3. The Beauty Paradox: Art and Communication

> No one can write decently who is distrustful of the reader's intelligence, or whose attitude is patronizing.
>
> —**E. B. White, from *The Elements of Style***

Learning to deal with frustration is part of professional life. So is being able to explain what you do and why you do it. I kept repeating those maxims to myself on November 1, 2010, after the weekly news magazine I worked for, *Época*, published what I considered a decent graphic about the prison population in Brazil.

It all began two weeks before. As the magazine's infographics director, one of my responsibilities was to coordinate a two-page section called "Diagram," a news story told through short pieces of text, statistical charts, maps, and illustrations. "Diagram" was our big infographic of the week, and we put a lot of effort and resources into it.

From January 2010, when I was hired, to that moment in November, we had published more than 30 "Diagrams," each a detailed visual description of subjects as diverse as demographics; spaceships; boats made of thousands of recycled plastic bottles (its name is *Plastiki*); *and* election results, with a wide assortment of other data-based stories besides.

Part of my job was to dream up potential stories for "Diagrams," so I read several newspapers a day looking for inspiration. An item published by *Estado de São Paulo*, one of Brazil's three largest newspapers, caught my eye. It contained data recently released by the Ministry of Justice revealing a surge in the number of prison inmates over the previous four years. Surprisingly, although *Estado* cited the ministry's exhaustive database, it did not include a chart.

Stories about packed prisons in Brazil are nothing new. The problem dates to a military dictatorship that ruled the country between 1964 and 1985, and, paradoxically, it has only gotten worse as the police and judiciary have become more efficient. More efficiency leads to more criminals behind bars, which is good, but it also pressures federal and state governments to keep up by building more facilities. There's never enough money for that.

When dealing with a story that people are already familiar with, what you lack in novelty must be compensated for with depth. After all, **journalism is not just about covering the news, but also about providing context for the news**.

Building a Narrative Structure

As I was downloading and organizing the data from the Brazilian Ministry of Justice, Humberto Maia, a talented young reporter, telephoned sources who could explain what the numbers meant. He spoke with public officials, sociologists, and human rights advocates.

We decided to create a stand-alone graphic with four parts:

1. A comparison of Brazil's prison system and those of other countries between 1997 and 2007. We had found a United Nations report showing that Brazil ranked fifth in prison population growth over those years and first in the Americas. Its number of inmates grew 150 percent in that

decade.

2. A list of the Brazilian states with the most drastic inmate increases between 2007 and 2010, based on the Ministry of Justice data. We decided to calculate the number of inmates per 100,000 people in each state, as this measure allows a fair comparison of regions with different-sized populations. Had we used absolute numbers, the states with more inhabitants, such as São Paulo and Rio de Janeiro, would always rank first.
3. A graphic that showed the imbalance between the number of prison inmates and the number of spaces for them in jails. In the worst cases, like the state of Acre, there were more than two prisoners per space. We included those figures.
4. Explanations highlighting the most surprising numbers. Designers sometimes forget that in many cases an infographic is a narrative based on charts, maps, and diagrams, in which text is crucial.

Our next step was to devise a structure that would make sense of the data. We decided to use headlines to guide readers through the information:

1. Between 1997 and 2007, Brazil experienced the fifth-largest increase in prison population in the world;
2. The trend has continued since 2007; and
3. Government has not kept pace with the growing prison population by building sufficient accommodations.

Figure 3.1 shows the infographic we published.

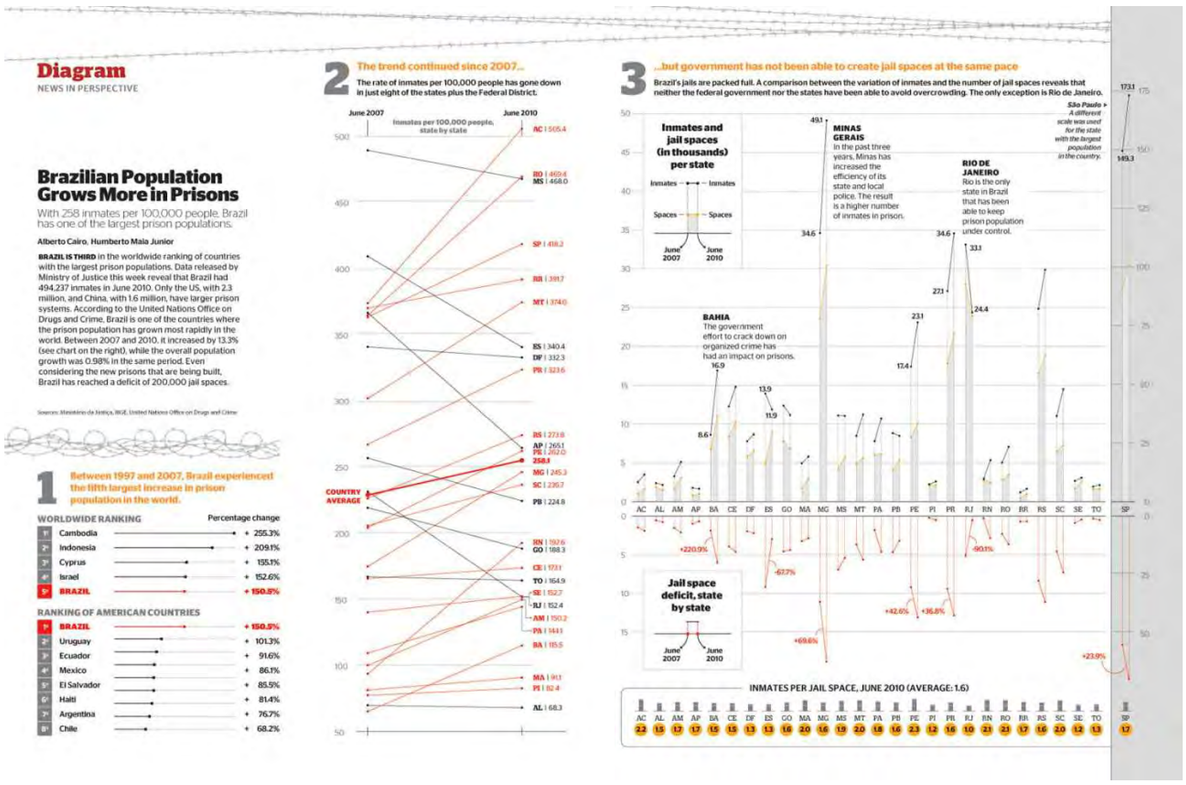

Figure 3.1. *Época* magazine (São Paulo, Brazil). Originally published in Portuguese on November 1, 2010.

We ended up with a two-page, graphics-based story told in several layers of increasing depth and complexity that readers could explore at their leisure. While we could have restrained ourselves and merely summarized the data, I reasoned that readers living in Rio Grande do Norte, Tocantins, or Amazonas would want to analyze how their home states compared with others and with the country

averages. They would want details in terms of granular data. On seeing the story in print, I believed we had created an acceptable and interesting graphic.

Not everyone agreed.

An Unexpectedly Controversial Chart

The *Época* newsroom finishes working on each issue by Friday evening. The magazine hits the newsstands Saturday morning. That gives executive editors—myself among them at the time—a chance to look over the stories and prepare for a critique meeting that takes place every Monday morning before the next edition is planned.

On Monday, November 1, 2010, I arrived in the newsroom five minutes before the meeting started. Anticipating a routine critique, I basked in the lingering feeling of peaceful drowsiness after a particularly nice, quiet weekend. **Nothing prepared me for what happened next.**

"I feel compelled to say that this week's 'Diagram' is horrible," said one of the executive editors. "We should strive to become more popular. Our average reader is not going to be able to understand something as complex as this."

The comment unleashed a firestorm. "I think this graphic is not friendly enough. No one will read it," said another colleague.

The director took a turn: "The problem is not complexity. The infographic is not hard to understand. The problem is that it is ugly."

"In my opinion, it has too much information," another colleague said.

Holy *crap*! I was flabbergasted. Patiently, I waited for everyone to finish tearing our project down, giving myself a chance to cool off. Then, I explained the reasoning behind the piece: the gathering of the data, the structure, the narrative, the depth. No one was convinced. It really wasn't my goal to convince them. The critique meeting is not the place to persuade others of how good your work is, but to hear suggestions for how to improve it.

Even if I disagreed with the objections, and even if, one year later, the graphic would go on to win a Malofiej Infographics award, the highest honor in the infographics field, I took the comments to heart. In fact, they led me to revisit a question that generations of designers have pondered:

What does "ugly" mean when used to describe an infographic?

That is, what did my colleagues, whose combined journalism experience totaled more than 100 years, really mean when they said that the graphic was *horrible*, *too complex*, and that *it could scare readers away*?

The Visualization Wheel

After the meeting, I took a couple of hours off to reflect. I grabbed a pen and paper and began sketching and taking notes, which helps me think. I listed my colleagues' opinions. According to them, our graphic was:

1. Too complex
2. Too abstract
3. Too far from the aesthetics a majority of our readers expect ("ugly")
4. Too dense

I discovered their critique could be summarized using a conceptual device I had developed while writing my first book, *Infografía 2.0* (2008, no English version

available): **the visualization wheel**. See **Figure 3.2**.

