bodies. Coleman's brain makes noise in order to make up for the lack of hearing activity in his damaged ear. This phenomenon is well known to psychiatrists treating schizophrenia. The source of schizophrenia can be found in 'pruning,' which the brain does during adolescence. In an attempt at increased efficiency, the brain prunes away unused links between neurons whose use has been severely limited. Sometimes, however, the brain performs this task with startling efficiency (it gets carried away, if one can say such a thing) and trims away essential, functioning cells. So while particularly effective pruning can lead to the potential for genius, excessive pruning puts a limit on internal stimulation. In some such cases the brain replaces stimulation to which it has already become accustomed with 'voices' that it creates from nothing. These are the voices that pursue some schizophrenics.

"Schizophrenics," Professor Barak explains, "hear voices that their ears do not pick up and they have visions their eyes do not see. They are incapable of filtering voices as well as visual stimuli. They are simply overwhelmed."

There is nothing new about tinnitus. One of the earliest recorded examples appears in the Babylonian Talmud in a story about Titus Flavius Vespasian (41-81 CE), the Roman emperor who destroyed the Temple of the Jews in Jerusalem. As recorded in the Talmud, Vespasian tore down the curtain that stood before the Holy Ark and wrapped inside it all the ritual vessels he planned to transport back to Rome to present in his victory march. His crime, however, was quickly avenged: "This was the wicked Titus who blasphemed and insulted Heaven. What did he do (when he entered the Temple)? He took a harlot by the hand and entered the Holy of Holies and spread out a scroll of the Law and committed a sin on it. He then took a sword and slashed the curtain...Titus further took the curtain and shaped it like a basket and brought all the vessels of the Sanctuary and put them in it, and then put them on board ship to go and triumph with them in his city... (On the way to Rome) a gale sprang up at sea which threatened to wreck him. He said: Apparently the power of the God of these people is only over water. When Pharaoh came He drowned him in water,

when Sisera came He drowned him in water. He is also trying to drown me in water. If He is really mighty, let Him come up on the dry land and fight with me. A voice went forth from heaven saying; Sinner, son of sinner, descendant of Esau the sinner, I have a tiny creature in my world called a gnat... Go up on the dry land and make war with it. When he landed the gnat came and entered his nose, and it knocked against his brain for seven years. One day as he was passing a blacksmith's it (the gnat in his brain) heard the noise of the hammer and stopped. Titus said, I see there is a remedy. So every day they brought a blacksmith who hammered before him. If he was a non-Jew they paid him four zuz, if he was a Jew they said, It is enough that you see the suffering of your enemy. This went on for thirty days, but then the creature got used to it. Rabbi Phineas son of 'Aruba said; I was in company with the notables of Rome, and when he died they split open his skull and found there something like a sparrow two selas in weight."

This story drives home the important principle put forth in the first rule of noise according to which the only way to rid ourselves of a bothersome noise is by some other bothersome noise, often even more bothersome. I told this story to a friend – an expert on noise and also on Eastern culture – and this intrigued him. Years ago he already understood from his teacher in India that the most efficient method for overcoming our small troubles is by thinking of larger troubles, which leads, eventually, to the troubles of the entire world. Indeed, as this book suggests, our willingness to expose ourselves to bothersome noises stems from the hope of screening different noises that we find it hard to silence. This, as you will recall, is the first rule of noise, and it is applicable not only to internal noises but to physical noises as well.

A world without noise

The possible ramifications of a world without noise are generally tested far from the public eye in dungeons of torture run by various covert operations organizations, but the phenomenon – called 'sensory deprivation' – has been the subject of much psychological research. A 'sensory deprivation tank' looks like a large bathtub with a sealed lid that is impervious to sound and light. A silent pump brings air into the tank and the temperature of the water is that of the human body. Salts dissolved in the water raise the water's density to ensure that whoever finds himself there will float easily. People who have spent time in a sensory deprivation tank describe a situation in which after only a few hours they experience all sorts of strange hallucinations, to the point where they see their limbs outside their

bodies. One only in ten volunteers manages to remain in the tank for more than ten hours; the others cannot stand the internal stimuli that the brain creates in lieu of external stimuli. The sensory deprivation tank is important for understanding our relationship to noise, since it shows us that our goal is not to eliminate noise altogether but rather to strike a balance between different types of noise according to their suitability to our own personal noise profiles, which differ from person to person. Some people need constant noise stimulation – internal and external – or else they will be faced with the noise of loneliness and insecurity, while others need nothing more than the slightest background noise for balance.

Sensory deprivation is the subject of one of the more unusual stories in the Mishnah, the ancient compilation of oral Jewish law. In the Sabbath Tractate of the Babylonian Talmud, a story is told about the period of twelve years during which Rabbi Simeon Bar Yochai and his son, Rabbi Eleazar, hid in a cave after the father denounced the Romans and was sentenced to death. All throughout their stay in the cave they were fed miraculously by a carob tree and a water well and had no need for the world of external stimuli. "They would strip their garments and sit up to their necks in sand. The whole day they studied, when it was time for prayers they dressed, covered themselves, prayed, and then took off their garments again, so that they should not wear out. Thus they dwelt twelve years in the cave. Then Elijah came and stood at the entrance to the cave and exclaimed, 'Who will inform Bar Yochai that the emperor is dead and his decree annulled?' So they emerged. Seeing a man plowing and sowing, they exclaimed, 'they forsake life eternal and engage in life temporal!' Whatever they cast their eyes upon was immediately burned up. Thereupon a heavenly voice came forth and cried out, 'Have you emerged to destroy My world? Return to your cave!' So they returned and dwelt there twelve months, saying, 'The punishment of the wicked in Hell is twelve months.' A heavenly voice then came forth and said, 'Go forth from your cave!' Thus they came out, and wherever Rabbi Eleazar wounded, Rabbi Simeon healed. He said to him, 'My son! You and I are sufficient for the world.'"

The story in fact describes a cruel experiment in laboratory-like conditions in which a father cuts his son off from the outside world. The result of this experiment – raising the boy without external stimuli or influence – is destructive. When the two leave the cave they destroy and burn everything in their path. Their second departure from the cave is less destructive, but still futile. Everything the son destroys the father manages to repair, but nothing they add nothing constructive to the world.

Noise on the job

All of us are familiar with the noise potential of the various electronic devices that are part of our daily work routine, from the four minutes it takes us to recover our concentration after receiving an email while engaged in some task, to the 'silent' function on cell phones that desperately buzzes the phone's owner. This is the noise that Schopenhauer was referring to when he called it the "most impertinent of all forms of interruption." And what about meetings, the focal point of the day for many of us? How can we classify them?

The potential for noise in our daily work schedule is something I grasped one day when I was trying to sum up twenty years with Evergreen, the venture capital fund I founded. I was startled to discover that during this period the company had produced 293 quarterly reports for investors that comprised some quarter of a million words. Most were certainly never read by the people they were intended for. Further, I had taken part in no fewer than fifteen thousand different business meetings, many of which were with people I would meet only once and then never again due to a blurred combination of optimism and desperation that came from ignoring early-warning signs of the futility of these meetings. There was the time, for example, that I arrived at a meeting in Toronto straight from a Swiss hospital, where I had been operated on after a skiing accident, only to discover that the potential investor I was supposed to meet had no recollection of having set up this meeting with me. The truth is, he had not been very enthusiastic about meeting me in the first place and had only agreed after I put pressure on him. All those words lost in quarterly reports are one thing, but what about the time lost on meetings?

The time has come to analyze your meeting schedule. This may be the best investment you can make in your future, if you keep in mind that the time spent in unnecessary meetings is time that is irretrievable.

A refreshing take on this subject is provided by Marc Abrahams, the colorful Guardian reporter and organizer of the annual Ig Nobel Prize. Abrahams is a fan of bizarre research; among the winners for 2006 was the groundbreaking study on why woodpeckers don't get headaches even though they peck trees at a rate of twenty times per second for a total of twelve thousand times a day. In 2007, the prize in the field of medicine went to research conducted on the side-effects of swallowing swords.

In an article he published in the Guardian, Abrahams claimed that there is a direct connection between the number of meetings a person takes part in and his or her deteriorating mental state. Even if we ignore the jovial tone Abrahams takes in presenting

his ideas, there is no ignoring some of the research he quotes. One study, carried out by Alexandra Luong and Steven Rogelberg, looked at the work of thirty-seven university employees over a one-week period. The participants recorded the number of meetings in which they took part each day and the length of each meeting, as well as filling out a questionnaire dealing with their feelings and mood at the end of each work day. Unsurprisingly, the employees who took part in the greatest number of meetings reported higher levels of fatigue and a feeling of overload.

The researchers' explanation for this phenomenon is that meetings disrupt the main work of employees as they perceive it; the more meetings they attend, the more they are in need of their mental resources. The research is not conclusive about the connection between the length of meetings and fatigue. In fact, those studied claim that five short meetings on a variety of topics demand greater mental resources than one meeting of the same length.

A follow-up study done by Rogelberg investigated the effect of the length of time of a meeting on the wellbeing of the employee. In this study it was possible for the first time to distinguish between those who relate to meetings as a disruption of their workday and those who perceive them as a welcome event. The burnout that comes from many meetings is balanced out in cases where the employee's personality is ranked low on the ladder of determination and devotion in completing tasks. This type of person is more flexible in the way he relates to work and enables the daily schedule to develop in reaction to the events of the day. On the other hand, those ranked high in task completion set goals for themselves, and they will try to reach those goals under any circumstances.

As expected, the task-completers are negatively affected by meetings, even more so by many short meetings than fewer longer meetings of the same duration. Conversely, those ranked low in task completion will probably welcome meetings and feel these meetings lend structure to their days and represent an efficient way of interacting with other employees. It turns out that both types of employees are more greatly affected by their approach to productivity in meetings than by the number of meetings or the time spent in them. A meeting perceived as productive overcomes the feeling of disruption even with task-oriented employees.

Still, even a careful survey of the research in this field has not come up with any reference whatsoever to the most interesting subject of all: the mental burnout that comes from the noise of one-time meetings. Toll booth operators hold the record for such meetings; they also hold the worldwide record for suicide among various professions. Is

there a connection between the two? Are one-time meetings a particularly bothersome disturbance since they do not lead to any sort of human relationship in which there is the potential for attaining the quiet that comes with satisfying our need for connection?

The study of hassles and interruptions is precisely one of the fields of research pursued by Professor Dov Zohar of the Department of Industrial Engineering and Administration at Israel's Technion, the Israel Institute of Technology. I interviewed him in December 2007 in his office overlooking an expansive, inspirational view of Haifa Bay.

Zohar defines this interruption in terms of his research as the appearance of an external factor that disrupts a certain task. "The interruption occurs," says Zohar, "when it is not possible to provide the external factor with an immediate response, thus preventing continuation with the task at hand. A person who has been interrupted at whatever job he was doing has to make an extra effort in developing a new plan of action and sometimes even to make unplanned decisions. All this extra effort creates psychological pressure which leads to burnout and depletion of energy sources needed for completing the original task."

In an experiment that Zohar conducted he examined the effect of on-the-job disruptions on mood and feelings of fatigue among a sample of parachuting instructors. The disruptions included transportation glitches (late buses), missing equipment, and administrative and communication troubles. Zohar ranked the disruptions on a scale of severity and their effects were tested over the period of a week. The sample was comprised of forty-one parachuting instructors, all male, all doing their compulsory military service in Israel. Most of the tasks were based on activities lasting four hours, with an hour or two break between tasks. The lunch break was planned to accommodate delays caused by the morning activities resulting from disruptions. The workload was measured twice daily, during the lunch break and at the conclusion of the afternoon activity. Mood and fatigue levels were checked before sleep according to the scientific measuring tools accepted in this field. "And indeed," Zohar concludes, "the research came up with a clear correlation between the severity of the hassles on the one hand and bad end-of-day moods and fatigue on the other."

In a different study, which has not been published, Zohar looked into the mood shifts caused by disruptions that emails create on those who receive them. His subjects this time were employees of a hi-tech company characterized by the expectation that they will respond to emails very quickly. Zohar sent an email message along with a simple questionnaire. The message was sent randomly to various recipients twice a day for a

period of two weeks. Concurrently, the mood of the recipients was tested ten minutes after this disruption. Here too, it became apparent that disruptions have a negative effect on mood. Furthermore, the later in the day the disruption occurred, the greater the negative effect on the recipient's mood. As with the experiment conducted among parachuting instructors, it was clear that disruptions force us to invest additional resources both in providing a response to the disruption and in returning to the task at hand. Unsurprisingly, the more fatigued we are, the harder it is to come up with these resources.

The Noise of Randomness

"Creativity is the ability to introduce order into the randomness of nature."

Eric Hoffer

A friend of mine, a lecturer at a university, once confessed to me that she had killed someone. Before I could add a dark and exotic dimension to her normally sedate personality, she told me the whole story. Her closest neighbor was a famous sculptor. One night, when he was aflame with inspiration, the sculptor was up working until the wee hours of the morning, using all his noisy equipment and preventing my friend from sleeping. She pleaded with him to control his artistic urges, to no avail; she wound up going to work the next day red-eyed and irritable, and wished him in her heart of hearts a strange and awful death. Lo and behold, on the afternoon of that very day, the sculptor was crushed to death by a large slab of stone being unloaded by a hapless and incautious truck driver. My friend was convinced that her prayers had been heard and accepted on high and the sculptor stricken in the blink of an eye. Was this a case of bad luck? A shocking coincidence? Or perhaps higher powers that determined the fate of this nighttime disruptor?

Needless to say, the feeling that there is a connection between our actions and the random occurrences that take place around us is a very common form of noise (dubbed 'magical thinking' by psychologists, this phenomenon has been well researched). If I wish my neighbor ill and my wish is fulfilled, I am consumed by the noise of terrible guilt. If I wish only good things to my friends and nothing of this is fulfilled, I am subject to feelings of not having done enough, since no one will contest my ability to affect reality through my thoughts (after all, it's a fact that last time I concentrated really hard, the player on the other team missed his foul shot). The very last thing to come to mind in this case is that in both cases I was witness to the invisible hand of randomness.

If you do not know whether to classify randomness as a noise amplifier or a self-generator of noise, I invite you to give up on the intellectual challenge. The debate is useless since according to the second rule of noise, Each of us carries our own personal noise amplifiers. The level of noise we eventually experience is the outcome of the noise input *after* it has been processed by our personal amplifiers. Thus, randomness becomes part of the equation itself, either as the noise generator or the noise amplifier. Mathematicians and philosophers argue the question of whether mathematics has always been there waiting to

be discover it or whether we created it from nothing through human ingenuity. But such a debate can never take place with regard to randomness. It has always been there, waiting to make an impact, from the encounter between the gases ammonia, methane and hydrogen that created life, to the genetic mutation that brought with it multiple sclerosis. Randomness has no intentions and refers to no one specifically. Because of this, and as with other biases that act as noise amplifiers, we are unaware of its existence. But randomness, even if it is not an independent source of noise, is a universal element, like noise, which it continuously feeds. Its effect is so enormous precisely because it manages to fool even the cautious and those who know better. Randomness is thus two-faced: sometimes it appears as a source of noise (when we are unable to make sense of events) and sometimes as a noise amplifier (when we apply fallacious explanations to events in our lives, as with my friend the university lecturer). It would appear we have good reason to suppress randomness from our consciousness in favor of explanations of the world around that grant us a more central place, rather than making us the victims of chance.

Blind date with the world

Google Trends is one of the tools offered by the popular search engine for the purpose of seeing how often a certain topic has been searched on the net over time. A simple check reveals that the word 'luck' is far more frequent than the word 'coincidence.'

Luck, as slippery as it is, is one of those terms that is meant to give meaning to our lives. Coincidence, on the other hand, is powerless in this sphere. Our relationship to coincidence in our lives is determined by the desperate need we have for understanding our existential context, and our desire to protest against our unavoidable demise, which cruelly erases all our material and spiritual successes. We find it difficult to acknowledge the existence of coincidence in our lives, mainly because such an admission would show us to be no more than leaves blowing in the wind, our lives meaningless.

When coincidence works in our favor we hasten to call it luck, but even people who have been involved in a difficult and traumatic event are likely to take consolation in the feeling that they were chosen by some higher power. Feeling that we are being related to – even when it brings suffering – is preferable to being ignored, whether it be by fate or a higher power; we prefer to feel ourselves at the center of events, even if they are unpleasant, because the world seems less threatening that way, and we become something more than small and insignificant.

Indeed, let's admit it: we are sometimes willing to acknowledge statistical calculations that explain coincidences that happen in the lives of other people, but we have trouble accepting them in our own. In such cases our fragility rises to the surface, along with that desperate desire for meaning, the will to belong. "We are chosen!" we say: to hell with statistics!

Albert Einstein claimed that "God does not play dice," by which he meant that the universe answers to a certain set of rules even if those rules are not always evident to us. Complete understanding of such rules would remove all meaning from the dimension of randomness. But if we ever reach the scientific understanding that would give meaning to everything that transpires around us, we would discover that our brains – and especially our emotional systems – limit our ability to benefit from that understanding. In the meantime, and apparently forever, we are condemned to living in a world that is not entirely comprehensible to us, a world in which randomness rules whether we accept that fact or not. Randomness is a particularly effective noise generator. The most prevalent form of insulation against it is invoking a higher power, usually religious, that enables us to ascribe the random events in our lives to it, and to pray to it for the purpose of creating a bit of order in our complex lives.

It takes a very thorough understanding of statistics to be able to distinguish between the possible and the fantastic in mathematical terms, but nature, for its part (as we have already seen), turns us into the statistically blind in its desire to protect us. We are watchful against any existential threat, irrespective of its statistical probability. Our brains are not built to understand the world and the laws that keep it running; rather, they are designed to ensure that we will be able to handle with success any event that might threaten our survival and our ability to reproduce. Aside from those who deal with statistics professionally – and sometimes even they – we are exposed to the biased interpretation of random events that turns them into meaningful events.

In his book *There Are No Accidents: Synchronicity and the Stories of Our Lives*, Robert H. Hopcke claims that our lives are a story written by a string of coincidences. The book could never have become a bestseller were it not for the way the idea behind it captured the imaginations of so many readers. The book jacket entices potential readers with heartwarming stories of coincidence: a woman who meets a man on a blind date after having had a blind date with him many years earlier in a different place; the career of a singer that changed course when she mistakenly went to auditions for a musical; and a woman who received an unexpected gift after dreaming about this very item. Another

bestseller, *Beyond Coincidence* by Martin Plimmer and Brian King, gathers hundreds of such stories of coincidence suffused with an underlying question: can this really be coincidence?

And my answer is an unequivocal YES!

Randomness is in effect the result of a lack of complete information. If you were among the family members of the 18,465 seamen who sailed with Admiral Nelson to the Battle of Trafalgar you would have been waiting in nail-biting terror in London of 1805 for news of the battle. You would have been preoccupied with the question of whether you would ever see your loved one again. But John Richards Lapenotière, commander of the HMS Pickle, the tiny Bermuda sloop that made its way to England to announce the victory, had detailed news of how the battle ended and who died there (in England nothing is overlooked; the list of the twenty-one stops Lapenotière made and the names of the horses he rode from Plymouth to London is still extant). In another example, if you look at a coded message all you see is a lump of numbers and letters. If, however, you have access to the code, then you are in possession of information that may be of great worth.

As long as we do not unravel all the secrets of the universe, randomness will continue to be the way in which nature reveals its face to us, a fact we must come to terms with. The understanding that we do not have control over much of our reality is no less comforting than the thought that some higher power is in charge. Let us not forget that in a city with millions of residents, an event with odds of one in a million of occurring happens several times a day without any need for the involvement of a higher power.

Noise in the investment portfolio

Nassim Nicholas Taleb is an essayist, belletrist, and researcher who is, according to his website, "only interested in one single topic: chance (particularly extreme and rare events)." He is also, since 2001, the bestselling author of two books: *Fooled by Randomness: The Hidden Role of Chance in the Markets and Life* and *The Black Swan: The Impact of the Highly Improbable*. The former deals with the important role of randomness in our lives and, as part of that, of luck masquerading as expertise.

In one of the chapters, Taleb presents the story of an imaginary dentist who retires to southern sunshine. This dentist, Taleb tells us, has been a particularly successful investor over the years, who over-performs the S&P Bond Index by 15 percent annually with a standard deviation of 10 percent. This is, let's admit, an extremely savvy investor who enjoys a 93 percent probability of making money in any given year. Quite impressive. But if

that very same dentist's portfolio is examined every single second, the probability of making money shrinks to a mere 50.02 percent at any given second.

In other words, when we look at the data at a very high frequency we receive little meaningful information and a lot of noise. If the dentist decides to check his investment portfolio every minute, over a period of eight hours per day, he will experience 241 pleasant moments of gains and 239 painful moments of losses. Since it is known that loss evokes stronger emotional reactions than gain, our dentist is likely to end his day completely drained, his nerves frayed.

If, however, the dentist can hold off and check his portfolio only once a month then the rate of positive performance rises to 67 percent. And if he can manage to look only once a year he will find he has earned during nineteen years out of twenty.

If we try to analyze the relation between noise and meaningful information in the above example, we find that when we check the data once a year there are 0.7 parts noise to every piece of signal (meaningful information). If, on the other hand, we check the portfolio every hour, we are exposed to thirty parts noise for every single piece of meaningful signal. When we apply this to every second, the rate skyrockets to 1,796 parts noise to every piece of signal.

The conclusion is that when we look at a phenomenon – in this case the performance of an investment portfolio – at too high a frequency we are actually looking not at the phenomenon itself but at its variance. Emotionally speaking, we are not equipped to differentiate between noise and relevant information, so checking a portfolio too often leads to early burnout from alleged losses, stemming from our lack of self-restraint. Taleb explains that this is the reason that news (the frequent exposure to events) overflows with noise while history (patient observation of events) is almost completely devoid of noise.

People active in stock trading are well aware of the detrimental health effects of overexposure to market developments. In *The Black Swan*, Taleb returns to the story of Nero Tulip, a bonds trader who adopted risky business strategies designed to earn big profits over a long period of time, the price being regular, frequent small losses. But this strategy cost Tulip dearly, since quite quickly his body showed signs of physical exhaustion, the result of the neurobiological effects of ongoing small losses. Tulip discovered that his hippocampus, the part of our brains that controls memory, had been subject to the chronic pressure of negative feelings over such a long period of time that his brain endured irreversible damage. Thus, if you are not a professional trader and you worry about your

health, you would be well advised to suffice with weekly (or monthly, if you can stand it) portfolio updates instead of daily or more.

