Choice Architecture

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CHAPTER 25

Choice Architecture

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Consider the following hypothetical example:

The director of food services for a large city school system runs a series of experiments that manipulate the way in which the food is displayed in cafeterias. Not surprisingly, she finds that what the children eat depends on such things as the order of the items. Foods displayed at the beginning or end of the line are more likely to be eaten than items in the middle, and foods at eye level are more likely to be consumed than those in less salient locations. The question is, What use should the director make of this newfound knowledge?

Here are a few options to consider:

1. Arrange the food to make the students best off, all things considered.
2. Choose the food order at random.
3. Try to arrange the food to get the kids to pick the same foods they would choose on their own.
4. Maximize the sales of the items from the suppliers that are willing to offer the largest bribes.
5. Maximize profits, period.

Option 1 has obvious appeal. Although there can be some controversies, few would argue with the premise that the kids would be better off eating more fruits and vegetables and fewer burgers, fries, and sweets. Yes, this option might seem a bit intrusive, even paternalistic, but the alternatives are worse! Option 2, arranging the food at random, could be considered fair-minded and principled, and it is in one sense neutral. But from the perspective of a practical food service director, does it make any sense to scatter the ingredients to a salad bar at random through the line or separate the hamburgers from the buns? Also, if the orders are randomized across schools, then the children at some schools will have less healthy diets than those at other schools. Is this desirable?

Option 3 might seem to be an honorable attempt to avoid intrusion: try to mimic what the children would choose for themselves. Maybe this should be thought of as the objectively neutral choice, and maybe the director should neutrally follow people's wishes (at least where she is dealing with older students). But a little thought reveals that this is a difficult option to implement. The experiments prove that what kids choose depends on the order in which the items are displayed. What, then, are the true preferences of the children? What does it mean to try to devise a procedure for determining what the students would choose "on their own"? In a cafeteria, it is impossible to avoid some way of organizing food.

Option 4 might appeal to a corrupt cafeteria manager, and manipulating the order of the food items would put yet another weapon in the arsenal of available methods to exploit power. But if the director is honorable and honest this would not have any appeal. Like Options 2 and 3, Option 5 has some appeal, especially to a trained economist or a food-services director who is given incentives to follow this approach. But the school district must balance a range of priorities and requirements. Does it want its cafeterias to act as profit centers if the result is to make children less healthy?

In this example the director is what we call a *choice architect*. A choice architect has the responsibility for organizing the context in which people make decisions. Although this example is a figment of our imagination, many real people turn out to be choice architects, most without realizing it. Doctors describing the available treatments to patients, human-resource administrators creating and managing health-care plan enrollment, marketers devising sales strategies, ballot designers deciding where to put candidate names on a page, parents explaining the educational options available to a teenager; these are just a few examples of choice architects.

As the school cafeteria shows, small and apparently insignificant details can have major impacts on

people's behavior. A good rule of thumb is to assume that "everything matters." Even something as seemingly insignificant as the shape of a door handle. Early in Thaler's career, he taught a class on managerial decision making to business school students. Students would sometimes leave class early to go for job interviews (or a golf game) and would try to sneak out of the room as surreptitiously as possible. Unfortunately for them, the only way out of the room was through a large double door in the front in full view of the entire class (though not directly in Thaler's line of sight). The doors were equipped with large, handsome wood handles that were vertically mounted cylindrical pulls about two feet in length.

When the students came to these doors, they were faced with two competing instincts. One instinct says that to leave a room you push the door. This instinct is part of what psychologists call the reflective system, a deliberate and self-conscious thought process by which humans use logic and reasoning to help them make decisions. The other instinct says, when faced with large wooden handles that are obviously designed to be grabbed, you pull. This instinct is part of what is called the automatic system, a rapid, intuitive process that is not associated with what we would traditionally consider *thinking*.[1] It turns out that the latter instinct—the gut instinct—trumped the former—the conscious thought—and every student leaving the room began by pulling on the handle. Alas, the door opened outward.

At one point in the semester, Thaler pointed out this internal conflict to the class, as one embarrassed student was pulling on the door handle while trying to escape the classroom. Thereafter, as a student got up to leave, the rest of the class would eagerly wait to see whether the student would push or pull. Amazingly, most still pulled! Their automatic systems triumphed; the signal emitted by that big wooden handle simply could not be screened out.

Those doors are examples of poor architecture because they violate a simple psychological principle known as stimulus response compatibility, whereby the signal to be received (the stimulus) must be consistent with one's desired action. When signal and desire are in opposition, performance suffers and people blunder.

Consider, for example, the effect of a large, red, octagonal sign that reads "GO." The difficulties induced by such incompatibilities are easy to show experimentally. One of the most famous such demonstrations is the Stroop (1935) test. In the modern version of this experiment, people see words flashed on a computer screen and they have a very simple task. They press the right button if they see a word that is displayed in red, and press the left button if they see a word displayed in green. People find the task easy and can learn to do it very quickly with great accuracy. That is, until they are thrown a curve ball, in the form of the word *green* displayed in red, or the word *red* displayed in green. For these incompatible signals, response time slows and error rates increase. A key reason is that the automatic system reads the word faster than the color naming system can decide the color of the text. See the word *green* in red text and the nonthinking automatic system rushes to press the left button, which is, of course, the wrong one.