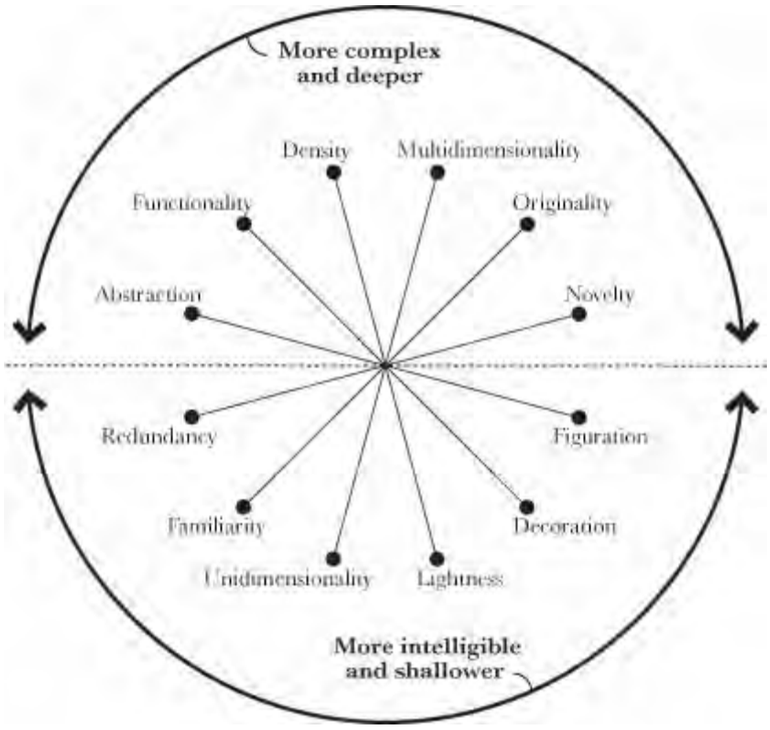

Figure 3.2. The visualization wheel.

The visualization wheel's axes correspond to the main features you need to balance when you design an information graphic. For this reason, I also refer to it as the *tension wheel*. The idea isn't so original: It's based on a similar wheel in Chapter 1 of Joan Costa's *La Esquemática* (see bibliography). My wheel includes several changes and more axes.

A word of warning before we move on: The visualization wheel is an aid I use for thinking about my own graphics. The position along each axis is therefore very subjective, so it is unlikely you'll be able to use it for academic or quantitative analyses. It is an exercise in meta-visualization: *a visualization for planning visualizations*.

Let's see how the wheel works.

The outer layer is divided into two hemispheres, each with six features. The upper hemisphere's features define graphics that are deeper and more complex. By complex I mean the amount of effort readers have to invest in deciphering a particular graphic. Depth is the number of layers of information a graphic includes.

It is possible for a graphic to be complex *and* shallow if you use a funky graphic form to encode irrelevant data, or simple *and* deep if you encode tons of data with common graphic forms. But, in general, complexity and depth are related variables in information graphics and visualizations. Graphics containing a good amount of data tend to be more difficult to read, but are also more rewarding and enlightening.

Let's look at the axes.

Abstraction-Figuration

An information graphic (or a portion of it) is completely *figurative* when the relationship between the referent and its representation is perfectly mimetic. The more distant the representation and its referent are, the more abstract the infographic will be: For example, a realistic illustration of a person is more

figurative than a pictorial symbol of the person. In extreme cases, there will be no natural relationship between the two, and in those cases we would say that the connection between referent and representation is *conventional*.

You can see this axis at work in two scenes of a single interactive graphic of mine about the NASA Cassini-Huygens Mission to Saturn. See **Figure 3.3**.

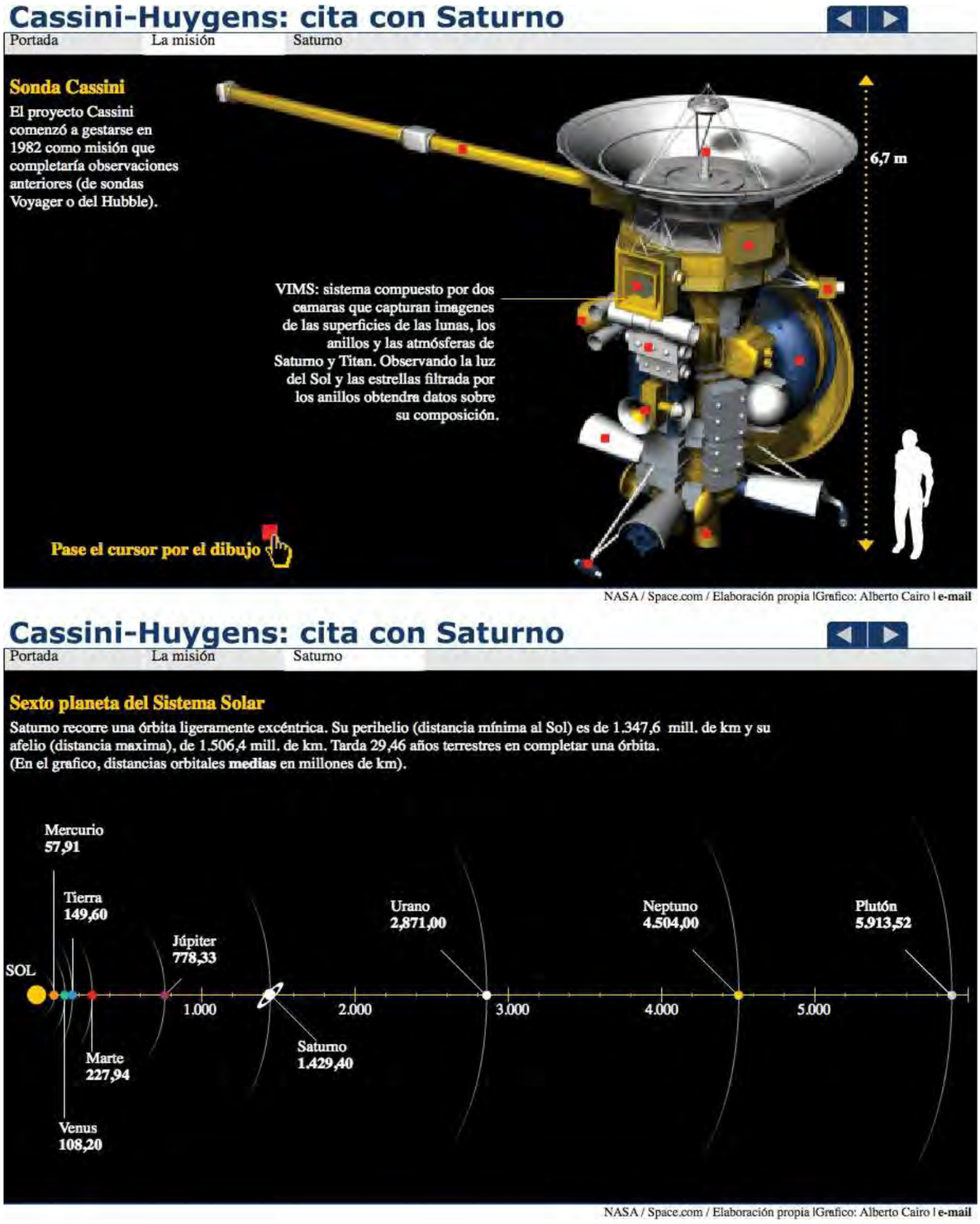

Figure 3.3. Cassini-Huygens Mission: http://www.elmundo.es/elmundo/2004/graficos/jun/s4/cassini.html.

The graphic in the top image is more figurative. The illustration resembles the object it intends to explain. The graphic at the bottom displaying the distances between planets in the solar system is much more abstract. In general, the more closely a graphic reproduces a material reality, the more figurative it will be.

On the other hand, if the representation involves significant conceptual manipulation on the part of the designer, it will tend to be more abstract. In the case of the Saturn mission graphic, I consciously reduced the realism of the

planets to transform them into simple color circles, and I placed them on top of a distance scale—another conceptual item device.

Functionality-Decoration

A graphic can be functional and visually pleasing, obviously, but here I am not considering stylistic elements that improve readability, such as the correct use of elegant fonts and carefully crafted color palettes. This axis refers to the inclusion of visual elements that are not directly used to enhance the comprehension of the material.

Take another look at the Brazilian prison graphic (Figure 3.1). Do you see the barbed wire? That's what I would call a non-functional visual element. It's decoration. Decoration is not bad per se, but it can interfere with the information in a chart if not handled well.

Density-Lightness

The position an infographic occupies on this axis is related to the amount of data it displays in relation to the space it uses. See the two graphics in **Figure 3.4**, which my colleagues and I created at *Época* magazine. Although almost equal in size, the graphics offer very different amounts of information. The first graphic is very dense; the second, very light, although still informative.

