Choice Architecture

ADRIAN R. CAMILLERI and RICK P. LARRICK

Abstract

"Choice architecture" is a metaphor capturing the idea that all choices occur within a structure of contextual and task features. These features in turn help to "construct" a person's choice. In this chapter, we summarize the academic literature on three types of choice architecture tools—defaults, information restructuring, and information feedback—and document some real-world examples where these tools have been applied as successful "nudges." We end the chapter with a discussion of some key challenges and opportunities associated with this new field—including the need for customized choice architecture and the political acceptability of the use of choice architecture—and highlight some avenues for future research.

CHOICE ARCHITECTURE

The concept of "choice architecture" is borne from the discovery that people's preferences are not stable, but malleable. This discovery has emerged from several decades of behavioral decision research. A memorable demonstration—called *partition dependence*—is an elegant illustration of malleable preferences. Partition dependence is the cognitive tendency to give equal weight to different categories in a judgment or choice task. Because categories can often be reconfigured, people's judgments and preferences likewise change. For example, in one experiment, people were much more likely to select fruits and vegetables from a menu when the list of foods was grouped in terms of "fruits," "vegetables," and "cookies & crackers" than when the same list of foods was grouped in terms of "fruits & vegetables," "cookies," and "crackers" (Fox, Ratner, & Lieb, 2005). This study shows that different choices can be made depending on how people subjectively partition a set of options or how those options are otherwise grouped.

Experimental findings such as partition dependence reveal that preferences can differ across ostensibly equivalent choice situations. These results prove that people are not purely rational decision makers with stable,

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well-understood preferences. Rather, people's preferences are influenced by many of the contextual and task features associated with a choice that should not rationally influence choice. The list of these features is broad—in this article, we summarize in detail only a few—but they include the number of options, the default option, the similarity of options, the presence of compromise or "decoy" options, the type of attributes, the number of attributes, the correlation between the attributes, the scale the attributes are expressed upon, and the type of response mode. In general, these contextual and task features can change what information is used, how that information is processed, and how an evaluation is expressed.

"Choice architecture" is a metaphor which captures the idea that all choices occur within a structure that is rich with contextual and task features. Together, these features help to "construct" a person's choice (Lichtenstein & Slovic, 2006; Payne, Bettman, & Johnson, 1992). The concept of choice architecture makes it evident that there is no such thing as a neutral choice architecture: Every single choice—from selecting tonight's dinner to selecting a lifelong partner—is embedded within an environment that will influence choice. It is also important to be clear that the concept does not deny that people's choices are a function of their values, attitudes, goals, and preferences; it simply adds choice architecture as another contributing factor.

The vast majority of choices are made in environments in which no designer ever deliberately chose the choice architecture. More recently, however, people have become increasingly interested in how the choice architecture can be explicitly designed to influence choice. Those who engage in such work are called *choice architects*. Of course, marketers have been in the choice architecture business for centuries with the specific goal of selling products and services for profit. A new class of choice architects has emerged with goals focused on improving decisions for the benefit of the individual and society. The ethos of this new class of choice architect, heralded by Richard H. Thaler and Cass R. Sunstein (2008), is that by knowing how people think, choice architects can design choice structures that make it easier for people to choose what is best for themselves, their families, and their society, and all without restricting freedom of choice (Johnson *et al.*, 2012). For example, partition dependence reveals a potential intervention that can be implemented in order to "nudge" consumers toward choosing healthier fruits and vegetables while still permitting the complete freedom to choose the less healthy cookies.

The general goal of a nudge is to use psychological insights to help people make better decisions by designing better choice architecture. Such architecture usually includes presenting more (or sometimes less) information or by restructuring information to make it more easily processed. Policy makers are especially interested in identifying nudges that align individual choices with societal benefits, particularly in the domains of financial savings, health, and the environment. Nudges can have their effect through different mechanisms and can be thought of in terms of outcome nudges and process nudges (Dietvorst, Milkman, & Soll, 2014). Outcome nudges tend to tap a general psychological tendency and shift people's preferences in the direction of an outcome selected by the architect. For example, people's tendency to select a fuel-efficient vehicle increases when fuel economy is expressed by multiple correlated metrics such as miles per gallon (MPG), annual fuel cost, and greenhouse gas emissions because people "count" these attributes and are impressed that they all favor the efficient car (Ungemach, Camilleri, Johnson, Larrick, & Weber, 2014). Process nudges are those that allow people to better process information and thereby allow them to make choices more aligned with their personal values, attitudes, and goals. For example, people's tendency to select a fuel-efficient vehicle increases when presented with a greenhouse gas rating but, crucially, only for those people who hold pro-environmental attitudes (Ungemach *et al.*, 2014). Therefore, process nudges can serve as "signposts" that remind people about their values and goals and also point them toward the options that best satisfy them.