Although we have never seen a green stop sign, doors such as the ones described above are commonplace, and they violate the same principle. Flat plates say "push me" and big handles say "pull me," so do not expect people to push big handles! This is a failure of architecture to accommodate basic principles of human psychology. Life is full of products that suffer from such defects. Is it not obvious that the largest buttons on a television remote control should be the power, channel, and volume controls? Yet how many remotes have the volume control the same size as the "input" control button (which if pressed accidentally can cause the picture to disappear)?

This sort of design question is not a typical one for economists to think about because economists have a conception of human behavior that assumes, implicitly, that everyone relies completely on their reflective system, and a mighty good one at that! Economic agents are assumed to reason brilliantly, catalogue huge amounts information that they can access instantly from their memories, and exercise extraordinary willpower. We call such creatures Econs. Plain old Humans make plenty of mistakes (even when they are consciously thinking!) and suffer all types of breakdowns in planning, self-control, and forecasting, as documented in many of the other chapters in this book.

Since the world is made up of Humans, not Econs, both objects and environments should be designed with Humans in mind. A great introduction to the topic of object design for humans is Donald Norman's wonderful book *The Design of Everyday Things* (1990). One of Norman's best examples is the design of a basic four-burner stove. Most such stoves have the burners in a symmetric arrangement, with the controls arranged in a linear fashion below. In this set-up, it is easy to get confused about which knob controls the front burner and which controls the back, and many pots and pans have been burned as a result.

Norman's basic lesson is that designers need to keep in mind that the users of their objects are Humans who are confronted every day with myriad choices and cues. The goal of this essay is to develop the same idea for people who create the environments in which we make decisions: *choice architects*. If you

indirectly influence the choices other people make, you have earned the title. Consider the person who designs the menu in a restaurant. The chef will have decided what food will be served, but it is someone else's job to put those offerings on paper (or blackboard), and there are lots of ways to do this. Should hot starters be in a different category from cold ones? Are pasta dishes a separate category? Within categories, how should dishes be listed? Where should prices be listed? In a world of Econs, these details would not matter, but for Humans, nearly everything matters, so choice architects can have considerable power to influence choices. Or to use our preferred language, they can nudge.

Of course, choice architects do not always have the best interests of the people they are influencing in mind. The menu designer may want to push profitable items or those about to spoil by printing them in bold print. Wily but malevolent nudgers, such as pushy mortgage brokers, can have devastating effects on the people who are influenced by them. Conscientious choice architects, however, do have the capability to self-consciously construct nudges in an attempt to move people in directions that will make their lives better. And since the choices these choice architects are influencing are going to be made by Humans, they will want their architecture to reflect a good understanding of how humans behave. In this chapter, we will offer some basic principles of effective choice architecture.

Defaults: Padding the Path of Least Resistance

For reasons of laziness, fear, and distraction, many people will take whatever option requires the least effort, or the path of least resistance. All these forces imply that if, for a given choice, there is a default option—an option that will obtain if the chooser does nothing—then we can expect a large number of people to end up with that option, whether or not it is good for them. These behavioral tendencies toward doing nothing will be reinforced if the default option comes with some implicit or explicit suggestion that it represents the normal or even the recommended course of action.

Defaults are ubiquitous and powerful. They are also unavoidable in the sense that for any node of a choice architecture system, there must be an associated rule that determines what happens to the decision maker if she does nothing. Of course, usually the answer is that if I do nothing, nothing changes; whatever is happening continues to happen. But not always. Some dangerous machines, such as chain saws and lawn mowers, are designed with "dead man switches," so that once a user lets go of the handle, the machine's blades stop. Some "big kid" slides at playgrounds are built with the first step about two feet off the ground to keep smaller kids from getting on and possibly hurting themselves.[2] When you leave a computer alone for a while to answer a phone call, nothing is likely to happen for a given period, after which the screen saver comes on. Neglect the computer long enough, and it may lock itself. Of course, a user can decide how long it takes before the screen saver comes on, but implementing that choice takes some action. Most computers come with a default time lag and a default screen saver. Chances are, those are the settings most people still have.

Downloading a new piece of software requires numerous choices, the first of which is "regular" or "custom" installation. Normally, one of the boxes is already checked, indicating it is the default. Which boxes do the software suppliers check? Two different motives are readily apparent: helpful and self-serving. Making the regular installation the default would be in the helpful category if most users will have trouble with the custom installation. Sending unwanted promotional spam to the user's email account would be in the self-serving category. In our experience, most software comes with helpful defaults regarding the type of installation, but many come with self-serving defaults on other choices. Just like choice architects, notice that not all defaults are selected to make the chooser's life easier or better.

