The doorbell rings. I glance out the window and see a Federal Express delivery truck. I open the door, exchange pleasantries with the driver, sign for my package using a nifty industrial-strength PDA, and then watch her scurry down the stairs and back into the truck. As she races away to the next delivery, I take an extra moment to look at the FedEx logo on the side of the truck, as I always do, and smile. Some people smile when they see children playing in a park. Others when they see one of those rare red-and-purple-sky sunsets. I smile when I see good design.

I like the FedEx logotype in particular because it employs one of my favorite design principles: propositional density. Look at the logotype. Read it. See anything interesting? Even if you did not consciously process the arrow created by the negative space between the “E” and the “X,” there is a good chance you processed it subconsciously. The arrow, pointing left to right, brings to mind concepts like “movement,” “forward thinking,” and “safety,” which, incidentally, align with the words I would use to characterize my delivery experience this morning. That the FedEx logotype reinforces attributes that the company wants to associate with its brand makes the design a good one. That it achieves this extra meaning without any additional elements is what makes it a great design, a propositionally dense design. And, to paraphrase Robert Frost, that makes all the difference.

Propositional density is the amount of information conveyed by an object or environment per unit element. The principle borrows from Noam Chomsky’s seminal Syntactic Structures and builds on the style of application promoted by Brooks Landon in his approach to teaching writing. Landon emphasizes sentence development in effective writing and asserts that the best writing is generally made up of longer, not shorter, sentences. The key to effective writing, he argues, involves the density of propositions in the sentence as much as more traditional writing fodder such as syntax, rhythm, and balance. To Landon, the sentence is a visible piece of writing. The propositions advanced by a sentence are assumptions and ideas, not necessarily written out. He offers the following metaphors:

I like to think of the written sentence as the part of the iceberg you see above the water, while many of its underlying propositions remain out of sight, under water. Put another way, propositions are the atoms from which the molecule of the sentence is constructed.

High propositional density is the key factor in making designs—whether designs of sentences, objects, or environments—engaging and memorable. It is what makes double entendres interesting, puns funny, and the FedEx logotype intriguing. Now, if the word “proposition” gives you pause because you slept through linguistics, or the term “density” makes you wince because of its association with physics, fear not: We need borrow only what we need from these fields to apply the principle and no more.

For present purposes, a proposition is an elementary statement about an object or environment that cannot be easily broken down into constituent propositions. Consider, for example, the propositions: “The FedEx logotype is purple,” “The FedEx logotype is gray,” and “The FedEx logotype is an abbreviation of ‘Federal Express.’” While a linguist or logician might quibble that these propositions could be broken down even further, they are sufficiently reduced for our purposes and do a good job of describing the FedEx logo. These are called “surface propositions,” because they describe the salient, perceptible elements of the logotype.

Now consider the arrow created by the negative space. It is not an element, per se, in that...
First, I do not accept that there are designs that are not explicitly communicative. When an object or environment is perceived, it communicates. The propositions expressed by the design, and the extent to which they align with one another, often determine its success or failure.

Its presence is a function of negative space created by the physical elements in the design, yet it expresses a number of propositions: “Federal Express is on the go,” “Federal Express is forward thinking,” “Federal Express has direction,” and so on. Note that these propositions, unlike surface propositions, are highly dependent on the meaning that the observer ascribes to the arrow. These are called “deep propositions,” because they describe underlying and often hidden meanings of elements.

The propositional density of any design can be estimated by dividing the number of deep propositions by the number of surface propositions. Mathematically:

$$PD = \frac{Pd}{Ps}$$

where:
- $Pd$ is the number of deep propositions,
- $Ps$ is the number of surface propositions.

Note that $PD$ can be estimated only because the number of deep propositions is variable across observers.

Objects and environments with high $PD$ are more interesting and engaging than objects and environments with low $PD$. Simple objects and environments (i.e., few surface propositions) that are rich in meaning (many deep propositions) are perceived to be the most compelling, especially when the propositions are complementary. Though the specific thresholds have not yet been determined empirically, successful designs commonly have $Pd > 1$, which is a good benchmark to consider when applying the principle.

