

**Behavioral**

**Economics**

**Applying Behavioral Economics  
And Cognitive Psychology  
To The Design Process**

By Nikki Pfarr





# Designing to Change Behavior

## In the 21st century,

the toolkit of the modern designer is rapidly expanding. Design practice is maturing, and what was once a focus on aesthetics and usability is broadening to incorporate interdisciplinary knowledge from a variety of fields. The problems we solve are changing too - growing in size, scope, and complexity. We now find ourselves working in a wide range of domains, from education and policy development to energy consumption and healthcare.

At the same time, it's become increasingly apparent that whether we're designing a mobile phone, a surgical release form, a corporate policy, or the infrastructure for a subway system, all of the design decisions we make have the potential to influence human behavior - whether we intend them to or not.

If we can harness a better understanding of how and why our designs impact human behavior, we can develop solutions that intentionally shape behavior. What's more, we

can encourage behaviors that lead to preferable outcomes, benefitting society, humanity, and the environment, in addition to business goals.

Behavioral economics and cognitive psychology are two fields that shed light on the factors that impact human decision making and motivate our behaviors. Knowledge from these fields can help us better understand why people behave the way they do, help us design to reinforce or change that behavior, and help us make more informed predictions about how people will behave when faced with new decisions in the future.

The challenge is taking this deep academic knowledge and applying it to our design practice. At Artefact, we're exploring new tools and methods to incorporate learnings from behavioral economics and cognitive psychology into our design process. This report will share some of the principles and tips we've uncovered along the way.

## 21st Century Design

As design practice matures and the problems we face grow in scope and complexity we can turn to fields like behavioral economics and cognitive psychology for deeper insights about human behavior.

## Dounuts for breakfast

When you decided what to eat for breakfast today, how did you make that decision? Maybe you considered a few choices and then selected the option that sounded most appealing. Maybe you eat the same thing everyday, and so today you just stuck to your normal routine. Whatever you did, it probably felt like a fairly rational decision.

In reality, there are dozens of additional factors that likely impacted your decision about what to eat for breakfast today, most of which you weren't consciously aware of. Everything from what you were expecting to eat, to unrelated imagery in your environment, to how far in advance you purchased the food, to the size of the plate you got out of the cabinet, to whether or not you were feeling mentally overwhelmed at that moment all could have played a role.

When all of these factors are taken into account, our perception of what the best choice is when we're making a decision can be easily skewed. As a result, we often end up making selections that may not be in our long-term best interests – these are referred to as “irrational” decisions. (Donuts for breakfast, anyone?)

## Why do people behave irrationally?

As human beings, we make irrational decisions all the time – decisions where the outcome isn't in our own, long-term best interest. We eat junk food, we fail to max out our contributions to our retirement funds, or we engage in bad habits like not exercising or flossing regularly.

Why do we do these things? In part, behaving irrationally can be attributed to the cognitive shortcuts, or mental heuristics, our brains utilize – little patterns in our thinking that usually help us process information more efficiently, but occasionally result in errors in our perceptions, valuations, and judgments. These predictable errors are known as cognitive biases, and they're highly studied in fields like cognitive psychology and behavioral economics.

Behavioral economics, in particular, explores how theories and models in economics (which are based upon the assumption that humans are rational creatures) change when we take into account the impacts of cognitive biases and irrational behavior. It offers a lens through which we can better understand existing human behavior, as well as a toolkit for designing decisions and decision-making contexts to help people make better choices.

The following are a few of the key findings that we can begin to apply to the design of new products and services.

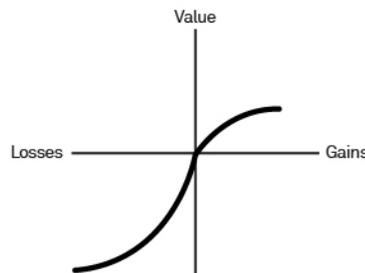


## How to change a surgeon's mind

### *Framing and Loss Aversion*

Have you ever received a raise at work? Did you think about your new salary as \$80,000, for example, or did you think about it as \$5,000 more than you used to make? For most people a raise is perceived in terms of how it compared to their previous salary, and the new salary is rarely considered in absolute terms.

