



So, You Think Your Customers Understand Percentages?

Most consumers incorrectly believe that a 50 percent cost discount is worth the same as a 50 percent benefit bonus, or that a 30 percent cost increase is as bad as a 30 percent benefit decrease. They're better off choosing the percentage cost change and we should help them.

Most people, even highly educated ones, are bad at percentages. Offer your average shopper a choice between 50 percent more product per dollar and a 35 percent price reduction, and almost everyone will pick 50 percent more volume, thinking that it's a better deal. It's not. The 35 percent cost reduction leads to a 54 percent $[\frac{.35}{(1-.35)}=.54]$ improvement in price per unit of volume whereas the 50 percent benefit increases only leads to a 50 percent improvement in unit price.

(1) 5 cents (not 10)

(2) 5 minutes (not 100)

(3) 47 days (not 24)

Source: Cognitive Reflection and Decision Making, Shane Frederick

Take the Cognitive Reflection Test (1) A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost? _____ cents

(2) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes

(3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days

Answers:

Faced with a choice between two marketing offers with percentages, we almost always opt for the largest percentage without calculating its impact in terms of cost/benefit (or benefit/cost) rate. What we fail to see is that percentage cost discounts always beat percentage benefit bonuses—provided that you can choose the cost and benefit level that you want of course (say, when buying coffee by the pound or internet access by the minute). To see why, take an extreme case. 100 percent more product quantity for the same price is great, but it simply says that the price per unit has halved. 100 percent less cost, on the other hand, means that the product is entirely free.

Even perhaps more surprising, a given percentage cost increase is always superior to the nominally-equivalent benefit decrease. This again is best seen when looking at 100 percent changes. A 100 percent

price increase hurts, but it only means that unit price has doubled. A 100 percent benefit (product quantity) decrease means that you are left with absolutely nothing! So, percentage cost changes always beat percentage benefit changes, regardless of whether the end result is a gain or a loss to the consumer.

Percent cost changes always beat percent benefit changes

The superiority of the percentage cost change over the percentage benefit change holds regardless of the cost and benefit. Consider, for example, a consumer who is looking to buy a new car. The current car's engine gets a rate of 40 miles/gallon (MPG). She is looking at two possible options. Compared to her current car, one car advertised as needing "50 percent fewer gallons [of fuel] per mile". This is the percent cost reduction frame. The second car is described as "50 percent more miles per gallon" (the percentage benefit increase frame). In our studies, about 90 percent of the people we polled think that these two cars are identical in terms of fuel efficiency. However, the percentage cost reduction (50 percent fewer gallons) is better for the consumer, resulting in a 100 percent improvement in terms of miles per gallon (80 MPG). In contrast, the percentage benefit increase (50 percent more miles) leads to only a 50 percent improvement in MPG (from 40 MPG to 60 MPG).

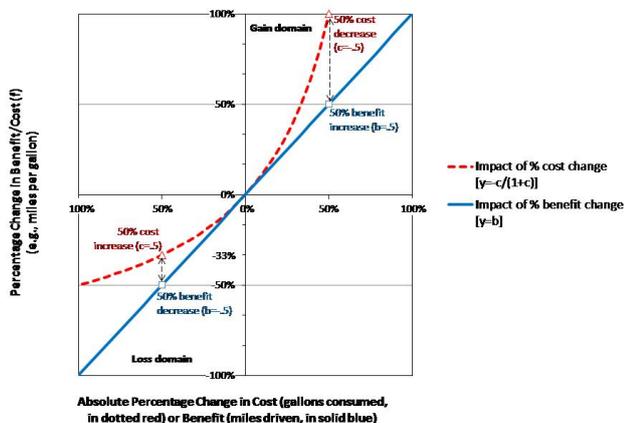


Chart note: For any percent change in cost (gallons of fuel consumed) or benefit (miles driven), the percent cost change line (dotted, in red) is always above (i.e. more beneficial for the consumer) than the percent change benefit line (in blue, solid).