Many organizations, public and private, have discovered the immense power of default options, big and small. Consider the idea of automatic renewal for magazine subscriptions? If renewal is automatic, many people will subscribe, for a long time, to magazines they do not read. Or the idea of automatically including seat reservations or travel insurance (for an extra charge, of course) when customers book train or airline tickets (Goldstein et al., 2008). Smart organizations have moved to double-sided printing as the default option. During the presidential campaign, Barack Obama's chief campaign advisor, David Plouffe, ordered all printers to be put on this setting, and the city of Tulsa, Oklahoma, estimates it will save more than $41,000 a year with double-sided printing (Simon, 2008).

The choice of the default can be quite controversial. Here are two examples. Faced with a budget crunch and the possible closing of some state parks because of the recent recession, Washington State legislators switched the default rule on state park fees that drivers pay when they renew their license plates. Before the recession, paying the $5 fee had been an option for drivers. The state switched from an opt-in to an opt-out arrangement, in which drivers are

charged unless they ask not to pay it. For transparency, the state provides information to each driver explaining the reason behind the change. So far, the move has worked, though critics do not think it is a long-term solution to the state's financial problems.

In another example, an obscure portion of the No Child Left Behind Act requires that school districts supply the names, addresses, and telephone numbers of students to the recruiting offices of the branches of the armed forces. However, the law stipulates that "a secondary school student or the parent of the student may request that the student's name, address, and telephone listing not be released without prior written parental consent, and the local educational agency or private school shall notify parents of the option to make a request and shall comply with any request" (NCLB, 2002). Some school districts, such as Fairport, New York, interpreted this law as allowing them to implement an opt-in policy. That is, parents were notified that they could elect to make their children's contact information available, but if they did not do anything, this information would be withheld. This reading of the law did not meet with the approval of then-Secretary of Defense Donald Rumsfeld. The Departments of Defense and Education sent a letter to school districts asserting that the law required an opt-out implementation. Only if parents actively requested that the contact information on their children be withheld would that option apply. In typical bureaucratic language, the departments contended that the relevant laws "do not permit LEA's [local educational agencies] to institute a policy of not providing the required information unless a parent has affirmatively agreed to provide the information."[3] Both the Department of Defense and the school districts realized that opt-in and opt-out policies would lead to very different outcomes. Not surprisingly, much hue and cry ensued.

We have emphasized that default rules are inevitable—that private institutions and the legal system cannot avoid choosing them. In some cases, though not all, there is an important qualification to this claim. The choice architect can force the choosers to make their own choice. We call this approach *required choice*, or *mandated choice*. In the software example, required choice would be implemented by leaving all the boxes unchecked and by requiring that at every opportunity one of the boxes be checked in order for people to proceed. In the case of the provision of contact information to the military recruiters, one could imagine a system in which all students (or their parents) are required to fill out a form indicating whether they want to make their contact information available. For emotionally charged issues like this one, such a policy has considerable appeal, because people might not want to be defaulted into an option that they might hate (but fail to reject because of inertia or real, or apparent, social pressure).

A good example where mandated choice has considerable appeal is organ donation. As discussed by Johnson and Goldstein (2003) some countries have adopted an opt-out approach to organ donation called *presumed consent*. This approach clearly maximizes the number of people who (implicitly) agree to make their organs available. However, some people strenuously object to this policy, feeling that the government should not presume anything about their organs. An effective compromise is mandated choice. For example, in Illinois when drivers go to get their license renewed and a new photograph taken they are required to answer the question Do you wish to be an organ donor? before they can get their license. This policy has produced a 60% sign-up rate compared to the national average of 38%.[4] Furthermore, since the choice to be a donor is explicit rather than implicit, family members of deceased donors are less likely to object.

We believe that required choice, which is favored by many who like freedom, is sometimes the best way to go. But consider two points about the approach. First, Humans will often consider required choice to be a nuisance or worse and would much prefer to have a good default. In the software example, it is helpful to know what the recommended settings are. Most users do not want to have to read an incomprehensible manual in order to determine which arcane setting to elect. When choice is complicated and difficult, people might greatly appreciate a sensible default. It is hardly clear that they should be forced to choose.

Second, required choosing is generally more appropriate for simple yes-or-no decisions than for more complex choices. At a restaurant, the default option is to take the dish as the chef usually prepares it, with the option to substitute or remove certain ingredients. In the extreme, required choosing would imply that the diner has to give the chef the recipe for every dish she orders! When choices are highly complex, required choosing may not be a good idea; it might not even be feasible.

Expect Error

Humans make mistakes. A welldesigned system expects its users to err and is as forgiving as possible. Some examples from the world of real design illustrate this point.

In the Paris subway system, Le Métro, users insert a paper card the size of a movie ticket

into a machine that reads the card, leaves a record on the card that renders it "used," and then spits it out from the top of the machine. The cards have a magnetic strip on one side but are otherwise symmetric. Intelligent subway card machines are able to read the strip no matter which way a user inserts her card. In stark contrast to Le Métro is the system used in most Chicago parking garages. When entering the garage, a driver puts a credit card into a machine that reads it and remembers the information. Then when leaving, the driver inserts the card again into another machine at the exit. This involves reaching out of the car window and inserting the card into a slot. Because credit cards are not symmetric, there are four possible ways to put the card into the slot (face up or down, strip on the right or left). Exactly one of those ways is the right way. And in spite of a diagram above the slot, it is very easy to put the card in the wrong way, and when the card is spit back out, it is not immediately obvious what caused the card to be rejected or to recall which way it was inserted the first time.