TOOLS OF CHOICE ARCHITECTURE

There exist a number of excellent resources summarizing different choice architecture tools (Johnson *et al.*, 2012), debiasing techniques (Soll, Milkman, & Payne, 2014), and practical guides for nudging (Ly, Mazar, Zhao, & Soman, 2013). In this section, we aim to summarize some of the most important tools together with some examples of where these tools have been applied as successful nudges.

Defaults

A default is the option that will be enacted automatically if someone does not actively intervene to change it. The presence of a default represents one of the strongest forms of choice architecture (Smith, Johnson, & Goldstein, 2013). One classic demonstration shows that there exist very large differences in organ donation rates between very similar European countries that vary in whether organ donation is the default or not (Johnson & Goldstein, 2003). For example, at the time of the study, the donation rate was 12.0% in Germany but 99.9% in nearby Austria. On average, where organ donation was the default more than 99% of the population was an organ donor, whereas where organ donation was *not* the default the rate was less than 30% of the population.

The effectiveness of a default stems from at least three sources (Smith *et al.*, 2013): First, people tend to assume that the default has been singled out intentionally as a recommendation or a signal as to what most people choose. Second, a default may be psychologically interpreted as an option that is in some sense already possessed by the person and therefore giving it up could be perceived as a loss, which is potentially painful, and also opens the door to feelings of anticipated regret. Third, it takes more effort to change a default than to keep a default even when the effort required is as little as clicking on a button.

One of the most successful applications of defaults has been retirement savings. The program studied by Madrian and Shea (2001) altered whether employees had to opt-in to a retirement program or were automatically enrolled and had to opt out. Those participating in the retirement increased from roughly 50% to over 85%.

Information Restructuring

Humans are limited in their capacity for processing information (Miller, 1956; Newell & Simon, 1972). Therefore, a general principle in the design of useful choice architecture is to present information in a format that is easily processed. Often this requires an understanding of the goals that people are attempting to achieve as well as an understanding of their processing limitations. A good example is the introduction of unit pricing information, which recognizes that consumers often have a goal of purchasing the cheapest product available but struggle to calculate which product is most cost effective when products vary in size. Unit pricing information rescales a product's price in terms of a single, standardized unit that is common across products of the same type (e.g., "price per ounce"). When unit pricing information is presented for a range of competing products, then consumers are more easily able to achieve their goal of purchasing the most economical product (Russo, 1977).

When purchasing a vehicle, consumers are often concerned with the fuel economy of the vehicle, primarily because they are interested in minimizing their future fuel costs. In the United States, fuel economy is expressed in terms of MPG. Although a vehicle with a higher MPG is always more efficient than a vehicle with lower MPG, equal increases in MPG are not equal in gas savings (Larrick & Soll, 2008), yet people look at differences in MPG to guess gas savings. For example, over 100 miles, most people think that the gas savings of improving MPG from 20 to 50 is greater than the savings of improving MPG from 10 to 20 because the first change is both a larger difference and percentage increase. Yet, the first change saves only 3 gallons and the second change saves 5 gallons. This nonlinear relationship is not captured by

MPG and few have the knowledge or processing capacity to make the translation. The solution is to think about gallons of gas used over some meaningful distance. The 2013 US fuel economy and environment label, which was designed by National Highway Traffic Safety Administration and Environmental Protection Agency, has embraced this solution by including a "gallons per 100 miles" metric. More recent research suggests that consumer's tendency to select a fuel-efficient vehicle increases when fuel economy is expressed as the cost of gas over 100,000 miles (Camilleri & Larrick, 2014). The cost metric feeds directly into the consumer's cost-minimization goal and the scale is helpful because it roughly corresponds to the average US driver's lifetime vehicle mileage.