See how good you are at percentages

Rank the following printers by speed (pages per minute).

- Printer 1: Prints 50% more pages per minute than your previous printer

- Printer 2: Takes 45% less time to print each page than your previous printer.
- Printer 3: Prints 40% more pages per minute than your previous printer.
- Printer 4: Takes 35% less time to print each page than your previous printer

Answer: The correct order, from fastest to slowest, is: printer #2, printer #4, printer #1, printer #3.

As I show in my recent paper **Percentage cost discounts always beat percentage benefit bonuses**, forthcoming in the new **Journal of Marketing Behavior** and written with **Bhavya Mohan** of Harvard Business School and **Jason Riis** of the Wharton School, the 50 percent cost change is also better than the 50 percent benefit change when measuring fuel efficiency in litres per 100 km.

Helping consumers evaluate nominally equivalent percentage changes

So how should we frame offers to consumers? We examined whether additional information about the percentage increase/decrease can help consumers to better assess nominal percentage changes. We asked 400 people to rank printers by speed. We asked them to imagine they are setting out to purchase a new printer to replace an old one, which printed 25 pages per minute (ppm). Across three conditions, the participants examined four printers; the efficiency of two of them was described as a percentage change in the number of pages printed per minute, the other two were described in terms of the amount of time needed to print one page. In another condition, we included a standard rate alongside the percentage changes, described in pages per minute (ppm). When rate information was present, 57 percent of participants provided the correct ranking, but when rate information was absent, only 8 percent ranked the printer accurately. Such errors were also made by freelance workers who were unable to understand bonuses and incentives. We asked Amazon Mechanical Turk workers to complete a word search puzzle and paid them a wage for every task completed (every word found). We then gave them the opportunity to complete a second job and choose between two nominally equivalent bonus structures: a 50 percent benefit change (more pay per word found) or a 50 percent cost change (finding fewer words for the same pay). Again, rate information (pay per word found) was either present or absent.

In this study, choosing the right payment plan had a large impact on the worker's pay. Those who chose the second option (the 50 percent cost decrease) earned a 23 percent premium for doing the same amount of work over those who chose the "50

percent more per word found” option. Reflecting the benefits of transparency, only 7 percent chose the more advantageous payment scheme (fewer words) when rate information was absent, versus 49 percent when rates were present.

The Journal of Marketing Behavior

Journal of Marketing Behavior, edited at INSEAD, publishes theoretically grounded research into human behavior in the marketplace. First, papers should make theoretical advances by offering and empirically testing new behavioral theory or extending or integrating extant theory. Second, papers should focus on behavioral outcomes more than on psychological processes. Third, behaviors should translate into clearly detectable choices. Fourth, JMB construes the marketplace broadly, not only in terms of monetary exchanges between firms and customers but also in terms of non-monetary choices and preferences (e.g., political or religious beliefs and choices; cultural exchanges of stories and ideas; etc.).

Throughout the experiments, we also observed that the numeracy skills of the consumer impacted the results. People who got at least one correct answer in the Cognitive Reflection Test were more likely to find the correct answer.

Why should marketers change?

The status quo may currently be good for marketers. Framing offerings as a percentage benefit change will give away less product at a higher unit cost. But customers are getting more information from more places than ever before and patience for corporate self-interest is wearing very thin. Companies that are seen to be protecting their customers and giving them value will come off as more authentic and trustworthy.

Our experiments show that more transparency helps consumers to make more informed decisions. Rate information helps all groups of consumers equally, but what might be even more helpful is to frame offers in terms of hard dollar benefits and not percentages. Giving everyone a measure of numeracy can enable marketers to make sure everyone understands, regardless of how good they are at percentages.



Pierre

Chandon is a Professor of Marketing at INSEAD and The L'Oréal Chaired Professor of Marketing, Innovation, and Creativity. He is also the Director of the **INSEAD-Sorbonne Behavioural Lab**.

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