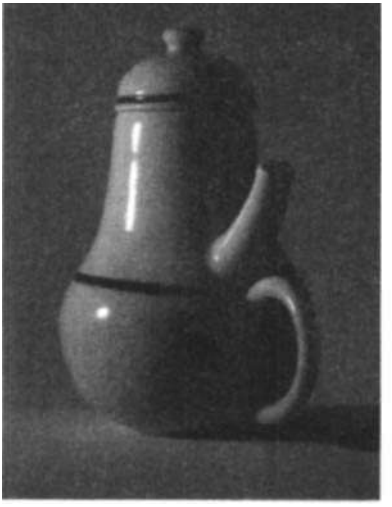

FIGURE 0.1

An impossible teapot.

(Author's collection. Photograph by Ayman Shamma.)

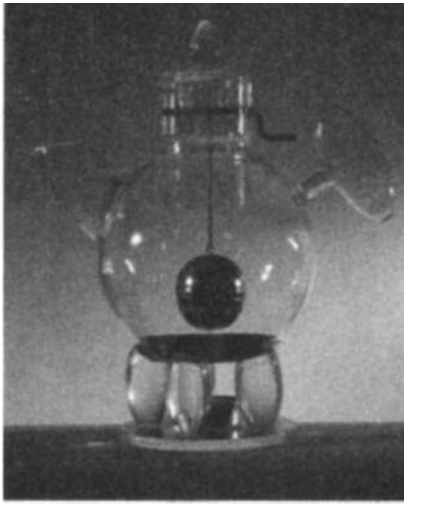

FIGURE 0.2

Michael Graves's "Nanna" teapot.

So charming I couldn't resist it.

(Author's collection. Photograph by Ayman Shamma.)

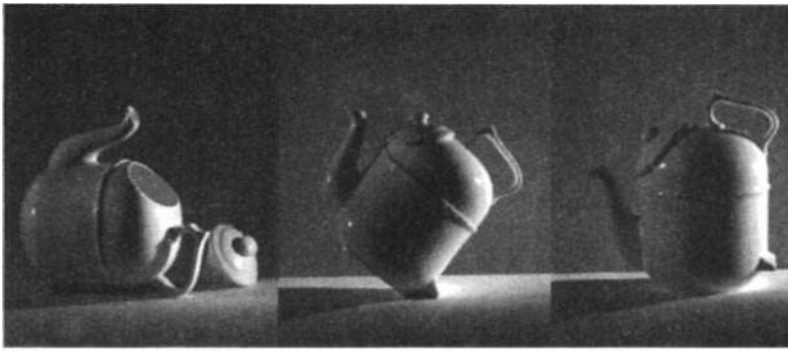

FIGURE 0.3a, b, and c

The Ronnefeldt "tilting" teapot. Put leaves on the internal shelf (not visible, but just above and parallel to the ridge that can be seen running around the body of the teapot), fill with hot water, and lay the teapot on its back (figure a). As the tea darkens, tilt the pot, as in figure b. Finally, when the tea is done, stand the teapot vertically as in figure c, so the water no longer touches the leaves and the brew does not become bitter.

(Author's collection. Photographs by Ayman Shamma.)

Three Teapots

> If you want a golden rule that will fit everybody, this is it: Have nothing in your houses that you do not know to be useful, or believe to be beautiful.
>
> *—William Morris*
> *"The Beauty of Life," 1880*

I HAVE A COLLECTION OF TEAPOTS. One of them is completely unusable—the handle is on the same side as the spout. It was invented by the French artist Jacques Carelman, who called it a coffeepot: a "coffeepot for masochists." Mine is a copy of the original. A picture of it appears on the cover of my book *The Design of Everyday Things.*

The second item in my collection is the teapot called Nanna, whose unique squat and chubby nature is surprisingly appealing. The third is a complicated but practical "tilting" pot made by the German firm Ronnefeldt.