Over the years, automobiles have become much friendlier to their Human operators. They buzz when the seat belts are not buckled. Warning signs flash when the gas gauge is low, or the oil life is almost over. Many cars come with an automatic switch for the headlights that turns them on when the car is operating and off when it is not, eliminating the possibility of leaving lights on overnight and draining the battery.

But some errorforgiving innovations are surprisingly slow to be adopted. Take the case of the gas tank cap. On any sensible car the gas cap is attached by a piece of plastic, so that when a driver removes the cap she cannot drive off without it. This plastic cap is so inexpensive that once one firm had the good idea to include this feature, there should be no excuse for building a car without one.

Leaving the gas cap behind is a special kind of predictable error psychologists call a *postcompletion* error (Byrne and Bovair, 1997). The idea is that once the main task is finished, people tend to forget things relating to previous steps. Other examples include leaving ATM cards in the machine after withdrawing cash, or leaving the original in the copying machine after making copies. Most ATMs (but not all) no longer allow this error because the card is returned immediately. Another strategy, suggested by Norman, is to use what he calls a *forcing function*. In order to accomplish a desire, another step must first be taken. If a user has to remove her card before physically receiving her cash, she will not forget it.

Another automobile-related bit of good design involves the nozzles for different varieties of gasoline. The nozzles that deliver diesel fuel are too large to fit into the opening on cars that use gasoline, so it is not possible to make the mistake of putting diesel fuel in a gasoline-powered car (though it is still possible to make the opposite mistake). The same principle has been used to reduce the number of errors involving anesthesia. One study found that human error (rather than equipment failure) caused 82% of the "critical incidents." A common error was that the hose for one drug was hooked up to the wrong delivery port, so the patient received the wrong drug. This problem was solved by designing the equipment so that the gas nozzles and connectors were different for each drug. It became physically impossible to make this previously frequent mistake (Vicente, 2006).

A major problem in health care that costs billions of dollars annually is called *drug compliance*. Many patients, especially the elderly, are on medicines they must take regularly and in the correct dosage. So here is a choice-architecture question: How should a drug designer construct a dosage schedule?

If a onetime dose administered immediately by the doctor (which would be best on all dimensions but is often technically infeasible) is ruled out, then the next-best solution is a medicine taken once a day, preferably in the morning. It is clear why once a day is better than twice (or more) a day. Because the more often a patient must take the drug, the more opportunities she has to forget. But frequency is not the only concern; regularity is also important. Once a day is much better than once every other day because this schedule activates the automatic system. Taking the pill becomes a habit. By contrast, remembering to take medicine every other day is beyond most Humans. (Similarly, meetings that occur every week are easier to remember than those that occur every other week.) Some medicines are taken once a week, and most patients take this medicine on Sundays (because that day is different from other days for most people and thus easy to associate with taking one's medicine).

Birth control pills present a special problem along these lines, because they are taken every day for three weeks and then skipped for one week. To solve this problem and to make the process automatic, the pills

are typically sold in a special container that contains twenty-eight pills, each in a numbered compartment. Patients are instructed to take a pill every day, in order. The pills for days twenty-two through twenty-eight are placebos whose only role is to facilitate compliance for Human users.

Another serious problem in the world of medicine stems from the oftenfrenzied hospital environment. Because a patient's medical care can require hundreds of decisions each day, some doctors and hospital administrators have experimented with using checklists for certain treatments where human error can lead to serious harm. The checklists contain simple, routine actions, all of which doctors learned in medical school but may simply forget to follow because of time constraints, stress, or distractions. For instance, the checklist designed by a critical-care specialist at Johns Hopkins Hospital for treating line infections included five simple steps from washing one's hands with soap to putting a sterile dressing over the catheter site once the line is in.

The point of the checklists was twofold. It helped with memory recall, which is critical in a hospital where events like a person writhing in pain can easily make you forget about whether you have washed your hands. The checklist also broke down the entire complex process into a series of steps that allowed staffers to better see what constituted a high standard of performance. The results from what seem like just simple reminders stunned the doctors. The ten-day line-infection rate fell from 11% to zero. After fifteen more months, only two patients got line infections. Forty three infections and eight deaths had been prevented. Two million dollars had been saved (Gawande, 2007, 2010; Pronovost et al., 2006).

While working on *Nudge* (Thaler and Sunstein, 2008), Thaler sent an email to Google's chief economist, Hal Varian. He intended to attach a draft of the introduction to give Varian an overview of the book but forgot the attachment. When Varian wrote back to ask for the missing attachment, he noted that Google was experimenting with a new feature on its email program, Gmail, that would solve this problem. A user who mentions the word attachment but does not include one would be prompted with "Did you forget your attachment?" Thaler sent the attachment along and told Varian that this was exactly what the book was about.