Another fascinating example of noise generated by sampling too often can be found in the financial crisis of Fall 2008, the ultimate noise generator. During the week beginning October 6 the world's major stock exchanges fell by more than 20 percent. The Tel Aviv Stock Exchange (TASE), on the other hand, which is usually directly affected by market trends, fell by only 6 percent. The explanation for this unusual turn of events does not come from the robustness of the Israeli economy, nor from the efficacy of the financial tools used in this part of the world. In fact, the explanation is far simpler: the TASE was closed for the Yom Kippur holiday, from Wednesday until the following Sunday. During this time the rest of the world experienced three days of tumultuous trading that caused a plunge of more than 10 percent. All of this was nothing but noise to the Tel Aviv traders, who upon returning to work on Sunday related primarily to the optimism of New York traders in the last hour of trading on Friday. The Tel Aviv Stock Exchange went down that Sunday, but only by 4 percent (Don't worry: as time went on the TASE fell in line with the other stock markets around the world.)

The foundations for perceiving and understanding the effects of noise on the economic world were laid by the American economist Fischer Black in a groundbreaking article titled, simply, *Noise*, which was published in the Journal of Finance in 1985. The noise he refers to is the noise created by a large number of small events whose misleading influence could very well overshadow a small number of large events. Noise is what in effect enables trade in financial markets. It is what causes markets to be inefficient on the one hand, but which often prevents us from exploiting this inefficiency. Noise creates uncertainty about the future, makes it difficult to estimate demand or technological developments, and is responsible, in Black's opinion, for the ebb and flow of financial markets. Noise, in terms of uncertainty, causes us mistakenly to believe that currency fluctuations or inflation are what bring about change in trade investments, while in fact these occur purely randomly. Even more generally, he claims, noise is what prevents us from testing the validity of various theories concerning the ways in which financial markets operate (causing entrepreneurs to fail when they come up with products they erroneously believe people will want to purchase).

Black contends that as far as the individual is concerned, people trade in a speculative manner since there is no agreement about financial events to come – the

anticipated growth rates of a particular company, the future prices of commodities, or interest rates. This lack of accord stems from the fact that each of us interprets data differently. However, given the complex nature of markets, a large part of the data we possess is not information at all, but noise, the result of random changes and not some proven trends. If everyone knew everything, market trading would be suspended since all players involved would share the same ideas about anticipated developments and the prices that should be assigned to various financial assets. In a sense, activity in the capital market can be described as a gamble made by investors about which is the noise and which is the truly relevant information. Black distinguishes between information brokers and noise brokers. Unfortunately, it is difficult to make a clear distinction between the two; thus, those we consider to be noise brokers perceive themselves as trading on information that others in the market mistakenly see as noise. Confused? That is exactly the explanation for the enormous investments made by investment firms in general and hedge funds in particular as they develop quantitative methods designed to enable them to distinguish between noise and information in the markets in which they operate.

Lions on a diet

I met Nassim Nicholas Taleb in New York in October 2008. At the time, he was at the height of his influence; his Black Swan theory had earned him dramatic confirmation as markets collapsed. Our pleasant meeting was frequently interrupted by journalists wishing to interview him.

Taleb was already working on ideas for his next book. When I told him about the topic of this book he seemed ready for the challenge; he does not read newspapers or watch television and his email inbox answers with an automatic message that he is indisposed, as I would later learn for myself.

Taleb instantly agrees with the observation that randomness is the root of noise. "Determinism," he says, "is one hundred percent purified signal. Absolute randomness is zero percent signal and one hundred percent noise. But most of the information we consume is somewhere between these two poles, and the challenge before us is to filter the messages we are exposed to without losing the signal."

He affirms that in spite of the astonishing success of his books and the inpouring of requests to lecture, his economic success (which is not terribly important to him) is due to his talents as a trader and mainly his ability to distinguish between noise and meaning.

Today as well he is capable of closing himself in his hotel room before a lecture and testing, for fun, the efficacy of the financial noise filters he has developed by playing the market.

The way Taleb operates in this matter falls in line with another of his theories. He believes that working with energy bursts serves our purpose best. In his opinion, people who work hard and adopt a punishing schedule lose focus quickly, along with their ability to think independently. He believes that the only result of a strict work ethic is that one drowns in noise at the expense of any real signal of meaning. In fact, Taleb claims that he himself is not inundated with financial information noise because he reads only the headlines, and even those irregularly. Taleb gave careful consideration to my suggestion of expanding the definition of noise to other aspects of life, and then he surprised me again with an unconventional thought, albeit hardly random: he claimed that as with financial market traders, a lifestyle that is too regimented is hazardous, and we would be well advised to adopt a little chaos in our lives. "If we observe predators in the jungle," he says, "we see that they nap most of the day and then, with a small number of minutes of activity, they satisfy their needs. This is a healthier way of making use of our bodies, biologically speaking," he claims. "But we have trouble assuming such a regimen. Regular eating habits, not to mention outright gluttony, cause the body to fill up with biochemical signals that harm the sensitivity and efficiency of our delicate biological systems. If, on the other hand, we wish to upgrade the system of transporting nutritional information that is essential to our bodies then we would do well to fast. Our bodies would recognize more easily the nutritional elements of our food if only we would adopt a diet of reduced noise-stimuli that our bodies receive in this context."

Taleb believes that a reduction of stimuli is likely to aid our intellectual activity as well. He says about himself that he does not write for more than fifty minutes each day (five hundred words, if you are curious) while for the rest of the day, often as he walks in the park, the ideas that will fill his writing with content in the days to come take form.

The hot hand fallacy

Imagine you are a basketball coach jumping nervously on the sidelines, your team down a single point with only a few seconds left in the game. Your star shooter, with a 55 percent shooting average over five years of play, has been unable to sink more than two shots out of ten this evening, with some real heartbreaking misses. Another veteran player whose multi-year average is 45 percent is ten for ten this evening. So who are you going to trust with the final shot of this game?

Most sports fans – as well as nearly everyone else – would give this critical shot to the guy who has gone ten for ten today, since they believe that this player is enjoying what is known in sports lingo as a 'hot hand,' an expression that anyone who has watched even a single game of basketball is familiar with. But Amos Tversky and Thomas Gilovich would act differently. In 1985 the two teamed up with Robert Vallone, a masters candidate at Stanford, in order to investigate the situation. They analyzed forty-eight home games played by the Philadelphia 76ers during the 1980 season. Their research revealed that a player's chances of making a given shot were in no way affected by the number of baskets he had made or missed before his last attempt. Furthermore, the number of baskets made or missed in a row by a given player was not significantly different from the number that could be expected, according to his personal average. These results were true for foul shots as well. In other words, in the situation presented here (and all other things being equal), a player with a higher lifetime career average has a better chance of making the last shot regardless of his performance on a given day. A number of studies done in the wake of Tversky and Gilovich's pioneering research have confirmed the findings.

So how is it possible to explain the fans and players who believe the ball should be entrusted to someone who has managed to string together a few baskets rather than the one with the higher shooting average? Gilovich hypothesizes that the source of this belief is in the bias of memory (a string of baskets leaves a stronger impression) and a lack of understanding of the term 'chance.'

When results of the study were published in The New York Times, the paper was forced to devote most of its sports pages to the angry reactions of sports fans and sports professionals. People were unable to give up their intuitive feelings and label 'hot hand' as a fallacy. One way of understanding this fallacy is by understanding the role of chance behind the scenes. If we assume that the chances of making the basket are 50 percent (a rate applicable to most professional players) then we can think of them in terms of a coin toss. Let's say that 'heads' is making a basket and 'tails,' missing a basket. If you toss the coin

twenty times there is a 50 percent chance of tossing heads four times in a row and a 25 percent chance of tossing heads five times consequently. However, at any given moment during this exercise the chance of pulling 'heads' on the next toss is unaffected by earlier tosses.

That is exactly what happens in a basketball game. A player shoots twenty times, his chances of making the shot are 50 percent and his chances of shooting five baskets in a row (which will be inscribed in our memories) are 25 percent, not low at all. But all of this is the hand of fate and is true for every player; a 'hot hand' plays no role in the explanation. The player's next shot will adhere to his multi-year shooting average.

If the 'hot hand' fallacy can make the headlines of the sports pages then its sisters in the pure-chance family have invaded the financial pages. Assuming an asset manager has a 50 percent chance of outperforming the market in a given year (an optimistic assumption with regard to most asset managers) then, as with basketball, his chances of doing so four alike running are – by nothing more than chance – 6 percent. But could you resist interviewing such an investor like some conquering hero for your financial journal?

At the height of the Fall 2008 financial crisis, Israel's Haaretz newspaper published the story of a law and finance student from Jerusalem who had managed to surprise a bank clerk and himself by tripling his personal wealth from the start of the crisis. The student boasted to the stunned journalist, sharing his investment strategy – which seemed quite logical to me during normal stock market activity, but even then I would have waited for a long enough period to ground my assessment of its successes. But here, in this case, a mere three weeks were enough for a journalist craving optimistic news to headline positive investment results. Investing during a period of financial turmoil like the one we experienced in Fall 2008 is like catching a falling knife midair: you need a lot of luck not to get hurt, let alone succeed (assuming that this success is more than just a positive headline for the paper).

Still, it is important to remember that journalists are not statisticians, and the idea that athletic or financial achievements are the result of pure statistical chance goes against everything a journalist is after when he pursues a headline. In everything connected to headlines based on quantitative data – the good news and the bad concerning investors and markets or even victims of weekend road accidents – what we are looking at is the result of a statistical phenomenon whose laws and properties are not always known either to us or to the journalist. Every phenomenon has its own statistical distribution (in those simple cases in which it is possible to describe the phenomenon by means of a single statistical

distribution), and every statistical distribution has its own extreme range of values, high and low. These ensure an ongoing flow of headlines, and noise as well. If we look at two phenomena we have already considered – that the number of road accidents occurring over one particular weekend seems especially large – there is only meaning to this 'increase' if the phenomenon repeats itself with a frequency that raises the suspicion that the statistical characteristics of the phenomenon have changed. But as long as seven people lose their lives over a single weekend that occurs once in twenty-two weeks on average, we know that the basic phenomenon – the distribution of road accident victims – has not changed and that what we are looking at is its variance, or in other words, noise. If the number of suicides in the Israel Defense Forces is thirty per year (which has been the number, more or less, for many years), then we can expect five weeks a year during which two or more soldiers will kill themselves. Remember, there will be no connection between this number and external events; the number of suicides is the result of pure chance, the laws of statistics, which in this case reveals itself in young people's tragedy. On the average, three suicides in one week will occur once each year, and I can assure you that when they do they will merit unjustified media headlines and even a governmental inquiry. But that would not be the first government inquiry to address a phenomenon that is essentially the noise of statistical variance.

Statistical variance manages to fool us so handily simply because the laws governing the phenomenon are not obvious to us. The following scenario, told to me by Nassim Nicholas Taleb and recounted in his book *Fooled by Randomness*, will show what I mean. Imagine you receive a letter at the end of the month from someone you do not know, in which the writer predicts that the stock market will rise in the coming month. You hasten to throw out the letter along with all the other junk mail. You forget about the matter until a second letter arrives in the same envelope the following month. You have a vague recollection of that first letter predicting a rising market and indeed, you must admit, that is exactly what happened. The new letter predicts a continued rise in the market even though you believe that the financial situation is not really suited to another rise, so you pitch the letter. The third letter arrives as precisely as a Swiss clock and reminds you that for the second month running the writer's predictions have come true. This letter predicts additional growth in the coming month, which you think is pretty gutsy, considering recent market developments. And since three months straight of rising markets is no trivial matter, this time you put the letter aside and find yourself thinking about its contents now and again. At the end of the month the market has risen again. This time you open the end-of-

month letter with awe and reverence; its author predicts a downturn, which actually comes to pass. The fifth letter augurs the same, as does the sixth, and the market follows suit. That makes six letters and six accurate predictions. By now it seems to you that the people behind these letters sure know what they are talking about. The seventh letter comes with an investment opportunity, some exotic real estate offer managed by the writer of the letter. The temptation is great since the letter-writer has proven himself as someone who understands market trends even in difficult circumstances. Perhaps investing in the opportunity he is offering is exactly the right thing during these troubling times (and times are always troubling).

This scenario is an example of a case in which we are duly impressed and which will convince us to take action simply because we do not understand the laws governing the behind the scenes action.

In fact, market trends are the last thing about which the letter writer knows anything. He has sent out ten thousand letters to recipients like you. To half of those he predicts a market upswing and to the other half a downswing. At the end of the month he sends out another five thousand letters, this time only to the group who received the accurate prediction. Once again he sends half of the letters predicting one trend and the other half the opposite, with no connection to what is actually happening in the market. He continues with half the number of letters again, and by the sixth he has narrowed down his original audience to 312 people who have received six accurate predictions, all of whom he hopes will be ripe for an investment opportunity with him. This is, in essence, the financial version of the statistical manifestation that underlies the hot hand fallacy.

Demystifying this sting operation makes clear the difference between the person standing to the side and watching the dragon's tail thrash up and down and the person who watches from afar, sees the whole picture, and can understand the connection between the thrashing tail and the knight fighting it.

A large part of the media noise surrounding a quantitative result of a certain phenomenon that follows statistical laws has to do with the realization of the extreme, though not impossible, range of the phenomenon. The reason that both we and the media are ensnared by the noise made by statistical variance is that we are not familiar with the fundamental laws of the phenomenon, so we perceive random events generated by statistical variance as offshoots whose extremes are worthy of reporting (and not as a single extreme event from among a variety of insignificant events that do not warrant reporting).

Try the following: imagine that you are set the task of defining the boundaries of your city by drawing a square on a city map. Next, draw four vertical and four horizontal lines across the square, evenly spaced, so that you wind up with twenty-five identical small squares. Then imagine that each of these squares represents one of twenty five city neighborhoods. Hang the map on a cork board and throw darts at it; each hit in a certain square/neighborhood represents the relative percentage of parents unwilling to allow their children to have an MMR triple vaccination (assuming that the sociodemographic distribution of the population of the neighborhoods is similar). Although the dart toss is completely random you will find on the map squares that are completely empty (no darts), a few with two darts and a few with three or even four darts. In our example, these are neighborhoods with a hard core of people who oppose vaccination. As the person in charge of health services, how would you strategize for a localized propaganda campaign? As a journalist, try to pen a piece on a family in one of the neighborhoods whose daughter has recently suffered from one of the medical events that can stem from the vaccine or that this very same sort of malady has attacked some distant relative of theirs who used to live in the neighborhood but emigrated long ago and with whom they have lost contact. If, however, you understand the statistical laws that allow such events to take place you will skip the article and head straight for the obituaries, which are known to be noise-free.

Randomness is the chief editor responsible for many of the news items we read. Its centrality is second only to the crippling fear that some of these items are meant to awaken in us. H. G. Wells, author of *The War of the Worlds*, understood this intimately. He predicted that a day will come when statistical thinking will be as important as reading and writing. But if you have no plans to go back to school, even for the purpose of buying yourself guaranteed peace and quiet, you can always adopt as a very effective alternative the understanding that randomness will always be around as an expression of our lack of knowledge in comprehending the laws upon which the world runs.

The end of randomness?

In our culture, the task of banishing randomness from our lives has been delegated to scientists. They are the ones who toil at this important job, revealing the laws underlying various phenomena that characterize our world. Understanding these laws is knowledge, and knowledge is the key to distinguishing between meaningful information and random noise. However, the history of science does not bode well for those seeking peace and quiet from a stable, long-term system of laws that describes the reality surrounding us. The laws of physics that determined the way we perceived the world for many generations were later partially or even completely refuted. Well researched medical procedures often do not last fifty years.

Chris Anderson, editor-in-chief of Wired magazine, is not worried. In a controversial article he published in July 2008, Anderson claims that the flood of data and data processing capabilities on hand thanks to modern technology make the scientific approach we are familiar with obsolete. Sensors everywhere, unlimited storage capacity and the unprecedented ability to gather, store and understand enormous quantities of data alter science as we know it, according to Anderson. As this ability grows stronger, so too will the opportunities for finding answers to fundamental questions. Anderson opines that in an age of unlimited wealth of data, 'more' is not only more, it is something altogether different from what we knew previously.

Anderson quotes statistician George E. P. Box – "Essentially, all models are wrong but some are useful" – in order to claim that in today's age of plenty (data) and the ability to process these data, we are no longer in need of models or laws. Companies like Google take care of filtering information in a framework of what he calls "the most measured period in human history," and they present us with the actual answers that the old models were supposed to foresee.

The question of whether the advanced ability to process and store knowledge will neutralize the noise of randomness from our lives is no less philosophical than it is technical. If the limitations on our use of knowledge are, as this book claims, the result of our evolutionary hardwiring, then the addition of knowledge will not have much effect on these limitations. We are condemned to live our lives exposed to the noise of randomness and we tend to attribute unfounded meaning to random events that stem from our evolutionary needs. If indeed that which is random represents the noise, and knowledge reduces what is perceived as random in our lives, then the temptation to gather knowledge is huge. But in addition to our evolutionary limitations, all you have to do is look at all the newspapers and

magazines in your local bookstore or at airports or on the net in order to understand that this is not practical. Knowledge is a noise suppressor, but accepting the fate that randomness is part of our lives is the ultimate noise suppressor.

The Noise Stories Make

"God created humans because he loves stories."

Rabbi Nachman of Breslav

Ask someone to repeat after you. Start with four random numbers, say, 4726. Do it again, this time with five numbers: 39243, then six, seven. Keep adding numbers until the person you chose for this experiment cannot keep up. The number of digits of the largest number he was able to recall is known as his 'digital span.' For most of the population that number is seven plus/minus two.

Next, for a very brief few seconds, show someone a graph plotted with dots and ask her to count the number of dots she saw. That's right: if the number of dots on the page was less than seven then there is a good chance your person will get it right. But if the number of dots is greater than seven, the number of mistakes will grow as well.

Indeed, it is impossible to discuss the topic of informational noise without relating to the memory storage capacity of human beings. The pioneering work of cognitive psychologist George A. Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information," was published in 1956 and deals with the limitations of human short-term memory. The article has for many years been considered a classic in the pantheon of studies that has shaped the body of scientific research in the behavioral sciences.

The article opens with a confession by Miller: "My problem is that I have been persecuted by an integer. For seven years this number has followed me around, has intruded in my most private data, and has assaulted me from the pages of our most public journals. This number assumes a variety of disguises, being sometimes a little larger and sometimes a little smaller than usual, but never changing so much as to be unrecognizable. The persistence with which this number plagues me is far more than a random accident. There is, to quote a famous senator, a design behind it, some pattern governing its appearances. Either there really is something unusual about the number or else I am suffering from delusions of persecution. The number is seven."

In experiments he conducted, including those investigating the human capacity for information, Miller succeeded in recognizing a highly unusual and yet random similarity between the capacity of various conceptual channels. Even when these channels are

expressed in a variety of human tasks, it is clear that the most efficient capacity of all of them is between five and nine information bytes. Miller conjectured that the reason for this was a simple but undetected mechanism that could be found in the foundations of the phenomenon.

Miller also discovered that the memory span of young adults comprises seven elements, which he calls 'chunks.' Chunks can be made up of numerals, letters, words or other units. (Later studies refined Miller's findings and found that memory span is approximately seven digits, six letters and five words long.) Human memory for verbal content such as numbers, letters or words is highly dependent upon the amount of time one needs to express them aloud (the time needed for expressing a seven-digit number in English is two seconds) and the familiarity of the person being tested with the words he is hearing.

That is how it was determined that human memory has a chunk capacity in the short-term of 'seven plus or minus two.' Moreover, it became apparent that it is possible to expand the efficiency of short-term memory by recoding the information details. Students of Morse code, for example, learn each dot and dash as a chunk. They quickly learn to organize the dots and dashes into letters, and these turn into chunks. Later, the letters combine into words that become chunks themselves. That is how the short-term memory of a telegraph operator can take in dozens of dots and dashes and not a mere seven.

The film *Rain Man*, starring Dustin Hoffman and Tom Cruise, tells the true story of an autistic man with rare cognitive abilities. He is capable, for example, of guessing the number of toothpicks that fall from a container to the floor. Neuropsychologist Oliver Sacks reports on a similar incident in his book *The Man Who Mistook His Wife for a Hat*. The chunks that these people relate to are much larger, far beyond normal human capacity.

It is generally believed that Miller's research influenced the number of digits that comprise phone numbers in the United States and that area codes were designed to ensure that phone numbers need no more than seven digits, the limit of human short-term memory capacity.

Memory limitations are yet another reason for the power of stories in our lives. Because the storage of knowledge contained in complex information is problematic, we tend to compress the information we receive into a story that we can remember. In this way we turn individual details into a narrative that makes it easier for us to store information in our memory. The use of stories is the most efficient method our brains have for overcoming the

problem of short-term memory capacity. By chance, stories also answer some of our most important evolutionary needs.

Do chimpanzees tell stories?

If you are subjects in the kingdom of noise then your most loyal agent for making your noisy ideas heard is the story. Stories are effective, they fit the human need for meaning and connection perfectly, and, as we just saw, they make efficient use of our limited memory capacity. Stories are rich with content but also noise, since the storyteller does not always take the listeners needs into account.

The power of the human story explains the dominant structure used in most newspaper and television reports. This structure comprises a person whose story is touching, a link to the general topic of the article, a little background, analysis, and then back to the original touching story about a certain individual. When the journalistic package really works then there will be some intellectual content added to the central attention-getting element, the personal story. But that does not always happen. It takes tremendous self-discipline to detach that touching personal story from the issue at large. Not every journalist reporting on J., who fell into prostitution after high school, will remember to note that cases like these are rare and should not be thought of as some sort of societal trend or moral lassitude. Presenting the story of one certain individual, as special as that person may be, usually becomes nothing but noise for anyone trying to learn something about the reality of our lives. This type of story does not necessarily represent reality and is likely to serve the common interest in stories that we share with journalists. Let's admit that we crave stories about other people. We love to tell them and we love to hear them. This is a basic human need with deep evolutionary roots.

While it is true that chimpanzees do not tell stories, they do in fact spend some twenty percent of their time delousing their fellow herd members. This is their way of developing and maintaining social relations. People exchange stories in order to make use of others' experience, but like monkeys we do it principally for the purpose of developing social relations.

We are people of stories, not numbers. In our culture, stories replace our need and limited ability in dealing with numbers. A research firm specializing in Canadian public opinion once asked the people it was interviewing how many millions make up a billion. Forty-five percent of those asked did not know the answer. So how exactly can people be

expected to react if they are told that the level of a certain poisonous compound reaches three parts per billion in their drinking water? All they can do is rely on their emotional systems, which do not of course understand what a billion is. The only thing we grasp is that this compound is dangerous, which is enough for us to sound our warning bells.

Stories hold a certain magic for us, especially in the face of numbers or particularly low numerical relations (in these cases our blindness to probability is nearly total). Indeed, most of the dangers that the media wave in our faces morning, noon and night are those whose probability of manifestation are less than one to one hundred.