The Carelman pot is, by intent, impossible to use. The Nanna teapot, designed by the well-known architect and product designer

Michael Graves, looks clumsy but actually works rather well. The tilting pot, which I discovered while enjoying high tea at the Four Seasons Hotel in Chicago, was designed with the different stages of tea brewing in mind. To use it, I place the tea leaves on a shelf (out of sight in the pot's interior) and lay the pot on its back while the leaves steep. As the brew approaches the desired strength, I prop the pot up at an angle, partially uncovering the tea leaves. When the tea is ready, I set the pot upright, so that the leaves are no longer in contact with the tea.

Which one of these teapots do I usually use? None of the above.

I drink tea every morning. At an early hour, efficiency comes first. So, upon awakening, I pad into my kitchen and push the button on a Japanese hot pot to boil water while I spoon cut tea leaves into a little metal brewing ball. I drop the ball into my cup, fill it with boiling water, wait a few minutes for it to steep, and my tea is ready to drink. Fast, efficient, easy to clean.

Why am I so attached to my teapots? Why do I keep them out on display, in the alcove formed by the kitchen window? Even when they are not in use, they are there, visible.

I value my teapots not only for dieir function for brewing tea, but because they are sculptural artwork. I love standing in front of the window, comparing the contrasting shapes, watching the play of light on the varied surfaces. When I'm entertaining guests or have time to spare, I brew my tea in the Nanna teapot for its charm or in the tilting pot for its cleverness. Design is important to me, but which design I choose depends on the occasion, the context, and above all, my mood. These objects are more than utilitarian. As art, they lighten up my day. Perhaps more important, each conveys a personal meaning: each has its own story. One reflects my past, my crusade against unusable objects. One reflects my future, my campaign for beauty. And the third represents a fascinating mixture of the functional and the charming.

The story of the teapots illustrates several components of product design: usability (or lack thereof), aesthetics, and practicality. In cre-

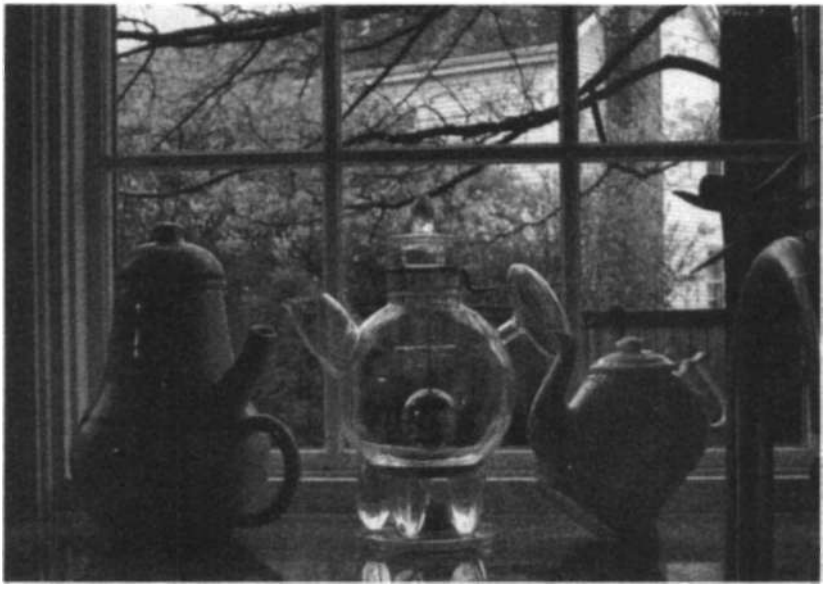

FIGURE 0.4
Three teapots: works of art in the window above the kitchen sink.
(Author's collection. Photograph by Ayman Shamma.)

ating a product, a designer has many factors to consider: the choice of material, the manufacturing method, the way the product is marketed, cost and practicality, and how easy the product is to use, to understand. But what many people don't realize is that there is also a strong emotional component to how products are designed and put to use. In this book, I argue that the emotional side of design may be more critical to a product's success than its practical elements.

The teapots also illustrate three different aspects of design: visceral, behavioral, and reflective. *Visceral* design concerns itself with appearances. Here is where the Nanna teapot excels—I so enjoy its appearance, especially when filled with the amber hues of tea, lit from beneath by the flame of its warming candle. *Behavioral* design has to do with the pleasure and effectiveness of use. Here both the tilting teapot and my little metal ball are winners. Finally, *reflective* design considers the rationalization and intellectualization of a product. Can I tell a story about it? Does it appeal to my self-image, to my pride? I

FIGURE 0.5

The MINI Cooper S.