Visitors to London who come from the United States or Europe have a problem being safe pedestrians. They have spent their entire lives expecting cars to come at them from the left, and their automatic system knows to look that way. But in the United Kingdom automobiles drive on the left-hand side of the road, and so the danger often comes from the right. Many pedestrian accidents occur as a result. The city of London tries to help with good design. On many corners, especially in neighborhoods frequented by tourists, the pavement has signs that say, "Look right!"

Give Feedback

The best way to help Humans improve their performance is to provide feedback. Well-designed systems tell people when they are doing well and when they are making mistakes. Some examples are the following:

Digital cameras generally provide better feedback to their users than film cameras. After each shot, the photographer can see a (small) version of the image just captured. This eliminates errors that were common in the film era, from failing to load the film properly (or at all), to forgetting to remove the lens cap, to cutting off the head of the central figure of the picture. However, early digital cameras failed on one crucial feedback dimension. When a picture was taken, there was no audible cue to indicate that the image had been captured. Modern models now include a satisfying, but completely fake, shutter click sound when a picture has been taken. Some cell phones, especially those aimed at the elderly, include a fake dial tone, for similar reasons.

One of the most scenic urban highways in the world is Chicago's Lake Shore Drive, which hugs the Lake Michigan coastline that is the city's eastern boundary. The drive offers stunning views of Chicago's magnificent skyline. There is one stretch of this road that puts drivers through a series of S curves. These curves are dangerous. Many drivers fail to take heed of the reduced speed limit (25 mph) and wipe out. In September 2006, the city adopted a new strategy for slowing traffic. It painted a series of white lines perpendicular to the traveling cars. The lines progressively narrow as drivers approach the sharpest point of the curve, giving them the illusion of speeding up, and nudging them to tap their brakes.

Until the recent release of data by the Chicago Department of Transportation, only anecdotal accounts provided any indication of how effective the lines had been in preventing accidents. According to

an analysis conducted by city traffic engineers, there were 36% fewer crashes in the six months after the lines were painted compared to the same sixmonth period the year before (September 2006–March 2007 and September 2005–March 2006). This level of reduction at the cost of some extra paint is remarkable. To see if it could make the road even safer, the city installed a series of overhead flashing beacons, yellow and black chevron alignment signs, and warning signs posting the reduced advisory speed limit. Again, accidents fell—47% over a sixmonth period (March 2007–August 2007 and March 2006–August 2006). Keep in mind that this post-six-month-period effect included both the signs and the lines. The city considers both numbers to be signs of success.

An important type of feedback is a warning that things are going wrong, or, even more helpful, are about to go wrong. Laptops warn users to plug in or shut down when the battery is dangerously low. But warning systems have to avoid the "boy who cried wolf" problem of offering so many warnings that they are ignored. If a computer constantly nags users about whether they want to open attachments, they begin to click "yes" without thinking about it. These warnings are thus rendered useless.

Some clever feedback systems are popping up in ways that are good for the environment and household budgets. There is the Ambient Orb, a small ball that glows red when a customer is using lots of energy but green when energy use is modest. Utility companies have experimented with sending customers electricity bills that tell them how much energy they are using compared to their neighbors. Prius drivers already know how easy it is to be entranced by a screen that continuously updates your miles-per-gallon rate, and how hard it can be not to adjust driving in order to squeeze the most mileage out of each fuel tank. Nissan has developed an acceleration pedal that adjusts its resistance when the driver has a lead foot (NASCAR-like acceleration wastes gas). Two Stanford graduate students have come up with a piece of technology that combines all of these feedback mechanisms into one amazing piece of choice architecture. Called the SmartSwitch, users turn a light on using a slide switch. Like Nissan's pedal, the switch is harder to push when lots of energy is being used, giving the owner a subtle reminder about those bad habits. The switch can also be linked to other homeowners in the neighborhood so that the switch slides less smoothly when all the neighbors are blasting their air conditioners on a hot day.

Feedback can be improved in many activities. Consider the simple task of painting a ceiling. This task is more difficult than it might seem because ceilings are nearly always painted white, and it can be hard to see exactly where you have painted. Later, when the paint dries, the patches of old paint will be annoyingly visible. How to solve this problem? Some helpful person invented a type of ceiling paint that goes on pink when wet but turns white when dry. Unless the painter is so color-blind that he cannot tell the difference between pink and white, this solves the problem.

Understanding Mappings: From Choice to Welfare

Some tasks are easy, like choosing a flavor of ice cream; other tasks are hard, like choosing a medical treatment. Consider, for example, an ice cream shop where the varieties differ only in flavor, not calories or other nutritional content. Selecting which ice cream to eat is merely a matter of choosing the one that tastes best. If the flavors are all familiar, such as vanilla, chocolate, and strawberry, most people will be able to predict with considerable accuracy the relation between their choice and their ultimate consumption experience. Call this relation between choice and welfare a *mapping*. Even if there are some exotic flavors, the ice cream store can solve the mapping problem by offering a free taste.