It turns out that when making decisions, we tend to judge our options as losses or gains relative to some starting



## Breakfast?

How did you decide what to eat for breakfast today? A variety of factors may have subconsciously influenced your choice.

## The Value Function

One of the most prominent theories that signaled the emergence of behavioral economics as its own field is called Prospect Theory (see Kahneman & Tversky, 1979). The Prospect Theory value function helps us understand the impact of losses and gains relative to a starting reference point. The function is designed to take into account references points and loss aversion – as you can see in the figure, the reference point is the origin, and the function is steeper for losses than it is for gains (illustration from Kahneman & Tversky, 1979, p. 279).

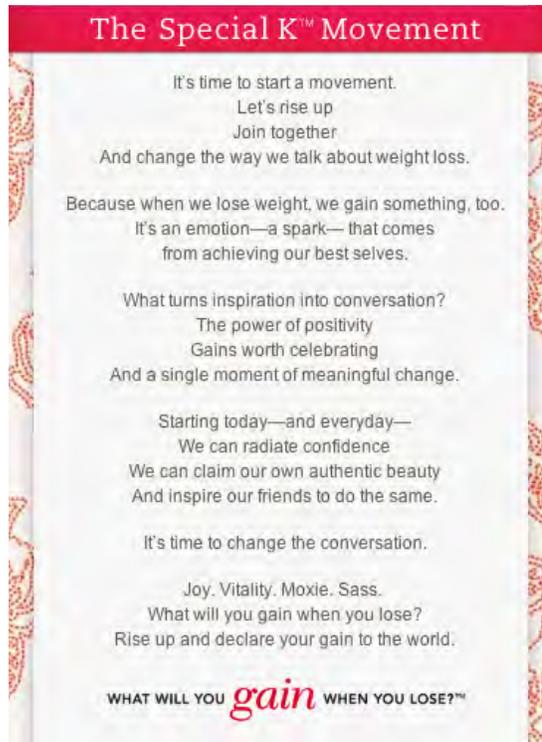
reference point. Research has shown that losses are more painful than gains are pleasurable – and as a result people exhibit loss aversion in which they will go to great lengths to avoid losses (Kahneman & Tversky, 1984). Thus, the framing can have an impact on which option a person selects: when an outcome is framed in terms of its corresponding losses, instead of its corresponding gains, people often make different decisions (Tversky & Kahneman, 1981). Further, researchers have observed that people frequently accept the loss or gain frame they are presented with, without ever considering the flip side (Tversky, 1996).

In one study (McNeil, Pauker, Sox, & Tversky, 1982) patients, physicians, and students were presented with two lung cancer therapies and asked to select which one they preferred. Roughly half of the participants were presented the treatment options described in terms of chance of living (the survival frame, emphasizing gains), whereas the other half were presented the treatment options described in terms of chance of dying (the mortality frame, emphasizing losses). However, the treatment options were identical in both frames.

In the survival frame, Therapy A was preferred by 63% of respondents overall. But when the same therapies were described in the mortality frame, Therapy B was preferred by 61% of respondents overall. Simply switching the framing of the options caused people to change their preferences!

**Design Tip:** To encourage one behavior or selection over another, emphasize its associated gains rather than its associated losses.

*Special K* has adopted this approach with its latest campaign. “The Special K Movement” reframes weight-loss as being about what you gain by losing weight (a feeling of achievement, confidence, etc.), rather than about what you have to give up by dieting.



**Design Tip:** To discourage a behavior or selection, make it seem undesirable by emphasizing its associated losses; heighten this effect by associating additional losses with the undesirable option.

*StickK.com* encourages users to set a goal and put down money that they will “get back” if they achieve their goal. But if they don’t achieve their goal, not only will they lose the money, they can elect in advance to have the money donated to an “anti-charity” – a charity associated with a cause that the person doesn’t support! These additional losses make failing to achieve a goal more painful, and less desirable.

**The Special K Challenge**

Focuses more on what you will gain rather than what you will have to give up while dieting.