The principle of restructuring information in order to nudge people toward better decisions is also exemplified by the 2009 US Credit Card Accountability Responsibility and Disclosure (CARD) Act. One of the mandates of the CARD Act is that credit card holders must receive a monthly statement that provides information about how different levels of payment strategies, such as the minimum payment per month, will affect the payoff time. One new feature of the statement is that it is required to state the minimum payment that must be made per month in order to eliminate the balance in 3 years. Research has shown that this new statement leads to credit card holders toward better judgments, although the benefits are reduced for those less numerate and when charges continue to be added to the card (Soll, Keeney, & Larrick, 2013).

Restructuring information has also been an important tool in the battle against obesity. As part of the Patient Protection and Affordable Care Act of (2010), the US Food and Drug Administration (FDA) has proposed guidelines for mandatory menu labeling of calorie information for US chain restaurants with at least 20 locations. The aim of this policy is to provide consumers with relevant information at the point of purchase with the hope that this information will lead consumers to make healthier food choices (Downs, Loewenstein, & Wisdom, 2009). Examination of choice behavior following the introduction of calorie information on menus reveals a relatively modest decrease in the average number of calories consumed (Kiszko, Martinez, Abrams, & Elbel, 2014). Other work suggests that alternative choice architectures could be more helpful to consumers trying to process the additional information. For example, one study found that consumers selected a meal with fewest calories when the menu items with calorie information were ordered from low to high and color coded with red and green to signify poorer and better food choices, respectively (Liu, Roberto, Liu, & Brownell, 2012). More generally, the multiple traffic light system on food labels has most consistently helped consumers identify healthier products (Hawley *et al.*, 2013). Restaurants also have the option of providing calorie ranges for entrees that are customizable. Recent evidence shows that in such contexts consumers can underestimate their actual calorie intake unless the calorie range endpoints are labeled with example items (Liu, Bettman, Uhalde, & Ubel, 2014).

Information Feedback

The ability to causally link action and outcome in order to learn and change behavior is a fundamental law of human nature (Thorndike, 1898). Therefore, an important decision faced by the choice architect is what data to feedback and how to visualize that data so that it is timely and easily processed. An interesting example is the Power-Aware Cord, which Time Magazine named as one of the best inventions of 2010. The Power-Aware Cord is a power strip that lights up while it is drawing power and becomes brighter as more power is used (Gustafsson & Gyllenswärd, 2005). The tool provides instant and intuitive feedback about energy use. In contrast to this ambient feedback, other products such as the "Eco-Eye" provide direct, real-time numerical feedback regarding the money that is being spent on electricity consumption (Pierce, Odom, & Blevis, 2008).

The capability to provide in-home electricity displays—digital devices that can give near-real-time information about electricity usage, in some cases with appliance-disaggregated consumption information—has provided a new field in which appropriate choice architecture must be developed. According to one summary report, direct feedback of energy usage can produce between 5% and 15% consumption savings (Darby, 2006). Interestingly, there appears to be a divergence between the types of feedback information that consumers prefer (appliance-specific and dollar-feedback) and the types of feedback information that are actually effective for learning about appliance energy use (aggregated kilowatt hour; Krishnamurti, Davis, Wong-Parodi, Wang, & Canfield, 2013). This suggests that consumers may become overwhelmed with the disaggregated information. Potentially because of this, another study found an advantage for a simple display screen that used only ambient face designs in which the size and shape of the face's smile varied depending on power usage (Chiang, Mevlevioglu, Natarajan, Padget, & Walker, 2014).

Another approach to providing feedback is to present consumers with information about their usage relative to some benchmark. Comparisons of any kind are useful because they help turn outcomes that are hard to evaluate, such as energy use, into something that can be judged as a success or failure (Kahneman & Tversky, 1979). Avoiding failure is very motivating. In one study, households were left with a door hanger that reported the household's energy consumption compared to the average household in their neighborhood during a specific period (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). For some households, this descriptive norm information was coupled with injunctive norm information: If the household had consumed less than the average household then a happy face was drawn, whereas if the household had consumed more than the average household then an unhappy face was drawn. On average, presentation of the descriptive norm moved all households' electricity consumption toward the average: those using more energy than the average reduced their consumption, whereas those using less increased their consumption. This undesirable boomerang effect observed in the low-use households was eliminated when the descriptive norm information was coupled with the injunctive norm information (i.e., the happy face). These insights have been implemented by the software company Opower, which partners with utility providers around the world to promote energy efficiency. Opower sends home energy report letters comparing electricity use to similar neighbors together with injunctive norm information such as smiley faces as well as personalized ways to save energy and money. The program has been widely considered to be a great success and, according to one estimate, the average program has reduced energy consumption by 2.0% (Allcott, 2011a).