The source of this phenomenon is likely to be linked to the structure of the human brain. As is known, the right hemisphere is responsible for the creative and emotional aspects of our existence while the left, the seat of logic, enables us to perform economic analyses. Low probabilities seem not to be 'processed' in the left hemisphere and they appear to wander about in the tangle of neurons in the right hemisphere, where they link up with emotions and become a story – the end of the world draws near, personal ruin is unavoidable due to bad health or a natural disaster on its way to consume us. Numbers – especially those representing low probabilities – are an excellent device for disseminating fear. Within a short period of time we relate to the numbers presented to us as if they were established facts. John Allen Paulos described this conditioning well in his book *Innumeracy*: "Mathematics is the quintessential way to make impressive-sounding claims which are devoid of factual content."

One of the simplest ways to enable a meaningful discussion of numbers is to rid ourselves of the ignorance that surrounds us in everything that has to do with the true dangers involved in various activities. What truly is the risk we run of falling victim to a virulent bug? An airplane crash? A terrorist attack perpetrated by someone who mistakenly thought us to be an enemy? How about the cosmic rays we must face day in and day out? The only people in our culture who feel comfortable in the field of especially low probability are lawyers and career officers. Both must, for different reasons, plan each step accordingly so that they will have answers for events whose probability is low.

Too optimistic, bring another story

In 2001, Wylie Burke and her colleagues at the University of Washington studied a series of articles about breast cancer that were published in American journals during the years 1993 to 1997. Eighty-four percent of the women who appeared in the articles were under the age of fifty when they were discovered to have the disease, and nearly half of them were under forty. However, according to the researchers, medical statistics differ dramatically from the reality portrayed by these journals: in real life only 16 percent of women diagnosed during the period of the study with breast cancer were under the age of fifty and only 3.6 percent under forty. It turned out that the older women – who are at higher risk of getting breast cancer – were not included in the articles. Only 2.3 percent of those women mentioned in the articles had passed the age of sixty and not a single one of the 172 articles reviewed by the researchers included a woman over seventy, despite the fact that two-thirds of all women diagnosed with breast cancer are over the age of sixty. The American media had turned the reality of breast cancer on its head and made medical veracity a victim of the human interest story.

The stories of cancer patients are personal, often colorful, and always emotional – which are exactly the elements of any good piece of journalistic writing that etches itself onto the readers' memories. Young women are a far better story than old ones; however, the important truth of age as a major risk factor in the disease (that is, that the risk rises with age) is completely overlooked and does not figure into the consciousness of readers of these articles, even if they are presented afterwards with a handful of statistics published in other articles.

Indeed, a study conducted at Oxford University in 2007 confirms the distorted influence of the media on the reader's perception with regard to anything having to do with the correlation between age and breast cancer. One of the questions posed to participants was, At which age are women at highest risk of being stricken with breast cancer? Fully 56.2 percent responded that age was no factor; 9.3 percent believed that the highest risk was between the ages of forty and fifty; 21.3 percent thought that fifty to sixty was the highest at-risk group; 6.9 percent believed the correct answer to be sixty to seventy; and a mere 1.3 percent said that the highest at-risk age is seventy to eighty. Only a tiny portion of those questioned – 0.7 percent! – got the correct answer: eighty and above.

This misperception is liable to put older women in danger if they forgo tests since they believe they are not at risk, and create the unjustified noise of worry among younger women.

The often criticized tendency of the media to emphasize the negative in the stories they report derives its justification directly from evolutionary sources. In truth, our evolutionary hardwiring encourages this sort of journalistic writing. A threat will always be interesting evolutionary news to a brain constantly scouting the world for dangers. A study conducted by Michael Siegrist of the University of Zurich and George Cvetkovich of Western Washington University found that people tend to place more faith in research that produces negative results than research that concludes there is no real risk involved. The researchers showed a test group some studies about health risks – food coloring and electromagnetic fields – and the members of the group assumed that the studies were more credible when they noted risks rather than when they failed to find risks.

It is important to remember that it is rare for the media to serve us data that has not been given an interpretation. Usually, the facts are woven into a story, the skeleton of which is nearly always, in journalism, one of causality. However, very few journalists can differentiate between causality and randomness, and even fewer are willing to invest the energy necessary for making that distinction. Causality serves another need as well; it helps us overcome the limitations of memory by linking a random collection of data to form a narrative that is easier for our brains to store.

Still, the real danger in following a narrative blindly is that we miss entirely the important information in the story and erroneously adopt incorrect information simply because it makes for a better story, or one that is easier for us to remember. However, if we read these stories from the outset in the interest of encountering the dangers lying in wait for us, we do not reach the goal, and the stories become noise that distances us from the important facts. Stories, it appears, are not a good way in which to receive new information about the potential danger that lie ahead.

Some stories may be hazardous to your health

It turns out that the addictive attraction that the media has toward controversial topics can even be hazardous to one's health. Here is a story of media involvement in one of the stormiest issues to arise among the parents of British schoolchildren in recent years.

In August 2008 the British Department of Health launched a public health campaign to encourage all citizens under the age of eighteen to receive an MMR vaccine to prevent measles, mumps and rubella. In the two years preceding this initiative, 1,726 cases of measles had been recorded, a number that exceeded the total sum of cases from the entire

previous decade. The Department of Health suspected that a measles plague would affect some one hundred thousand children and could lead to serious complications, including death. The background to the worries expressed by the Department of Health was the sharp drop in the number of people receiving the MMR vaccine – from 91 percent of the population in 1997 (very close to the 'herd immunity' level needed to ensure extinction of the disease) to a mere 80 percent in 2003. (Since then the rate has increased slightly.)

The main reason for this decrease in the number of people being vaccinated was the suspicion parents had with regard to the connection between the MMR vaccine and autism. This connection is not substantiated by professionals in the field but it gained a foothold among the general population thanks to particularly wide coverage of the topic in the media.

In her book *Health, Risk and News*, Cardiff University researcher Tammy Boyce shows how British media reports dealing with this alleged connection between the MMR vaccine and autism grew exponentially from 1998 to 2002, when it reached a peak. During this period, the number of people receiving the vaccine dropped dramatically.

In the United States, where the MMR vaccine panic received surprisingly scant coverage, the rate remained high, at about 90 percent. One fascinating bit of information uncovered by Boyce concerns the effect of one specific local newspaper – the South Wales Evening Post – which came out squarely against the vaccine and had a direct influence on its readership: among them, the number of people receiving the vaccination fell by 13.61 percent, as opposed to only 2.4 percent in other parts of Wales. This fact would not surprise Paul Slovic or his colleagues. They had discovered back in the 1970s that there is a strong correlation between the ranking of risks by the public and the amount of attention these receive in the press.

The original research that first dubiously tried to establish a connection between the MMR vaccine and autism was carried out by Dr. Andrew Wakefield and eleven of his colleagues at Saint George Hospital in London. The study was later discredited and Wakefield and two colleagues were charged with improper professional conduct by the General Medical Council of the UK. The study, which had involved only twelve children, was published in the prestigious Lancet journal in 1988. Traces of the measles virus had shown up in the blood of eight of the children studied; the study itself never mentioned the MMR vaccine but Wakefield had tossed the idea about a connection between the MMR vaccine and autism into an earlier article he had penned. At a press conference following publication of the study results in Lancet, Wakefield mentioned the possibility of a

connection once again, claiming that it would be safer to stop using the MMR vaccine altogether, replacing it with three separate vaccinations, an approach that had already been discredited as weakening the general immunity level of the population. But this was enough for the British media, and the MMR and its offshoots became a true cause célèbre. The chances of uncovering a new health scandal to rival the thalidomide disaster (the drug meant to solve problems of morning sickness that led to the births of limbless children) is the holy grail upon which generations of health reporters have been raised.

Denials by the authorities did little to undermine the determined efforts at frightening British mothers and children. Alleged signs pointing to a cover-up campaign on a national level only served to fan the fires of the media reports. Claims made by the Department of Health to the effect that separate immunizations were inferior to the triple MMR vaccine were sharply trounced in the press as interference with the taxpaying citizen's right to free choice.

Wakefield, who defended his thesis nobly all on his own against the British establishment, became a media hero. Now, a decade later, it is the children who were not vaccinated thanks to the noise generated by Wakefield and the media who are at real risk of serious health complications.

Further food for thought can be found in JAMA, the Journal of the American Medical Association, which published descriptions of two studies carried out on the dangers of cancer resulting from radiation to which children are exposed. The first study discovered a link between the two while the other did not. Researchers at a Toronto hospital came up with nineteen articles from a variety of newspaper all of which related to studies that had been published. Nine mentioned only the research in which dangers were cited; none reported on studies in which no dangers were mentioned. Ten additional articles reported on both, but these gave more space to the research pointing to a connection between exposure to radiation and cancer.

An airplane that lands safely, a husband who has not murdered his wife and a place that has not been struck by an earthquake for several hundred years are not considered newsworthy. Who would believe that in 2003 alone 875 Americans choked to death while eating? Or that tiny lights on Christmas trees hung negligently would take more lives than shark attacks around the world? Just try offering a news editor the story of a vicious shark attack, preferably on a young and female victim, and you will be able to take at least a day's rest from the bothersome buzz of other accidents, elections and football players whose success has gone to their heads, causing them to lash out at anyone doubtful of their talents.

Excuses are very short stories

When our emotional systems adopt intuitive versions of events, the rational side of our brains hastens to support our gut feelings, even when they are highly questionable. Under such circumstances the left side of our brains – which is responsible for the logical aspects of our actions – kicks in and manages to justify, often brilliantly, what the right has already carried out. The phenomenon has been discovered even in people whose two hemispheres have been severed due to an accident or some other reason. Brain researcher Michael Gazzaniga once asked one such patient of his to get up and march. He made this request solely to the patient's left eye, which meant only his right brain would receive the information. When asked why he was marching about, the patient, whose left brain had no clue but gave him an impromptu answer anyway, said, "I'm getting myself something to drink."

It seems that our need for excuses is so overpowering that information we receive may satisfy us simply because it provides an explanation, even a flimsy one, for whatever it is we are facing. Research has proven that excuses can serve us well until a more rational explanation comes along, and, as in many cases, even when no such explanation arrives. That is one of the reasons that stories have such power over us. A slim joke book I once read had creative excuses for complaints like these: "Waiter, there's a fly in my soup," said the diner. "Yes," says the experienced waiter. "It's the heat that killed him." This is just one of dozens of possible responses to the age-old joke, one of the best of which is "Lower your voice, please, or everyone's going to want one." I was reminded of the joke on a recent flight that was seriously delayed. Speaking from the flight deck, the pilot announced that the delay was caused by the fact that the aircraft had been late arriving from somewhere else – useless information that does not reduce the airline's responsibility one iota in failing to make use of their fleet, but which is somehow supposed to appease irate travelers.

This sort of event, which we encounter on a daily basis, raises a question: what is the place of "cause and excuse" in our lives and to what extent is our social behavior effected by the way in which the suitable excuse skews our judgment?

A brilliant study published in 1978 by researcher Ellen Langer of Harvard University casts doubt on the flattering assumption that we form our behavioral strategies based on information presented to us and on proper reasoning.

In one of her studies, a man (collaborating with her) approached a line of people waiting to use a photocopying machine and asked to jump to the head of the line. He used three different excuses in making his request. In the first he told the people in the line that he had only five pages to photocopy and asked politely if he could cut the line. In the second, he added an explanation that contained useless information ("because I need to photocopy these pages") since everyone was in the same position. The third was identical to the first but to this he added relevant information: "...because I'm in a hurry."

The result was that 60 percent of those asked let him pass them by in the line without any excuse and 94 percent allowed it when the information was relevant and meaningful. But only 1 percent less – 93 percent – were willing to let the man go to the head of the line even when the information was useless. As could be expected, women responded at a higher rate than men.

The study is important because it teaches us that in an encounter between two strangers, at least in the line for the photocopying machine, it is enough to utter the word "because" for the vast majority of people waiting in the line to give in to the request. Furthermore, it would appear that the presence of *any* excuse at all, regardless of the information it contains, makes us willing to suspend our powers of reasoning.

Anyone who follows the stock market frequently because that is his job or because of some other unjustified reason can only stand in awe at the creativity and speed at which financial news agencies make excuses for changes in the market. In some cases, the exact same reason is given by way of explaining why the price of a certain security has risen in the morning and fallen in the evening.

But hang on a moment. Could it be that the headlines in financial newspapers that attribute changes in the stock market to various causes also fall into the category of "excuses devoid of meaningful information" and merit our attention due only to our desperate existential need to attribute cause to every event in our lives? The answer to this question naturally depends on what we mean by "meaningful information" and on the actual ability of headlines to explain the changes in value of financial assets, like stocks.

The answer is hidden in the wave of studies that grew out of the unexpected collapse of the stock market in October 1987. These studies set out to evaluate the link between news and the ability to explain the dramatic events of the day. Economist Larry Summers, who later served as Secretary of the Treasury in the Clinton administration and later as Obama's top economic advisor, took part in the most famous of these experiments. The researchers set out to determine to what extent macroeconomic news – changes in

interest rates, industrial output, inflation – explains monthly changes in the stock market over the period 1926 to 1986. The results were that this kind of news, which is clearly meaningful and relevant, cannot explain any more than one third of market fluctuations. News of a one percent rise in inflation, for example, translated to a monthly depreciation of only 0.13 percent on the S&P index.

In a second stage of the experiment, researchers examined the effect of some fifty non-economic news-making events (elections, the Kennedy assassination, the Cuban missile crisis, the Japanese attack on Pearl Harbor, etc.) on the stock market. The news of the smooth passing of American presidency from John F. Kennedy to Lyndon Johnson caused the stock market to rise by 3.98 percent, whereas the assassination itself precipitated a mere 3 percent decline. The dropping of the atomic bomb on Hiroshima, for example, precipitated no more than a 0.5 percent monthly change (the stocks rose). Perplexingly, it turned out that the most dramatic fluctuations in the stock market often took place on days on which there was no significant news.

The study concluded that even when taken together, political and international news with macroeconomic news can only account for less than half of the changes in the stock market. And this was only with regards to the most prominent news. One person who certainly was not surprised by the study done by Summers and his colleagues was the researcher Richard Roll, who was already trying back in 1984 to track the connection between the price of orange juice concentrate in commodity futures trading and the weather report on the news. He found that, contrary to simple logic and general opinion, news can explain only a small part of the change in price of this weather-dependent commodity.

Thus, nearly all headlines are nothing more than excuses. And excuses are noise. We need them to quench our thirst for explanations no less than the media needs them in order to keep afloat. For once, the media is not to blame.

Certainty is magic

The magical pull of certainty is first cousin to the power of stories and excuses. Like them, the magic of certainty introduces order into the randomness of our lives and grants us meaning where meaning does not truly exist.

Gerd Gigerenzer, head of the Center for Adaptive Behavior and Cognition at the Max Planck Institute for Human Development in Berlin, published *Reckoning with Risk: Learning to Live with Uncertainty* in 2002. The novelty of Gigerenzer's approach is the great importance he attributes to the human need for certainty in the face of the quantitative presentation of data. He offers as his own personal starting point for discussion what is known as Franklin's Law, coined by Benjamin Franklin in a 1789 letter: "Nothing can be said to be certain but death and taxes."

The need for certainty is an existential human need. Uncertainty creates bothersome noise that we wish to rid ourselves of. Under such circumstances, we prefer a one-dimensional picture even if it does not represent reality in its full complexity. The Necker Cube is a good example:

The cube's depth is unclear since its two-dimensional lines do not allow the viewer to know which side is at the front and which at the back. However, when we gaze at the Necker Cube the picture is not unclear to us since we only see one or the other of the two possibilities, not both at the same time. After staring at the cube we can suddenly see the other option, but once again, only that one. Failing to distinguish the two is not a failure of our sensory system, which broadcasts its best guess to our cognitive system, which in turn interprets matters with a high level of unjustified certainty.

I was reminded of our tendency to identify patterns when, several years ago, I was invited to the birthday party of a friend. Feeling good after several glasses of wine, we began playing party games, as if we were young again. One game we played was the Dream Game, in which one person volunteers to leave the room. When he returns to the room he is told that while he was out, one of the other people in the room told a dream he had recently had. The volunteer must ask yes/no questions of the people in the room in order to figure out the dream and identify the dreamer. In fact, no one tells a dream; all the participants simply answer yes or no randomly to whatever the volunteer asks them, taking care not to contradict any previous answer.

The surprising result was that the ambitious volunteer managed to put together a surreal dream, one that was actually quite revolting, based on the random answers the others gave him. But when it came time to guess whose dream it was we hastened to let him in on the joke in order to avoid humiliating someone (and causing the volunteer to lose a friend). I have seen the game played in various versions but it always come out in much the same way. Our bias toward controlling that which is random is that strong. Our evolutionary need for identifying patterns even where they do not exist is the breach into which escapes a long list of noises masquerading as meaningful information or as one component of a picture representing a potential threat.

Second only to our tendency to see order in randomness is our tendency to find meaning where it does not exist, especially in grief. Thus, for example, many thought they saw the face of the devil rising in smoke from the collapsed World Trade Center. Incidentally, at that time the bestselling book on Amazon was *The Prophecies of Nostradamus*. Search engines registered more hits for this sixteenth-century apothecary and alleged seer than the usual queen of the internet: sex. Part of the book's popularity, which was published in 1555, stemmed from the way the prophecies were worded, allowing for many interpretations. In spite of the book's popularity, academics have been unable to find proof of any of his prophecies, let alone prophesize according to what is written in the book.

Off with their heads!

The malaise we are meant to feel in the absence of calming certainty takes an interesting turn in a particularly noisy direction with regard to our need to find someone to blame for our failures or other unfortunate events. Studies show that we tend to relate distressing events to the negative influence of others rather than to chance, especially concerning dramatic, emotional events.

In one such study, carried out by Ed Walster, a group of subjects was told that a man had parked his car on an incline and that when he walked away the car rolled down the hill and smashed into a fire hydrant. When asked for their reactions, most of the subjects expressed tolerance for his error and said that they had had similar lapses.

A second group was told a slightly different version of the story, in which the car rolls down the hill and hits a passerby. The participants of this group were much harsher in their criticism, vilifying him and holding him responsible, even though the negligence was

the same in both cases. It seems that when things truly go wrong we are predisposed to look for someone to blame.

This harmless experiment is the explanation for the thousands of words that swamp newspapers, radio and television daily in a quest to find someone to blame. The possibility that once again we are faced with a chance occurrence of a phenomenon whose underlying properties and laws are unknown to us, or to a statistical distribution that is revealed to us through extreme variance, does not even come up for discussion.

A doctor who mistakenly amputates the wrong limb will appear on the front page, while a health system that loses thousands of patients because of a negligent approach goes unmentioned. We may be blind to probability and find it difficult to assess risk but we are excellent at identifying improper behavior. Looking to place blame encompasses everyone: the failed all-stars coach, the secretary of transportation during whose tenure accidents increased, the CEO whose company's stocks plummet and of course, the doctor who failed to detect a malignant growth in time.

If we stop looking for people to blame – not that there isn't sometimes justification for it – we will be giving up on many many pages in the newspaper and significant air time on radio and television. Even letters to the editor will shrink drastically if we cull the letters of blame, not to mention the thousands of touching human interest stories whose heroes point an accusing finger at someone – usually the authorities. The media responsible for journalistic ethics turn to the accused for a reaction. That reaction doubles the amount of verbiage that should not have been there in the first place, if we were only prepared to give up on our obsessive quest for finding guilty parties.

During the financial crisis of 2008 the business community was surprised when the U.S. Congress did not immediately affirm a rescue package put together by the administration for the purpose of saving the economy. American voters made it clear to their representatives that there could be no dealing with the financial crisis until the guilty parties were humiliated, tarred and feathered.

Placing blame on others is one of the main characteristics of the human condition, in that it provides a response to a relatively wide variety of basic needs. First, the need for certainty and order in our world, the need to place limits on what we cannot explain. Finding someone to blame gives order to our lives and provides us with the feeling that we are in control, thus suppressing the noise of uncertainty. Second, we tend to think in terms of results instead of process. Finding someone to blame is the natural extension of focusing

on unsuccessful results. And third, the magic that stories hold over us. Finding someone to blame is a proper end to a story that would otherwise conclude in an unsatisfying manner.

The noise of a story gone wrong

Neurologists have long understood the phenomenon in which our brains draw particular satisfaction from recognizing patterns. Whether you accept the evolutionary explanation that early identification of a threatening pattern is a survival tactic or you prefer the version that calls it a system for promoting the brain's efficiency, the fact remains. Every time the brain recognizes a familiar pattern it releases a small quantity of dopamine, a natural chemical that is responsible for some of our feelings of pleasure and satisfaction. We enjoy an infusion of dopamine when we recognize a pattern in a musical composition (which is one accepted explanation for the pleasure we derive in listening to music) but also when we gaze at a phenomenon with recognizable properties and laws. It is also under the influence of dopamine that we are attracted to that which is symmetrical and harmonious.

Indeed, a number of quantitative and aesthetic relationships have assumed prominence among the myriad patterns that comprise Western culture. The Golden Ratio is one of them. It exists when the ratio between the sum of two quantities and the larger one is the same as the ratio between the larger one and the smaller one, which is represented by the number 1.6180339887. This relationship is found in many forms in nature. The golden rectangle in architecture is defined as a rectangle with these exact proportions, and was considered pleasing as far back as Ancient Greece; many of the buildings erected at that time make use of the golden rectangle.

Other relationships answering to this non-binding classification of aesthetic ease and comfort include several mathematical phenomena, like normal distribution (the bell curve). If a higher power were to remove from our lives every phenomenon explicable by normal distribution, we would be exposed to the insufferable noise that comes with our inability to assess what is anticipated in a wide variety of phenomena. For example, we would be surprised to discover that the difference in heights between our children is a full meter and that they read at widely different levels. We would also discover an unfamiliar spread of data about on-the-job satisfaction among our friends. Normal distribution is the 'law' that stands behind a long series of physical and behavioral phenomena in our lives.

Nassim Nicholas Taleb's *The Black Swan: The Impact of the Highly Improbable* deals with the limitations of normal distribution in finding suitable laws and properties for the

complex reality of the financial world. A black swan is, it will be recalled, a meaningful and unexpected event likely to have an extreme effect on our lives as individuals and as a society. By way of explanation, Taleb says that in reality most of us live our lives in the nation of Mediocristan. In contrast, the reality he recognizes as relevant for decision-making is the one in which black swans are expected guests, if rare. Welcome to the nation of Extremistan.