	Therapy A	Therapy B	Preferred Therapy
<b>Survival Frame</b>	Of 100 people having Therapy A 90 live through the therapy, 68 are alive at the end of the first year and 34 are alive at the end of five years.	Of 100 people having Therapy B all live through the therapy, 77 are alive at the end of one year and 22 are alive at the end of five years.	Therapy A (63%)
<b>Mortality frame</b>	Of 100 people having Therapy A 10 die during the therapy, 32 die by the end of the first year and 66 die by the end of five years.	Of 100 people having Therapy B, none die during the therapy, 23 die by the end of one year and 78 die by the end of five years.	Therapy B (61%)

**Framing Treatment Options**

Problem descriptions adapted from reprint in Tversky & Kahneman, 1986; emphasis added.

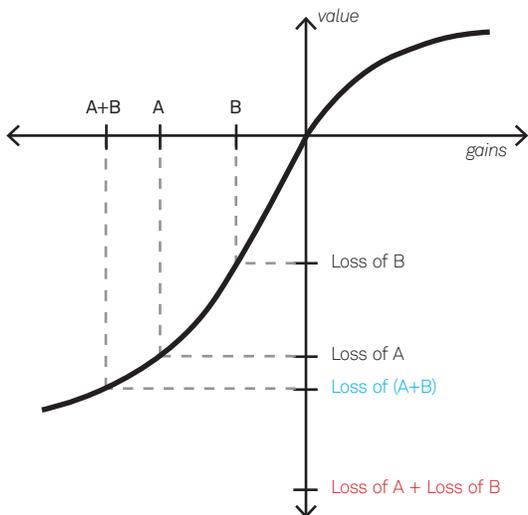
So, are we advocating the use of framing to sway a surgeon's professional opinion toward an outcome that favors a designer's or company's interests? No. But it is important to recognize the influence framing, which is often inadvertent, can have on a range of decisions. If your surgeon seems to be favoring one treatment over another, make sure he or she has considered both the loss and the gain frame first!

**Why paying for checked luggage is so painful**  
*Rules for Mixing and Matching Losses and Gains*

Have you ever been shopping for a big-ticket item, and added a small item to your cart because, "What's another couple of bucks?" Or perhaps you've purchased airline tickets recently, only to feel nickel-and-dimed when you get to the airport and you have to pay additional fees for everything from your luggage to your in-flight meal?

In reality many of our choices not only consist of a single loss or a single gain, but complex combinations of losses and gains. The ways in which losses and gains are integrated or segregated impacts our perception of them. In general, people get more pleasure out of gains that occur separately rather than together, and more pain out of losses that occur separately rather than together (this is modeled by the concavity and convexity of the Prospect Theory value function) (Thaler, 1985). When a small loss is coupled with a large gain, the small loss may be more easily overlooked and/or the net impact feels less painful than if the loss was presented by itself (Thaler, 1985). Similarly, when a small gain is coupled with a large loss, the small gain may be overlooked – it's more beneficial in that case to break apart the small gain and present it separately, as a sort of "silver lining" (Thaler, 1985).

**Figure 1**



In one study (Thaler, 1985) participants were presented with different life scenarios of two fictional characters, Mr. A and Mr. B. For each scenario, participants indicated who they thought would be more happy, or who would be more upset. Example scenarios included:

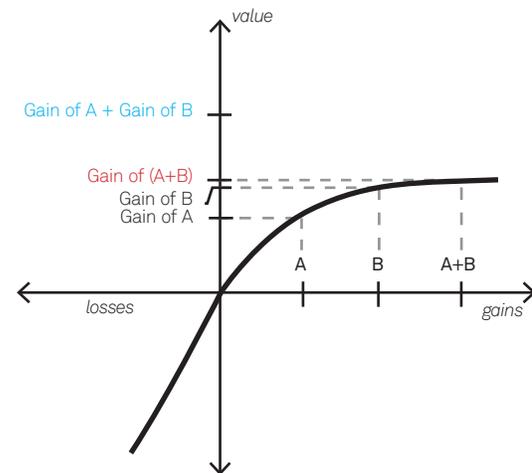
*"Mr. A was given tickets to lotteries involving the World Series. He won \$50 in one lottery and \$25 in the other. Mr. B was given a ticket to a single, larger World Series lottery. He won \$75. Who was happier?" 64% of participants thought Mr. A, who received two separate gains, would be happier.*