"It is fair to say that almost no new vehicle in recent memory has provoked more smiles." *(Courtesy of BMW AG.)*

love to show people how the tilting teapot works, explaining how the position of the pot signals the state of the tea. And, of course, the "teapot for masochists" is entirely reflective. It isn't particularly beautiful, and it's certainly not useful, but what a wonderful story it tells!

Beyond the design of an object, there is a personal component as well, one that no designer or manufacturer can provide. The objects in our lives are more than mere material possessions. We take pride in them, not necessarily because we are showing off our wealth or status, but because of the meanings they bring to our lives. A person's most beloved objects may well be inexpensive trinkets, frayed furniture, or photographs and books, often tattered, dirty, or faded. A favorite object is a symbol, setting up a positive frame of mind, a reminder of pleasant memories, or sometimes an expression of one's self. And this object always has a story, a remembrance, and something that ties us personally to this particular object, this particular thing.

Visceral, behavioral, and reflective: These three very different dimensions are interwoven through any design. It is not possible to have design without all three. But more important, note how these three components interweave both emotions and cognition.

This is so despite the common tendency to pit cognition against emotion. Whereas emotion is said to be hot, animalistic, and irrational, cognition is cool, human, and logical. This contrast comes from a long intellectual tradition that prides itself on rational, logical reasoning. Emotions are out of place in a polite, sophisticated society. They are remnants of our animal origins, but we humans must learn to rise above them. At least, that is the perceived wisdom.

Nonsense! Emotions are inseparable from and a necessary part of cognition. Everything we do, everything we think is tinged with emotion, much of it subconscious. In turn, our emotions change the way we think, and serve as constant guides to appropriate behavior, steering us away from the bad, guiding us toward the good.

Some objects evoke strong, positive emotions such as love, attachment, and happiness. In reviewing BMW's MINI Cooper car [figure 0.5], the *New York Times* observed: "Whatever one may think of the MINI Cooper's dynamic attributes, which range from very good to marginal, it is fair to say that almost no new vehicle in recent memory has provoked more smiles." The car is so much fun to look at and drive that the reviewer suggests you overlook its faults.

Several years ago, I was taking part in a radio show along with designer Michael Graves. I had just criticized one of Graves's creations, the "Rooster" teapot, as being pretty to look at, but difficult to use—to pour the water was to risk a scalding—when a listener called in who owned the Rooster. "I love my teapot," he said. "When I wake up in the morning and stumble across the kitchen to make my cup of tea, it always makes me smile." His message seemed to be: "So what if it's a little difficult to use? Just be careful. It's so pretty it makes me smile, and first thing in the morning, that's most important."

One side effect of today's technologically advanced world is that it is not uncommon to hate the things we interact with. Consider the rage and frustration many people feel when they use computers. In an article on "computer rage," a London newspaper put it this way: "It starts out with slight annoyance, then the hairs on your neck start to

prickle and your hands begin to sweat. Soon you are banging your computer or yelling at the screen, and you might well end up belting the person sitting next to you."

In the 1980s, in writing *The Design of Everyday Things*, I didn't take emotions into account. I addressed utility and usability, function and form, all in a logical, dispassionate way—even though I am infuriated by poorly designed objects. But now I've changed. Why? In part because of new scientific advances in our understanding of the brain and of how emotion and cognition are thoroughly intertwined. We scientists now understand how important emotion is to everyday life, how valuable. Sure, utility and usability are important, but without fun and pleasure, joy and excitement, and yes, anxiety and anger, fear and rage, our lives would be incomplete.

Along with emotions, there is one other point as well: aesthetics, attractiveness, and beauty. When I wrote *The Design of Everyday Things*, my intention was not to denigrate aesthetics or emotion. I simply wanted to elevate usability to its proper place in the design world, alongside beauty and function. I thought that the topic of aesthetics was well-covered elsewhere, so I neglected it. The result has been the well-deserved criticism from designers: "If we were to follow Norman's prescription, our designs would all be usable—but they would also be ugly."