Consider, for example, the much heralded logo of Barack Obama’s 2008 presidential campaign. The logo expresses essentially three surface propositions: “The logo contains a blue circle,” “The logo contains red and white lines,” and “The red and white lines cut horizontally across the lower half of the circle.” The number of deep propositions expressed, by contrast, is quite large: “The circle represents an O for Obama,” “The circle represents unity,” “The circle represents stability,” “The red and white lines represent the American flag,” “The red and white lines represent patriotism,” “The red and white lines represent a landscape,” “The red and white lines represent amber waves of grain,” “The blue circle represents sky,” “The center of the circle represents a sun rising,” “A sun rising represents change,” and so on. Based on this list of propositions alone, a rough estimate of $PD$ for the logo is $PD = 10 / 3 = 3.33$, a very high propositional density. Additionally, the propositions are positive and complementary, creating a synergistic effect. The rendering is simple, but the meaning runs deep—a primary reason for the logo’s appeal and effectiveness.

Propositional density explains the benefit of incorporating emergent elements like the arrow in the FedEx logotype and the sunrise in the Obama logo. Normally, the cost of additional propositions is additional complexity. However, incorporating emergent elements and Gestalt-type effects enables a designer to add deep propositions without adding elements. In design, it is the closest thing to a free lunch as you can get.

Let’s look at a product-design example, the Hug salt and pepper shakers. The surface propositions are: “One shaker is black,” “One shaker is white,” “The shakers are anthropomorphic,” and “The shakers appear to be hugging.” The deep propositions are: “The white shaker represents salt,” “The black shaker represents pepper,” “The shakers represent people of different races living in harmony.” The shakers represent the idea that opposites...
This kind of aligned proposition is greater than the sum of its parts. Meta-aesthetic that is coherent and consistent with one another, creating a meta-aesthetic that is greater than the sum of its parts. This kind of aligned propositional density endows a product with a depth of expression that reveals itself slowly over time—more like a story than a product—sustaining interest in its aesthetic and its expression of social commentary. Contrast the propositional density of the Hug shakers with that of more conventional salt and pepper shakers. Conventional shakers would generally have three surface propositions—i.e., "One shaker is black," "One shaker is white," and "The shakers are cylindrical!"—and two deep propositions—i.e., "The white shaker represents salt" and "The black shaker represents pepper," yielding a PD $= 2 / 3 \approx 0.6$, a very common and very unmemorable design.

I often get resistance when discussing propositional density with designers who engage in design activities that are not "explicitly communicative"—i.e., their focus is on function or the engineering, and they perceive worrying about propositional density as tantamount to worrying about ornament. First, I do not accept that there are designs that are not explicitly communicative. When an object or environment is perceived, it communicates. The propositions expressed by the design, and the extent to which they align with one another, often determine its success or failure. Designers can choose to manage this communication to peak effect, or throw the dice and hope things turn out. Not worrying about it does not make it go away; it just makes the outcome subject to chance. Second, increasing propositional density does not in any way support increasing elements in a design—if anything, it suggests the opposite. Increasing ornament increases the number of surface propositions, which decreases propositional density.

Making high propositional density a persistent design objective is a thoughtful, purposeful way to achieve the optimal balance between interestingness and complexity. It forces everyone in the design process to get beyond thoughtless loyalties to -isms (e.g., minimalism) and think about what the design is actually saying (or should say), if anything. I can hear Brooks Landon chastising those who believe that short sentences are always better. It is an oversimplification—one variable in a two-variable equation. Finally, considering propositional density ensures that the right questions are asked. Does the expression of form align with the business objectives? Does it create the right affective response? Do the propositions expressed complement or conflict? Probing these questions can be a revealing exercise, and will make the final design better. You can usually tell when a design process either formally or intuitively considers propositional density; the result is simple but has depth—it says more with less.

When King Hiero suspected a metal smith of substituting silver for gold in the making of his crown, he asked Archimedes to determine whether the gold in his crown was pure. Archimedes knew that, given the density of gold and the weight of the crown, he could determine its purity. However, the volume of the crown could not be found without melting it. Archimedes’ solution was conceived while taking a bath, as he observed the mass of his body displacing the bathwater. He deduced that one could determine the volume of any object by observing the amount of water it displaced. This discovery so excited Archimedes that he purportedly jumped from the bath and ran through the streets of Syracuse naked, crying "Eureka!" I remember when I first learned about propositional density: I was not taking a bath; I did not run through the streets naked. But I have cried "Eureka!" after applying the principle on more than one occasion.