*"Mr. A's car was damaged in a parking lot. He had to spend \$200 to repair the damage. The same day the car was damaged he won \$25 in the office football pool. Mr. B's car was damaged in a parking lot. He had to spend \$175 to repair the damage." 72% of participants thought Mr. B would be more upset, as Mr. A had experienced a loss but had also experienced a separate, small gain that offset the pain of the loss – a sort of "silver lining."*

Overall, participants' responses corresponded with the notion that two losses separately are more painful than if they were lumped together, two gains separately are more pleasurable than when they are lumped together, and a small gain following a larger loss makes the loss feel a little less painful.

So why is it so painful to pay an extra fee for checked luggage when you arrive at the airport? You experience the cost of your initial ticket purchase, and the cost of your luggage fee as two separate losses. It's more painful for the airline to charge you for the luggage separately, when you check in, than if it had just charged you the same amount up-front, when you originally bought the ticket.

**Figure 2**



**Figure 1:**  
**Using the value function to understand why two losses together are less painful than two losses separately**

*Suppose you're facing two losses, A and B. Due to the shape of the value function, combining the losses (shown here as Loss of (A+B)) produces a smaller decrease in overall value, and thus a less painful outcome, compared to presenting the losses separately (shown here as Loss of A + Loss of B).*

**Figure 2:**  
**Using the value function to understand why two gains separately are more pleasurable than two gains together**

*Suppose you're facing two gains, A and B. Due to the shape of the value function, separating the gains (shown here as Gain of A + Gain of B) produces a larger increase in overall value, and thus a more pleasurable outcome, compared to presenting the gains together (shown here as Gain of (A+B)).*

**Design Tip:** To make multiple losses seem less daunting, couple them together.

Round It Up America encourages donations to charity by asking restaurant patrons to simply round up their bill to the nearest dollar and donate that amount. Patrons are thus faced with a small loss added to an existing loss, rather than being faced with an unrelated request for donation that would feel like a new loss altogether.

**Design Tip:** To make multiple gains more pleasurable, separate them conceptually and temporally, if possible.

Progressive Car Insurance offers dozens of discounts that are all individually identified for customers – including the “Multiple Policy Discount,” the “New Car Discount,” the “Senior Adult Discount,” the “New Student Discount,” etc.