Usable but ugly. That's a pretty harsh judgment. Alas, the critique is valid. Usable designs are not necessarily enjoyable to use. And, as my three-teapot story indicates, an attractive design is not necessarily the most efficient. But must these attributes be in conflict? Can beauty and brains, pleasure and usability, go hand in hand?

All these questions propelled me into action. I was intrigued by the difference between my scientific self and my personal life. In science, I ignored aesthetics and emotion and concentrated on cognition. Indeed, I was one of the early workers in the fields that today are known as cognitive psychology and cognitive science. The field of usability design takes root in cognitive science—a combination of cognitive psychology, computer science, and engineering, analytical

fields whose members pride themselves on scientific rigor and logical thought.

In my personal life, however, I visited art galleries, listened to and played music, and was proud of the architect-designed home in which I lived. As long as these two sides of my life were separate, there wasn't any conflict. But early in my career, I experienced a surprising challenge from an unlikely source: the use of color monitors for computers.

In the early years of the personal computer, color displays were unheard of. Most of the display screens were black and white. Sure, the very first Apple Computer, the Apple II, could display color, but for games: any serious work done on the Apple II was done in black and white, usually white text on a black background. In the early 1980s, when color screens were first introduced to the world of personal computers, I had trouble understanding their appeal. In those days, color was primarily used to highlight text or to add superfluous decoration to the screen. From a cognitive point of view, color added no value that shading could not provide. But businesses insisted on buying color monitors at added cost, despite their having no scientific justification. Obviously, color was fulfilling some need, but one we could not measure.

I borrowed a color monitor to see what all the fuss was about. I was soon convinced that my original assessment had been correct: color added no discernible value for everyday work. Yet I refused to give up the color display. My reasoning told me that color was unimportant, but my emotional reaction told me otherwise.

Notice the same phenomenon in movies, television, and newspapers. At first, all movies were in black and white. So, too, was television. Movie makers and television manufacturers resisted the introduction of color because it added huge costs with little discernible gain. After all, a story is a story—what difference does color make? But would you go back to black-and-white TV or movies? Today, the only time something is filmed in black and white is for artistic, aesthetic reasons: The lack of full color makes a strong emo-

tional statement. The same lesson has not fully transferred to newspapers and books. Everyone agrees that color is usually preferred, but whether the benefits are sufficient to overcome the additional costs it entails is hotly debated. Although color has crept into the pages of newspapers, most of the photographs and advertisements are still in black and white. So, too, with books: The photographs in this book are all in black and white, even though the originals are in color. In most books, the only place color appears is on the cover—presumably to lure you into purchasing the book—but once you have purchased it, the color is thought to have no further use.

The problem is that we still let logic make decisions for us, even though our emotions are telling us otherwise. Business has come to be ruled by logical, rational decision makers, by business models and accountants, with no room for emotion. Pity!

We cognitive scientists now understand that emotion is a necessary part of life, affecting how you feel, how you behave, and how you think. Indeed, emotion makes you smart. That's the lesson of my current research. Without emotions, your decision-making ability would be impaired. Emotion is always passing judgments, presenting you with immediate information about the world: here is potential danger, there is potential comfort; this is nice, that bad. One of the ways by which emotions work is through neurochemicals that bathe particular brain centers and modify perception, decision making, and behavior. These neurochemicals change the parameters of thought.

The surprise is that we now have evidence that aesthetically pleasing objects enable you to work better. As I shall demonstrate, products and systems that make you feel good are easier to deal with and produce more harmonious results. When you wash and polish your car, doesn't it seem to drive better? When you bathe and dress up in clean, fancy clothes, don't you feel better? And when you use a wonderful, well-balanced, aesthetically pleasing garden or woodworking tool, tennis racket or pair of skis, don't you perform better?