Another important comparison is a *goal*, which refers to a specific quantifiable level of performance (Locke & Latham, 1990) and is a salient reference point against which to judge success and failure (Heath, Larrick, & Wu, 1999). For example, one study found that marathon runners' finish times significantly bunch up near round numbers that serve as natural goals such as the 4-h mark (Allen, Dechow, Pope, & Wu, 2014). The American Internet start-up, stickK.com, has utilized the power of explicit goals by allowing users to set up a public "commitment contract" in which they agree to achieve a certain goal, such as losing weight, or else a legally binding contract will be triggered that sends their money to third parties, including "enemies." The site also encourages the use of referees: people who help monitor the progress of the contract. According to stickK's analysis of 125,000 contracts over 3 years, the success rate for people who do not name a referee or set financial stakes is only 29% but it rises to 80% when a contract includes a referee and financial stakes.

KEY CHALLENGES AND OPPORTUNITIES FOR FUTURE RESEARCH

As choice architecture grows as a dedicated area of study, it will face new challenges and opportunities. We briefly review these in terms of theoretical challenges, practical challenges, and application opportunities.

Theoretical Challenges and Opportunities

Choice architecture draws on a wide range of psychological insights both in identifying decision making shortcomings that need to be improved and in the tools for helping decision makers. This presents a major challenge: Can there be a theory of choice architecture that is organized around a few basic constructs? This is one of the major issues for future research. We suspect that the answer to this question will be "no"—but that frameworks for designing interventions can be created. Frameworks will focus on diagnosing the relevant psychological limitations for a given task (such as myopia in retirement savings, saving for college, and investments in energy efficiency), the task stage (search for information, choice of options, post-decision implementation), and the range of solutions that can be chosen (externally selected defaults, personal pre-commitments, etc.). We would propose that such a framework would require a cost–benefit analysis that assesses both ease of implementation for a solution and the likelihood of effectiveness.

Perhaps the main theoretical challenge for choice architecture is to move away from identifying "one-size-fits-all" solutions to making them contingent on the interests and abilities of the decision maker. Some examples of choice architecture already have this quality. The notion of a "sign post" (in which the same information is translated to several possibly relevant goals, such as translating an automobile's gas consumption to gas cost and greenhouse gas impact) is an aspect of choice architecture that reminds consumers of their personal values (which may differ between people) and allows them to act on those values. Taking this a step further, choice architecture could allow a decision maker to personalize his or her own information from a menu (such as what information to look at, how it is scaled, etc.). Instead of receiving gas costs expressed as a fixed distance, prospective car buyers could tailor the distance to their own expected driving. In many situations, however, complete personalization may defeat the purpose of choice architecture. Research in judgment and decision making has shown that people often "don't know what they don't know." If there is a danger of neglecting important information, the choice architect could mandate the inclusion of specific pieces of information while allowing for personalized tailoring. For example, a structured process for guiding retirement savings decisions could require the decision maker to see an actuarial estimate of his or her life span (including a ninetieth fractile) and an illustration of compounding over that period of time for an early investor and a late investor. Decision makers could then personalize it further with health information, personal interests (e.g., preferred retirement age), and risk preferences for investments.