Choosing among treatments for some disease is quite another matter. Suppose a person is diagnosed with prostate cancer and must choose among three options: surgery, radiation, and watchful waiting (which means do nothing for now). Each of these options comes with a complex set of possible outcomes regarding side effects of treatment, quality of life, length of life, and so forth. Comparing the options involves making trade-offs between a longer life and an increased risk of unpleasant side effects, such as impotence or incontinence. Weighing these scenarios makes for a hard decision at two levels. The patient is unlikely to know these trade-offs, and he is unlikely to be able to imagine what life would be like if he were incontinent. Yet here are two scary facts about this scenario. First, most patients decide which course of action to take in the very meeting at which their doctor breaks the bad news about the diagnosis. Second, the treatment option they choose depends strongly on the type of doctor they see (Zeliadt et al., 2006). (Some specialize in surgery, others in radiation. None specialize in watchful waiting. Guess which option is the most likely candidate for underutilization?)

The comparison between ice cream and treatment options illustrates the concept of mapping. A good system of choice architecture helps people improve

their ability to map and hence to select options that will make them better off. One way to do this is to make the information about various options more comprehensible by transforming numerical information into units that translate more readily into actual use. When buying apples to make into apple cider, it helps to know the rule of thumb that it takes three apples to make one glass of cider.

Mapping is a frequent problem in consumer electronic decisions like purchasing a digital camera. Cameras advertise their megapixels, and the impression created is certainly that the more megapixels the better. This assumption is itself subject to question, because photos taken with more megapixels take up more room on the camera's storage device and a computer's hard drive. But what is most problematic for consumers is translating megapixels (not the most intuitive concept) into understandable terms that help them order their preferences. Is it worth paying an additional hundred dollars to go from four to five megapixels? Suppose instead that manufacturers listed the largest print size recommended for a given camera. Instead of being given the options of three, five, or seven megapixels, consumers might be told that the camera can produce quality photos at 4 by 6 inches, 9 by 12, or poster size.

Often people have a problem in mapping products into money. For simple choices, of course, such mappings are trivial. If a Snickers bar costs $1, it is easy to figure out the cost of a Snickers bar every day. But do consumers know how much it costs you to use a credit card? Among the many built-in fees are (1) an annual fee for the privilege of using the card (common for cards that provide benefits such as frequent-flier miles); (2) an interest rate for borrowing money (which depends on your deemed credit worthiness); (3) a fee for making a payment late (and you may end up making more late payments than you anticipate); (4) interest on purchases made during the month that is normally not charged if your balance is paid off but begins if you make your payment one day late; (5) a charge for buying things in currencies other than dollars; and (6) the indirect fee of higher prices that retailers pass along to consumers to offset the small percentage of each transaction the credit card companies take.

Credit cards are not alone in having complex pricing schemes that are neither transparent nor comprehensible to consumers. Think about mortgages, cell phone calling plans, and auto insurance policies, just to name a few. For these and related domains, we propose a very mild form of government regulation that we call RECAP: Record, Evaluate, and Compare Alternative Prices.

Here is how RECAP would work in the cell phone market. The government would not regulate how much issuers could charge for services, but it would regulate their disclosure practices. The central goal would be to inform customers of every kind of fee that currently exists. This would not be done by printing a long unintelligible document in fine print. Instead, issuers would be required to make public their fee schedule in a spreadsheet-like format that would include all relevant formulas. Suppose an American is visiting Toronto and his cell phone rings. How much is it going to cost to answer it? What if he downloads some email? All these prices would be embedded in the formulas. This is the price disclosure part of the regulation.

The usage disclosure requirement would be that once a year, issuers would have to send their customers a complete listing of all the ways they had used the phone and all the fees that had been incurred. This report would be sent two ways, by mail and, more important, electronically. The electronic version would also be stored and downloadable on a secure website.

Producing the RECAP reports would cost cell phone carriers very little, but the reports would be extremely useful for customers who want to compare the pricing plans of cell phone providers, especially after they had received their first annual statement. Private websites similar to existing airline and hotel sites would emerge to allow an easy way to compare services. With just a few quick clicks, a shopper would easily be able to import her usage data from the past year and find out how much various carriers would have charged, given her usage patterns.[5] Consumers who are new to the product (getting a cell phone for the first time, for example) would have to guess usage information for various categories, but the following year they could take full advantage of the system's capabilities. Already sites like this are popping up. One of them, billshrink.com, tracks cell phone plans, credit cards, and gas stations, saving people money by helping them pick the best plan (or card) for their consumer habits. We think that in many other domains, from mortgages to energy use to Medicare, a RECAP program could greatly improve people's ability to make good choices.

Structure Complex Choices

People adopt different strategies for making choices depending on the size and complexity of the available options. When facing a small number of well-understood alternatives, the tendency is to examine all the attributes of all the alternatives and then make trade-offs when necessary. But when the choice set gets large, alternative strategies must be employed, leading to serious problems.

Consider, for example, someone who has just been offered a job at a company located in another

city. Compare two choices: which office to select and which apartment to rent. Suppose this individual is offered a choice of three available workplace offices. A reasonable strategy is to look at all three offices, note the ways they differ, and then make some decisions about the importance of such attributes as size, view, neighbors, and distance to the nearest restroom. This is described in the choice literature as a *compensatory* strategy, since a high value for one attribute (big office) can compensate for a low value for another (loud neighbor).