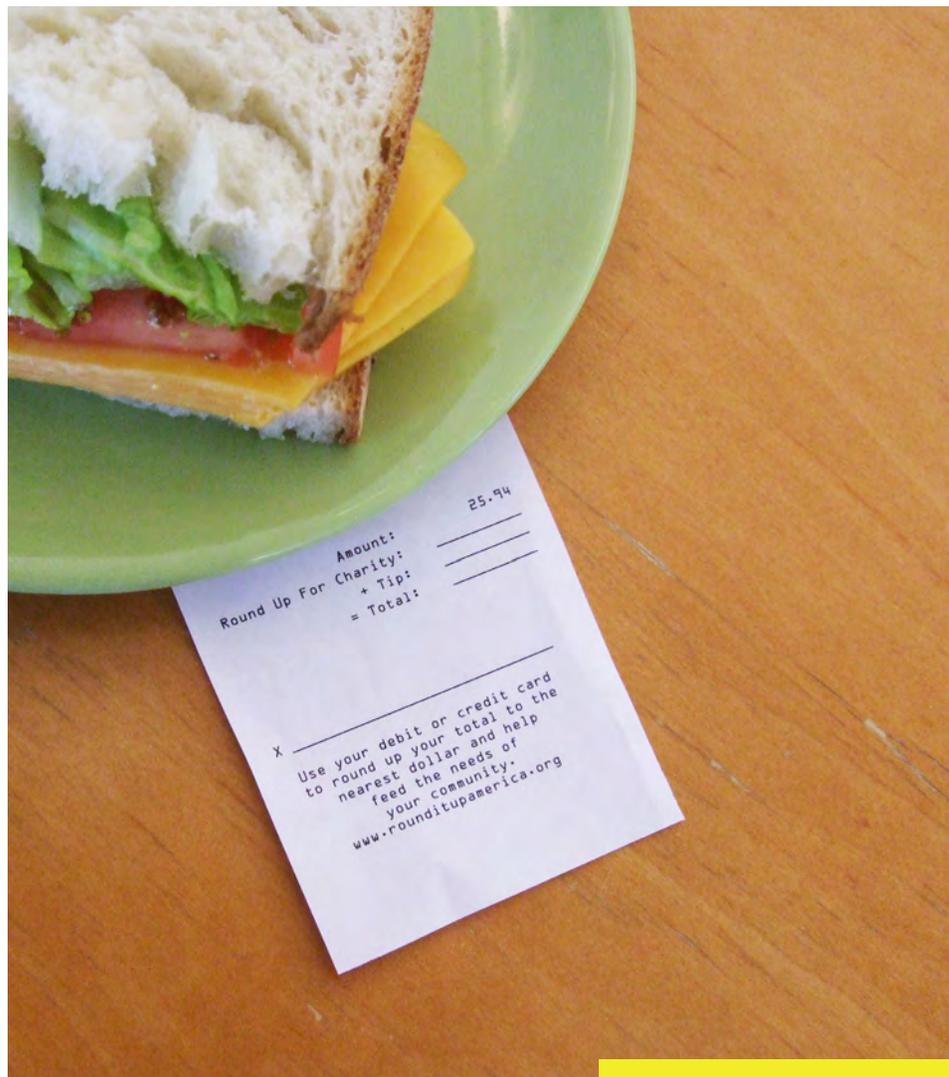
**Reducing AIDS transmission through inaction**  
*The Power of Defaults and the Status Quo Bias*

**What it’s all about**

Think about a weekly meeting or class you attend. Do you tend to sit in the same seat every time, even though the seats aren’t assigned? Or, returning to our earlier breakfast example, do you eat the same thing every morning because, well, that’s just what you always eat? If so, you’re not alone.

Research has shown that people exhibit a status quo bias, the tendency to go along with an existing situation or selection rather than taking action to change it (Samuelson & Zeckhauser, 1988). The loss associated with changing or giving up the current situation often looms larger than any gains associated with acquiring a new situation (see earlier section on Framing and Loss Aversion). One result of the status quo bias is that we are more likely to select the default option whenever one is present (see Madrian & Shea, 2001, for an example of how powerful default options can be when it comes to 401(k) contributions and allocations).

Changing AIDS testing for pregnant women in Zimbabwe from opt-in to opt-out increased testing rates from 65% to 99% over a six month period (Chandisarewa et al., 2007). By making AIDS testing opt-out, taking the test becomes the default option. Women had to take additional effort to opt-out of the test, and inaction led to having the test – thus the status quo bias was used to help women make healthier choices for them and their future children.



**Design Tip:** To encourage people to select a specific option, make it the default; likewise to discourage people from selecting an option, don’t make it the default.

The wedding registry at [Macy's.com](http://Macy's.com) allows couples to indicate that they'd like to be environmentally responsible when it comes to their gift packaging. When a gift-giver purchases an item, the “Gift box” option is not selected by default.

**choose shipping options**

shipping method	cost	estimated delivery (for in stock items only)
<input checked="" type="radio"/> Standard	\$8.00	3-6 business days
<input type="radio"/> Premium	\$18.00	2-3 business days
<input type="radio"/> Express	\$28.00	1-2 business days

[shipping rates & information](#) **Note:** Items will ship as soon as they are process and may arrive in multiple boxes on different day

**IS THIS ORDER A GIFT?**  yes  no

**Gift box** (\$6.00 per order)

**go green** This couple has chosen our Go Green option and prefers gifts shipped from Macy's without gift wrap or gift box

Yes, please package the items going to this address in gift box(es).