Taleb concedes that the physical dimensions of humans, such as weight and height, divide up according to the bell curve of normal distribution, but the important things in life behave differently. For example, if you make decisions about your health then Mediocristan is a safe place to be. Unreasonable outside influences in such a case should not be great. But if, on the other hand, you are dealing with topics in which the accumulated effect is important, like wealth, gains in your stock portfolio or your venture capital investment portfolio, then using normal distribution is misleading. A single loss can erase one hundred gains and vice versa, a single large gain can make up for years of losses. In the half-century between 1950 and 2000, the ten most extreme days in the financial markets account for half of all gains. So how exactly can the bell curve be applied in connection to changes in the stock market that determine the wealth accrued by many of us and the financial stability of others?

If you feel uncomfortable with Taleb's analyses you are apparently hearing the noises made by the new reflection of the financial reality which can no longer be explained away by the traditional tools of normal distribution. It is hard to deny that the weakening grasp of scientific beliefs and outlooks on the laws and properties according to which we live our lives has become a major source of noise. If you wish to restore your peace of mind, which has come under attack by these ideas, you can always recall that thermal noise (the noise generated by thermal agitation of electrons in a conductor) has a greater effect on our world than changes in the stock market do, and it still behaves according to the good old bell curve.

The Noise of Consumerism

"The only reason a great many American families don't own an elephant is that they have never been offered an elephant for a dollar down and easy weekly payments."

Mad Magazine

Once, while showering, I could hear over the rush of water the sound of my mobile phone ringing. It took me a moment to remember that the ring tone I thought I was hearing was the one from my old phone, which I had replaced two weeks earlier. Do you ever imagine hearing your phone ring when in fact it is completely silent?

John Naish, the London Times correspondent for health and lifestyle, does not carry a mobile phone as a self-defense strategy. In his 2007 book *Enough: Breaking Free from the World of More*, Naish investigates the many ways in which we trip over the out-of-date hardwiring of our brains, bringing about the poisonous effect of informational noise. Naish also believes that we rely on instincts that provide old answers to new challenges, especially the challenge of life in a society of abundance, in which our brains are still programmed to fear want and deprivation so that we are propelled to consume everything that becomes available to us. According to Naish, our brains 'want' 'now.' Up-to-date medical technologies enable us to glimpse these archaic reactions of our brains as they are taking place in our heads, providing us with explanations about how we succeeded in building a culture that encourages us to activate all our problematic instincts, from the ones that react to abundance by searching for more, to those that react to comfort, prompting us to work harder even as our free time increases.

Robert Trivers, an evolutionary biologist at Rutgers University, explains the phenomenon well: "We've evolved to be maximizing machines. There isn't necessarily an off-switch in us that says, 'Relax, you've got enough.' To which Naish adds that "just because our basic brains evolved in the Pleistocene era doesn't condemn us to blundering around the twenty-first century like Flinstone families."

Until now, Trivers claims, we managed to develop rapidly while coping successfully with new problems, thanks to the ability of our mental equipment to adjust and rewire itself anew according to the need.

Perhaps the time has come for an additional update of our mental systems in an age of such material and informational affluence, where every new purchase forces us to push aside something we acquired in the past. And if that were not enough, these exchanges

become less and less rewarding. Has the time not come to understand, in the words of Eric Hoffer, that we will never manage to consume enough of what in any case we will never need in order to be happy?

Naish relates that in 1970 the city of Brighton asked the directors of the city aquarium to release the dolphins in their possession. Experts had discovered that the delicate sonar systems that dolphins have was being constantly bombarded by stimuli from the walls of the cramped pools in which they were being held, to the point that they were being made blind and deaf by a whole world of white noise, according to those who opposed the dolphins' miserable existence in the aquarium. Now you, too, understand how the dolphins felt; everywhere you look or listen someone is trying to capture your attention. Your neurons are swimming with marketing messages, bothered by advertisements and sidetracked by ideas for new products.

Whales are in danger, too. Underwater noise pollution caused by ship engines and oil rigs increases the level of underwater noise. The Times of India reported in September 2008 that IFAW, the International Fund for Animal Welfare, had completed a study showing that noise pollution was impeding whales' ability to communicate. It turns out that whales are using only ten percent of the vocal range that they were using only a decade ago.

We are bombarded with some 3500 sales proposals every day, an average of one proposal every fifteen seconds that we are awake. In 2004, companies worldwide spent more than \$200 billion on advertising. The number of ads on television has tripled in the last ten years, and more new information has been created over the past two decades than in all the five thousand years of human culture that preceded them. A thirty-second ad during the Super Bowl that cost \$645,000 in 1988 rose to \$2.385 million by 2007. And as if that were not enough, a study carried out in Japan has shown that advertisements are perceived as louder than regular television programming.

Although less than one-fifth of all ads leave any kind of impression, the best, most creative minds are hired to tempt our brains with some new promotional material. Naish claims that this is possible due to the human instinct that causes us, when we are inundated with information, to feel as though we must go in search of more information to make sense of the confusion.

Our informational consumer habits have been dubbed 'infomania.' More and more we have turned into infomaniacs who obsessively gather every piece of information available in the foolish hope that the missing piece is the one that will give meaning to all the others.

The survival strategies that held us in good stead for thousands of years of threat and deprivation while other species became extinct become burdensome when they ruin our ability to enjoy the abundance surrounding us. On the African savannahs where our forefathers developed, alertness and watchfulness were matters of life and death. Use of every bit of information was essential. Anything new – unfamiliar faces, shapes, ideas – was quite rare compared to today and immediately raised a conflict between fear and curiosity. It took some break in the dam of inquisitiveness among primitive man to overcome his fears and experiment to see what would happen if he threw a stone at the winged creature standing on a nearby boulder. But a person who took such chances would be rewarded with new food and reproductive opportunities that became available to him. An evolutionary mechanism ensured that whoever reproduced as a result of information gathering would spread his curiosity genes to the following generations.

I invite you to peruse the headlines of various newspaper websites. A relatively large number of the news briefs that run in the margins are presented as questions: How much will an apartment in the new midtown luxury building cost you? Who made a fool of himself at the celeb-studded reception? Why are Europeans more polite than Americans? A question mark at the end of a headline is meant to be an irresistible invitation to our investigative brains.

In order to understand how consumer ads work you need to delve into the evolutionary roots that enable them to have an effect on us. In fact, our brains get a drug infusion every time we learn something new. In a study conducted in 2006, researchers at the University of Southern California found that when we learn a new concept, the 'click' that accompanies it activates a whole shower of natural chemicals (opioids) in our brains, which are similar in structure to morphine.

Irving Biederman, who conducted the research, claims that the human brain has a cluster of receptors very sensitive to a certain chemical precisely in the area of the brain responsible for absorbing new information. Biederman believes that we are programmed to feel elation each time we learn something new about our world, since this gives us a survival advantage.

Until recently (thousands of years in evolutionary terms) this reward system was suppressed in favor of more pressing needs like food and physical safety. In the comfortable rooms we occupy today hunger and predators do not stalk us, which is how infomania can run amok unchecked, causing us to thirst after frightening news (which always enjoys a healthy evolutionary curiosity), banal texts, gossip and other junk news. So long as there is

something new in this news our brains feel rewarded. In fact, Biederman tracked the electrical activity taking place in the brains of volunteers by using fMRI (functional Magnetic Resonance Imaging) and found that there was less activity each time they were shown the same image. A new image, however, raised electrical activity in their brains.

This is why the large international corporations find themselves in constant pursuit of a shrinking supply of new images that will dope us into (chemical) elation – the tremendous challenge facing advertisers today. Every technique that has proven efficient is condemned to lose its magic the more we use it. Potential buyers await the next innovation. Marketers refine their methods in order to persuade us that we haven't yet bought enough of whatever it is we don't need anyway, and we will be convinced only for as long as the message is still new to us and our brains are being rewarded. For most industries, that is enough.

Consumer advertising also profits from matters that viewers discover on the news, where ample space is given over to disasters around the globe. Our brains overflow with unnecessary anxiety when we watch repeat broadcasts of the most horrifying daily events. Advertisers know that the bigger the threat portrayed in photographs, the more we will consume them. The terror is recycled, but we do not learn anything new from recycled material since our emotional systems, which react to frightening news, are not built to reduce feelings of fear by means of rational considerations. Instead, our feeling that the world is a dangerous and uncontrollable place is only reaffirmed. Such constant stimulation creates anxiety, and there are psychologists who believe that exposure to more than thirty minutes of news a day can bring on anxiety and even depression.

The truth about most-influential lists

This year, as every year, magazines around the world will publish their most-influential lists. What these lists seem to have in common is how much they change from year to year; fewer than one-fourth of the names on them generally make the cut the next year. Could it really be that the eternal fame of people on the most-influential lists is that fleeting? Or is some other system at work here?

The real list of the most influential could be put together on the basis of how many times someone's name is mentioned in the media and in private conversation, which naturally cannot be recorded. The academic influence of scientists, for example, is measured exactly in that manner – according to the number of times other researchers

quote their research. Applying this method would reveal that the change in the list of who really are the most-influential people is not, in fact, so great from year to year, but instead reflects an editorial opinion about the ranking of topics on the financial and public agenda no less than it reflects the influence of a certain personality. I have been told that issues containing the most-influential lists are among the most popular and widely read of the year. Apparently, the editorial boards of magazines are aware of our desperate human need for making a little sense and order in the sea of information that engulfs us (and nothing can do that like a ranking list), and they act accordingly and in a way that will serve the magazine's own financial interests as well.

Similar reservations can be expressed about nearly every list of the top ten or top one hundred. Or the worst: a celebrity can make it onto the world's worst-dressed list after appearing only once or twice in unsuitable attire, but mainly because he or she is known to millions. The beggar on the corner is of course dressed even worse, but he is known only to those who step on him each morning.

In order to investigate this phenomenon of the most-influential lists up close, I subscribed for six months to Time Out London. I noticed that the 'critics' choice' of plays and exhibitions seemed to change at an impossibly rapid rate; if at a given moment a certain play was the best thing showing in London, then we should expect it to remain on the list for a while, like a book on the bestsellers' list (which stays on the list by virtue of its sales). The Time Out lists, however, were based on the pressing necessity for whatever is new, even at the price of artistic integrity.

I studied the weekly magazine for twenty-two weeks, making sure to keep on top of show closings so as not to look for them in the critics' choice list even if they were there the week before. Here are the results: seventy-six different plays appeared on the list during the period concerned (six each week). Of these, only thirty-two (!) made the list a second week running and a mere two hit a record of five weeks on the list. Four plays managed to stay in the critics' choice list for four weeks running while four different plays rated three appearances, not necessarily consecutively. Twenty-two plays made the list twice. Incidentally, at any given time there are some one hundred and fifty plays being staged in London and mentioned in the magazine. You do not need an advanced degree in statistics to realize that it is hard to be considered a Time Out-recommended play in London for longer than the blink of an eye. Out with the new, in with the newer, this popular magazine tells us. The result, however, is that the average citizen, who sees no more than three plays a year, can never know which in the opinion of the magazine are the ones not to miss. There

is nothing he can do but follow the list of recommended plays, which changes constantly because the magazine is more concerned with selling copies than it is with artistic criticism.

In the U.S., a film's fate is largely determined by sales over the first weekend of its release. This is consumerism at its best: if you are at a party and you don't have anything to say about the latest Hollywood product to hit the markets, you don't exist.

So under these circumstances, it came as a surprise to no one when France, a stronghold of European culture, produced *How to Talk About Books You Haven't Read*, the amusing book by well-known literature professor Pierre Bayard that provides a method for being able to discuss some of the classics of world literature without reading them. Bayard's recommendations include avoiding details and rational thoughts, allowing instead the subconscious to express one's personal relationship to the book. If you are called upon to summarize the book for others, Bayard suggests that you place the book in front of yourself, close your eyes, try to assess what might have been of interest to you in this particular book and then write about yourself.

Entrepreneurs in, tigers out

My thoughts returned to the topic of most-influential lists when in 2007 I visited an exhibition of the photographer Taryn Simon, who for years has been documenting the hidden and often dark sides of the American experience.

One of her photographs was of a magnificent white tiger crouching in its cage. From the accompanying text I learned that this was Kenny, who was born to a tiger breeder in Arkansas on February 3, 1999. Kenny is mentally and physically handicapped. He is limited in his movements and his sunken nose makes breathing and chewing difficult. Nevertheless, breeders consider him 'high quality' because he was born with white fur, blue eyes and a pink nose, the holy trinity as far as white tigers are concerned.

It turns out that nearly all white tigers in the United States are born from being bred with members of their own family in order to ensure the proper genetic mix for 'high quality' cubs. Inbreeding has become the most common method for reaching this goal. Still, in spite of the breeders' best efforts, only three percent of these cubs are considered 'high quality.' All the other cubs from Kenny's litter, for example, can be counted among the 97 percent of 'low quality' animals, with yellowish fur, cloudy eyes and a nose that is not pink.

Nature conservationists do not actually consider white tigers to be rare. They claim that breeders, zoos and amusement parks tend to overbreed this unlucky species for financial gain. A high quality white tiger sells for no less than \$60,000.

Is Kenny a celebrity among white tigers because of the winning combination of his features? Does he feel that way as he tries in desperation to eat the food his keepers place in front of him, or when he limps to the other side of the cage? And in general, what is the connection between external features that breeders term 'high quality' and the qualities of this unique species when it is free in nature?

The feeling that Kenny the white tiger is an allegory for an entire culture in which competitiveness, social standing and consumerism are the new definitions of societal 'quality' did not cease to disturb me for hours after I left the exhibition. 'White tigers' may appear in gossip columns and various lists of the most influential, but the other 97 percent of the population can do nothing but accept the external, superficial features decided upon by the 'breeders' in everything concerning the way they look, speak and act.

But who exactly are those 'breeders' who, for example, press young technology entrepreneurs into competing, at almost any price, to be the biggest success story on the net?

Michael Arrington, for example, the founder of TechCrunch, a blog that reviews technology startups, is a good place to start. A good word from Arrington can lead to an avalanche of responses from venture capital funds fighting to fund the fledgling enterprise. A bad word, on the other hand, will seal the fate of even the most interesting project. Arrington is so enamored of his own influence that he is likely to publish a poorly researched review and correct himself later, without even offering a suitable apology.

Skype, a technological white tiger of the hi-tech species, was founded by Niklas Zennström and bought by eBay in 2005 for \$2.6 billion. Two years later the new owners admitted that the deal was a failure, since Skype did not live up to its promise, and Zennström was fired. Had the money from this failed venture made its way to you, you would have found yourself squarely in the middle of the Forbes list of billionaires.

Indeed, the people who decide and make these lists are among the new 'breeders.' If in 2006 it was enough to have one billion dollars to be included on the Forbes richest list, by 2007 it took \$1.3 billion; just give it the old college try and come up with that missing \$300 million! But if you mess up, you may very well find yourself cross-eyed and with yellow fur, limping all the way to the bank.

There is a price for the narrow funnel that these new breeders encourage. High quality or not, we are all more vulnerable than we realize to the noise of being in style – both as individuals and as a society. The three percent at the top of the pyramid are afraid of losing their status (keep in mind how long the half life is for people on the most-influential list) while the rest fear the echoing failure of falling short of reaching the top. Just like Kenny the white tiger, none of this is visible from the outside. If only we could decide that 'high quality' refers to good parents, loyal friends and people who extend a hand to those in need...

Bullshit and the art of crap-detection

"Television is altering the meaning of 'being informed' by creating a species of information that might properly be called disinformation. Disinformation does not mean false information. It means misleading information -- misplaced, irrelevant, fragmented or superficial information -- information that creates the illusion of knowing something, but which in fact leads one away from knowing..." So wrote American media theorist and culture critic Neil Postman in his 1985 book about the ravages of television, *Amusing Ourselves to Death*.

Postman delivered his most famous lecture in 1969 at a national convention of English teachers. The lecture was entitled *Bullshit and the art of crap-detection*, which says it all. Postman encouraged the teachers to develop their students' ability to differentiate between that which is meaningful and that which is not. He asked the gathered crowd to accept as a basic assumption that we are exposed to more bullshit than is right and proper every single day, so if they could only help the students to accept this fact as well they could prevent the reoccurrence of the very same noisy and cruel fate that befell us.

Postman is an expert in identifying the empty expressions we use and gives markers to the variety of bullshit we are exposed to. Utterances that are intended to glorify the speaker and dwarf his listeners, fanatical utterances and utterances that are nothing but the bullshit of superstition: "Superstition is ignorance presented in the cloak of authority. Like, for instance, that the country in which you live is a finer place, all things considered, than other countries. Or that the religion into which you were born confers upon you some special standing with the cosmos that is denied other people."

But Postman's teachings are particularly interesting in that he makes a connection between the finality of our existence and the noise generated by the media. The most

important characteristic that Postman identifies in this context is the sharp sense of recognizing the ridiculous: "Maybe I mean to say, a sense of our impending death. About the only advantage that comes from our knowledge of the inevitability of death is that we know that whatever is happening is going to go away. Most of us try to put this thought out of our minds, but I am saying that it ought to be kept firmly there, so that we can fully appreciate how ridiculous most of our enthusiasms and even depressions are...Reflections on one's mortality curiously makes one come alive to the incredible amounts of inanity and fanaticism that surround us, much of which is inflicted on us by ourselves."

Indeed, there are few topics that make us feel more helpless than thinking about our own death. Could it be that the consumer culture in which we are awash is a way of coping with this noise?

The world of modern literature has its own answer to that question. Don DeLillo's 1985 novel *White Noise* confirmed his reputation as one of the most important writers of our time. The plot takes place in a bucolic midwestern college and follows a year in the life of Jack Gladney – a professor who has made his name by pioneering the field of Hitler Studies – and his family, when 'white noise' bursts into their lives, which is DeLillo's definition of the incessant murmur of American consumerism. DeLillo presents the characters as they try to distract themselves from their fears, most notably (and extremely) their fear of death, which causes them to distance themselves from any chance of discovering their real selves. DeLillo admits that he got inspiration for the death-obsessed Jack Gladney from Ernest Becker's book *The Denial of Death*, which was discussed in Chapter X, "The most awful noise of them all." He has explained that the idea for writing *White Noise* came to him while he was watching the news on television and discovered that chemical spills had become so routine that no one wished to report them anymore.

In one of the book's scenes, Jack confesses to Murray, his friend and colleague at the university, that death is his worst anxiety, the only thing he thinks about, and that all he wants is to live. Babette, Jack's wife, is also fearful and uncertain in her identity due to her fear of death. They find their own personal solution for this existential problem with which they are grappling through consumerism.

Author Gail Hareven wrote about *White Noise* that "the characters' attempts to grapple with anxiety are unavoidably consumer attempts...The family gets carried away on a shopping trip meant to bring salvation...The remedy for their anxiety is buying something... In a world of consuming it is hard to distinguish between an image and the 'real thing,' between the reflection from a television screen and me."

There are few books that succeed so well in making the connection that DeLillo does between the noise of the fear of death and the noise of consumer culture. With sadness at our fate, and in keeping with the first rule of noise, the most recent noise tends to replace the original noise, since it is more bothersome.

The Noise of Experts

"Where facts are few, experts are many"

Donald R. Gannon

The person attributed with expressing the idea that information is not knowledge is Albert Einstein. Nevertheless, many have noted that what may be true for scientific observation is not necessarily true for the world of investment. Intuition opens the door to the feeling that additional financial information improves our investment capabilities just as a lack thereof is liable to harm them. Paul Andreassen, a psychologist at MIT, thought differently. In a series of experiments he conducted among MBA students, Andreassen divided the students into two groups, each of which selected a portfolio of stocks they were familiar enough with to be able to estimate their values. Both groups bought and sold stocks in their portfolios according to the information with which they were provided; one group was allowed to see only the actual change in the stock price, while the other was exposed to a constant barrage of financial news and commentary that explained the fluctuations in the market.

To Andreassen's surprise, the group exposed only to the fluctuations made surprisingly better decisions than the group exposed to news and commentary. Further, the more the stocks fluctuated, the greater the disparity between the two groups. Ultimately it became clear that overexposure to information leads to distraction. Instead of focusing on the main variable – changes in a stock's trading price – the information-exposed group was preoccupied with the latest financial gossip and rumors coming from the market. As psychologist Herbert Simon, winner of the Nobel Prize in Economics, said, "A wealth of information creates a poverty of attention." As a result, members of the information-exposed group proved to be more active than the other group. But as is well known, the stock market punishes those who act with overconfidence, especially the kind that leads to excessive activity. Research has proven again and again that excessive activity is a sure way to harm one's performance. Thus, too much information leads to excessive activity and this, in turn, leads to underperformance. The phenomenon is known as an 'illusion of knowledge,' and is based on the erroneous belief that the accuracy of a forecast increases in direct proportion to the quantity of information available.

It was Paul Slovic who, in 1973, conducted the classic experiment that turned this belief on its head. Slovic showed a list of eighty-eight different variables pertaining to a

racehorse's performance (number of races won, weight to be carried, etc.) to eight experienced bookmakers and asked them to rank this list according to importance.

In the next stage, the bookmakers were given the information they had ranked as important for the forty most recent races of a number of horses. The bookmakers were asked to rank the top five horses for each race, using the top five variables by importance, and then the top ten, twenty and forty variables. Thus, each bookmaker predicted the results of each race four times, based on the differing amounts of information he received.

In addition to their predictions the bookmakers were asked to rank the confidence level with which they made each prediction. Figure 2 shows how accuracy of their predictions and their confidence changed with the growing quantity of information at their disposal:

The result was that the accuracy of the picks remained the same no matter how much information the bookmaker possessed. On the other hand, notice what happens to the confidence curve: it rises sharply with the amount of information. When the bookmakers had five pieces of information at their disposal there was some correlation between the level of accuracy and self-confidence. But when forty pieces of information were available the level of accuracy remained constant at 15 percent, while the confidence level rose to more than 30 percent. This pioneering research demonstrated for the first time that additional information is not necessarily better. It does not change the quality of the prediction, only the level of overconfidence.

Other studies have confirmed this phenomenon, by which additional information does not necessarily improve performance but does clearly increase confidence. A study published in 2007 by Claire Tsai and her colleagues made use of Slovic's classic experiment in a different, though not altogether removed, field.

The study set out to assess the connection between the quantity of information available to amateur football fans and their ability to predict the outcomes of fifteen NCAA games. The results revealed that, like the experiment carried about by Slovic thirty-five years earlier, the ability of the participants did not improve with more information. It stood at 62 percent after participants were given six randomly selected pieces of data and remained at that rate after the fifth stage, when participants were in possession of thirty pieces of data.

In this experiment, too, the researchers tested the level of confidence the participants felt when making their predictions. Here, too, as with the original experiment, the additional information had a positive effect. From a 69 percent confidence rate after six pieces of data had been handed over, the participants' confidence rate rose to nearly 80 percent after receiving all thirty pieces of data. All right, you're saying, in a horse race or college football anything can happen. But what about European soccer? Surely soccer works according to the illusion of knowledge – more information, more actions – so, you say, stop driving me crazy about trusting predictions. No problem: behavioral science researchers have more subjects for esoteric study than funds for research.