A second approach to avoiding the "one-size-fits-all" solution is to use data provided by the decision maker to tailor aspects of the architecture to the individual. For example, Smith *et al*. (2013) propose that instead of giving everyone the same default, there can be made "smart defaults" that use simple algorithms embedded in a website or app to calculate the best match for an individual. These defaults could be used for retirement investing or in health care by having an individual fill out basic demographic information (age, gender, family size, etc.). One new technology that embraces this approach is the "smart" Nest Thermostat, which learns when it should turn on and off from past consumer behavior and responds to changes in the environment such as someone turning on the oven. The program would then recommend a best fit given a person's profile, but this is not binding, and the individual would be welcome to search further and explore more options. Smith *et al*. (2013) note that businesses may face a conflict between serving the interests of a consumer and maximizing their own profit—it might be in the interest of an insurance company to steer a consumer toward a plan with a high premium, especially if the consumer is likely to incur low medical costs. The authors propose that an enlightened company that serves its customers interests best will perform better over the long term; however, they also acknowledge that in some cases a third party (such as the government or a consumer advocacy agency) will need to run or oversee the system to help ensure it meets the consumer's interests.

Practical Challenges and Opportunities

Several practical challenges are emerging as choice architecture receives more academic and public attention. On the academic side, the field of choice architecture lies at the intersection of different fields and disciplines, especially psychology—which spawned the basic behavioral insights underlying choice architecture—and behavioral economics—which is interested in quantifying, understanding, and remedying systematic deviations from rationality in market behavior. The challenge here is that the two disciplines have many differences in terms of language, methods, and, most fundamentally, assumptions about how to approach problems. For example, economists are more inclined than psychologists to focus on incentives and to prefer formal, elegant models of behavior. But there is also an opportunity here. The heart of behavioral economics lies in psychology. There are strong prospects for a continuing intellectual partnership. Psychologists specialize in generating new behavioral insights, often using laboratory samples with subjects of convenience; economists specialize in streamlining behavioral claims to their most testable form and then testing them in large archival data or randomized controlled studies in the field. For example, the economist Hunt Allcott has tested both the effectiveness of descriptive norm interventions in energy use (Allcott, 2011a) and the degree to which people's confusion about "MPG" would change market behavior in car purchases (Allcott, 2011b).

As choice architecture increasingly guides policy decisions made by some national and state governments, there is a basic question of the public and political acceptableness of such uses. Thaler and Sunstein (2008) argue that using a choice architecture intervention, such as a default, to help consumers is more "libertarian" than many policy choice options such as mandates or bans that restrict choice. Although the state is "paternalistic" in trying to help individuals make better decisions for themselves and society, the use of defaults preserves individual autonomy. In addition, choice architecture interventions are often relatively low cost to implement and involve no use of taxes, making them more palatable to politicians and media pundits who hold conservative fiscal views. Nevertheless, there has been some political pushback on using choice architecture interventions (The Economist, 2014). The most important audience who must accept the use of choice architecture in policy is the voter affected by those policies. This is a growing area of research: How much do people trust or distrust different sources of intervention (e.g., the government, a corporation, or a third party, such as a professional association)? And can other mechanisms, such as disclosure of the intervention or the option to opt out of the intervention (Smith *et al.*, 2013), make the intervention more acceptable?

CONCLUSION

The idea of choice architecture starts with the finding from psychology that preferences are malleable and adds the logical claim that choices are never made in a vacuum—there is always a structure. But was the structure designed well or by accident? The role of the choice architect is to take insights from psychology to build a better structure—to help guide decision makers to better choices for themselves and society. Many applications have already been found in financial decisions, health decisions, and environmental decisions. More remain to be invented and "built."

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Adrian is an expert in the field of behavioral decision making, with special interests in risky decisions, environmental decisions, and choice architecture. His research attempts to understand how people's choices are influenced by the way that information is presented and reveal what information formats produce the best choices. Adrian's research has been published in highly reputed academic journals including Cognition, Journal of Public Policy & Marketing, and Judgment and Decision Making. You can learn more about him at http://adriancamilleri.net/

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Larrick's research interests include individual, group, and organizational decision making. Specific areas of research examine environmental decision making, the wisdom of crowds, and choice architecture. His research on the "MPG Illusion" (Larrick & Soll, 2008, Science) influenced the redesign of the EPA fuel economy label in 2013, which added a new metric (gallons per 100 miles metric) that described gas consumption. Larrick received his PhD in social psychology from the University of Michigan in 1991. Before joining Duke in 2001, he taught at Northwestern's Kellogg Graduate School of Management (1991–1993) and at the University of Chicago's Graduate School of Business (1993–2001). Larrick received his BA in psychology and economics from the College of William and Mary.

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