Before I go on, let me interject a technical comment: I am talking

here about affect, not just emotion. A major theme of this book is that much of human behavior is subconscious, beneath conscious awareness. Consciousness comes late, both in evolution and also in the way the brain processes information; many judgments have already been determined before they reach consciousness. Both affect and cognition are information-processing systems, but they have different functions. The affective system makes judgments and quickly helps you determine which things in the environment are dangerous or safe, good or bad. The cognitive system interprets and makes sense of the world. Affect is the general term for the judgmental system, whether conscious or subconscious. Emotion is the conscious experience of affect, complete with attribution of its cause and identification of its object. The queasy, uneasy feeling you might experience, without knowing why, is affect. Anger at Harry, the used-car salesman, who overcharged you for an unsatisfactory vehicle, is emotion. You are angry at something—Harry—for a reason. Note that cognition and affect influence one another: some emotions and affective states are driven by cognition, while affect often impacts cognition.

Let's look at a simple example. Imagine a long and narrow plank ten meters long and one meter wide. Place it on the ground. Can you walk on it? Of course. You can jump up and down, dance, and even walk along with your eyes shut. Now prop the plank up so that it is three meters off the ground. Can you walk on it? Yes, although you proceed more carefully.

What if the plank were a hundred meters in the air? Most of us wouldn't dare go near it, even though the act of walking along it and maintaining balance should be no more difficult than when the plank is on the ground. How can a simple task suddenly become so difficult? The reflective part of your mind can rationalize that the plank is just as easy to walk on at a height as on the ground, but the automatic, lower visceral level controls your behavior. For most people, the visceral level wins: fear dominates. You may try to justify your fear by stating that the plank might break, or that, because it is windy, you

might be blown off. But all this conscious rationalization comes after the fact, after the affective system has released its chemicals. The affective system works independently of conscious thought.

Finally, affect and emotion are crucial for everyday decision making. The neuroscientist Antonio Damasio studied people who were perfectly normal in every way except for brain injuries that impaired their emotional systems. As a result, despite their appearance of normality, they were unable to make decisions or function effectively in the world. While they could describe exactly how they should have been functioning, they couldn't determine where to live, what to eat, and what products to buy and use. This finding contradicts the common belief that decision making is the heart of rational, logical thought. But modern research shows that the affective system provides critical assistance to your decision making by helping you make rapid selections between good and bad, reducing the number of things to be considered.

People without emotions, as in Damasio's study, are often unable to choose between alternatives, especially if each choice appears equally valid. Do you want to come in for your appointment on Monday or Tuesday? Do you want rice or baked potato with your food? Simple choices? Yes, perhaps too simple: there is no rational way to decide. This is where affect is useful. Most of us just decide on something, but if asked why, often don't know: "I just felt like it," one might reply. A decision has to "feel good," or else it is rejected, and such feeling is an expression of emotion.

The emotional system is also tightly coupled with behavior, preparing the body to respond appropriately to a given situation. This is why you feel tense and edgy when anxious. The "queasy" or "knotted" feelings in your gut are not imaginary—they are real manifestations of the way that emotions control your muscle systems and, yes, even your digestive system. Thus, pleasant tastes and smells cause you to salivate, to inhale and ingest. Unpleasant things cause the muscles to tense as preparation for a response. A bad taste causes the mouth to pucker, food to be spit out, the stomach muscles to contract. All of

these reactions are part of the experience of emotion. We literally *feel* good or bad, relaxed or tense. Emotions are judgmental, and prepare the body accordingly. Your conscious, cognitive self observes those changes. Next time you feel good or bad about something, but don't know why, listen to your body, to the wisdom of its affective system.

Just as emotions are critical to human behavior, they are equally critical for intelligent machines, especially autonomous machines of the future that will help people in their daily activities. Robots, to be successful, will have to have emotions (a topic I discuss in more detail in chapter *6).* Not necessarily the same as human emotions, these will be emotions nonetheless, ones tailored to the needs and requirements of a robot. Furthermore, the machines and products of the future may be able to sense human emotions and respond accordingly. Soothe you when you are upset, humor you, console you, play with you.

As I've said, cognition interprets and understands the world around you, while emotions allow you to make quick decisions about it. Usually, you react emotionally to a situation before you assess it cognitively, since survival is more important than understanding. But sometimes cognition comes first. One of the powers of the human mind is its ability to dream, to imagine, and to plan for the future. In this creative soaring of the mind, thought and cognition unleash emotion, and are in turn changed themselves. To explain how this comes about, let me now turn to the science of affect and emotion.