In an experiment conducted in Sweden, researchers set out to examine the level of confidence and the ability to predict game outcomes of the first round of the 2002 World Cup Championships by 251 people participating in the experiment. Some of them were experts (sports columnists, coaches, fans) and others completely ignorant about everything connected to soccer – if you can believe there could be such people in Europe. In this study as well, the level of accuracy in the predictions of both groups of participants was similar, and often better, than a completely random guess. Nevertheless, the application of one simple rule, according to which the prediction is based on the position of the group in world ranking, would bring about a better result than that made by most of the participants. In this study, too, the phenomenon was evident: adding information did not improve the results of the predictions (especially among the non-experts) but did increase the confidence of those being tested.

Conventional wisdom says that a surplus of information is always preferable to a lack thereof. The two incorrect assumptions that form the foundation of such thinking are that we will always be able to ignore irrelevant information and that our brains are not limited in their capacity for processing information.

We have already looked at the limitations of the second assumption in George A. Miller's *The Magical Number Seven, Plus or Minus Two*. And yet, investors and other decision-makers spare no effort at knowing everything possible about a stock or anything connected to a decision they are about to make. If you are familiar with investors then you know that most of them believe they need to know more about the stocks that interest them than anyone else in order to make a killing in the market. They are likely to spend their time reading reports, newspaper items and anything else they think will be relevant, in the hope that this activity will indeed improve their performance.

And what about the first assumption? True, the idea that a surplus of information is preferable to a lack not only has clear evolutionary backing, as we have already seen, but economic as well. Truth be told, the logic seems quite clear: if you are not in need of additional information, simply avoid using it. But what corrupts this simple assumption is the overconfidence that comes along with a lot of information. Studies repeatedly prove that overconfidence and excessive optimism adversely affect our judgment, almost more than any other factor, and since they encourage excessive activity they become one of the biggest destroyers of stock value in the market.

At this stage, if indeed you have become convinced that a surplus of information is corrupting, then undoubtedly you will ask yourself how little is too much? Australian researcher Meliha Handzik has an answer for you, but I'm not sure you'll love it. Handzik planned an experiment in which participants were asked to make predictions about the optimal production quantities of a fictional company selling ice cream on Sydney's famed Bondi Beach. The participants were made production managers, and their goal was to trim costs involved in inaccurate sales predictions that lead to over-production and the inability to sell the product, or under-production, which allows the competition to take a bite out of their market share.

At the end of each day the participants were asked to decide about the production quantities of ice cream for the following day, for which they were presented with – what else? – information. This information included three items: a comprehensive weather forecast, a solar radiation report, and the number of people expected on the beach for that day. The test groups were split into two – one received only one item of information while the other received all three. You guessed right: the group that received more information made accurate predictions less often than the other group.

Our thirst for financial and other information does not improve our performance. On the contrary, additional information beyond a certain level harms our performance, especially because it adds to our self-confidence.

Nonetheless, we continue to read the daily papers, listen to television and radio commentators, consume financial news on the web and open with excitement any email that seems to bring new information. This is considerable noise for what not only fails to aid us in making investment decisions but also probably harms our investment capabilities.

Equity analysts are the noisiest

One of the most bothersome noises for readers of financial columns in newspapers is the analysts' recommendations published nearly every day. Even if we agree that such recommendations are designed to promote business for the investment houses that employ these analysts, we can still expect a certain level of accuracy in the predictions.

Rui Antunes, at the time a member of the research team at the Dresdner Kleinwort Bank, decided to test this accuracy. Antunes looked into the gap between analysts' predictions for companies' performances and their actual performance according to the proximity of the analysts' forecast date to that of the publication of the results. The study, which included analysts' predictions from 2001 to 2006, began some two years before the results were published and investigated how the analysts' forecasts changed with regard to the companies' financial performance the nearer the date of publication of the results.

Antunes' conclusions were, at very best, worrisome. It seems that financial analysts are hopeless optimists. In the U.S., the average twenty-four-month forecast error is 93 percent, and the average twelve-month forecast error is, predictably, smaller, at 47 percent. Even at this level of error it is clear that the analysts' forecasts are worthless and can be classified as pure noise. The data for Europe are no less disconcerting and are nearly identical to those of the U.S.

If you had hopes that the companies would provide more useful, less optimistic information, wait until you read the results of a study conducted by Duke University on the level of optimism among CFOs of large American corporations with regard to the economy – in general and at their own companies. The study was carried out at each quarter and tested for the first time during the second quarter of 2002. CFOs, it appears, are consistently more optimistic about their own companies' finances than about the economy in general.

In a study conducted in December 2007, before the official start of the economic slowdown, the CFOs were relatively optimistic with regard to the economy (57 on a scale of 0 to 100, with 100 being absolute optimism) but much more optimistic about their own companies (68 on the scale).

A different question in the study set out to clarify how CFOs figure the price of the value of their own company's stock relative to its actual price in the market. The percentage of CFOs that thought their stocks were being traded below their actual value was 60-80 during the six years studied (1996-2002). Only 20-40 percent felt their stocks were being traded at a fair value. Of particular interest is the stance of the CFOs at technology

companies. Even at the height of the bubble, at the start of the millennium, nearly 90 percent believed their stocks were undervalued. So much for objective information from the companies' management.

Nassim Nicholas Taleb has a strong opinion on this matter. During our conversation he informed me that when he was only twenty-two years old and an MBA student at the Wharton School of the University of Pennsylvania, he was struck with the idea of efficient markets. According to this idea, there is no chance of profiting from traded securities since investors have already expressed the information they have about them in their price. Under these circumstances, the marginal financial information that the media provides can no longer serve the investor in a stock of a public corporation. Ever since, he admits, he has stopped reading newspapers and watching television, which enables him to read more than one hundred books a year.

The investor who mistook his analyst for a hat

The only stocks that rose at the height of the drama that gripped the financial world in the fall of 2008 were those of companies manufacturing hats. Thousands of financial analysts and commentators around the world watched their computer screens in shock, praying that no one would think to pull up what they had written only weeks before the downfall in some cases, and make them eat their hats – which is a nice way of saying what they really feared was professional humiliation and even losing their jobs. One of those experts was Richard Bove, an analyst with Ladenburg Thalmann Financial Services. On August 21, 2008 he upgraded Lehman Brothers, the first domino to topple, to 'buy.' Bove was convinced that Lehman Brothers was an excellent candidate for a hostile takeover and that management would not be willing to sell too low.

On September 5, ten days before the fall of the venerable firm, Jeff Hart of Sandler O'Neill and Partners expressed confidence in Lehman Brothers' ability to overcome the credit crisis and urged his clients not to sell. Hart was certain the bank could absorb the losses anticipated in its financial reports.

Six months earlier, the Goldman Sachs investment bank raised their ranking of Lehman Brothers stock from 'neutral' to 'buy' after analyst William Tanona was assuaged by the steps taken by the Federal Reserve to reduce drastically the chance that one of the large investment firms could be harmed (was he perhaps thinking of Goldman Sachs as he wrote his report?). Lehman Brothers thus joined Morgan Stanley on the list of stocks

recommended by Goldman Sachs. Tanona set a target price of \$45 per share, a modest rise in the price of Lehman stock when the recommendation was published.

Aaron Katzman, managing director of America Israel Investment Associates, needs a particularly large hat. On January 1, 2008 Katzman predicted that the Dow Jones would end the year at 14,350 points. Half a year later he informed the readers of his blog that the picture would become clear and the positive results of companies would confirm for all the world that the U.S. was not and had not been in a recession.

Mark Hulbert announced to readers of MarketWatch in December 2007 that he would make an exception and relate to predictions for the upcoming year, even though he did not usually attach much importance to such forecasts. Hulbert quoted the predictions of seven sources whose opinions he valued, including Value Line. The conclusion was cautious optimism.

An especially wide-brimmed hat should be placed on the desk of Professor Jeremy Siegel, senior lecturer at the Wharton School, who lectured at the annual conference of directors of Israeli public companies, in January 2008. He said, "The U.S. is far from a recession...and the sub-prime crisis will fade out by mid-2008... as for the stock market, the recovery expected toward the middle of the year should positively affect the leading indexes, which should, in my opinion, lead to a 10 percent yield."

But the largest hat of all should be saved for Jacob Frenkel, former governor of the Bank of Israel and vice chairman of AIG international. Frenkel is a regular guest of the World Economic Forum at Davos and his optimistic forecasts are a source of warmth for the policy-makers who gather each year in the snowy town. The frostier forecasts there were annually made by Nuriel Rubini, a professor of economics at NYU. In January 2007 Rubini identified the Three Bears waiting in the woods of global economics for Goldilocks: the housing market, the credit crunch resulting from high interest rates, and the high price of oil. In response, Frenkel admonished him (to applause from the crowd). "I'm sorry, my friend, Mr. Rubini," he said, "but I must disagree with you. All these bears lurking for us in the woods ultimately sprout horns and turn into bulls." He claimed that these dark predictions would not come true and that it was nearly possible to say that we are immune to failed economic policy thanks to the strength and efficiency of the financial markets.

A quick look through the morning papers since the fall of Lehman Brothers and the acquisition of AIG by the U.S. government continues to provide headlines behind each of which stands a businessman holding a particularly tasty hat in his hand.

Professor Andrew Baum of the University of Reading is fairly certain that the crisis in the real estate market will end in the next two years, claiming it is the "quickest in the history of real estate crises." Chaim Katzman, chief shareholder of Gazit and the real estate firm Equity One opined in a newspaper interview that the case of Lehman Brothers indicates that we have reached the bottom.

But wait a moment: isn't the mere presentation of these data a kind of distortion on my part? Many analysts were more cautious, and there are certainly a few businesspeople who related to the situation from a broader perspective than the limited financial viewpoint of their companies (the writing on the wall was so clear that there was nothing left of the wall, only writing). Of course these people exist, and may even represent the majority. But I am trying to prove a point – that the opinions of financial experts and leaders are not better than our own. If I were to present an objective picture here I would be damaging my chances for doing so, so instead I have with a clear conscience chosen to present what suits me. Yes, I am sorry to tell you, but the last few pages have been a twenty-four-karat example of pure noise. At least I have the integrity to say so.

Information is not knowledge and knowledge is not wisdom

The majority of the information we consume is spoon-fed to us by various media outlets seemingly shrouded in authority. Should we be spending our limited time and attention on listening to the commentators who can be found in every news report these days?

You know the situation: the former government secretary or advisor, a speaker in demand around the world, leans back comfortably in his interviewee's chair, adjusts his glasses, and holds forth on a slew of options available to the chairman of the Federal Reserve for solving the economic crisis. But does this VIP really know something the rest of us do not? Has anyone bothered to check to what degree his hundreds of past predictions have come true to date?

It turns out that the experts are no different from the rest of us, especially in the way in which they err. Philip Tetlock, a professor of psychology at Berkeley, spent twenty years of his life proving this calming distinction. You can read about his findings and conclusions in his 2005 book, *Expert Political Judgment: How Good Is It? How Can We Know?*

Tetlock's research proves that people who have made a career of forecasting – experts who appear on television, those quoted in articles, governmental and business advisors – are not truly better at it than we are. When they are wrong they are only

occasionally perceived as accountable for their errors, and even less frequently they themselves are willing to admit it. In these circumstances they steadfastly claim that their timing was off, or they were misled by an unexpected event, or they were wrong for all the right reasons. Their self-justifications are similar to our own, and their limited willingness to change their outlooks as a result of their mistakes is reminiscent of ours. Furthermore, the more the expert is well-known and often quoted, the more he is expected to miss on his predictions. The accuracy of experts' predictions is in inverse proportion to their self-confidence, their public recognition, and surprisingly, beyond a certain point, even the depth of their knowledge. The problem of experts is the problem we all have as human beings. We are in love with our own gut feelings and hate being wrong.

In an experiment Tetlock was present for thirty years prior to writing his book, a lab mouse was put in a T-shaped maze in which there was food at one end of the T. The food, however, was not evenly distributed; 60 percent of the time it was placed on the left side of the T.

A group of students from Yale, where the experiment was conducted, was asked to guess along with the mouse where the food would be placed. The mouse understood early on that the food was placed on the left side of the T more often than the right and so he headed toward that side every time. Thus, he succeeded 60 percent of the time. The students, preoccupied as they were with discovering the complexity of the experiment, were only able to guess correctly 52 percent of the time.

Like those students, experts tend to get caught up in their own attempts at exposing the complex layers and dimensions of the topic at hand, thereby erring in their predictions. Further, some of them enjoy the publicity and public esteem that obligate them to make use of every bit of the knowledge they have in their field in order to impress viewers or readers. In many cases this does not work in their favor or ensure accurate predictions.

The experts – again, like all of us – relate to the future as something undefined and the past as unpreventable. Experts are good at being right after the fact. If you look back it is easy to see the string of events leading up to the fall of the Soviet Union or the attack on the World Trade Center. But that same string of events, so obvious in hindsight, is nothing more than a meaningless collection of dots when viewed into the future from the time they take place.

Tetlock's study was done of 284 experts who make their living as commentators and advisors predicting trends in politics and economics. In the framework of the experiment, Tetlock asked them to predict the chances of certain events in the fields of their expertise

and other fields ever taking places. These are some of the questions: Would the end of South African apartheid be bloody, violent? Would Gorbachev be ousted from office in a revolution? Would the U.S. start a war in the Persian Gulf? In the course of the experiment, which ended in 2003, the experts handled 82,361 predictions!

In addition to his patience, Tetlock was well served by the ultimate simplicity of the statistical measuring tools he was using. The participants were asked to rank the probability of a trend developing by labeling it solely according to one of the following categories: 'growth' (as in financial growth), 'reduction' (as in a tax reduction) or 'no change.' The results were disappointing: the experts' chances for predicting probability for each of the situations was no greater than the random selection of 33 percent for each option.

Tetlock found that among experts, as with other populations studied, there is a prevalent tendency to err in terms of recollecting the probability they attached to an event after it indeed took place. They claimed that they predicted the turn of events more accurately than what was listed on their questionnaires. Also like us, the experts tended to err when they attached greater probability of occurrence to events with a greater number of variables.

The interesting challenge facing Tetlock was the attempt at defining the characteristics of those who succeeded in relative terms in their predictions as opposed to those who failed. The inspiration for the solution was found in the 1953 essay *The Hedgehog and the Fox*, written by British philosopher Sir Isaiah Berlin about Tolstoy. Berlin borrowed the title from the ancient Greek saying, "The fox knows many things, but the hedgehog knows one big thing."

The hedgehogs in Tetlock's research are the bad forecasters. They see the world through a one-dimensional lens and try to expand their field of vision to new areas through exaggerated confidence in their own powers of prediction and a lack of patience toward anyone who is not prepared to adopt their point of view. Hedgehogs believe, for example, that international relations are determined by a single bottom line: a balance of terror, culture wars or globalization, for example. On the contrary, people who are better at making predictions seem more like the foxes in Berlin's fable. These are people who know a lot of little things, skeptical about over-inclusive explanations and preferring a series of local explanations rather than a single huge theory. They make use of various sources of information and, truth be told, are not so sure of their own abilities of prediction.

The hedgehogs tend to exaggerate. Twenty percent of the events that hedgehogs said could not happen or were most unlikely to happen actually took place, as opposed to

only ten percent of the foxes. More than 30 percent of the events that the hedgehogs predicted would happen with certainty or near certainty did not happen. The foxes' rate was 20 percent.

Still, it is important to acknowledge that we all suffer from our primitive attraction to the decisive and self-confident hedgehog. The only thing that the media loves more than a hedgehog is two hedgehogs with conflicting opinions.

The Noise of Medical Information

"My doctor gave me six months to live, but when I couldn't pay the bill he gave me six months more."

Walter Matthau

In 1998, as I was approaching my fiftieth birthday, a close and very health-conscious friend persuaded me to undergo a cardiovascular scan using the latest technology available at that time.

The results of the scan changed my life. Printed on the impressive stationery of the New York clinic at which I did the test, the results painted a depressing picture of the chambers of my heart and with it, my deteriorating health. The doctor used statistical tables and graphs in four colors to outline the cruel fate that awaited me, the unlucky one in six people tested who receive this verdict. The scanning device had tested the amount of calcium in my blood vessels under the assumption – usually correct – that there is a correlation between the amount of calcium in the blood vessel and the fatty deposits that clog them and expose us to fatal heart attacks. Statistical data have always impressed me and at that time I still believed that the light of human progress shone from even the darkest corners of New York. After a short period of despondency, which included writing a will for the first time in my life, I decided to take my fate in my own hands. My lifestyle, which already included modest physical exercise and a basic awareness of good dietary habits, became a model of health: running, swimming or tennis nearly every day, red meat once a year, and only if that year had seen a 30 percent rise in the stock market.

Within months I had lost nearly ten percent of my body weight (I was not fat to begin with), and I proudly showed off my sunken cheeks as a badge of unfettered good health. In my mind's eye I envisioned scenes normally reserved for cardio lab researchers, my organs regaining their youth and flexibility, my heart developing new blood vessels to accommodate all the excess physical activity, the fats in my blood retreating in horror. That year's results of the full medical examination I have been undergoing yearly since the age of thirty-five confirmed my feelings, except for a stubborn cloud of doubt lingering over the stress test. While I was in absolutely excellent condition, each year my EKG would change during the exam and the nurse would summon the doctor in order to have a closer look at the electrical deviation that turned up there. Without boring you with all the gory details, I

was obliged, nearly every year, to add a few more coronary tests – some rich in radiation – to make sure I (the doctors insist on 'we') would not be taken by surprise in the future with an unexpected heart attack. I considered these tests a necessary evil and wondered to myself whether being in excellent shape were not enough to guarantee good health. Seven years after the original CT I did that same test again, at a clinic that made use of the very same equipment for purposes of comparison – even though by that time there were newer, faster scanning machines.

Once again there were numbers, graphs in four colors, and the same results. My seven years of self-discipline made no impression on the machine, the pride and glory of General Electric. At the end of this examination as with the first one, the doctor made it clear that only one in six people tested worse than I. The difference was that this time I could not change my lifestyle. Another tightening of the belt would lead to malnutrition or addiction to competitive sport at a harmful level.

I bore my fate courageously, praying that the end would not come before I could complete my first book. And then one day, while I was running in a London park, I felt a sharp pain in my left arm, one of the warning signs of an impending heart attack. I jumped into a taxi, had my wife waiting with my passport, and off we sped to the hospital. On the way I phoned my doctor back in Israel. After a brief consultation he informed me that I had been stung by some insect, probably a bee (suddenly I could see the sting itself) and that there was no need for panic. I must admit that all those extra tests, scans and examinations had succeeded in undermining my confidence.

Two years later, after some chest troubles, my doctor and I decided there was no way of avoiding a coronary angiogram, an invasive procedure in which a flexible tube is inserted into a vessel in the groin and threaded to the area of the heart requiring treatment, while a radiocontrast agent is administered. The picture is captured on the screen, enabling doctors to determine the extent of clogging in the blood vessels. Dispassionately and with great patience, like people untroubled, we made the appointment for the following morning at a private hospital.

Since the potential outcome of a coronary angiogram requires the cooperation of the patient, general anesthesia is not used. So I could see, along with the attending cardiologist, the blood vessels leading to my heart. I did not need long years of medical school and punishing residencies to understand that my arteries were completely clear.

Yes, dear reader, as you have undoubtedly already guessed, I was a victim of surplus medical information, and I have learned my lesson. In an overly emotional response I

stopped taking the few medications that were routinely recommended for people over a certain age (in the meantime I have resumed taking them). My suspicions with regard to interpretations of medical test results and the self-confidence displayed by doctors have been replaced by a stable source of renewed peace and confidence in my body and in the lifestyle I have adopted (so that first exam did in fact have an important effect on me). In my meetings with doctors – which are less frequent these days – I ask them to phrase their prognoses in terms of relative risk, and when they mention a number of options for explaining a certain medical situation I ask them to rank the options according to the order of the likelihood of their occurrence, and to try to predict which is most likely and which is least. If the tests they want me to do involve intrusive procedures or radiation, I do them only for the purpose of negating a likely possibility, and I think twice before doing them. Oddly enough, I came to understand that that seemingly unnecessary exam gave me the peace of mind that dozens of other exams robbed me of.

Our health, especially when it is deteriorating, is a source of noise that bursts in on us every time there is some sign of illness or some routine examination comes up with positive findings. Medical prognoses, tests, repeats of those tests (for verification) and often additional tests have frustratingly become part and parcel of medical routine today.

We open the envelope containing our test results and concentrate on the page that sums them up, desperately hoping to decipher what is written there before bringing it to the doctor. We give in, relinquish the results and wait to hear whether he will calm us down or add noise to our lives. Is the doctor willing to give up on checking out all the possibilities in favor of quantitatively ranking those options that should be negated? Is the doctor willing to take a chance and separate the wheat from the chaff? Is the doctor willing to understand that there is a high price to pay in terms of noise for a surplus of information?

A pill of statistical sobriety in treating breast cancer

There are few phenomena that exemplify the noise made by medical exams better than the mammography, which is designed to detect early signs of breast cancer. In 1996, the University of California published results of the first study of mammography exams performed on some 26,000 women. It turned out that only one woman in ten who tested positive indeed found signs of the disease in the thirteen months following the exam. In other words, the results for nine of every ten women who tested positive on the mammography exam were found to be false positive in a second test administered later. Among younger women the false positive diagnosis was even higher.

With women who undergo the exam annually or biannually, the picture is even bleaker. After a series of ten tests, one in every two women who are *not* ill with cancer can expect to receive at least one positive answer during the period of testing.

Negating the positive finding involves an additional mammography, an ultrasound exam and sometimes a biopsy. For many women the mammography exam itself is painful and frightening, and a positive result can lead to anxiety, depression and loss of concentration. The emotional upheaval caused to women who test positive can be shattering and can very well remain with them even after the test proves to have been wrong.

In a study published in the *New England Journal of Medicine*, Joann Elmore and her colleagues investigated the data for 2,400 women between the ages of forty and sixty-nine who were tested for breast cancer during a ten-year period. The researchers defined a test with false positive results as a test that pointed to a suspicious finding that did not develop into the disease within a year. The sample included 9,762 mammographic scans and 10,905 manual chest examinations performed by a surgeon. Among the women scanned, 23.8 percent had at least one positive mammography examination during this period and 13.4 percent had one positive manual exam. The estimated chance of at least one false positive diagnosis after ten mammography exams was 49.5 percent, while the estimated chance of at least one false positive diagnosis after ten manual exams was 22.3 percent. The incorrect diagnoses led to 870 doctor's appointments, 539 extra mammography exams, 186 ultrasounds, 188 biopsies and one hospitalization. Researchers estimate that 18.6 percent of women who do not have breast cancer will nonetheless undergo one biopsy for every ten mammography exams they take. There is a national aspect to all this as well: for every \$100 allotted for mammography exams, an additional \$33 is spent in an attempt at disproving the incorrect results that were attained.