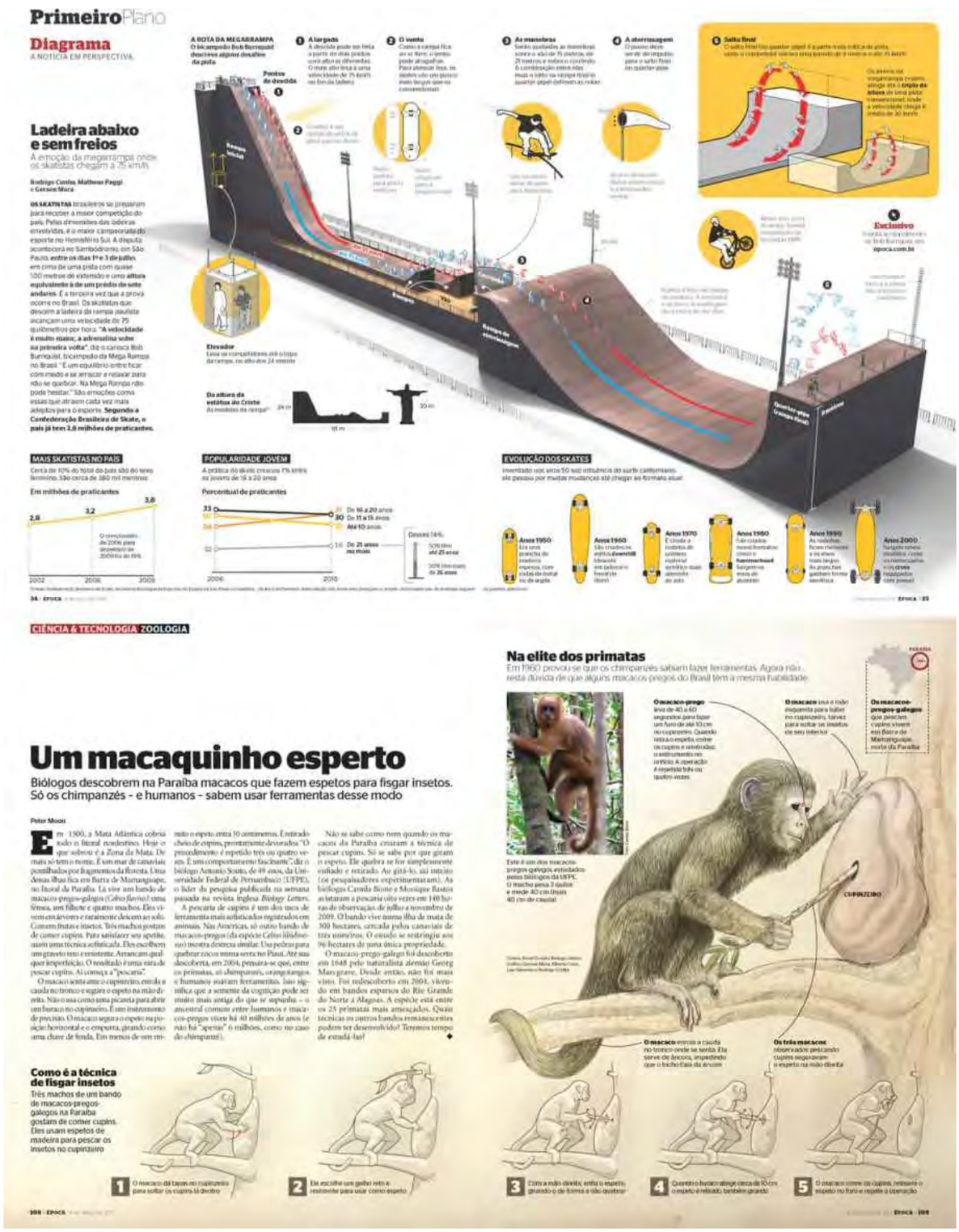

Figure 3.4. "Megaramp: Skate Boarding Competition in São Paulo," and "How the Brown Capuchine Macaque Hunts Termites."

Multidimensionality-Unidimensionality

This axis is a measure of two related variables: the number of layers of depth a graphic lets readers navigate, and the different forms it uses to encode the data.

Consider our prison graphic. I believe that this one leans toward the *multidimensionality* side of the wheel, because it gives readers the opportunity to dig into the data quite deeply. Also, in the case of the relationship between number of inmates and jail spaces in different states, it lets them see the same data in different ways.

Another example of multidimensional infographics is **Figure 3.5**, published by *The New York Times* right after the 2004 U.S. presidential elections. The popular vote is represented by county and by population density. The electoral vote is

shown state by state in a standard *choropleth map* (a map that uses different colors and shades) and in a *cartogram* (a map that distorts the relative size of regions proportionally to a variable—in this case, the number of electoral votes each state has). On top of the composition is the proportional symbol map I discussed at the end of Chapter 2, "Forms and Functions: Visualization as a Technology."

THE 2004 ELECTIONS

THE ELECTORAL MAP

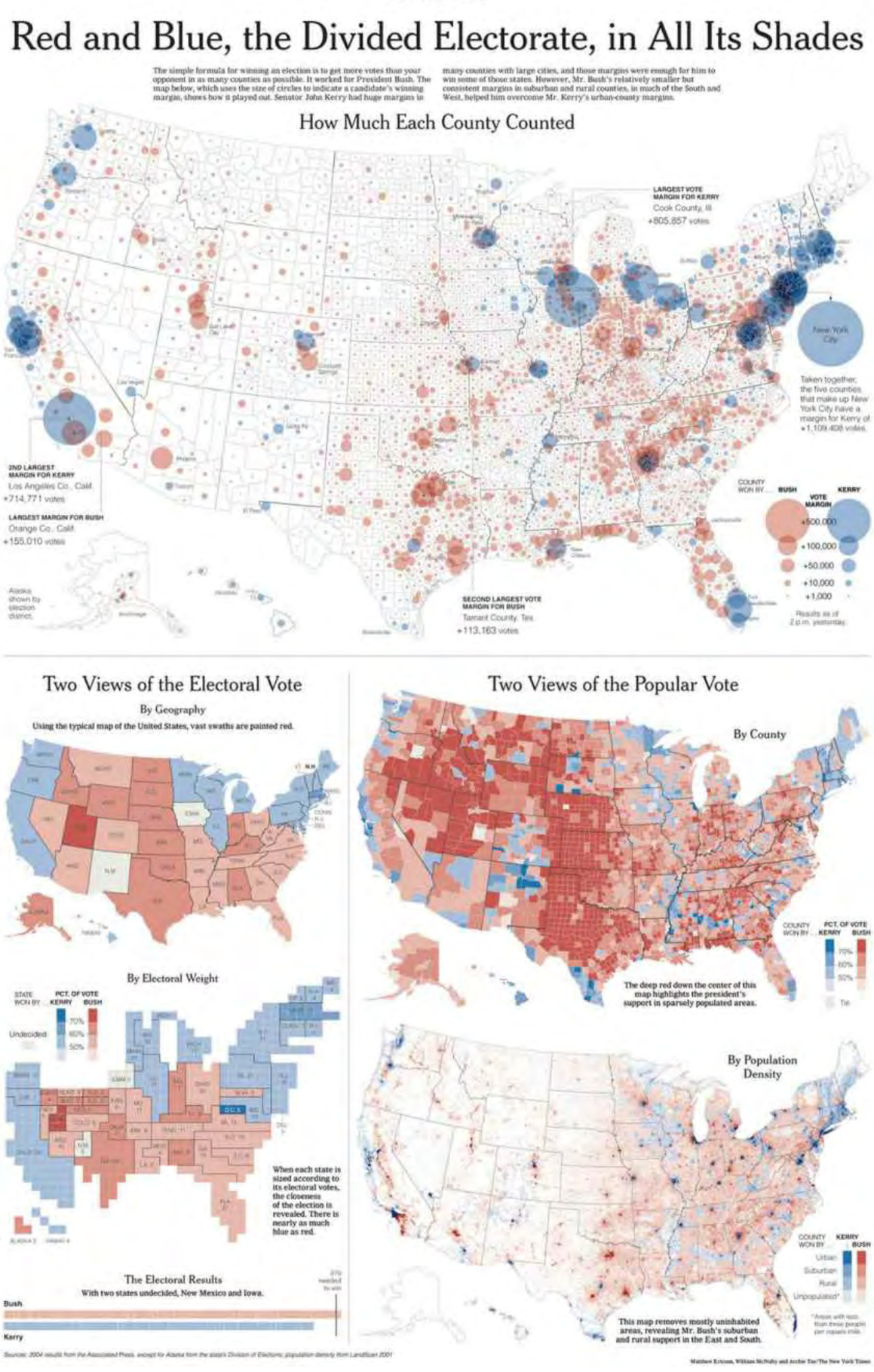

Figure 3.5. ***The New York Times*****. Reproduced with permission.**

Originality-Familiarity

Some graphic forms have become so common that they are almost as readable as text. Think of bar charts, line charts, and pie charts. This has not always been so,

of course. In the late eighteenth century, when the use of such charts was first systematized and theorized by polymath William Playfair, they were considered revolutionary, albeit understandable.

However, the explosion of the use of information graphics and visualization in many areas—from academic computer science departments to PR and marketing companies and more—has fueled a desire to innovate new graphical forms. An example of a form that today some people would find new or challenging is *theme rivers* (also called stream graphs), for instance. See one in **Figure 3.6**, made by Periscopic, an information visualization firm, for Yahoo!. It shows the keywords processed by Yahoo! Mail over a 30-second period. Word size and line width denote volume of occurrence. Spam keywords are shown in gray.

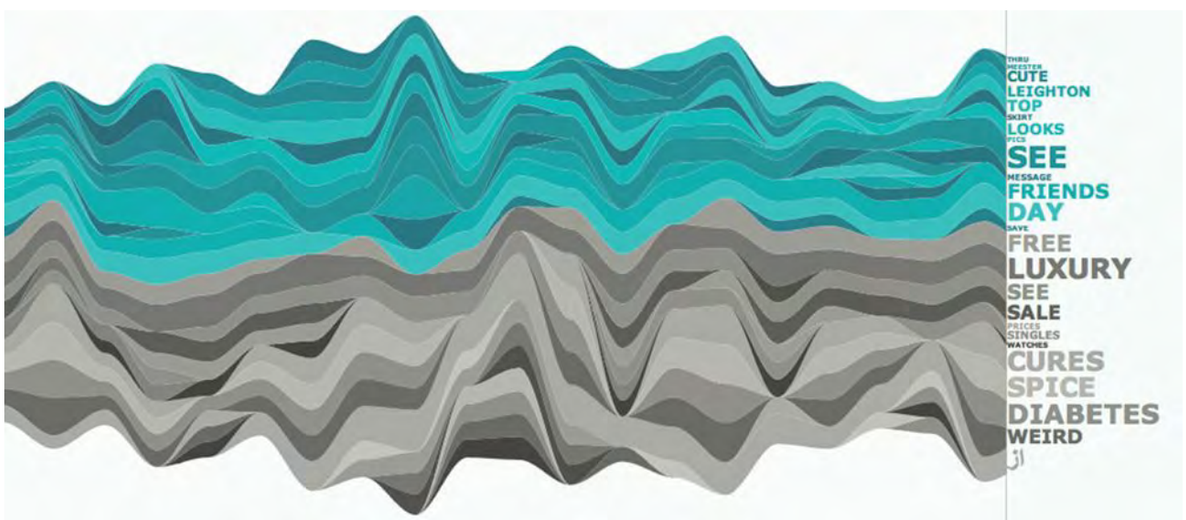

Figure 3.6. An example of a stream graph. ©2011 Yahoo! Designed by Periscopic (http://periscopic.com/).