**Round it up America**  
 Encourages donations by coupling losses together.

**Macy’s gift packaging**  
 Keeps “gift box” unchecked by default to encourage environmentally friendly behavior.

### Why instant gratification feels so good *Present Bias and Hyperbolic Time Discounting*

#### What it's all about

Have you ever “settled” for a product that was available today, rather than waiting for a more desirable product to be released in the near future? Or have you ever paid extra money for expedited shipping on Amazon.com, rather than wait the 4-5 days that free shipping might take?

It turns out that time plays a big role in our decision-making behaviors – specifically, the time when losses and gains occur can cause us to change our preferences. When facing decisions where different outcomes occur at different points in time, people tend to exhibit present bias: we prefer gains that occur in the present (instant gratification) to gains that occur in the future (refer to Laibson, 1997 for a discussion of quasi-hyperbolic time discounting, or beta-delta preferences, which describes how much emphasis we place on the present relative to future outcomes). The further into the future an outcome occurs, the more we perceive its utility as reduced or discounted – a phenomenon known as time discounting (Thaler, 1981). And while we want our positive outcomes to occur in the present, we want our negative outcomes to occur in the future: because their impact is perceived as discounted, future losses seem less painful than present losses.

One study (Thaler, 1981) asked participants to consider how much money they would need to be given in the future (one month, one year, and 10 years from now) in order to make them feel indifferent about receiving \$15 right away. The median responses were \$20 in a month, \$50 in a year, and \$100 in 10 years. In other words, an outcome occurring in

one month was discounted by 25%, an outcome occurring in one year was discounted by 70%, and an outcome occurring in 10 years was discounted by 85%!

*Design Tip: To encourage people to select an option or engage in behaviors where the positive outcomes are delayed, introduce present benefits to make the desired outcome more appealing.*

**Weight Watchers** incentivizes exercising – an activity with primarily long-term benefits – by awarding its members with “activity points” for completing different physical activities. Activity points can then be swapped for PointsPlus “food points,” that can be exchanged for food. Activity points function as a present gain – letting people eat a little more or indulge in an extra treat in the present.

**Using activity PointsPlus values** x

When you track activity, you can earn activity **PointsPlus** values, which can be swapped for food **PointsPlus** values. You can use activity **PointsPlus** values any time during the week, or just on the day you earn them. You can also choose to use your weekly **PointsPlus** before you start using your activity **PointsPlus** values, or vice-versa. The **PointsPlus** Tracker will automatically swap **PointsPlus** for you, however you decide to use them.

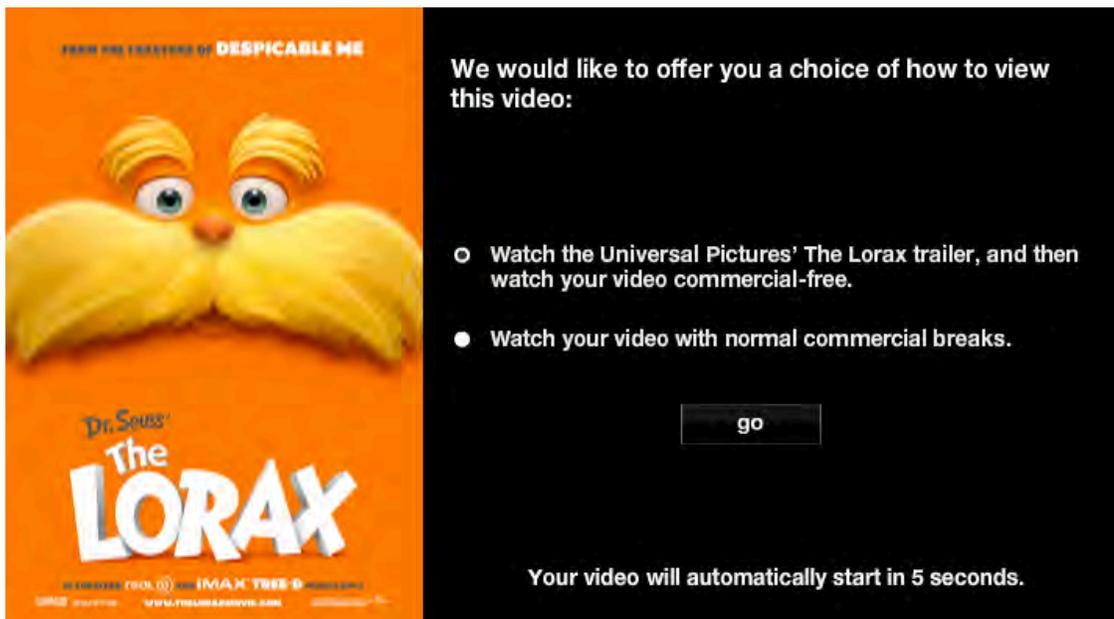
*Design Tip: To encourage people to select an option or engage in a behavior that is usually associated with a loss, delay losses so that they occur in the future.*