Obviously, the same strategy cannot be used to pick an apartment. In any large city, thousands of apartments are available, and no single person can see them all. Instead, the task must be simplified. One strategy to use is what Tversky (1972) called *elimination by aspects*. Someone using this strategy first decides what aspect is most important (say, commuting distance), establishes a cutoff level (say, no more than a thirtyminute commute), and then eliminates all alternatives that do not meet this standard. The process is repeated, attribute by attribute until either a choice is made or the set is narrowed down enough to switch over to a compensatory evaluation of the "finalists."

When people are using a simplifying strategy of this kind, alternatives that do not meet the minimum cutoff scores may be eliminated even if they are high on all other dimensions. For example, an apartment with a thirty-fiveminute commute will not be considered even if it has an ocean view and costs $200 a month less than any of the alternatives.

Social science research reveals that as the choices become more numerous or vary on more dimensions or both, people are more likely to adopt simplifying strategies. The implications for choice architecture are related. As alternatives become more numerous and more complex, choice architects have more to think about and more work to do and are much more likely to influence choices (for better or for worse). For an ice cream shop with three flavors, any menu listing those flavors in any order will do just fine, and effects on choices (such as order effects) are likely to be minor because people know what they like. As the choices become more numerous, though, good choice architecture will provide structure, and structure will affect outcomes.

Consider the example of a paint store. Even ignoring the possibility of special orders, paint companies sell more than two thousand colors for a home's walls. It is possible to think of many ways of structuring how those paint colors are offered to the customer. Imagine, for example, that the paint colors were listed alphabetically. Arctic White might be followed by Azure Blue, and so forth. While alphabetical order is a satisfactory way to organize a dictionary (at least if you have a guess as to how a word is spelled), it is a lousy way to organize a paint store.

Instead, paint stores have long used something like a paint wheel, with color samples ordered by their derivation from the three primary colors: all the blues are together, next to the greens, and the reds are located near the oranges, and so forth. The problem of selection is made considerably easier by the fact that people can see the actual colors, especially because the names of the paints are typically uninformative. (On the Benjamin Moore Paints website, three similar shades of beige are called "Roasted Sesame Seed," "Oklahoma Wheat," and "Kansas Grain.")

Thanks to modern computer technology and the World Wide Web, many problems of consumer choice have been made simpler. The Benjamin Moore Paints website not only allows the consumer to browse through dozens of shades of beige, but it also permits the consumer to see (within the limitations of the computer monitor) how a particular shade will work on the walls with the ceiling painted in a complementary color. And the variety of paint colors is small compared to the number of books sold by Amazon (millions) or web pages covered by Google (billions). Many companies such as Netflix, the mail-order DVD rental company, succeed in part because of immensely helpful choice architecture. Customers looking for a movie to rent can easily search movies by actor, director, genre, and more, and if they rate the movies they have watched, they can also get recommendations based on the preferences of other movie lovers with similar tastes, a method called *collaborative filtering*. People use the judgments of other people who share their tastes to filter through the vast number of books or movies available in order to increase the likelihood of picking one they like. Collaborative filtering is an effort to solve a problem of choice architecture. If an individual knows what others like him tend to like, he might be comfortable in selecting unfamiliar products. For many, collaborative filtering saves cognitive resources and search costs, thus making difficult choices easier.

A cautionary note: surprise and serendipity can be fun—and salutary, too—and there may be disadvantages if the primary source of information is what people like us like. Sometimes it is good to learn what people unlike us like and test it out. For fans of the mystery writer Robert B. Parker, collaborative filtering will probably direct them to other mystery writers, not Joyce Carol Oates or Henry James. Perhaps second-generation collaborative filtering will also present users with potential surprises. Democrats who like books that fit their predilections might want to see what Republicans are arguing because no party can possibly have a monopoly on wisdom.

Public-spirited choice architects—those who run the daily newspaper, for example—know that it is good to nudge people in directions that they might not have specifically chosen in advance. Structuring choice sometimes means helping people to learn so they can later make better choices on their own.[6]

Incentives

Our last topic is the one with which most economists would have started: prices and incentives. Although we have been stressing factors that are often neglected by traditional economic theory, we do not intend to suggest that standard economic forces are unimportant. This is as good a point as any to state for the record that we believe in supply and demand. If the price of a product goes up, suppliers will usually produce more of it and consumers will usually want less of it. So choice architects must think about incentives when they design a system. Sensible architects will put the right incentives on the right people. One way to start to think about incentives is to ask four questions about a particular choice architecture:

Who uses?

Who chooses?

Who pays?

Who profits?

Free markets often solve the key problems of decision making by giving people an incentive to make good products and to sell them at the right price. If the market for sneakers is working well, abundant competition will drive bad sneakers (meaning those that do not provide good value to consumers at their price point) from the marketplace, and price the good ones in accordance with people's tastes. Sneaker producers and sneaker purchasers have the right incentives. But sometimes incentive conflicts arise. Consider a simple case. Two friends go for a weekly lunch and each chooses his own meal and pays for what he eats. The restaurant serves their food and keeps their money. No conflicts here. Now suppose they decide to take turns paying for each other's lunch. Each now has an incentive to order something more expensive on the weeks that the other is paying, and vice versa. (In this case, though, friendship introduces a complication; good friends may well order something cheaper if he knows that the other is paying. Sentimental but true.)