Noisy, isn't it? But if you want even more noise, here is something to incite you: the radiation emitted by mammography devices has a carcinogenic effect that finds expression some ten to twenty years after the treatment. The risk is particularly great among young women and it reduces to nothing by the age of sixty. According to up-to-date estimates, two to four women among the ten thousand who took part in the mammography scan program began at age forty to develop cancer as a result of the radiation during the technique, and one of those will die as a result. The data represent only rough estimates and are affected by various technical elements. Nonetheless, it is important to recall that the amount of radiation emitted by mammography scanners in the 1970s was more than ten times greater than the amount emitted today.

Doctors as human beings

Gerd Gigerenzer, of the Max Planck Institute, asked a group of doctors what the chances are for a woman who tests positive on a mammography examination to be actually ill at the time of her exam. The features of the mammography scanner that Gigerenzer presented to the doctors were meant to find 90 percent of those who were in fact ill and to err in no more than 7 percent of the women who were not (in other words, a well woman receiving a false positive test result).

But we have forgotten the most important thing of all: the rate of breast cancer among women forty to fifty years of age is 0.8 percent (eight in every one thousand). This rate is what creates the most important reference point, the absolute risk. Without this piece of information, all the other data are meaningless.

So what then is the chance of a woman who gets a positive test result actually being ill? Complicated, no? Is it 90 percent, as many intuitively assume? Or something else altogether? Don't feel bad if you haven't got a clue, you are not in the minority. If we rephrase the question not in terms of percentages but in terms of relative frequency, the picture becomes clearer.

Eight of every thousand women are ill (an absolute risk of 0.8 percent). The instrument will catch seven of those, or about 90 percent. For every 992 healthy women tested, seventy will nonetheless receive a positive response (about 7 percent). In other words, all in all, from seventy-seven positive answers only seven reflect illness. Therefore, the chance of someone who has received a positive response on a mammography exam actually having breast cancer is seven out of seventy-seven, less than one to eleven (9

percent). Of the twenty-four doctors asked to relate to this question, only two were accurate. Another two were not far off (for the wrong reasons) and all the other missed the mark by a huge margin. This is an excellent example of the difficulty presenting a medical topic in terms of probability.

A positive response on a mammography exam is not good news, but the chance that the person receiving it is actually ill is much smaller than the chance that she is well.

Nevertheless, it is important to recall that despite the fact that the vast majority of positive test results are incorrect, the entire process carries a certain addition of information: the chance that those diagnosed with a suspicious finding at the time of the test is actually quite small, but still larger than it was before the exam (9 percent versus 0.8 percent from among the general population). On the other hand, the chance of someone who received a negative response being sick at the time of the test is even smaller than previously thought.

A similar experiment conducted by psychologist David Eddy did not enable doctors to save face: ninety-five of the one hundred doctors tested were unable to make the calculation.

It is disturbing to think how many hours of sleep were lost by women given false positive readings, and how many were anxiety-ridden enough to undergo unnecessary surgery. When the diagnostic exam is imperfect – and so it is with the majority of mammography exams – the basic benchmark of the disease (in terms of absolute risk) being tested is the key to medical assessment.

We expect a doctor to present us with a full picture, only part of which is medical and part of which is statistical modesty, stemming from an understanding of the level of limited accuracy that the test represents. But how many doctors give their patients this kind of information? And how many of them are willing to admit that they are not familiar with all these data? It turns out that doctors are professionals, some of whom are not experienced in the quantitative methods that form the basis of presenting medical information in a way that is clear to the patient, and, no less importantly, to themselves.

Absolute relativity can be very noisy

One of the main tools used by noise agents is the way in which they choose to present data. We encounter examples of such on a daily basis; in many cases, even the people presenting the data are not aware of their own distortions. But I'm sorry to say that this is not always done in innocence. Still, even when information is accidentally served up in a misleading manner, we should be able to expect more responsibility on the part of people who present research data to the public.

In one widespread example, a journalist quotes from a study whose results are phrased in the terminology of range (minimum to maximum) or a possible series of scenarios. Few are the editors who can resist the temptation to include the most extreme results in the headline of an article. In 2005, a U.N.-appointed subcommittee published the results of a study carried out in the wake of a huge simulation that tested two thousand different scenarios on the relationship between the level of carbon dioxide in the atmosphere and climate change. Some one thousand of the scenarios found that doubling the level of carbon dioxide in the atmosphere would raise the temperature by three degrees Centigrade. A single scenario from among the two thousand predicted a rise in temperatures by a whopping eleven degrees. Guess which scenario made the headlines.

Although the phenomenon is prevalent in many fields, I chose to include the noise of information presentation in the chapter dealing with medical information precisely because it is particularly harmful there. We are quite naturally sensitive about our own health issues and are likely to err in assessing risks we are exposed to only because of the manner in which they are presented to us. And exaggerated risk assessment is just another way of saying 'noise.'

'One in nine' is a slogan used to signify the proportion of women who contract breast cancer from among the general population. This frightening statistic was adopted by the non-profit organizations seeking to promote awareness among the public and health authorities. But if you were to divide the women into age groups and cause of death it becomes apparent that while there is truly a one in nine chance – or more – that a woman will contract breast cancer, this statistic actually refers to the course of her entire lifetime, when in fact the chance of contracting the disease is much higher later in life. That notwithstanding, the chances of dying from breast cancer at an advanced age are relatively smaller, since other possible causes of death, such as cardiovascular illnesses, tend to kill women earlier than breast cancer. In fact, in the U.S. only three out of every hundred women will die of breast cancer before the age of 85, a mere one-sixth of the number that

will die from cardiovascular diseases. Under these circumstances, it seems that the ratios 1:9 or 1:6 serve someone's purpose, but not necessarily women's. For those organizations that promote awareness of the disease, there are enough worrisome data to share with the public at large without resorting to half-truths that may find a more receptive audience.

Another example, this time from Sweden, where a particularly broad study was carried out on breast cancer patients: over a period of ten years, 280,000 women were tested for the connection between a yearly mammography examination and the annual mortality rate for breast cancer. Below is a concise presentation of the results:

Annual mammography examination	Mortality rate (per 1000 women)
Carried out	3
Not carried out	4

The most common way of presenting the results of this research would be to claim that a mammography examination reduces the chances of dying of breast cancer by 25 percent. While this is true, the information that this claim presents is only partial. Many people mistakenly understand this to mean that of every one hundred women who undergo the examination, the lives of 25 percent will be saved. In fact, the 25 percent was determined by the relationship between 3 and 4 in the table, which is of course far less impressive.

Another way of presenting the results is by using absolute terms of risk reduction. Thus four (the mortality rate for women who were not checked) minus three (the mortality rate of women who did a mammography examination) is one, and one in a thousand is .1 percent. In other words, if one thousand women undergo annual mammography exams for a period of ten years, apparently one of them will be kept from dying of breast cancer. That may be less impressive, but the absolute risk is not subject to manipulation, giving it a real advantage.

Of course, the benefits of the exam can be presented in terms of life expectancy. In such a case it can be stated that women between the ages of fifty and sixty-nine who are checked annually increase their life expectancy by twelve days on the average. For those women whose lives have been spared this means a difference between life and death, but for those responsible for providing health services on a limited budget this is a true ethical challenge.

Presenting the risk in relative terms tends to raise the level of fear among us, although in many cases this is unjustified. The temptation to present risk in this manner is great, since the use of relative terms is always more impressive. Here is another example: if you read a headline claiming that men with high cholesterol are 50 percent more likely to have a heart attack, I am certain you are disturbed and even frightened by this news. The number fifty looks large, but what is its true meaning? The facts, which the headlines and in many instances the articles themselves do not reveal, are that of every hundred men of fifty years of age without high cholesterol, four can be expected to die of a heart attack within ten years. In contrast, among the same number of men but with high cholesterol the number rises to six. So while it is true that six is fifty percent more than four, in absolute terms it is a different picture altogether. If we take into consideration the vast majority of the two groups who are not expected to die of heart failure in the coming decade, the growth in risk rises from 94 to 96, which is a little more than 2 percent. Suddenly, the importance of reducing cholesterol becomes decidedly less essential and the side effects of medicines designed to lower cholesterol take on a new relevance. The absolute risk rose by only 2 percent. Could it be that a pharmaceuticals firm is behind the news item about cholesterol that prefers relative data to absolute figures? Or perhaps it is a research institute hoping to impress potential investors?

"Eating processed meat," screams the newspaper headline, "raises chance of colon cancer by 20 percent." This time, I think, I'm really worried, I've been caught red-handed. All those fast food meals scarfed down when there was no time for a proper lunch. I knew it would end badly, but the question is, How badly? What is the actual meaning of this frightening piece of information for me personally? Why is uncertainty always expressed in vague terms when my own fears are so personal and concrete?

Getting back to the headline, there is certainly something missing in this important information. Twenty percent more than what? Should eating processed meat be compared to jumping from an airplane without a parachute or to a game of Russian roulette with a single bullet in the chamber? What is the reference point, the absolute risk (the most important bit of information)? What is the chance of a man my age being diagnosed with colon cancer in any event? If it is particularly low, well, 20 percent above a low chance is still low. If it is relatively high, then maybe it really is worthwhile thinking twice before adding an additional risk factor like processed meat. I went online and entered my personal stats and relevant medical history on the website of the Harvard Center for Risk Analysis. There I

learned that indeed, the risk of contracting colon cancer – the most fatal cancer after breast cancer – rises from ten in 100,000 between the ages of forty and forty-five to three hundred cases per 100,000 between the ages of seventy-five and eighty. The accumulative chance for a man to fall ill with colon cancer during his lifetime is one in twenty. In my case, thanks to lots of physical exercise, the situation is a little better, but now I can finally understand the real chance I take by eating processed meat. Even if I'll miss the taste, I might prefer not to raise my chance of contracting this widespread and relatively fatal cancer from 5 percent to 6 percent. But then again...anyway, I fully understand what is on both sides of the scale and I am capable of weighing the significance of refusing to give up my dangerous eating habits.

I'm not done yet, however. There is, in this manner of presenting data, a kind of unnecessary difficulty in assessing information. I have already explained that we have trouble assessing the vague meaning of percentages, especially if they are extremely low, and we feel more comfortable in an atmosphere of relative frequencies.

So let's try again. If five out of one hundred people will develop colon cancer during their lives then the eating of processed meat will raise this number by 20 percent to six. In other words, one more person from among those one hundred will fall ill. As for the other ninety-nine, the eating of processed meat presents no additional danger – either they will develop colon cancer anyway or will not have it even if they are regular consumers of processed meat . Now the risk assessment becomes simpler. Are we prepared to change our eating habits in order to keep from being that one person in one hundred who would not have become ill without eating processed meat?

Even though we make frequent use of percentages, it is important to understand that our brains do not process them as easily as relative frequency does. In a study done in Germany, one thousand people were asked whether 40 percent was a) one-fourth; b) four out of ten; or c) one of every forty. One third of the respondents got the answer wrong.

There will be blood...but nothing else

The medical information noise that men are exposed to can be understood through the use of fecal occult blood tests. This is a relatively simple test that demands nothing more than the childish skills of smearing excrement on an applicator. A positive response (finding blood) could signal the presence of colon cancer.

Here is some relevant information: Thirty of every ten thousand men in the U.S. are walking around with colon cancer at any given moment. Of those thirty, blood will turn up in the stools of fifteen of them. Of the 9,970 others, who do not have colon cancer, three hundred will be found to have some blood in their stools, providing a false positive result. Now, how are you going to deal with a sample of men over the age of fifty and with no symptoms who have gotten positive results from the fecal occult blood test? How will you determine how many of them indeed have colon cancer? Sure, you'd like to deal with this some other time when you're not so tired...

Well, I'll save you the trouble. The calculation is exactly the same one we had with breast cancer. Of every twenty men who receive a positive result from the test, only one is actually ill, which shows that this test is even far less reliable than the mammography exam. This calculation does not completely negate the advantage of using these fecal occult blood tests, since colon cancer is one of the most treatable forms of cancer when discovered early. But this test is an additional example of how for every single piece of relevant information we are exposed to, we must endure nineteen others that are irrelevant, mere noise. And this noise – an incorrect diagnosis in this case – causes distress and anxiety and is a particularly effective factor in harming our quality of life.

The half-lifetime of medical truth

I imagine I would be more forgiving about the noise of medical information if only I could be convinced of the long-term stability of the assumptions upon which most medical procedures are based. But here, too, it turns out that we are living in a city with no walls.

Dr. John Ioannidis of the University of Ioannina in Greece studied forty-five articles on medical-related topics that had been quoted widely and had appeared in a variety of professional journals over the period 1990-2003. He found that the results of one-third of the articles he studied had been disproved or seriously weakened by later research. Further, he claimed that there is a greater chance that research results will later be proven incorrect than correct. The variance in the credibility of the studies was very large. The size of the

sample, the methodology of the research and the level of statistical significance of the findings are just some of the factors that affect credibility. In Ioannidis' opinion, the chance that the findings of a particular study will be disproved is greater when the field in which the study is being conducted is not inundated with research; when there are economic interests behind the research; when researchers are competing against one another for the purpose of achieving results that are statistically meaningful; and most importantly, when there is too much flexibility in the planning of the experiment. All these are too detailed and too boring to make it into a newspaper headline heralding a new health threat that has come to kill us quietly, or a food familiar to everyone that suddenly has been proven to save lives. The most often quoted studies are those that are 'hot truths,' a term coined by Dr. Benjamin Moses. These are studies that turn up in the health columns of newspapers and sometimes even the headlines. Ioannidis' research presents an important dimension in the shelf-life of medical theories over the course of time. The 'hotter' a medical truth is, the more likely it is to be tested and challenged by others, which may lead to its refutation. A 'cold truth,' on the other hand, remains in place since the number of attempts at challenging it is relatively small.

Another problem that characterizes some medical research is the fact that it relies heavily on the answers provided by participants in the study. So, for example, if you ask heterosexual men in the U.S. about the number of sexual partners they have you'll get a larger number than the answer provided by heterosexual women to the same question. So much for the credibility of the respondents.

As reported in the Journal of Surgery, Gynecology & Obstetrics in 1997, two Australian surgeons presented seven of their colleagues with the results of 260 proofs of studies considered correct when they were published (1935-1994). These experts were asked to classify each of the proofs as 'true' or 'not true' according to current surgical procedure; in other words, they were asked to evaluate whether the results of those earlier studies were still valid. It turned out that the validity of these studies was diminishing at a rate of 0.75 percent annually, so that over a period of forty-five years they would lose half of their validity. That is the half-lifetime of medical truth when it comes to surgery.

A French group that investigated a different field (in this case, liver disease), came to similar conclusions. Six experts looked at 474 truths published in scientific literature during the period 1945 to 1999. This time, the classification was more explicit: 'valid truth,' 'former truth' (one that has been replaced by a truth that describes reality better), and 'false truth'

(proven incorrect). By 2000, only 60 percent of the original truths continued to serve the needs of doctors in this field.

How much radiation is good for you?

One of the main dilemmas confronting the person standing outside her doctor's office with a battery of tests to undergo has to do with the level of radiation involved vis-à-vis the benefits of doing them. From my own experience I can say that few doctors who are not radiologists are familiar enough with the data on radiation to which we are exposed in a given exam. Under such circumstances, it is only natural that a doctor will be primarily interested in learning what can be gleaned from the tests without properly considering the side effects of radiation.

Naturally, the risk involved depends on a variety of factors, including, among others, the patient's age, length of exposure to the radiation and the amount of radiation administered. But the inherent danger in high-level radiation is tangible. Radiation ionizes atoms in live cells and enables them to interact with other atoms, like those of DNA, causing them damage. When the level of radiation is low, the cells manage to repair the damage quickly, but with high-level radiation, the cells are incapable of fixing the damage and so they die or change irrevocably. When these altered cells divide, they are likely to create abnormal cells which, under certain conditions, can become cancerous. With very high levels of radiation, the body's immune system is harmed and it is no longer able to fight disease or infection.

A lack of information is a source of noise prevalent among patients who feel that they would like to be part of the process and are interested in taking responsibility for assessing the risks inherent in radiation. But a lack of information is also what enables our fears to take the place of grounded scientific data. Since the chapter dealing with the dangers of radiation will quite naturally be full of numbers and figures, I have tried to make these more accessible to the reader without distorting the picture. Below you will find the radiation data for several of the most common tests and, more importantly, a comparison between the risks involved in these tests and the risks involved in a few everyday activities. For readers who manage to wade through this veritable sea of data, the prize is peace of mind – at least in this sphere. These readers will soon understand that the level of risk from radiation for most medical examinations does not justify the noise in their heads.

These data are based on material gathered from the University of Idaho. Presenting them here is solely meant to improve general understanding and insight. Anyone faced with a decision involving the risks of radiation should consult with a specialist. As I have already stated, not every doctor is a specialist.

Radiation is measured in rems (Roentgen Equivalent Man). A thousandth of a unit is known as an 'mrem.' The average amount of radiation that an American is exposed to annually – excluding medical examinations – is 360 mrem. The source of this radiation is mostly natural, like radon gas.

One way to relate to risk is by comparing it to one chance in a million of dying from some regular activity that we carry out on a daily basis. This chart lists some common risks. (Each item on this list represent the same level of danger.)

- Smoking 14 cigarettes (lung cancer)
- Driving 40 miles in a car (accident)
- Flying 1500 miles in a plane (accident)
- Being exposed to 10 mrem of radiation (cancer)

In other words, the danger inherent in exposure to 10 mrem of radiation is equivalent to that of dying from smoking 14 cigarettes or driving 40 miles on an open road or flying 1500 miles in a plane. This risk is relatively low and it stands, as stated, as one in a million.

But we still don't know the precise meaning of 10 mrem of radiation in a medical examination. The following is a table comparing the radiation levels from a variety of medical examinations and various daily activities as mentioned above. (Source: *Radiobiology for the Radiologist* by Eric J. Hall.)

Examination	Radiation (in units of mrem)	Number of cigarettes smoked	Number of miles driven
Chest/Dental X-ray	3.2	9	23
Head X-ray	15	44	104
Barium Enema	54	148	360
Bone Scan	440	1300	3200
Full-body CT Scan	1100	3250	8000

Looking into the dangers shows us that radiation is not a high-risk event when compared to other risks we take upon ourselves on a daily basis. The effects of radiation have been studied for more than one hundred years and are no longer a mystery. In fact, radiation is the most clearly understood cause of cancer today. And still, I would not recommend becoming addicted to barium enemas just because they carry less risk of radiation than smoking eight packets of cigarettes.

The relatively high rate of radiation that comes with a full-body CT scan represents a level of risk that is similar to the one we take in driving for an entire year (just over 8000 miles on average). And in quantitative terms, we raise the risk of falling ill with cancer as a result of the radiation level of a full-body CT scan by one to one thousand, or 0.1 percent.

So, for example, the exposure of a fetus in the womb to 10,000 mrem of radiation – about nine CT scans – will cause damage to the fetus. It is important to recall that the risk to adults, whose cells reproduce more slowly, is lower, and that a large part of the comparisons are based on estimations. Nevertheless, since radiation has a cumulative harmful effect determined by the special characteristics of the patient, it is recommended to consult with a specialist when more than a one-time routine exam is in the offing.

DNA tests, the ultimate medical noise

Ah, we sigh; if only we could be in possession of our own genetic makeup and be able to assess the risks of contracting any of a number of illnesses we could no doubt save ourselves a lot of grief. This wish has been part of human culture from time immemorial, and the hope for eternal life is at the foundation of a large part of the mythologies of ancient civilizations. Now, however, with the deciphering of the human genome, we can, for the first time, add it to all the scientific knowledge we have amassed until now, thereby linking genetics to human illness.

Unfortunately, even when we have this important information we do not attain the peace of mind we yearn for thanks to our limitations in interpreting it. The complexity of statistical presentation grabs hold of us here, too. The wonderful story of genetics begins in Austria more than one hundred and fifty years ago when Gregor Mendel began growing peas in the garden of his monastery. An Augustinian friar, Mendel performed his botanical experiments with characteristic resolve and discipline, documenting some ten thousand pea plants in all.

At the conclusion of his experiments, and after having identified in his peas certain characteristics, some of which were dominant and some which were recessive, the principles of genetics were born. Even more than one hundred years later, Mendel's principles remain the cornerstone of heredity theory. We recognize the characteristics he attached to peas (color and height, for example) as genes, and genes as fragments of DNA, the material that comprises the human genome.

Since 1983, when the gene linked to Huntington's chorea was ascribed directly to a certain chromosome, most genetic discoveries have behaved like Mendel's peas in the sense that they have focused on the characteristics associated with individual genes. Maladies like Huntington's chorea, a monogenic disorder (an inherited disease controlled by a single pair of genes), are relatively easy to research and the results are easy to define in binary terms: if you have a certain genetic mutation in the relevant gene you will almost certainly develop the disease. The mutant gene that brings on these diseases is dominant and thus likely to pass from generation to generation even by one parent. This indeed holds true for certain diseases like cystic fibrosis. If you have that particular genetic mutation you will contract CF; if you do not, you will not contract the disease. That is perfect genetic determinism at work.

However, this is not a typical situation. Normally, discoveries of 'the gene that is responsible for a certain malady' merely documents a situation in which a particular mutant gene is found with higher frequency in people who suffer from a particular ailment as compared to those who do not suffer from this ailment. That is all. There is nothing unambiguous, nothing more than a gentle scientific push in the direction of exploring a possible correlation between the two. And what does that push consist of? How strong is it? There is no way of knowing.

Even in the case of multiple sclerosis, where there is a strong correlation between presence of the gene and the illness, the connection is still ambiguous. One of the two genes attributed to the disease is found in 87 percent of people suffering from multiple sclerosis. But it is not present among the other 13 percent of those who do not suffer from MS, and more importantly, the gene can be found in 85 percent of the people who never develop multiple sclerosis. The second of the two genes can be found in 78 percent of those afflicted with the disease, but also in 75 percent who are not.

Multiple sclerosis strikes 120-150 of every 100,000 people and the chance of getting it increases only marginally in the presence of the 'responsible' gene. And this is a malady in which the connection between the gene and the illness are thought to be relatively clear. With hundreds of other diseases the connection is far less pronounced or does not exist at

all. Most illnesses, it turns out, develop as a result of the mutual effects that several genes have on one another and are thus thought of as multigenic. Research is still being conducted, but what is clear is that not all genes behave with the simplicity that was observable in Mendel's peas. Even the very sober *New England Journal of Medicine* described the attempt at keeping track of research in the field like "drinking from a firehose."