Novelty-Redundancy

An information graphic can explain many different things once (novelty) or it can explain the same things several times, by different means (redundancy). Striking a balance between novelty and redundancy is critical. Novelty is important to avoid boring your readers, but a certain level of redundancy is necessary if you want to be understood.

See **Figure 3.7**, which shows a portion of an infographic about giant waves that I'll discuss later on in this book. The copy accompanying each step of the explanation repeats some of the information encoded in the illustration. In this case, the text not only complements the image (or vice versa), it also *strengthens* the message by clarifying what the image shows. Another example: In a complex statistical chart, you could add necessary redundancy by highlighting relevant data points.

Figure 3.7. Realistic illustrations accompanied by redundant copy.

If I had to visualize my Brazilian prisons infographic using the visualization wheel, the result would be **Figure 3.8**. I consider the graphic more abstract than figurative, for an obvious reason: The charts don't resemble physical reality but are conceptual tools that allow me to encode quantitative data.

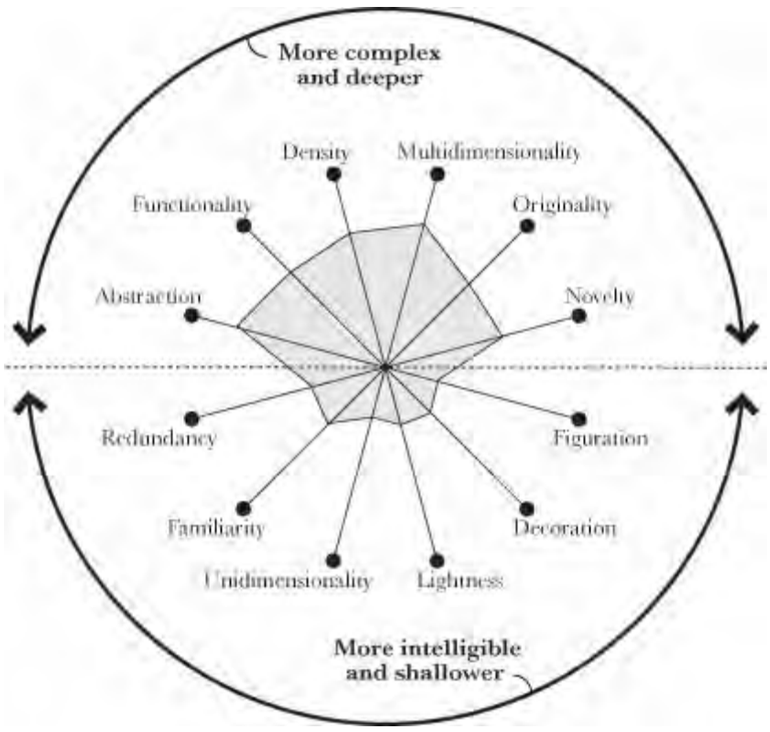

Figure 3.8. Visualization wheel of the Brazilian prisons infographic.

In a conventional sense, the chart is more functional than beautiful. It contains almost no decoration, although we paid attention to color palettes and the consistency of typographical style.

The chart is multidimensional: It has at least five layers of information that readers can explore.

It's not very original. All of the graphic forms are in common use—the bar chart, the slopegraph (used for the second part), the tables, and so on.

The charts contain quite a bit of redundancy. Notice on the second page, where the number of inmates is compared to jail spaces, that the same data is encoded in different formats. It also includes explanatory text to clarify the most striking figures.

Is this an adequate combination of factors? I believe it is. Despite the comments

from my colleagues, I don't think that this information graphic is overloaded or excessively difficult to read. It's not the prettiest thing in the world, I concede. But it's not very ugly, either. (I've done worse!)

It is true that, according to my own terms, the Brazilian prisons project leans toward the upper half of the visualization wheel: It is complex and deep. This should be no obstacle for readers of a quality publication such as *Época*. If we assume that our audience is willing to read 8,000-word stories about convoluted corruption schemes in the upper echelons of government, why not apply the same expectation to graphics? It would be strange to publish stories for adults illustrated with graphics for kids, which is what happens when publications underestimate what their readers can absorb.

Identifying your audience

The complexity of a graphic should be adapted to the nature of your average reader. This sounds easier than it really is. **Figure 3.9** explains that at least two factors influence the communication between a designer and an audience through information graphics and visualizations: first, how well the visual forms used to encode the information are adapted to the nature of the story the graphic should tell; and second, the previous knowledge the user has about the topic and about how those visual forms work (e.g., bar charts are more common than scatter-plots).

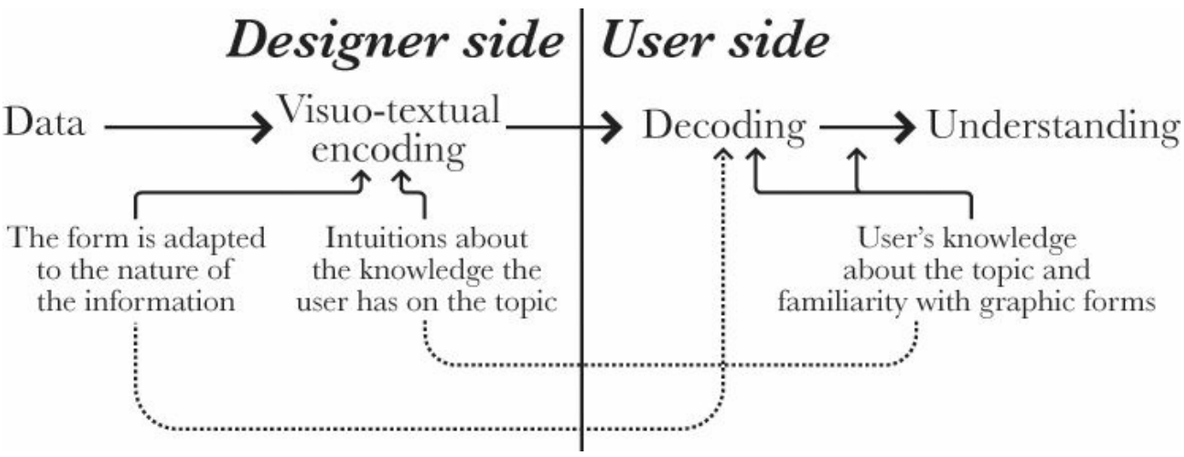

Figure 3.9. Designers encode, users decode.

The more specialized your audience niche, the more you can take for granted, and the more you can rely on what your users presumably already know.

Consider the charts in **Figure 3.10**. They display the co-occurrence of neuropsychiatric disorders within families, drawn from an academic paper published in the online magazine *PlosOne*.[1] Do you know what it all means? I don't (well, actually, only to a point). That is not criticism of the charts: It's just that the researchers didn't have me in mind when they plotted their graphics. They were thinking of their peers, people with so much knowledge of psychiatry and neuroscience that they can decode these graphics in the blink of an eye. They don't need extra explainers, legends, or any other artifice that designers ordinarily employ to make readers' lives easier.

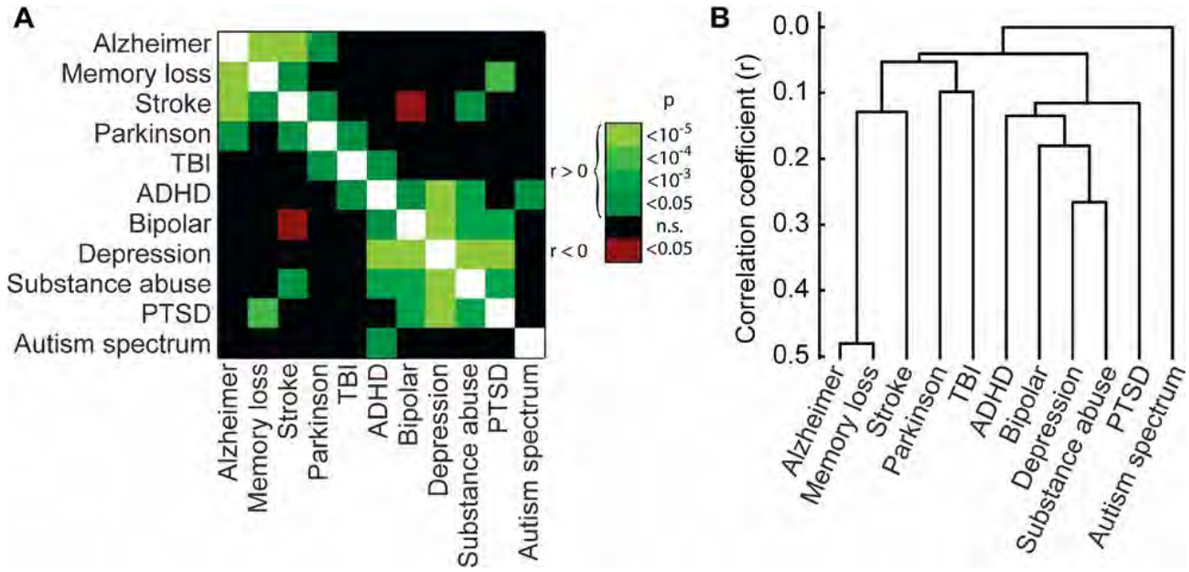

Figure 3.10. Try to figure out what these charts mean. It's not easy, is it?

