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Clever figures can mislead: Do the math, says physicist

Eileen Ambrose -- Personal Finance
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Consider two sales pitches: "Buy one, get one free" and "Buy two and get 50 percent off."

Which one is more likely to get you to open your wallet?

If you're like many consumers, the first offer appears more appealing.

The bottom line is that the two are the same.

That's the tricky thing about numbers. Depending on how figures are presented, you might feel you're saving money when, in fact, you're paying the same. Or more.

It's easy to be misled, too. Many of us have an ambivalent relationship with math: We're uncomfortable with numbers but we trust them. Advertisers, politicians and salespeople know this and use it to their advantage, says Joseph Ganem, an associate professor of physics at Loyola College in Maryland.

"It's not an outright lie," he says. "That's why it's so manipulative."

Ganem teaches quantum mechanics and studies infrared lasers. ("My expertise is light," he says. "I could talk about light for years.")

Out of curiosity three years ago, he applied his math skills to credit-card solicitations offering low introductory rates. After factoring in the transaction fees spelled out in the fine print, Ganem figured consumers would pay about the same under the new card as under their old one.

This exercise became the genesis of his book, *The Two-Headed Quarter: How to See Through Deceptive Numbers and Save Money on Everything You Buy*, which will be released in May. The physicist picks apart the math on all sorts of sales pitches - for houses, credit cards, insurance and zero-percent financing.

Here are some ways he says we are manipulated:

- The bigger the better. We like BIG numbers. So marketers use huge digits to grab our attention. America Online, for instance, once ran a promotion offering 1,025 hours of free Internet time. The small print said the offer was good for 45 days. Given that there are 1,080 hours in 45 days, customers would have had to be in front of their computers nearly around the clock to take full advantage of AOL's offer.

Or consider this food label: "90 percent Fat-Free." That sounds much more waist-friendly than saying 10 percent fat.

- In precision we trust. We give credence to numbers that are exact. Politicians are masters of precision. "They will never say 'half.' They say '50 percent.' It's never 'more than a trillion,' it's '1.6 trillion,'" Ganem says. They believe that very precise numbers gives them more credibility, he says.

But don't confuse precision with accuracy, Ganem warns.

- Apples and oranges. Food packaging also can mislead people into believing that what they eat is healthy, depending on the sample size used, Ganem says.

To illustrate, Ganem compares the nutrition labels for Classic Coke and Minute Maid apple-cranberry-raspberry juice. Coke has 39 grams of sugar and 140 calories per serving; the fruit drink has 31 grams of sugar and 120 calories.

At first glance, the fruit drink appears healthier. But a single serving of Coke is 12 ounces, while the fruit drink is 8 ounces. Ounce for ounce, Coke has fewer calories and less sugar than the fruit drink, the physicist says.

- Aversion to losses. We're not just misled by clever math. Marketers also play on our psychological aversion to losses, Ganem says.

Sales pitches are often designed to turn a loss into a perceived gain, the physicist says. A good example is 0 percent financing.

Say, a car is priced at \$15,000. You're told if you pay cash, you'll get a \$2,000 rebate. The car's price is actually \$13,000, Ganem says. But if you need to borrow to buy, you'll pay \$15,000 but get 0% financing for three years. The car still costs \$13,000, Ganem says, and the extra \$2,000 is essentially a finance charge paid up front.

"A finance charge is a loss," Ganem says. "Reframe that ... and now you feel it's a gain. And people will buy."

- Insuring all risks. You need insurance for your health, home and life, if someone depends on you.

But certain products play into our aversion to losses, even though the chance of loss is remote or the dollars involved are not much, Ganem says.

For example, accidental death insurance pays out if you die in an accident. But few people die that way, Ganem says. In 2002, less than 1 percent of deaths involved an aircraft, drowning or tornado. Auto accidents accounted for 1.8 percent of deaths. People are more likely to die from illness, Ganem says.

If you need life insurance, don't buy coverage for an event that's unlikely to happen, he says. Buy a policy that will pay out no matter how you die, he

says.

Similarly, sales people push extended warranties on products that are likely to become obsolete before they fall apart, Ganem says. Even if an appliance or product broke, consumers often could afford to repair or replace the item, he says.

"You can't buy a \$20 phone without being offered an extended warranty," Ganem says. "If you said 'No' every single time, you would save more than enough in the long run to pay for the few repairs you actually need."

Ganem says he hopes that people who read his book will come away with a healthy skepticism on how numbers are used. The book includes charts and work sheets so that readers can do the math themselves on product offerings.

"People seem to be afraid of math," he says. "It's not as inaccessible as they think."

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