#### Weight Watchers

Allows users to convert “activity points” to “food points,” making the benefits of activity more tangible in the present.

#### Hulu

Gives users the option to delay commercial viewing and enjoy immediate programming, although often at the cost of more commercials.



FROM THE CREATORS OF **DESPICABLE ME**

**We would like to offer you a choice of how to view this video:**

- Watch the Universal Pictures' The Lorax trailer, and then watch your video commercial-free.
- Watch your video with normal commercial breaks.

**go**

Your video will automatically start in 5 seconds.

Hulu employs a this strategy to get its viewers to watch more advertising. At the beginning of certain programs, viewers are given a choice of watching a long commercial (an immediate loss) and then watching the show commercial free, or to watch the show with regular breaks. If viewers act upon their desire to start watching the show more immediately, and elect not to spend time watching the longer, up-front commercial, they often actually end up spending more time watching commercials (albeit later in the show) overall! The normal commercial breaks tend to add up to more overall advertising time than the initial, longer commercial option (Nudge Blog, 2011).

### Putting it all together: a SMaRT solution

The examples above have largely focused on individual strategies that can be implemented to address one specific cognitive bias or error in judgement. When multiple strategies from behavioral economics and cognitive psychology are combined, the impact on peoples' behavior can be quite powerful.

Perhaps one of the most notable examples of a solution that employs several of these strategies is the [Save More Tomorrow \(SMaRT\)](#) program (Thaler & Benartzi, 2004), which has been effective at increasing employee contributions to retirement accounts. The plan starts by having employees agree to participate well in advance of the first paycheck deduction – thus eliminating any immediate losses that could go along with starting the account. Increases in contributions coincide with employees' raises, so the small additional loss is coupled with a larger gain and thus is relatively less painful. They've incorporated strategies related to loss aversion, integration of losses and gain, hyperbolic time discounting, and present bias, among others.

### But what don't we know?

Unfortunately, examples like SMaRT, which so elegantly and explicitly incorporates multiple strategies from behavioral economics, are few and far between. This may be partially due to the fact that there is still much research to be done in this field, and there are known gaps in our knowledge.

It's important to recognize that what we understand about behavior change right now is primarily relevant to individual behavior, and often short-term consumer behavior. We don't know a lot about what leads to successful long-term behavior maintenance, and the extent to which strategies for short-term change could lose their efficacy over time. We don't know a lot about using these strategies to change group behavior, or how to most effectively changing multiple behaviors at the same time. And we have limited knowledge about the interaction effects when we apply multiple strategies for short-term behavior change simultaneously.



#### Petrified forest

Signs discouraging stealing from the petrified forest ended up increasing theft.

We also have to recognize that larger societal, political, and economic climate shifts often need to occur to facilitate positive behavior change - and sometimes no amount of re-architecting individual consumer decisions will be able to have the impact that a new law has. As J.D. Trout points out in *The Empathy Gap*, sometimes people make “bad” decisions because in reality all of the options they were facing were poor to begin with. We don't always have the luxury of making good choices.

Given the limits of our knowledge in this space, it's imperative that we incorporate what we do know about behavior change carefully and thoughtfully into our design practices, and validate their success through real-world tests.

### Test, test, test

The insights and strategies that behavioral economics affords us can be very powerful – but it's important to recognize that these are not “easy fix” solutions that will immediately solve complex problems. To ensure that these strategies are being used effectively, and that they are actu-

ally resulting in the outcome you desire, it's critical that you test them in the field, with real people, in various contexts.