Few designers have the privilege of working for scientific publications, where it is easy to base decisions on assumptions about one's audience. Most of us work for general publications and face questions such as, "Is this graphic too complex for the majority of our readers?" or "Will our readers feel overwhelmed by the amount of data we've given them, or by the way we've presented it?"

Sadly, when faced with these challenges, **too many communicators dumb down the data**, simplifying it rather than *clarifying* it, and they add cutesy illustrations and icons that, to their way of thinking, will make the graphic presentations less dry.

The mind-set behind this approach is captured in a statement that I've heard, with minor variations, in three different newsrooms from three different managers who didn't know one another: "Our readers are idiots." The quote that opens this chapter, taken from E. B. White's great classic on writing, *The Elements of Style*, is the perfect antidote against this deleterious nihilism:

> No one can write decently who is distrustful of the reader's intelligence, or whose attitude is patronizing.

Do you respect your audience's intelligence? How do you know if you are overestimating it (not likely) or underestimating it (most common)?

Engineers vs. Designers: Edward Tufte and Nigel Holmes

There has always been a fundamental clash in information graphics and visualization between those who favor a rational, scientific approach to the profession, emphasizing functionality, and those who consider themselves "artists," placing emphasis on emotion and aesthetics.

There is a middle ground between the two groups, and the boundary between the two philosophies is blurry. But, in general, it is my perception that those in the first group typically come from technical backgrounds (statistics, cartography, computer science, and engineering), while those in the second group are graduates of graphic design, art, and journalism programs. The first group would be drawn to visualization wheels like the one shown on the left in **Figure 3.11**. The second group would prefer to deliver graphics similar to the wheel on the right.

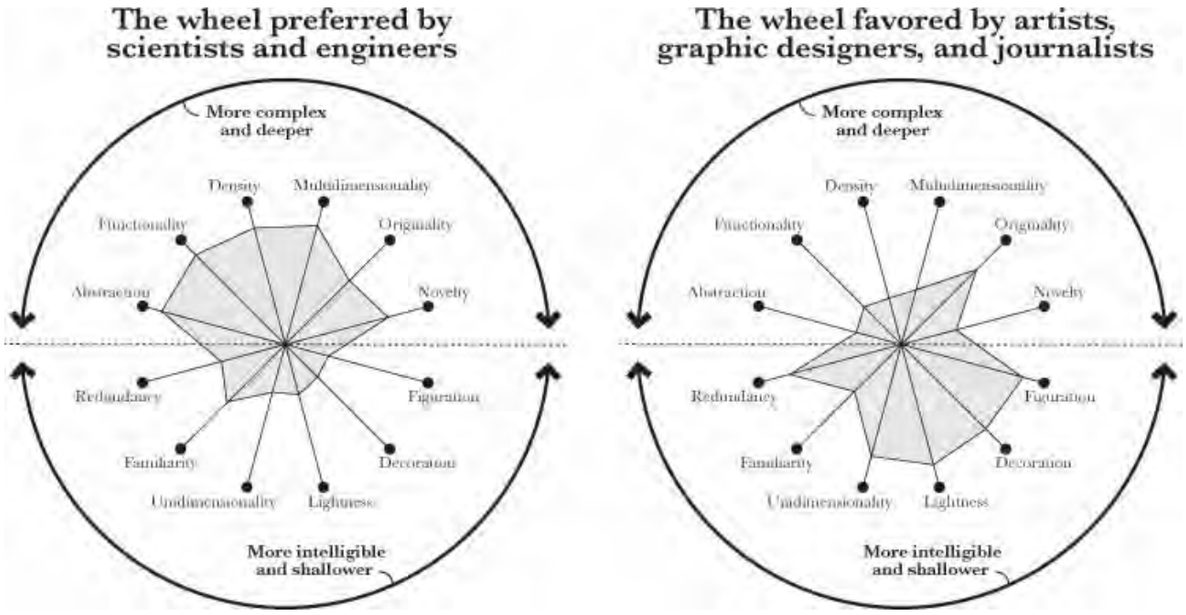

Figure 3.11. Different professional backgrounds, different ways of facing projects.

War between the factions was more or less formally declared by Edward R. Tufte in 1990. A professor emeritus of political science and statistics at Yale University, Tufte is arguably the most influential theoretician in information design and visualization, and deservedly so. His books *The Visual Display of Quantitative Information* (1983), *Envisioning Information* (1990), *Visual Explanations* (1997), and *Beautiful Evidence* (2006) are must-reads in our field.

In *Envisioning Information*, Tufte attacked an infographics tradition that took shape in the United States in the late 1980s and early 1990s. Thanks to the success of the visual style of *USA Today* (launched in 1982) and *Time* magazine, illustrated charts and pictorial maps became very popular.

Tufte coined a term to define pictograms and illustrations within charts and maps: *chartjunk*. To make his case, he chose a *Time* chart (**Figure 3.12**) designed by renowned artist Nigel Holmes, the magazine's art director at the time. Holmes himself recognizes that this is not one of his most inspired works, but also contends that Tufte picked just one graphic among hundreds and elevated an isolated anecdote to a category level to make his case.

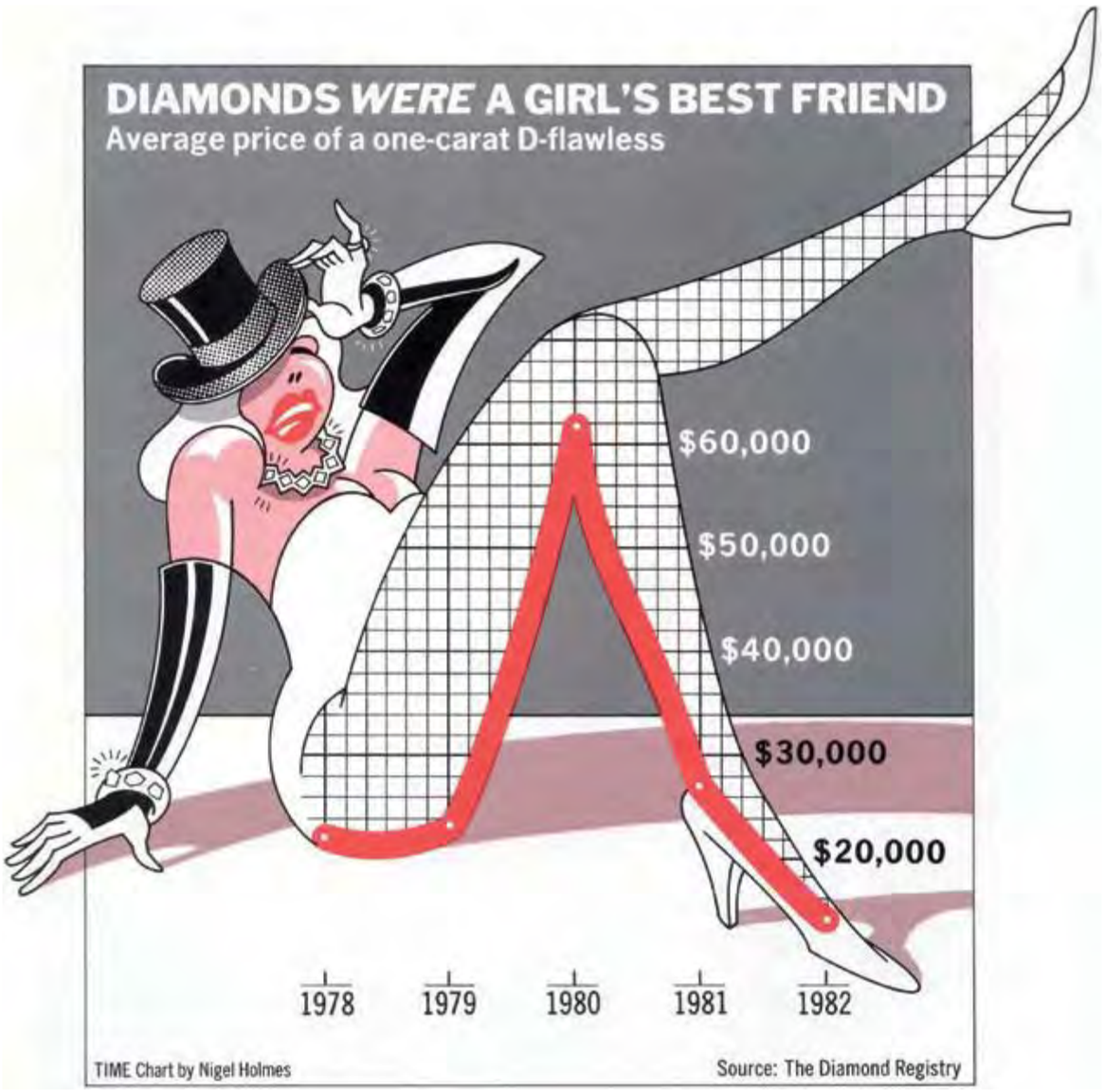

Figure 3.12. Chart by Nigel Holmes for Time magazine. (Reproduced with permission.)

Tufte explained why he despised decorative ideology represented by the graphic this way:

> Lurking behind chartjunk is contempt both for information and for the audience. Chartjunk promoters imagine that numbers and details are boring, dull, and tedious, requiring ornament to enliven. Cosmetic decoration, which frequently distorts the data, will never salvage an underlying lack of content. If the numbers are boring, then you've got the wrong numbers (...) Worse is contempt for our audience, designing as if readers were obtuse and uncaring. In fact, consumers of graphics are often more intelligent about the information at hand than those who fabricate the data decoration (...) The operating moral premise of information design should be that our readers are alert and caring; they may be busy, eager to get on with it, but they are not stupid.[2]

Minimalism and Efficiency

A cherished notion of Tufte's is a principle of efficiency: **A visual design project is good if it communicates a lot with little**. In his own words, in his principles of graphic excellence:

- Graphical excellence is the well-designed presentation of interesting data —a matter of substance, of statistics, and of design.