Many markets (and choice architecture systems) are replete with incentive conflicts. Perhaps the most notorious is the U.S. health-care system. The patient receives the health-care services that are chosen by his physician and paid for by the insurance company, with intermediaries from equipment manufacturers to drug companies to malpractice lawyers extracting part of the original cost. Different intermediaries have different incentives, and the results may not be ideal for either patients or doctors. Of course, this point is obvious to anyone who thinks about these problems. But as usual, it is possible to elaborate and enrich the standard analysis by remembering that the agents in the economy are Humans. To be sure, even mindless Humans demand less when they notice that the price has gone up, but only if they are paying enough attention to notice the change in price.

The most important modification that must be made to a standard analysis of incentives is salience. Are choosers aware of the incentives they face? In free markets, the answer is usually yes, but in important cases, the answer is no. Consider the example of members of an urban family deciding whether to buy a car. Suppose their choices are to take taxis and public transportation or to spend $10,000 to buy a used car, which they can park on the street in front of their home. The only salient costs of owning this car will be the stops at the gas station, occasional repair bills, and a yearly insurance bill. The opportunity cost of the $10,000 is likely to be neglected. (In other words, once they purchase the car, they tend to forget about the $10,000 and stop treating it as money that could have been spent on something else.) In contrast, every time the family uses a taxi, the cost will be in their face, with the meter clicking every few blocks. So a behavioral analysis of the incentives of car ownership will predict that people will underweight the opportunity costs of car ownership, and possibly other less salient aspects such as depreciation, and may overweight the very salient costs of using a taxi.[7] An analysis of choice architecture systems must make similar adjustments.

Of course, salience can be manipulated, and good choice architects can take steps to direct people's attention to incentives. The telephones at the INSEAD School of Business in France are programmed to display the running costs of longdistance phone calls. To protect the environment and increase energy independence, similar strategies could be used to make costs more salient in the United States. Suppose home thermostats were programmed to announce the cost per hour of lowering the temperature a few degrees during the heat wave. This would probably have more effect on behavior than quietly raising the price of electricity, a change that will be experienced only at the end of the month when the bill comes. Suppose in this light that government wants to increase energy conservation. Increases in the price of electricity will surely have an effect; making the increases salient

will have a greater effect. Cost-disclosing thermostats might have a greater impact than (modest) price increases designed to decrease use of electricity. Google, for instance, has developed a free electricity usage monitoring tool that provides information on energy usage and that, for customers without smart thermostats, can be hooked up to a handheld device.

In some domains, people may want the salience of gains and losses treated asymmetrically. For example, no one would want to go to a health club that charged its users on a per-step basis on the Stairmaster. However, many Stairmaster users enjoy watching the "calories burned" meter while they work out (especially since those meters seem to give generous estimates of calories actually burned). In Japan, some treadmills display pictures of food, like coffee and ice cream, during the workout to allow users to better balance their exercise and dieting habits.

We have sketched six principles of good choice architecture. As a concession to the bounded memory of our readers, we thought it might be useful to offer a mnemonic device to help recall the six principles. By rearranging the order, and using one small fudge, the following emerges.

iNcentives

Understand mappings

Defaults

Give feedback

Expect error

Structure complex choices

Voilà: NUDGES

With an eye on these nudges, choice architects can improve the outcomes for their Human users.

Notes

This essay draws heavily on Thaler and Sunstein's book *Nudge* (2008) and on other material that has appeared on the book's blog (www.nudges.org), and was edited by Balz. This chapter was written well before Sunstein joined the Obama Administration as counselor to the director of the Office of Management and Budget, later to be confirmed as administrator of the Office of Information and Regulatory Affairs. Nothing said here represents an official position in any way. Thaler is a professor at the Booth School of Business, University of Chicago. Sunstein is a professor at the Harvard Law School. Balz received his Ph.D. in political science from the University of Chicago.

1. In the psychology literature, these two systems are sometimes referred to as System 2 and System 1, respectively.

2. Thanks to a *Nudge* reader for this example.

3. Letter of July 2, 2003, to State School Officers signed by William Hanse, deputy secretary of education, and David Chu, undersecretary of defense.

4. Illinois's organ donation rate is compiled by Donate Life Illinois (http://www.donatelifeillinois.org/). For the national organ donor rate see Donate Life America, 2009.

5. We are aware, of course, that behavior depends on prices. If my current cell phone provider charges me a lot to make calls in Canada and I react by not making such calls, I will not be able to judge the full value of an alternative plan with cheap calling in Canada. But where past usage is a good predictor of future usage, a RECAP plan would be very helpful.

6. Sunstein, 2007, explores this point in detail.

7. Companies such as Zipcar that specialize in short-term rentals could profitably benefit by helping people solve these mental accounting problems.

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