Today, some 1,400 monogenic illnesses have been tested genetically, from multiple sclerosis to the mutation that causes breast cancer. Genetic research has made enormous progress in recent years, but the understandable hope that most diseases would have a single, clear genetic component has turned out to be an impossible wish – at least for the time being. The 1,400 illnesses tested so far represent some 5 percent of all illnesses in the developed world.

Still, there is nothing too complicated about this topic to keep the health columns from writing about them. Here, too, the temptation to decipher the secret of life unifies journalists, readers, viewers and listeners, and it is to this scientific atmosphere that Anne Wojcicki, a biotech analyst working at a California hedge fund, sat down at the so-called Billionaires' Dinner, an annual charity event held in Monterey, California, and asked her tablemates – including a geneticist and CEOs dealing with genetics, as well as her then-boyfriend (and now husband), Sergey Brin, cofounder of Google – about their urine. She was curious whether, after eating asparagus, they could smell it when they urinated. Most of them could pick up the smell of a sulfur compound released as the vegetable is digested. It turns out that a certain gene is responsible for this ability. Wojcicki's earthy question led to an in-depth discussion about the gap between the wealth of genetic information being collected by scientists and the limited access that the population at large has to this vast reservoir.

The meal proved to be fateful for Wojcicki. It led her to cofound her own start-up, 23andMe (a reference to the 23 pairs of chromosomes that contain our DNA), a company that would give people access to their own genome and help them make sense of it. 23andMe is meant to be the harbinger of medicine tailored to the genetic needs of the patient.

For \$1000 and ten minutes of slavering to fill a 2.5-milliliter vial with spit, clients receive, within a month, an email inviting them to log in and review the results. On the website, the results are presented in such a way as to enable clients to learn, among other things, their personalized risk for a particular condition. However, apart from a few

instances, most of the risks are presented in terms of probability. And in this sense, as Wojcicki herself stresses, they are not a diagnosis, but "simply for your information."

Wired columnist Thomas Goetz, who himself did the test, describes his difficulty in coping with the nature of the results he was given. His risk for heart disease may be lower than the average, but he is at double the risk for prostate cancer, with a 30 percent chance of developing it in his lifetime. His risk of having Restless Legs Syndrome (an ailment characterized by jerky twitches in the middle of the night) are 32 percent greater than the average. And at 12 percent, his chances of getting glaucoma are three times the average American's.

Scanning his spreadsheet, Goetz admits, makes the odds start looking "more like land mines. An 18 percent risk for this potentially fatal condition, a 13 percent risk for that debilitating condition, and somewhere out there looms a 43 percent chance for something I may survive but sure don't want."

While Goetz entertains the thought that he can take some control of his genetic risk factor by changing his lifestyle through eating right and exercising, he also knows that chance is an important factor in the health equation. It is generally accepted that smoking is the single worst choice most people can make in terms of their health. And yet, about one-fourth of long-term smokers will not die of smoking-related diseases. Similarly, the main risk elements for heart disease – high cholesterol and smoking and high blood pressure — explain only half the cases of the disease in the U.S. And what do these risk factors mean in our daily lives and behavior? Is it preferable to adopt a proper diet and exercise regimen with no connection to the chance of falling ill, or only if we find our personal health situation falling below the national averages? And anyway, won't we be better off (in terms of peace of mind) not knowing anything at all about the future risk of various illnesses that we could come down with and simply do our best to maintain our health? In fact, who among us can distinguish between a 25 percent chance of contracting lugumbrious pintocis (a made-up disease) from a 30 percent chance of getting it?

Wojcicki is careful – perhaps on the advice of her lawyers – to emphasize that she does not deal with diagnostics, but rather sees our genomes as providing information and nothing more. And yet, this is precisely the key to understanding how this magic that hovers over us, the genetic code – which is supposed to foresee the circumstances of our demise like some Greek tragedy – becomes one more item in the information noise we fail to harness to our practical needs.

And man clung to his wife

In September 2008, Sergey Brin, co-founder of Google, announced to the readers of his blog that he carries the gene mutation LRRK2, which increases his chances of being afflicted with Parkinson's disease. While many Parkinson's sufferers manage to continue functioning in spite of the disease, which damages the central nerve system and hampers speech and movement, there is actually no cure, and the symptoms grow worse over time. Brin's mother, Eugenia, carries the gene mutation and has Parkinson's disease. Brin discovered this important genetic information thanks to a test he did at the 23andMe lab, which his wife established.

Brin's family connections did not help him; the results he received put him at a 20 percent to 80 percent risk of contracting the disease. But before his blog readers, who crave transparency, could start selling off their shares of Google, Dr. Susan Bressman, chair of the Department of Neurology at Beth Israel Medical Center in New York City, weighed in, explaining that "many people with this mutation never develop the disease. He is more likely to have a normal life than a Parkinson's disease life." By her estimate, only 30 percent of the gene carriers develop the disease.

"This leaves me in a rather unique position," Brin wrote in his blog. "I know early in my life something I am substantially predisposed to. I now have the opportunity to adjust my life to reduce those odds (e.g. there is evidence that exercise may be protective against Parkinson's). I also have the opportunity to perform and support research into this disease long before it may affect me."

Brin has become a victim of the noise he himself helped finance (Google invested \$3.9 million in 23andMe). The wide range (20-80 percent) the test result gave as probable chances of his contracting Parkinson's leave him with almost exactly the same knowledge he had before being tested, in terms of what steps to take (he was of course aware of his mother's illness and the genetic risk involved). Physical exercise is always a good idea in dealing with a long list of health hazards and it requires no specific medical diagnosis. Supporting medical research is also fitting and proper, especially for someone who has succeeded in business so hugely and is willing to take a role of social responsibility.

Brin's story is an excellent example of a diagnosis that should have been avoided. The way the results are phrased not only disrupts a person's peace of mind, it does not make any suggestions for action that would not have been a good idea anyway, with no test. While Brin himself lavished praise on the genetic testing as only a devoted husband can do,

the public apparently understood the limitations of the test. Google's stock rose by \$10 per share on the day of Brin's announcement.

Pulling the plug

People who are already familiar with the harmful noise effects of too much health information and wish to limit their exposure to it will probably consider a number of alternatives, but few are likely to doubt the efficiency of all medical treatment in its entirety. But that is precisely what Robin Hanson, a colorful professor of economics at George Mason University, does in his article *Fear of Death and Muddled Thinking – It is So Much Worse Than You Think*. Hanson cites studies filled with people who cast doubt on the ability of medical treatment to prolong life and on the true contribution to our health that derives from increasing medical expenditures.

In a wide-ranging study from 1990, Jonathan Skinner and John Wennberg investigated five million consumers of medical insurance in 3,500 hospitals around the U.S. The topic tested could not be more direct: had medical treatment prolonged the lives of patients participating in the study? Factors taken into consideration include age, sex, race, income, education and primary health issues. The findings revealed that an additional expenditure of \$1000 for medical treatment during the final six months of a patient's life led to a narrow span providing anywhere from an addition of five days to one's life to a reduction of fifteen days. In some places, where patients were kept an additional day in Intensive Care, their lives were shortened on the average by several weeks. (Causality here plays a role as aggressive medical procedures aimed at saving a patient's life will often end in the IC unit.)

However, the most interesting study of them all is one that was carried out on the American health insurance system in the late 1970s by the Rand Corporation. (The results would probably be the same today, since they rely on human nature more than the nature of the medical system.) Five thousand eight hundred and sixteen people in six cities were divided into two groups and studied for three to five years in one of two possible situations. The first group comprised only people with health insurance, and the treatment they received was free of charge. The second group was made up of people who had to pay most of their health expenses out of pocket. Naturally, those with insurance visited doctors and hospitals more often and spent on the average 75 percent more on medical treatment than those who had to pay for each treatment. Since the sample was too small to investigate

mortality rates, the researchers opted to use a general measure based on more than twenty different health indicators. The study came up with no pronounced differences between the health status of those with free health insurance and those obliged to pay. When the data were spread over four subgroups – wealthy people with insurance, wealthy people without insurance, poor people with insurance, poor people without insurance – it became apparent that the only significant result was that the health status of poor people with free health insurance had worsened. Further investigation of all the health indicators turned up additional findings: the good news was that free health care produced better vision thanks to free eyeglasses, less tooth decay in children thanks to free dental care, and more normal blood pressure thanks to regular checkups. The bad news was that free health care led to increased absence from work. And among the most infirm, only hearing problems and acne showed a change in status. All the other important health factors proved no different from group to group.

A brave new world?

Dr. Benjamin Moses is a medical doctor and proponent of a groundbreaking worldview that succeeds in providing an organized conceptual framework for the charged encounter between information and risk assessment, at least in the medical field.

Moses' approach is not accepted by the medical establishment. He asks doctors to assess the information they possess using tools that some are not equipped to use and others are unwilling due to the personal responsibility involved.

According to Moses' vision, there will arise from the ashes of the old approach to medical education a new system that will train a new breed of wise and reasonable doctors. These true professionals will need to understand that the chief aim of medicine is to reduce health risks, rendering doctors responsible for incorporating risk assessments and ranking of risks attached to different medical options into recommendations to their patients. Thus, even those who have not formally studied medicine can participate in the medical decisions being made about their future.

I met with Dr. Moses several times during the course of writing this book. I asked that he review the medical data included here with his experienced, pedantic eyes in order to confirm that they are up to date.

"The numbers are less important than you think," he said, surprising me. "Different medical research studies come up with different results and comparative studies reveal a

wide variance between them. What's really important is the existence of a relevant and generally accept conceptual framework for coping with general and personal medical information." Moses claims that first and foremost it is important to distinguish between cases in which treatment is expected to reduce the health risk significantly and those in which it will change only slightly, which he refers to as 'health maintenance.' Most medical research and most meetings between doctors and patients fall into the latter group.

"Medical treatments carried out in the Intensive Care unit of a hospital generally relate to cases in which the risk to one's health is great," he says. "In these case, however, the medical vacillation between the chance to reduce the risk and the risk of treatment is small. What's more important is that both the doctor and the patient distinguish between this type of situation and others in which the health risk is slight. In such situations, the balance between the positive effects of the treatment (reducing the health risk) and the potential side effects of the treatment is far less clear. Thus, there is great significance in the patient's making the right choice. The doctor plays a decisive role in presenting the various options properly, the advantages and hazards of each, in a manner in which the patient is able to weight his or her decisions according to personal aspirations and values so that he or she may choose well."

Moses challenges the indoctrination endemic to preventive medicine, which deals with low-risk health issues. He believes that a woman who feels that the risk involved in detecting a cancerous growth in her breast two years late does not justify the social price of being stigmatized as a 'cancer patient' two years earlier (along with the anxiety of facing a suspicious finding proved later to be benign), and thus refuses to undergo regular mammography testing, is as legitimate as the woman who opts for mammography examinations every other year, as instructed. "A cancer patient may be ostracized from social groups and the workplace. The risk of a positive test result proving benign is significant, and comes along with much suffering and anxiety. Many women cannot set this anxiety aside even after the biopsy proves that the growth is benign," he says.

The example that Moses gives of noise caused by the minor risks that threaten to complicate an uninformed person's decision about a proper course of treatment is that of the information and instructions that come appended to medications. "Patients," he explains, "may refrain from taking a medicine that will lower their blood pressure out of fear of side effects whose chances of presenting are negligible." But since the pharmaceutical companies do not rank the risks of side effects in terms of probability or even in relative

terms, they become a dangerous source of noise for those who expect to be able to make an educated decision according to them.

Noise Suppressors

A man has to ask himself two questions-- First. Where am I going? Second. Who will go with me? If you ever get the questions in the wrong order you are in big trouble."

Sam Keen, American writer and philosopher

The hundreds of pages and tens of thousands of words you read in this book before reaching this point were meant to convince you that noise is one of the central foundations of our world and that it is woven into the fabric of our lives in such a way that it has become a significant factor in them. Seeing our lives through noise is a unique means for observing reality around us, if we are in search of more balance in our lives instead of control or exhausting existential vigilance.

I accept, in advance, the critics who claim that my choices in deciding what to present on the topic were subjective. But let it be stated that I would not even have been drawn to deal with this subject were it not for the fact that I had intimate personal experience with it. And since noise corners us everywhere, I had no choice but to shine light in those corners to which I myself had been pushed.

Famed photographer Henri Cartier-Bresson coined the expression, 'the decisive moment.' In his opinion, the entire art of photography revolves around this single, decisive moment in which the photographer sees through the lens of the camera the composition and expression she wishes to capture. This particular moment will never be repeated, and in fact, Cartier-Bresson's street photos are masterpieces of patience – the wait for the exact and proper moment. The act of nonfiction writing is comparable to photography in the sense that it attempts to capture the facts, interpretations and bits of reality that provide the basis for its ideas.

There is, however, another school of thought within photography that can be found in the thousands of undeveloped negatives made by important photographers no longer living. This school of thought believes that the essence of photography is actually in the choosing of the right picture from among thousands these photographers have made, sometimes with no planning or preparation. In their opinion, one successful photograph in a roll of thirty-six is a real achievement. They wish to record life as it passes before them, their own intervention limited, only later deciphering what their lenses have brought them.

Their artistic statement is not expressed by choosing the right moment, and in that same manner the different chapters of this book are the result of a process of sifting through hundreds of noises and then presenting only a handful – the ones that create the fascinating 'story' of noise as I see it.

The essence of the story is the essence of this book: noise fills the physical space around us as well as our souls. Each and every one of us can define our own personal noise signature, that admixture of noises we are exposed to on the one hand and the noises we were clever enough to get rid of. Although noise generally has a negative connotation, its complete absence contains a danger: our brains take over, filling us up with the missing noise, though not necessarily in a way that represents reality any better. Sounds that our ears have never heard and sights our eyes have never seen are common items on the menu of a brain hungry for stimuli.

Internal and external noises can be distinguished one from the other, though on occasion it is true that the boundaries are blurred. Among internal noises is that most awful noise of them all, that of the fear of our own death, along with a whole variety of social noises – the ones made by 'the other' and by our need to belong and of course those of personality disorders, which alone can fill volumes. Among the most widespread external noises, the noise of consumerism and the noise of information feature prominently, as well as the noise made by experts. Special place is given to medical information because of the huge noise potential contained within.

In fact, the noise generators we are exposed to ultimately get amplified from an unexpected source before they reach us. Each of us has personal noise amplifiers based on our evolutionary roots but also on the conditions in which we were raised, such as family, culture, friends, teachers.

External noises such as the noise of information are particularly fertile ground for harmful amplifiers because of the special effort made by noise agents in presenting their threats where no threat exists, and for creating 'news' where there is nothing new.

The rules of noise make sense and order of the complex relationships between noise generators, noise amplifiers and the manner in which they affect us. People seeking to change the mix of noises in their lives must understand how the rules of noise act upon them. A good starting point is trying to answer the following questions, arranged according to the rules of noise from which they derive.

The First Rule of Noise: We always prefer the noise that diverts our attention to the noise that is more bothersome.

What are the noises that bother you most of all, so much so that in order to keep from hearing them you are willing to allow other noises to penetrate your life? Perhaps the noise of fear of death? The noise made by 'the other'? The noise of wishing to belong? Maybe noises that come from personality disorders that are not debilitating but are nonetheless untreatable?

The Second Rule of Noise: Each of us carries his/her own personal noise amplifiers, which determine the level of noise we eventually experience.

Are you aware of your own noise amplifiers? Can you identify, even belatedly, when they kick in? Do you know enough about statistics and randomness to ward off both obvious and subliminal attacks made by the media and the noise agents the media serve?

The Third Rule of Noise: A lack of information is preferable to a surplus because information comes with a price tag – noise.

Are you able to recognize a subliminal advertisement when you see one? How many names from a most-influential list can you remember by heart? Can you recall all the unnecessary, time-consuming encounters you have had in the past two years with the medical system and with information it generates? Are you tuned in to news and current events programming for more than half an hour every day? Have you ever come across a financial commentator or analyst who has admitted being wrong?

Still, no rule from among the existing rules of noise can provide an answer to the most important questions of them all: Have you filled your life with enough content to be able to use the time that is left to you after you give up on a large part of the information noise you consume daily? Are you prepared to look in the mirror and acknowledge that the mix of noises you are exposed to does not suit you? Is it in your power to do something about it? And, most importantly of all, to paraphrase the philosopher Immanuel Kant, are you willing to dare to know?

Ladies and gentlemen, I give you *The Fourth Rule of Noise*: You set the price.

Pictures at an exhibition

I have learned that psychological counseling is an effective tool for treating a wide variety of internal noises, especially for those who wish to improve their quality of life and not as a focalized solution to distress that makes day to day existence difficult. Treatment that helps people strengthen their self-esteem equips them with one of the most effective noise suppressors there is.

During the course of working on this book, I could sense the therapeutic effect of the various intuitive insights that took shape in the writing. More than once I felt this was a form of real self-therapy. And, as with all effective therapy, I managed on a number of occasions to bring to my consciousness various habits of mine that have adversely affected the level of noise in my life. Not that I have managed to do away with them all, but at least now I am aware when they present themselves and am free to mobilize (or not) the moral strength needed to cope with them.

Understanding the dynamic that motivates the media and our reactions to the media is an additional recipe for attaining peace of mind. How long can a person be entertained by a puppet show in which the puppet handler's hairy arms can be constantly seen? If, as Shakespeare claimed, all the world really is a stage, then being able to recognize stage scenery for what it is will prevent us from following blindly the deceptions of clever directors. And stage scenery of the media is actually randomness, the 'story,' and the striking influence of evolutionary psychology. Let us admit to the fact that most daily newspaper headlines are noise. The true story is found, ultimately, in the history books and obituaries. You have the ability to decide how frequently you wish to be updated or how much you want to be exposed to the noise you are willing to take upon yourself.

This book does not pretend to offer a recipe for reducing the level of noise in your life. In truth, when a person's noise profile is as individual as fingerprints, is it possible even to offer such a recipe? The best I can do is to share with you the photographs I have chosen from my own personal album, the experiences I have undergone, the materials I have read – all these have affected my own noise profile. Here are some photographs I myself have opted to develop from among the negatives I found in the drawer marked 'noise suppressors.' Some of them I have amassed from an entire lifetime, while others are cobbled together from bits of reality.

Exercises in limiting consumption

At the end of the 1990s I had gold frequent flyer cards from no fewer than four airlines. It seemed as though important meetings awaited me in every major capital city (see the chapter 'Noise on the Job'). There were days when I found myself listening to the very pronounced accents of four different pilots telling me to fasten my safety belt and sit back and enjoy the flight. On the average, twice a year I had the opportunity to check for myself the theory that claims the rings surrounding Saturn are made up of the lost luggage of hapless travelers.

Still, I managed to find advantages in the frenetic pace I was living my life at the time. I took every free moment I had to visit the best museums in the world, where I got an education in art I would not have had anywhere else. I developed reading skills that enabled me to enjoy the best of the literary crop available in bookstores – even if some of that, I admit today, was itself unfiltered cultural noise.

I also discovered that spending time at high altitudes improves the imagination and creativity. Some of my most interesting business ideas came to me while at 36,000 feet, including that of the company I established, Evergreen (Swissair flight 65 from Zurich to Montreal). I got to the point where I preferred long day flights to night flights thanks to the fruit I knew I was going to harvest from being able to think at such heights.

One day, after losing my luggage on a flight from Frankfurt to Chicago, Lufthansa provided me with a coupon that proved to be good for most of my clothing needs (in an inspired move, they offered to reimburse me for half of all my purchases of necessities, assuming that the traveler would not change his tastes and would buy items similar to those he had lost). The suitcase was never found (an event with a probability lower than 1:100) but I was treated to a handsome suit that served me well for years, as well as a tie that became my 'lucky tie' for an entire decade until its unfashionable width made me the butt of jokes.

On one of my next flights I took the time to analyze what had happened so that I could learn whatever lessons were to be had. Losing luggage is a random event for which the airline assumes no responsibility (luggage is dealt with by airport employees) beyond the immediate replacement of necessities for which I had received the coupon. Still, I had to admit that the result was favorable as far as I was concerned: I had exchanged a few items of importance in my business wardrobe for very fashionable items at a large discount. I continued to ponder this and suddenly it dawned on me that the financial component of this event was not necessarily what was most important. In fact, I had updated my wardrobe

because I had had no choice (I had a business meeting first thing the next morning) and the airline had merely made the economic dimension of this act of acquisition simpler. And now the thoughts just kept coming – Why, I wondered, shouldn't I adopt this lesson I've learned and leave on trips with clothes that need to be replaced, either because they are worn and faded or because they have gone out of fashion? Then I'll leave them at the hotel and buy new ones to replace them. Since the economic aspect of this issue was not my main concern in the first place, I understood that I could do without the services of the airlines (which were supposed to lose my luggage for me) and even save myself the bother of waiting for what would never come, not to mention the frequent conversations with Lost Baggage departments.

The first two suits were easy. I got rid of an ugly English wool suit that I had been tempted to buy on an alcohol-infused trip to Scotland; after that, I actually left a suit I really liked, but which had been ruined by a hole made by the butt of a cigarette. From there, the selection grew tougher. Even though we only wear 20 percent of the clothing we own 80 percent of the time, it is hard for us to give up the possibility that one day we will prefer wearing something less complimentary or, with men, that one day wide ties will come back into style (see the chapter 'Closing Doors'). It took real self-discipline to keep going. All the while I felt as though I had taken up a particularly daring cause that would sustain the burgeoning challenge: I decided to declare war on irresponsible buying and amassing and ensure that the size of my wardrobe would not increase. The decision I made then, as a frequent traveler showing signs of fatigue from consumer culture, was essential and purposeful: for every article of clothing I purchased, I would get rid of another of the same kind. I kept to this rule for years and was pleased to find the pleasure in freeing myself from hoarding. I learned at some stage of this ritual of mine that it is hard to give up something beloved in exchange for something that has not yet proven itself, so I learned how one also grows richer from non-action. The rules I held myself to saved me quite a lot of money at the advanced stages of this strategy.

I felt great satisfaction at this little revolution of mine against social conditioning and at my sweet victory against the billions of dollars advertisers spend trying to get inside my head and make me spend money in ways I do not wish to. This was my first major achievement in my war on consumer noise even before I knew how to define the rich world of noises and the multitude of ways in which they affect us. At the height of the process, I recall a surrealistic scene in which two employees at a Swiss hotel ran after my taxi in heavy snow because they could not believe that I had intentionally left behind an almost new coat.

With the muscles of self-discipline I have developed in those years, I felt I could lift any burden that weighed heavily on my quality of life. And indeed, it was only a few short years later that I had little trouble giving up television news, my subscription to a financial journal I had read faithfully and a whole slew of other weeklies.