- Graphical excellence consists of complex ideas communicated with clarity, precision, and efficiency.
- Graphical excellence is that which gives to the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space.[3]

This efficiency principle is defined with more precision by Tufte as the *data-ink ratio*: a measurement of the amount of ink that is used to represent data in a chart. Tufte defines data-ink elements as those that cannot be removed without destroying the integrity of the presentation. The other items, those that amount to decoration, can be eliminated because they are either redundant or they distract the reader from what really matters. Tufte even proposed a little formula:

> Data-ink ratio = Ink that encodes data / Total amount of ink used to print the graphic

Nigel Holmes's diamonds graphic scores low in this formula. Let's say that 1,000 drops of color ink were used to print it. Of those, around 150 are the ones that define the line, the headline and subtitle, the scale, and the specific values. Those are the elements that encode data. The woman illustration is non-data ink. So:

> Data-ink ratio = 150 / 1,000 = 0.15

According to Tufte, the closer the data-ink ratio is to 1.0, the better the graphic is. The less ink you use for ornamental effects, the better. Tufte doesn't just consider mere decoration erasable. In his first book, he also proposed removing gridlines and even portions of bars in a bar chart. See **Figure 3.13**.

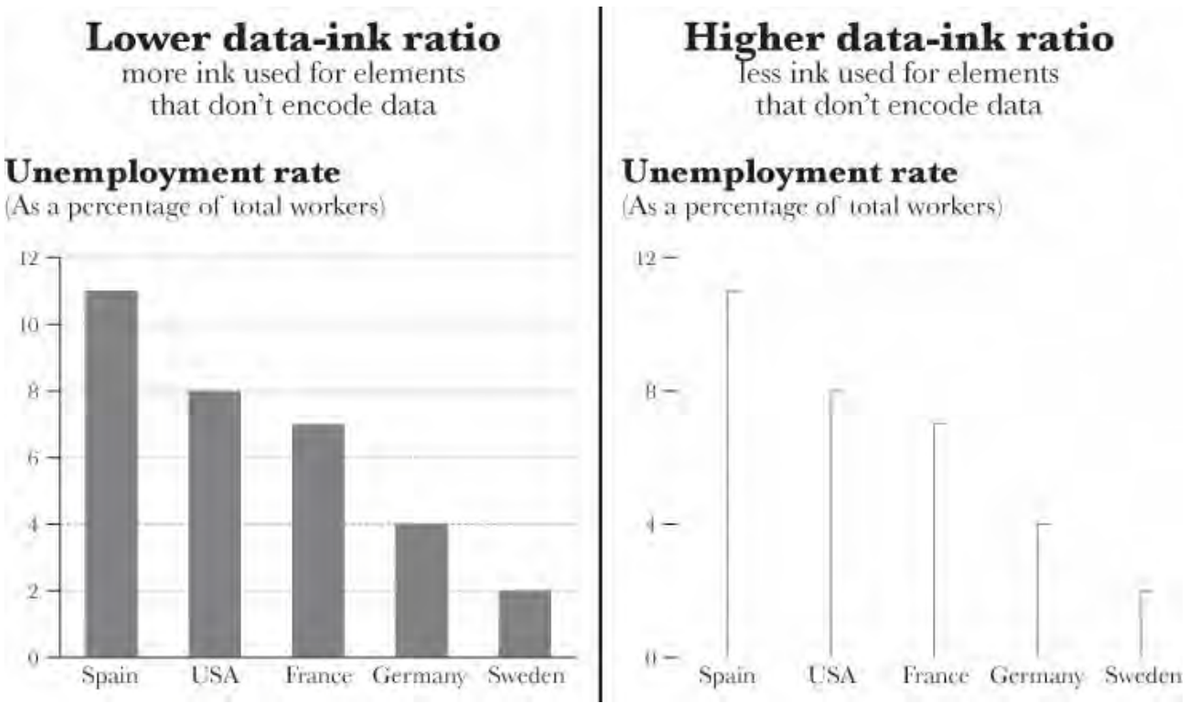

Figure 3.13. A traditional bar chart and its minimalist version.

Tufte's books imposed sanity at a time when flashy prevailed over functional, when pictorial and fun presided over abstract and intellectual. His writing style is as austere and economical as the graphics he favors, and many of his best quotes and soundbites (including "chartjunk" and "chartoon") became conceptual weapons in many discussions on what is appropriate in information graphics and visualization. But are Tufte's rants against *redundant* and *unnecessary* visual junk always right?

Is All "Chartjunk" Junk?

The problem with Tufte is that he tends to write in aphorisms and epigrams rather than building a continuous argument cover to cover. John Grady, a Wheaton College professor, observed in 2006 that Tufte's books are neither guides nor analytical texts, but "meditations" or essays: "Each chapter of his books consists of loosely integrated discussions of the merit of particular displays."[4] **That is why so many readers of Tufte's work** (in the past, myself among them) **feel a bit disoriented when they try to transfer his abstract principles to the real world.**

Another challenge of Tufte's writing is that he doesn't indicate whether an opinion is based on research or derived from personal views. The writing is matter-of-fact, as if the ideas are self-evident and grounded in reason. There are no cracks in the armor that would allow you to sense whether the author has any doubts. This minimalism is not purely a rational choice, it is also an aesthetic one. As much as I agree with Tufte on being serious about the data you handle, respecting the reader's intelligence, and reducing clutter and increasing elegance, his lack of differentiation between evidence-based assertions and personally informed intuitions is a weakness.

The data-ink ratio is paradigmatic. His assertion that a higher efficiency—the lowest amount of visual resources to communicate the highest possible amount of content—*always* facilitates understanding is dubious. This doesn't mean that designers should feel free to start cramming charts with cartoons and illustrations, but it does mean that resources considered by Tufte to be non-data ink—for instance, gridlines in a time-series chart, or unobtrusive and subtle icons that identify the topic the chart discusses—might not be junk at all. Far from obstacles to understanding, they may *enhance* understanding.

In the past decade, academic papers have tested Tufte's hypotheses with mixed results. A 2007 study from Ben-Gurion University presented 87 students with traditional bar charts and maximized data-ink ratio charts similar to those in **Figure 3.14**. The minimalist version was rejected by many of the participants, perhaps because the bar chart is such a common graphical form. More importantly, when researchers tested to see if readers interpreted the minimalist chart better and faster than the more cluttered one, they found no significant difference. In this case, radically reducing the bar chart to its main constituents was not a matter of functionality, but of visual style.[5]

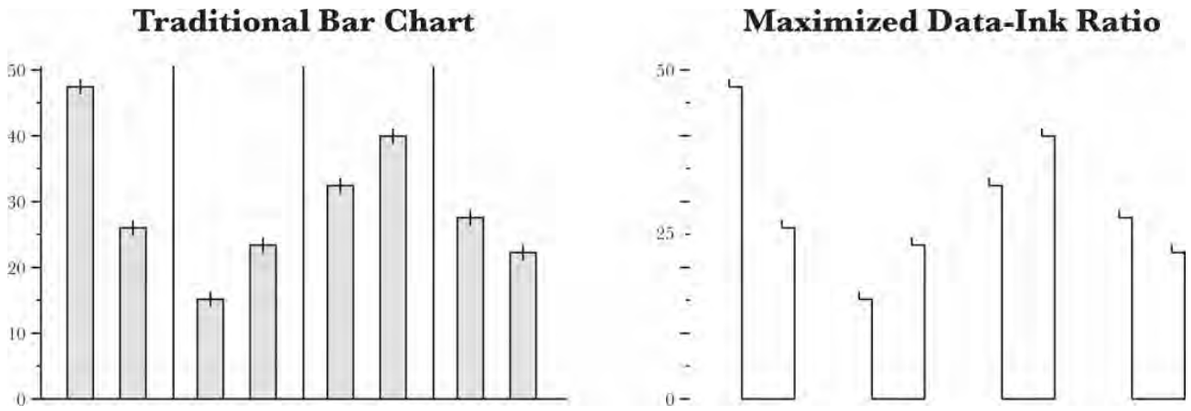

Figure 3.14. Which chart would you prefer?

In another study at the University of Saskatchewan (Canada),[6] 20 students read four old Nigel Holmes graphics and their corresponding minimalist versions

designed by the researchers. One was our well-known diamonds chart in Figure 3.15.