Many of the studies mentioned in this paper focus on isolating and researching individual cognitive biases and errors in decision-making – but in the real world, biases interact with one another and occur simultaneously. This is another reason why testing behavioral economics-inspired design solutions is critical: what works in the lab under controlled conditions may not be what works in the field.

For example, one team of researchers experimented with the wording on a sign in Arizona's Petrified Forest National Park. The park wanted to decrease the theft of petrified wood pieces by park visitors. Wording on the sign was designed to tap into loss aversion to make people less likely to steal – it said, "Your heritage is being vandalized every day by theft losses of petrified wood of 14 tons a year, mostly a small piece at a time." What the researchers found was that the sign actually had the opposite effect – rather than discouraging stealing, it appeared to encourage stealing! Why? Because visitors were introduced to the fact that "everyone" takes wood from the park, and that taking wood from the park therefore must be socially acceptable. Although loss aversion may have been the theory behind the wording, the intervention didn't end up having the desired effect when it was actually put in front of people. (See Cialdini, Goldstein, & Martin, 2008 for a discussion of this example.)

It's also important to realize that cognitive biases are not necessarily the same from person to person. Some people may be more risk-tolerant than others, and some people may be more present-biased than others. To fully understand the behavior an audience or user group is actually exhibiting, doing user research is key. Behavioral economics provides a great lens through which we can better understand human behavior, but it's also not a substitute for in-depth, real-world research.

## Saving lives or selling a bread machine

Of course, we can't employ behavior-change tactics without grappling with the moral implications: is it really ethical to change a person's behavior or sway their decision making, potentially without their knowledge? Can't these strategies be used to get people to do things they wouldn't otherwise do, or purchase things they don't really want to buy? And even if we're facilitating "better" decision making on the user's behalf, who has defined what "better" really means?

As designers and developers of new technologies, the reality is that we're impacting peoples' decisions whether we are doing it intentionally or not. When we harness knowledge from fields like behavioral economics, we can be more thoughtful about the way the products and services we

create influence decision-making, and ultimately impact user behavior. We're not facing a choice between influencing people or not influencing people, we're facing a choice between influencing people in ways we don't understand or being more knowledgeable and thoughtful about the way our designs influence behavior.

However, it's true that many of the insights about behavior change that exist today can be used to increase the sales of a specific bread machine (see Simonson, 1993) just as often, if not more frequently than they can be used to encourage people to save money for retirement, or to stop smoking. Here at Artefact we're adamant about using behavioral economics-inspired design strategies to help people achieve preferable outcomes that benefit humanity, society, and the environment. This is part of our design [21st Century Design](#) philosophy.

## Mini-experiments you can try yourself

Want to try your hand at influencing others? Here are some experiments you can try around your office or with your teammates.

### *Ordering lunch*

Divide your team in half. Give half of the team a pizza (or burrito or salad) order form that lists all of the available toppings with the prompt, "Which toppings don't you want on your pizza?" (the loss frame). Give the other half of the team the same form, but change the prompt to, "Which toppings do you want on your pizza?" (the gain frame). (Don't let the team members see each other's forms!) When the decision is framed as a loss, people will tend to craft pizzas with more toppings overall - they're loss averse! (See Levin et al., 2002)

### *Would you make this bet?*

Conduct a survey of your friends or team members. Tell each person you're offering them a wager, and want to know if they will participate. Here's the premise: you're going to flip a coin, and if the coin comes up heads, they lose \$50. Ask them how much they have to win if the coin comes up tails in order to take this bet. (Then explain to them that this was a hypothetical experiment and you're not actually going to flip a coin and exchange money.) If you average out the responses from everyone you talk to, the answer should come out to around \$100 – this is because most people perceive losses as twice as impactful as gains. (Adapted from Thaler & Sunstein, 2008, p. 34)

## Read more

For an in-depth discussion of a broader set of findings in behavioral economics, and to gain more historical perspective on the field, see Camerer, Loewenstein, & Rabin (2004) and Rabin (1998). For a look at the way in which designers in a variety of domains are utilizing these and other behavioral economics and cognitive psychology concepts, see the Artefact trend report on [the Frontier of Persuasive Design](#).

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