Self-esteem

Sport is an excellent way to get to learn who people really are. If it had been possible for me to invite every businessperson I worked with over the years to play a game of tennis or golf, I would have saved myself a lot of grief. With these two sports, by nature not team sports but sports that focus on the individual, we play against ourselves no less than against our adversary. While the healthy aspects of sports are indisputable, many of us athletes find in sport a socially acceptable way to express impulses that would be considered far from normative when expressed outside the playing field. Thus, a single game can give away more information about a person than a month full of lunches. A brilliant description of the psychological dynamic that finds expression through tennis can be found in the wise and entertaining book *Tennis and Psychology* by psychologist David Rudy, which unfortunately disappeared from the shelves and has been unavailable for quite some time. Aggression, blame, possessiveness and stinginess are just a few of the human characteristics that play a starring role in the book. All of them confirm the observation that in a game of tennis we meet two rivals: the person we are playing against and ourselves.

In the tennis club where I have played for years, I can't help overhearing what players say – and often shout – on the neighboring courts, especially when they miss an easy lob or fail to place the ball in the opponent's court. They call themselves 'idiots' and 'losers' and wonder aloud why anyone even let them play – just for missing a point. Needless to say, if someone else called them such names the matter would end in court or, before that, in the hospital.

Since I, too, regularly make mistakes on the court but manage (I hope) to bridle my frustrations, I wondered if there is a common denominator between people who have trouble controlling their own self-criticism. And if so, what effect does it have on their lives and on the lives of the people around them, off the tennis court. It was only a short distance from here to the obvious question 'Are they exposed to more noise?'

I believe they are, and that negative self-esteem is a sure recipe for bothersome exposure to social noises and other internal noises to the same extent that positive self-esteem is one of the most effective blocks against them.

The problem with self-esteem is that it is difficult to develop out of thin air. Self-esteem is the deep personal conviction of one's abilities to deal with daily challenges and our right to happiness. Although this definition seems simple, it is in fact a complex juxtaposition between our belief that we can learn, think and choose correctly. And if that isn't enough, in addition to our right to happiness we are meant to display confidence in the belief that we are worthy of respect, of achieving, of maintaining close relationships and deriving personal satisfaction. Positive self-esteem imbues a person with strength and the ability to handle life's hardships and the spiritual capacity for renewal. In contrast, when our self-esteem is low, we tend to be influenced more by the desire to avoid pain than the desire for pleasure. Negative forces have a greater influence on us when our self-esteem is low, and we become more dependent on others. And others, as we have already seen, are a common source of noise. Nevertheless, the esteem of others – as high as it may be – can never compensate us for a lack of self-esteem. Our self-esteem resides inside our beings like an intimate personal experience for which there is no comparison. Self-esteem is what we think about ourselves and not what others think about us. Even if your family, friends and partners love you, you may still not love yourself. Even if your colleagues think highly of you you may feel worthless. It is possible to fulfill others' expectations of you without fulfilling your own expectations for yourself or earn every honor imaginable without feeling you have any merit. I believe I have made myself clear.

It is hard to 'succeed' in life, however we define success, without self-esteem (a necessary condition, though not enough by itself). People who succeed but are lacking in self-esteem are especially prone to becoming victims of the Imposter Syndrome – they expect that someone will rip the masks from their faces at any given moment, exposing their weaknesses and vulnerabilities. You will recall that the orchestra at a masquerade ball is particularly noisy. In the same manner that the esteem of others cannot build one's self-esteem, so too are amassing property and wealth, sexual conquests, philanthropic endeavors or facelifts doomed to failure. Of all the kinds of judgment we pass during our lifetimes, the judgments we pass on ourselves are the most important.

The most influential factor in the formation of self-esteem is, apparently, our parents. To some extent this is the result of heredity, but mostly a result of the amount of love, worry, acceptance and interest that parents express toward their children, along with

the way they relate to failures and successes. Positive experiences later in life, the influence of relatives and friends, and success in school are all likely to strengthen self-esteem to some extent. Ultimately, though, one's self-esteem is consolidated at a certain stage of our growth process when we derive our esteem from within and not from others. Parents who make demands of their children and set clear limits that are effectively enforced and express themselves positively about their children's activities in well-defined areas help them greatly in consolidating their own self-esteem.

A person who possesses self-esteem can honor and respect himself in the face of actions or feelings of which he is not particularly proud. He feels responsibility for his actions and decisions and is cognizant of the fact that no one will come and put the world in order for him or make him happy.

I expanded a bit on this subject because I believe that self-esteem is particularly effective at suppressing the noises that are within the scope of this book. Self-esteem can, for example, successfully replace the meaning we wish for in our culture when we prepare ourselves for the most awful noise of them all – the noise of the fear of death. Indeed, Studies show that self-esteem provides self-defense against the fear of death and against a litany of fears and anxieties connected to it. As we have already seen, the source of many internal noises is the noise that 'others' make and the noises of trying to be accepted, to be one of the gang. Self-esteem reduces our dependency on others and our need for belonging since it imbues our lives with meaning without them. People with positive self-esteem are less exposed to the Imposter Syndrome and are likely to keep the noises of perfectionism at bay since they can withstand the failures that perfectionism cannot abide. They are also less susceptible to the noise of information since their world is well-ordered enough, and they are thus less affected by the noise of experts. Self-esteem is an excellent filter in a world packed with noises.

I am not a big believer in the effectiveness of methods that promise to repair or increase self-esteem through relatively short workshops. Nevertheless, I do feel that successful psychological counseling can aid in patching the holes in the process of building self-esteem that may be left from a young age. This is a major undertaking both in terms of finances and in terms of the spiritual commitment. Your reward will come when you manage to change your noise profile to one that suits you better. But if you are on the lookout for shortcuts, at least remember that self-esteem grows with the ability to say 'no' – certainly to others, but mainly to yourself.

Trust between the trenches

"You may be deceived if you trust too much, but you will live in torment if you don't trust enough," wrote Dr. Frank Crane, a Presbyterian minister whose 1927 book *Everyday Wisdom* provided 365 four-minute essays, one for each day of the year. Fifty years before any behavioral sciences researcher began to take an interest in the subject of trust, Crane understood that giving unconditional trust is a winning strategy for people whose peace of mind is important to them. Crane also grasped that even if we err on occasion and trust someone undeserving, our situation will be better (less noisy) than if we are suspicious of everyone and are afraid to trust. Crane was thinking about individual people, not about humanity as a whole, and he came to his realization by casting a sober eye at the advantages and disadvantages of the two behavioral options.

However, the times during which Crane tried out his ideas are different from today. The level of trust in the world has undergone major changes. According to evolutionary psychologists, altruism is a human virtue that is unnatural to a species whose behavior is motivated by the need to survive and must fight for limited resources. But trust is different. It has already been mentioned here that as the only species in nature with the ability to explore other times in our minds, we are capable of imagining future situations. Under such circumstances, trusting others is likely to prove itself to be an effective strategy if we assume that the object of our trust will indeed pay us back for our behavior.

Thousands of studies based on games of trust, among other things, have succeeded in mapping the various circumstances in which we trust in others. In scientific research, trust is defined as our willingness to take an emotional risk by trusting a complete stranger whose actions we have no way of influencing. The only question that researchers ask is in order to determine the individual or national level of trust is 'Do you believe that most people are trustworthy, or can you never be careful enough where others are concerned?'

The level of trust in a certain country is determined by the percent of people who respond that they believe most people to be trustworthy. The Scandinavian nations rank highest in level of trust and, unsurprisingly, they also rank among the highest in terms of quality of life. The bad news is that the level of interpersonal trust in western nations has been whittled away to half of what it was only fifty years ago. Trust, traditionally the basis of the intricate social fabric developed over hundreds of years, has deteriorated to the point that where two-thirds of the public answered in the positive to the question, 'Do you believe that most people are trustworthy?' in the 1960s, less than a third answer positively today.

Can the noise made by 'others' be suppressed by trust? For me, the following story has always provided the answer to that question.

Military operations at the beginning of the First World War were run pretty much the way they had been before the war, granting place of privilege to the cavalry. Within a short period of time, however, the movement of both sides ceased and the armies settled down into trenches that faced one another. There they remained throughout the war. In some cases, the two sides were so close that they could shout to one another. In most cases the soldiers were closer to their enemies than to their own distant commanders. Often there was a higher correlation between their sympathy for one another and their proximity than to the reasons that had brought the countries to war.

Since the armed forces had ceased moving, the high-ranking officers hoped that it would be possible to advance their aims by means of a war of attrition, and they ordered their soldiers on the front to make use of their weapons to harm the enemy at every opportunity. Some of the elite units behaved accordingly, while others on the front wandered outside the trenches, completely exposed to their enemies, and were observed on numerous occasions leaning against trees and reading books. The soldiers adopted a strategy of 'live and let live,' without ever intending to do so. Intentional cease-fires from enemy activity upheld during mealtimes, for example, expanded to longer hours of the day until slowly the opposing soldiers began to see one another as people just like themselves, with similar needs. In essence, the similarities between them were greater than those between the soldiers and their commanders. From the moment that both sides adopted the strategy whereby the enemy was allowed to 'live,' several soldiers took it upon themselves to find a way to place limits on aggression. The most famous of all was the cease-fire of Christmas 1914. This was the tip of the iceberg in a long series of secret agreements kept with almost no verbal communication between the sides. When the two sides were required to take action by their commanders, they reacted with ceremonious violent outbursts, like the daily bombardment at the same time each day of a certain target. Thus, those on the other side knew they were exposed to necessary danger only between the hours of two and four, and in a specified area.

Even though lone shots and salvos punctured the peace of the day, the two sides behaved with great patience as both understood that an inappropriate retaliatory action would drag both sides down into destructive violence. In one case, in the wake of cannon fire from the German side, a German soldier emerged from the trenches and shouted "We

are very sorry about what happened and hope that no one has been injured. This is not our fault. It was those damned Prussian gunners!"

The non-attack agreements that began in self-interest turned into a complex system of relations that contained no small measure of sympathy and even a moral code with roots planted deep in the history of English-German relations. There were incidents in which German soldiers expressed interest in the outcomes of English soccer league games. A group of soldiers fired an empty charge containing an offer to exchange newspapers in a similar manner. Popular music was an additional bridge that spanned this no man's land. Sometimes empty salvos were fired to the beat of music. The more the sides considered what united them, the more certain they were about the other's behavior.

When rumors of this matter reached the English high command, the latter organized incursions into enemy trenches using soldiers from different units. This made the effort to fake acts of aggression and to refrain from retaliatory action no longer possible. 'Live and let live' began in self-interest but when illuminated by human trust it was a behavior that saved many lives and turned insufferably difficult events something merely unpleasant.

Trust, in this story from history, turned out to be an effective suppressor of noise made by 'others,' even when the others are the enemy. But as Crane said, trust protects us first and foremost from the noise of the torment of ongoing suspicion.

Knowledge

Knowledge is a noise suppressor with a double effect: it serves as both a foundation for self-esteem and as a principal tool for us to use in coping with the noises made from statistical ignorance and many of the biases that cause us to feel threatened when there is no real reason. There are many definitions for knowledge, but most include the ability to identify bias at one level or another. Indeed, even if knowledge is the key to an entire world of possibilities and enjoyment, I have no doubt that understanding the biases we are exposed to is the first important step on the way to moderating the level of noise in our lives. You will not be able to reduce the internal noise amplifiers if you do not first unplug the energy sources that nourish them. And the most common source of all is ignorance, the cheapest form of human fuel. Knowledge starts in the spot where we admit that we do not know something and from there we take our fate in our hands in a process that is a combination of commitment and humility.

The behavioral sciences have identified dozens of biases that cloud our perception of reality and our decision-making abilities. The work of Professor Daniel Kahneman, winner of the Nobel Prize in Economics in 2002, on this subject has become the cornerstone of behavioral psychology sciences. It is impossible today to relate to this topic without following in the scientific footsteps of this original and prolific researcher. I was fortunate to spend time with him when he was the guest of honor at a conference of Evergreen investors. In a conversation we had four years later, in the fall of 2008, I asked him which of his many important projects can contribute the most to understanding the influence of behavioral biases on noise in our lives. Kahneman thought for a bit, then steered me to *Timid Choices and Bold Forecasts*, which he co-authored with Dan Lovallo in 2002.

In this article, Kahneman describes a project he was involved in in 1976. A team of experts was asked to develop a study program for Israeli high schools on the subject of judgment and decision-making under conditions of uncertainty.

After a year of hard work the question arose as to how much time would be needed to complete the planning of the project, which meant the presentation of a draft to the Ministry of Education. Each of the team members was asked to write his or her guess on a slip of paper. The estimations ran from eighteen to thirty months.

At this stage, Kahneman turned to one of the members of the team, an expert in educational program development, and said, "We are surely not the only team to have tried to develop a curriculum where none existed before. Please try to recall as many such cases as you can. Think of them as they were in a stage comparable to ours at present. How long did it take them, from that point, to complete their projects?"

It took the man no time at all to provide an answer. Slightly uncomfortable, he admitted that not all the teams actually completed their task. Some 40 percent gave up completely, and among those that did not he had trouble recalling a single one that took less than seven years or even ten to finish.

Responding to an additional question, the expert said that he cannot identify some relevant characteristic to differentiate between the present team and all the others. In fact, he admitted, the team's resources and abilities might even be inferior to those of previous teams.

Participants in the discussion – all of whom had professional experience with forecasting – preferred to refrain from discussing their experienced colleague's off-putting forecast, the chance that they might fail completely or, if successful, that they might need seven to ten years to complete their work. According to these criteria, there was no

justification for continuing the project, but not a single member of the team had the courage to draw this unpleasant conclusion and stop the project.

Thus, the team ignored a depressing forecast and continued its work, which was completed after eight years. The participants in Kahneman's story did not fail in processing the information they had; instead, they were blinded by over-confidence in their abilities and adopted 'internal vision,' meaning that they focused on the project in front of them instead of employing the 'external vision' suggested by the expert.

In their article *Timid Choices and Bold Forecasts*, Kahneman and Lovallo claim that decision-makers have a strong tendency to assess problems as unique. Further, they tend to accept every decision in isolation, neglecting statistics from previous data as well as the variety of scenarios that could actually occur in the future. Decision-makers tend to anchor their forecasts for the future in plans and scenarios heralding success instead of past results, which leads to overly optimistic predictions. But Kahneman's story offers an additional lesson to be learned: knowledge is experience – our own, but no less so that of others.

Research studies conducted by Daniel Kahneman, Amos Tversky, Paul Slovic, Richard Thaler, Thomas Gilovich, Baruch Fischhoff, Gerd Gigerenzer and others have been published and are available. Better understanding of the system that enables noise agents to tap their long fingers into our brains is the most effective guarantee that we will manage to develop our own personal noise-immunity kits.

All we have to do to obtain information is press a button. Knowledge, on the other hand, is amassed with patience and active commitment. However, let us not forget that even knowledge is not wisdom. The art of wisdom is to know what to ignore. Knowledge is something learned daily, while wisdom means giving up something we learn daily. By giving up, we can find the peace and tranquility hidden in letting go.

Meditation

I am not personally well acquainted with Eastern philosophy and have not myself experienced the joys of yoga, but a friend who knows a lot about them recommended *The Tibetan Book of Living and Dying*, by Sogyal Rinpoche. In a chapter on consciousness development, I found this short passage that seems to sum up all the biggest ideas:

[MISSING QUOTE FROM *THE TIBETAN BOOK OF LIVING AND DYING* BY SOGYAL RINPOCHE, HARPERCOLLINS; QUOTE APPEARS TWO PAGES INTO THE FIFTH CHAPTER ("Bringing Consciousness Home"???)]

My friend adds that "We always escape to noise, to action, for fear of encountering silence...who knows what we'll find there, or worse; *who* we'll find there."

Slow down

The seventh chord of the piece *As Slow As Possible* by composer John Cage was played on the fifth of February 2009 as part of the 'slowest and longest concert in the world.' The organ of the St. Burchardi church in Halberstadt, Germany began playing the piece in September 2001 and will continue to play for 639 years.

The St. Burchardi church leaders have joined legions of others who have found original ways to express their discontent with the bothersome and incessant murmur of what has become our pressing, pressured way of life. Cage himself wrote another work that investigates the relationship between music and silence, a piece that Cage himself said was his own personal favorite. There are three movements, during none of which is any music played. Cage explained that "there is no such thing as silence...everything we do is music. I wanted my work to be free of my tastes and preferences, since I think music should be separate from the thoughts of the composer."

On the thirty-first of January 2008 at precisely two-thirty in the afternoon, 207 members of Improv Everywhere froze in Grand Central Station, the world's largest train station. Every day, five hundred thousand people pass through the station without noticing what is happening around them. On this wintry Saturday they were asked to change their habits. People froze in their places while waiting for something, or as they drank coffee, or as they bent down to gather papers that had fallen and dispersed seconds earlier. One even froze in place as he used his body to block a runaway cart. The whole event lasted five

minutes, when the frozen actors resumed their regular lives, to the applause of thousands of people who stood watching them. This human installation has been repeated in Singapore, San Francisco and London's busy Liverpool Street station. It turns out that the buzz of modern life does not allow us to notice a lot of what is going on around us and is deserving of praise, if only we could stop our routine and give it our attention.

One year earlier, in 2007, The Washington Post conducted an experiment designed to determine whether beauty can penetrate the hectic daily rush so many of us endure. During a busy Washington morning rush hour, violinist Joshua Bell – one of the finest violinists of his generation – entered the L'Enfant Plaza metro stop in Washington, D.C., pulled out his Stradivarius and began playing Bach's Chaconne, one of six pieces he played during the forty-three minutes he stood there. Bell chose to open with this complicated piece because in his opinion it is "not just one of the greatest pieces of music ever written, but one of the greatest achievements of any man in history," so if any piece of music could catch the attention of passersby, this should be it. During the time he played, 1097 people hurried by on their way to work at one of the many government offices near the metro station. Only seven of them stopped to listen, while twenty-seven of them tossed a coin into Bell's hat, usually as they rushed by. Bell had collected a total of thirty-two dollars and change by the end of his stint. The experiment resulted in a long article in the Post by Gene Weingarten that drew reactions far and wide. In the article, Weingarten tries to learn something about the roots of the apathy of people scurrying to their jobs in the face of the beauty of Bell's playing, and he decides that beauty was irrelevant to the hundreds of people who passed by the virtuoso violinist as they ran off to fulfill the demands of the achievement driven society of which they are a part. When will we finally be able to slow our lives down? Will we manage before life slows us down into absolute silence?

Ten steps for improving your personal noise profile

During the editing of the book I was asked more than once to come up with a concise and practical list of what a person can do to improve his or her own personal noise profile. If you've made it all the way here, you know how difficult the task is and how many facets there are to noise, but here are some pointers that you may find helpful:

1. **Adopt a trust strategy.** Whether you think that 'most people are trustworthy' (as do 30 percent of the population) or that 'you can never be careful enough where others are concerned' (70 percent of the population), adopt a strategy according to which you put your trust in others unless they are proven unworthy of it. The betrayal of trust is certainly a noise generator, but continual suspiciousness is many times worse.
2. **Don't get lost, kid – grow up!** It is important to preserve childlike innocence but not an egocentric bias. The world does not revolve around you and you are not at its center. The people in your life are not more interested in you than you are in them. There is great relief in knowing that almost nobody noticed the foolish comment you made at dinner, and even greater relief in the feeling that you can be yourself, since in any event practically no one will notice.
3. **You can't always win.** This is particularly for parents of young children. If you cannot secure a quieter world for yourself, then at least let's take care of the next generation in that respect. It seems that a certain type of criticism that we subject our children to is a source of noise for an entire lifetime. Making parental acceptance or love conditional on a child's performance is destructive. Children are terrified of falling out of favor by failing, so do not ever tell them that second place is not good enough; only in films does it serve as encouragement. Offer emotional and verbal support to children facing difficulties ("This material is tough, isn't it?") and if they do not pass a test because they always put off doing their homework until the last minute then don't attack them; instead, use their disappointment in themselves to empower them ("You're not satisfied with the results, so what can you do next time to achieve better results?"). And most importantly, spend more time working with them to cope with failure than preparing them to execute everything they do perfectly. Otherwise you'll be raising self-destructive perfectionists.

4. Control the garbage in your life. You will never regain the time you spend on a purposeless meeting; no one ever complains on his death bed that he spent too little time at the office. Working on the computer with your email inbox open lowers your I.Q. by ten points, which is more than smoking pot (I write this from research, not experience). Learn to say 'no' to others, but mostly to yourself.

5. Emotion is important, but not where logic is needed. Life without emotion is like seeing a piece of jewelry in a hologram, with no chance of touching it. But our emotional system has evolutionary habits that are impolite, causing it to kick in before the rational system and in the guise of self-protection from existential threats, which merely confounds our perception of reality and in particular the way we assess risk. Next time you see mountains, ask yourself if it isn't really their shadow.

6. Learn statistics. Statistics is a scientific field that long ago became one of the most applicable branches of science. There are two main ways of dispelling statistical ignorance. The first, which requires real sacrifice, is by learning this special scientific language and acquiring the ability to interpret reality by means of a new vocabulary that can decipher the world around us in a manner that no other branch of science can. A person who can allow himself this luxury will discover that statistics is more than just a language, it is an entire worldview. The second (for those who pass on the first) is acknowledging that when we are presented with facts that move us emotionally there is probably a reason for that. Consult with people who are able to assess their meaning with scientific tools. These tools should enable you to distinguish between real news and what merely appears that way.

7. Embrace randomness. It's everywhere. Randomness is a major noise engine in our lives and is the tip of an iceberg of a phenomena whose rules are not clear to us. The big challenge we face with randomness is the difficulty in figuring out when exactly it comes into play, which entails becoming suspiciously cautious – a noise generator in and of itself. There is no middle ground here. Learn science, write a book on noise, or simply accept the fact that you will never understand all the laws that make the world around you function. There is peace of mind to be found in accepting what we cannot know.

8. Help your doctor get rid of unnecessary risks. Doctors are human beings and as such are not immune to human weaknesses. They tend to take certain risks in order to negate

others, even though the balance of those risks is not necessarily positive. Still, they can make the right decisions when confronted with the proper professional challenge in a mature manner. The challenge is to present medical findings in a way that enable you to participate in the decisions that affect your fate. Demand your right to receive quantitative information (yes, probabilities!) about risk and about possible side effects in dealing with your situation. Charity may save a person from death, but unwarranted radiation may not.

9. Beware of experts. They do not know a lot more than you and are likely to make more mistakes than you. Acknowledge the fact that your tendency to listen to them answers the need to make order of your world, even though no expert can do that for you. If you must listen to them – but only if you really must – prefer the expert who is not so sure of himself and who knows a little about a lot of things.

10. Turn off the television. According to an Estonian proverb, 'Silence is sometimes the answer.'

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FURTHER READING