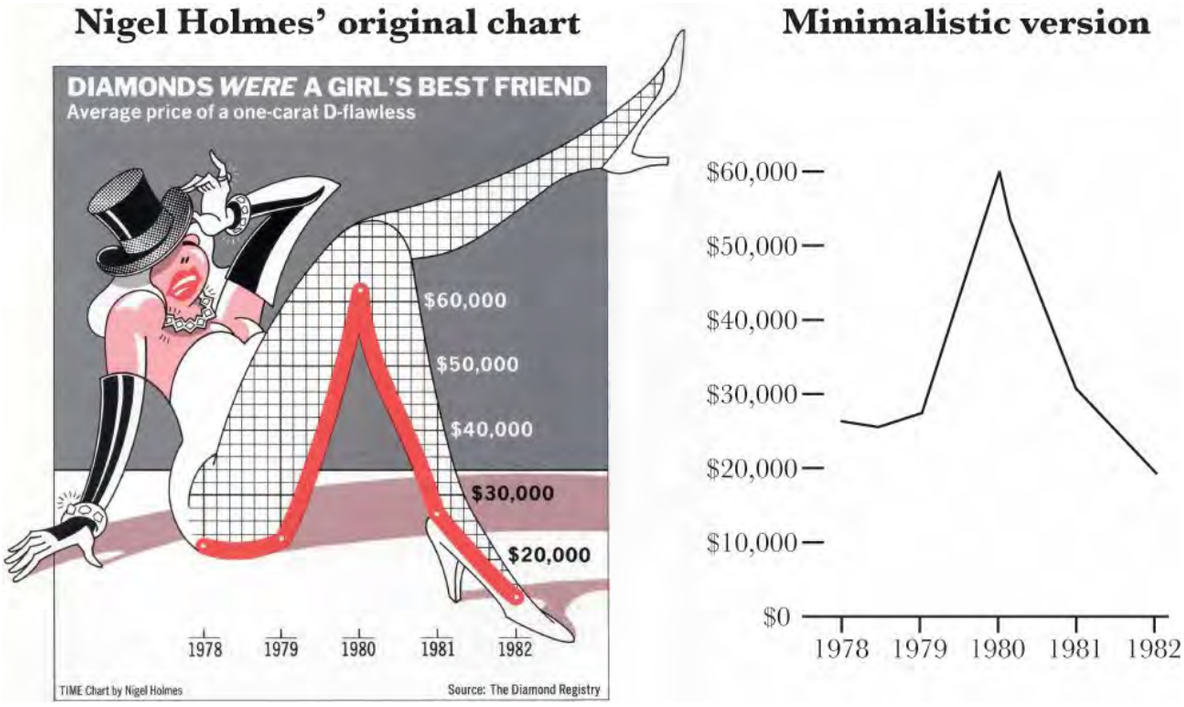

Figure 3.15. The original graphic is not very appealing, but the stripped-down version was not easily remembered.

The study was divided into three stages. First, the researchers used eye-tracking devices to register eye movements as each participant read each pair of graphics.

In the second phase, each subject answered a questionnaire about the charts' contents, answering questions such as:

1. What is its central topic?
2. What phenomena and variables does the graphic show?
3. What changes does the graphic highlight in the data it represents?
4. Does the graphic present information in an objective manner, or does the author editorialize about the content?

As in the Ben-Gurion University paper, the researchers detected no significant differences in the effectiveness of the embellished and minimalist graphics. The components of each pair of charts conveyed the message equally well.

The most interesting part of the study was the third phase, in which the researchers tested the level of short- and long-term recall for each graphic. The participants were divided into two groups of equal size. They were not informed that they would be questioned about the graphics later on. The first group was tested five minutes after phase two questioning was completed, while the second group was asked to return to the lab three weeks later.

In all cases, the participants were better able to recall the topics and contents of the chartjunk-filled graphics. Apparently, their coarse humor ("coarse" is the adjective Tufte used to refer to Holmes's work) enhanced memory.

Fun and Functionality

To call these two studies conclusive would be a mistake. Both have been justly criticized by experts such as Stephen Few, author of two essential books on statistical charts,[7] for their methodologies, for the small number of subjects tested, and for the lack of socioeconomic and cultural diversity among subjects.

While it would be risky to extract general lessons from the papers, I personally believe they suggest compelling reasons to doubt that always reducing charts to their barest bones facilitates comprehension and memorability. It depends on the audience's nature, knowledge, tastes, and expectations.

This idea coincides with what other critics of Tufte's approach, including Nigel Holmes, have observed: Tufte's influence in the visualization and information graphics communities has led many publications to adopt a style that is serious, cold, and stripped bare of aesthetic attributes that may be gratuitous to the statistician but that are useful for readers. This is not to say that we should not strive for economy of style and respect the integrity of the data, but that, as Donald A. Norman pointed out in *Emotional Design* (2003), beautiful things are more functional, and beauty is as much in the eye of the designer as it is in the eye of the beholder. Feeling good about an artifact makes us better at using it to accomplish a goal.

Holmes anticipated a similar idea in his early writings. He has always been an advocate of humanizing information graphics and using humor to instill affection in readers for numbers and charts. In *Designer's Guide to Creating Charts and Diagrams* (1984), he wrote in what appears to be a direct reference to Tufte's *Visual Display of Quantitative Information*, published the year before:

> If you belong to the school of people who believe that charts should only present statistics in the most straightforward, plain way, with no other visual help to the reader, for example, than the bar of the bar chart, the line of the fever graph, the circle of the pie chart, or the rules of the table, then move on to another part of the book. As long as the artist understands that the primary function is to convey statistics and respects that duty, then you can have fun (or be serious) with the image; that is, the form in which those statistics appear.[8]

Holmes also referenced this passage from *A Primer of Visual Literacy* (1973), a classic book by Donis A. Dondis:

> Boredom is as much a threat in visual design as it is elsewhere in art and communication. The mind and eye demand stimulation and surprise.

And Holmes praised the power of humor:

> Humor is a great weapon in your visual arsenal. As long as it is not malicious, making people laugh with you will usually help them remember your image and therefore the point of the chart. Even a smile will encourage a reader to look into the statistics if he or she might not have thought of reading in a less-embellished chart.

Many of the examples Holmes includes in his book are problematic from a structural standpoint because, as in **Figure 3.16**, integrating lines and bars with illustrations sometimes leads to misleading distortions. But they do use humor, and they are memorable. Most of the graphics would not be publishable today, as Holmes himself acknowledges, but we must remember that *Designer's Guide to Creating Charts and Diagrams* was marketed almost 30 years ago and is a product of its times.

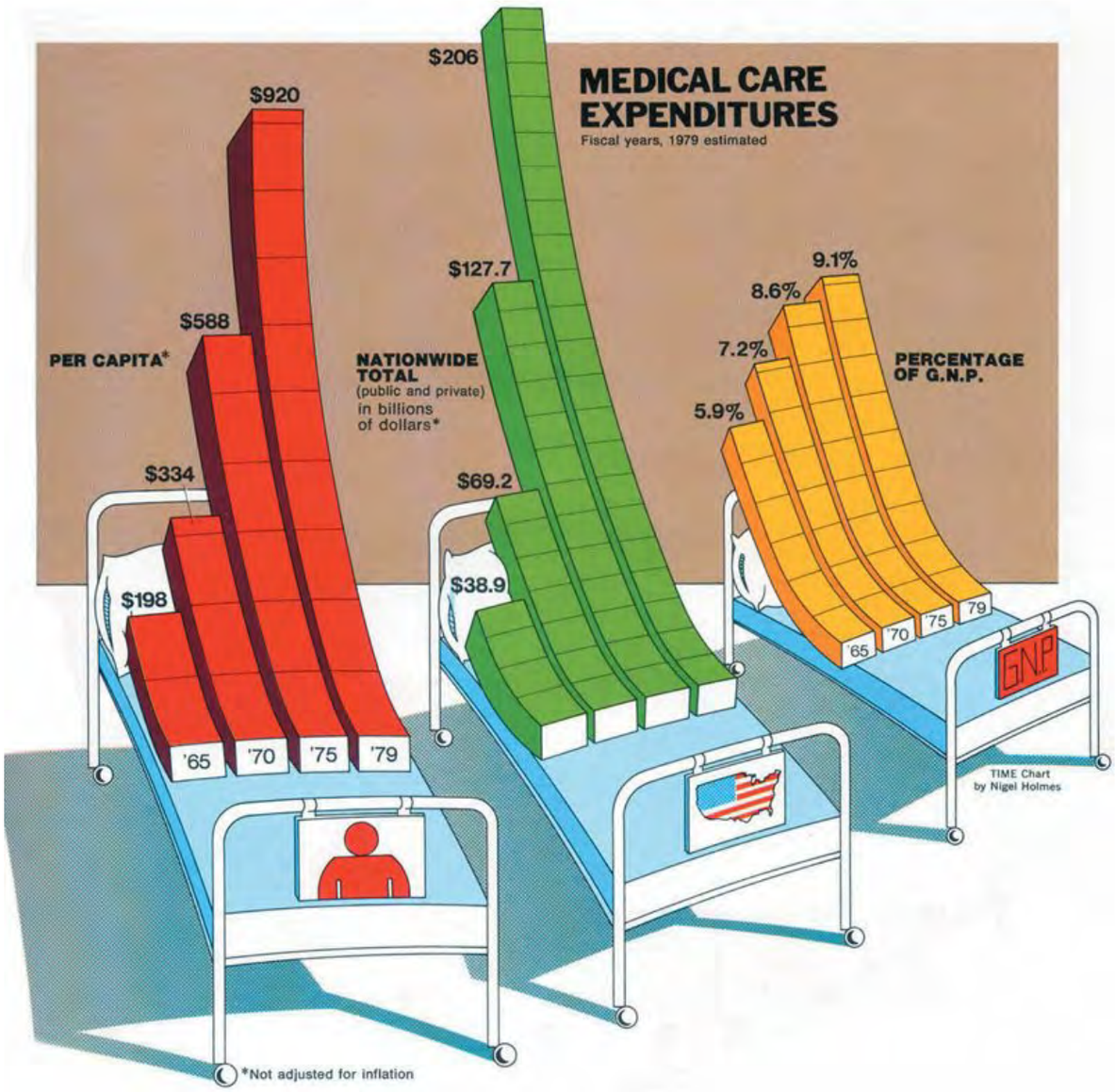

Figure 3.16. Too much expense on medical care makes bars feel sick. Chart by Nigel Holmes for *Time* magazine, 1979.

Holmes's style has evolved. Without losing its humorous appeal, it has become more restrained, as is evident in his wonderfully illustrated *Wordless Diagrams* (2004), which is witty, funny, and informative. (See Figure 3.17.) His work has become closer to the man he calls his main inspiration, Otto Neurath, one of the great thinkers of the twentieth century.

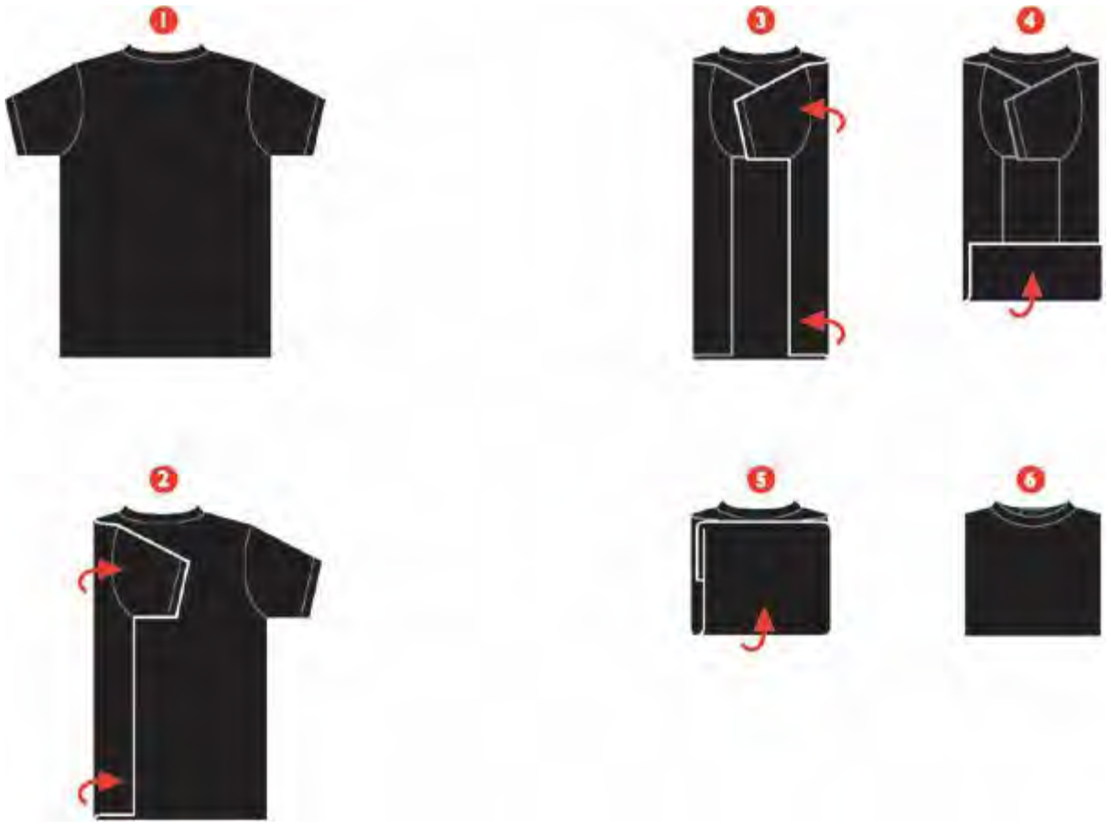

Figure 3.17. My mother was very happy after I read *Wordless Diagrams* (2005) by Nigel Holmes. After more than 30 years, I finally learned how to properly fold a T-shirt.

Otto Neurath and the Visual Education of the Masses

Otto Neurath was an Austrian philosopher, mathematician, sociologist, and political scientist born in 1882. He forged his fame in the world of information graphics in the Vienna of the first quarter of the twentieth century.

At the time, the capital city of Austria was a scientific and philosophical powerhouse. Besides Neurath, geniuses like Karl Popper, Niels Böhr, and Kurt Gödel walked Vienna's streets. Together, these intellectuals would be known as The Circle of Vienna, and their ideas gave rise to the philosophical tradition of logical empiricism.

Neurath combined the virtues of a rigorous, rational, and logical mind with the humanitarian concerns that emerged from his leftist leaning. He was a democratic socialist, a rare species in a time of ideological extremes. Neurath didn't want to communicate solely with his peers. He wanted to promote mass education. He defended the idea that abstract and mathematical thought could be conveyed with clarity and ease to people regardless of their social, cultural, and economic backgrounds.

Around 1925, as director of the Museum of Society and Economy in Vienna, Neurath devised *Isotype* (International System of Typographic Picture Education), a universal language based on pictograms whose goal was the "humanization of knowledge" and the overcoming of cultural barriers. Over many years, he worked with Gerd Arntz, a German graphic designer, and Marie Reidemeister (who would become Mrs. Neurath in the 1940s) to create many displays of information, charts, and maps of beautiful simplicity and clarity. See **Figure 3.18** representing the amount of fabric produced in Britain between 1820 and 1880. The chart shows a paradigm change: At the beginning of the century, production was small and mainly a family venture; later, it became industrialized.

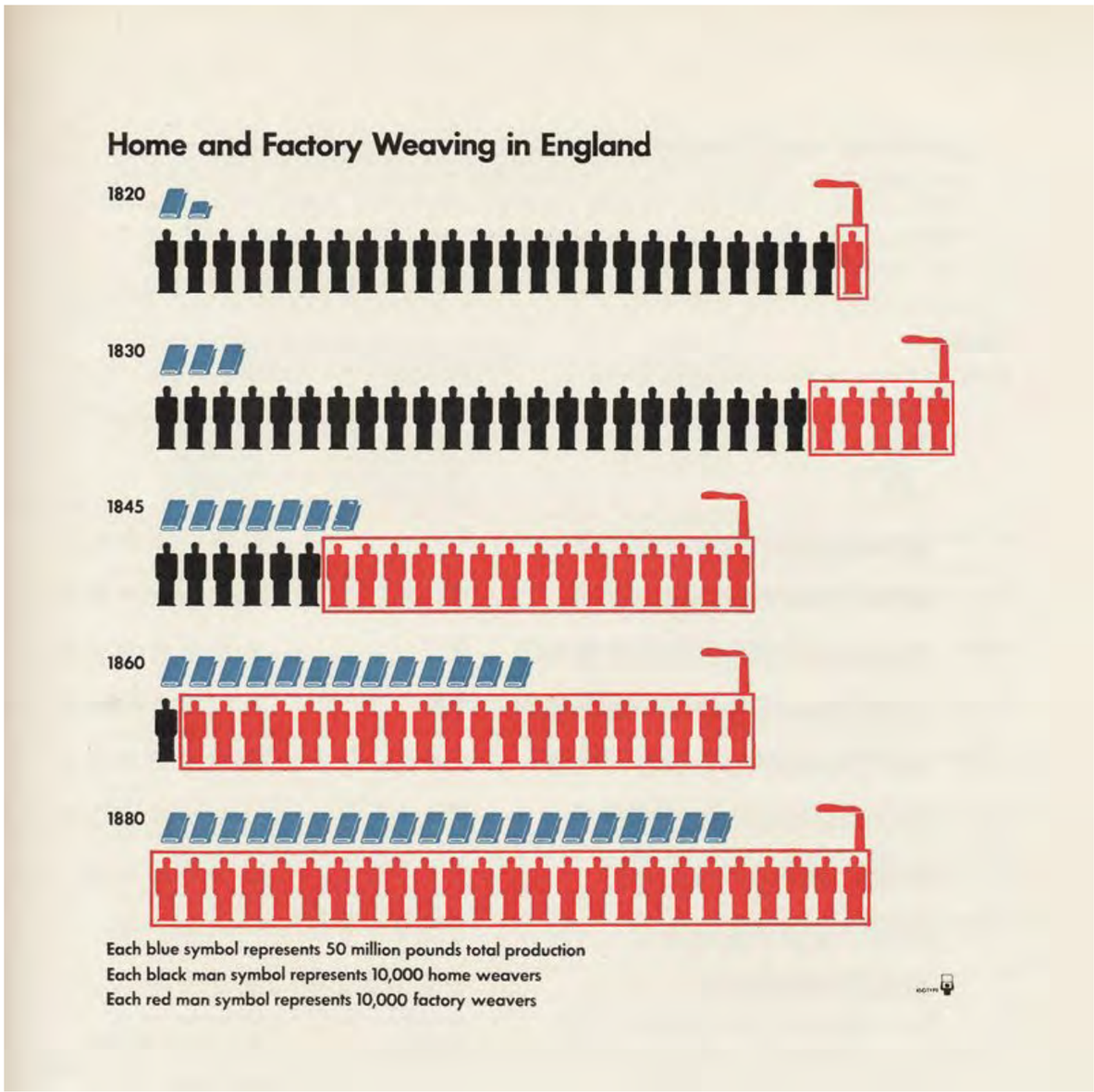

Figure 3.18. Otto & Marie Neurath Isotype Collection, University of Reading.

In his professional autobiography, written between 1943 and 1945 and titled *From Hieroglyphics to Isotype* (2010 edition), Neurath explained what his pictographic language was intended to achieve:

> We started our visualization in adult education by making exhibitions for museums and preparing sheets for classes and diagrammatic films in the Isotype style. We tried to evolve a new type of exhibition to attract the masses immediately. The subject of the exhibition should be serious but it should be combined with a charm and direct appeal to everybody. As many people should be persuaded to visit it as would go to some public show of purely entertainment value. Education has to compete with entertainment (...) It would be dangerous if education were to become a purely occupational matter and something boring in itself.[9]

Charm and direct appeal. Those words resonate deeply in Nigel Holmes's work, which, like Neurath's, tends to be tightly edited and to convey a few ideas with clarity and power. That goal is not opposite to Tufte's approach, but it is different. Tufte favors highly detailed, multivariate presentations that allow careful exploration on the part of the reader.

So who is right—Tufte in his defense of dense graphics, bereft of trivial "junk"? Or Holmes and Neurath and their populist graphics, encoding just a few easily

digestible messages with friendly looking pictograms and humorous illustrations? Is it possible to reach a synthesis between the two approaches, or at least to choose one of them without despising the other? I believe it is. After all, even if it may seem otherwise, Tufte's and Holmes's *ideologies* are more similar than different. This is the focus of the next chapter.