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What Infants, Children, and Other Species Can Teach Us

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What Primates Can Tell Us About the Surprising Nature of Human Choice

LAURIE R. SANTOS AND LOUISA C. EGAN BRAD

Psychologists interested in the nature of human social cognition face a problem that other scientists do not. A physicist studying the nature of a black hole does not have to worry about his own intuitive notion of what it *means* to be a black hole. Likewise, a molecular biologist has no personal phenomenology associated with the protein she is studying. Psychologists, however, do not have this luxury. Psychologists often find themselves probing into phenomena that they themselves *intuitively experience*: things like choices, preferences, and attitudes. The study of human social cognition necessitates poking about into phenomena that we—as experiencers of our own human cognition—think we know about intimately. Although psychological scientists have developed an impressive number of creative tools for studying these psychological phenomena in unbiased, objective ways (e.g., Bargh, 2006; Greenwald & Banaji, 1995), the fact that people *experience* their own psychological processes can make the study of human social cognition a tricky sort of enterprise, particularly when it comes to convincing people about the verity of our sometimes-unintuitive empirical results. This is especially true in cases where our objective empirical findings about how a particular process actually works directly conflict with our own subjective experience of how that process *seems* to work.

One area in which this tension between subjective experience and empirical findings has become particularly salient is in the study of human choice behavior. As humans, our lives are intimately defined by the choices we make each day. Our choices determine big things like where to live and work, as well as innumerable smaller issues like what shirt to wear, which cereal box to purchase, and exactly how to word a sentence in an e-mail. We also tend to have a very salient phenomenology associated with the act of making

choices. Most of the time, we feel as though our choices satisfy a number of reasonable criteria: We think our choices are free (they are made of our own volition and not dictated by outside circumstances), deliberate (they result from our own initiative and intentions), and rational (they are executed in ways that are meant to satisfy our stable preferences). Unfortunately, recent social psychological research suggests that most of our decisions do not work this way. Indeed, a growing body of work suggests that many aspects of human choice violate our subjective intuitions about how choice works. First, a growing body of empirical work suggests our choices are often less free than we think. A variety of new findings suggest that human choice is affected by a number of (often irrelevant) contextual factors (e.g., Kahneman, Slovic, & Tversky, 1982). Second, our choices are not always as salient to us as they feel. Psychologists have learned that we do not represent the content of our choices nearly as well as we feel we do (e.g., Johansson, Hall, Sikstrom, & Olsson, 2005). Finally, the road from preferences to choices does not seem to be a one-way street; instead, researchers have found that our preferences can be manipulated by the act of choosing (e.g., Ariely & Norton, 2008; Harmon-Jones & Mills, 1999).

Such findings pose a real threat to our intuitive idea of what it means to be a human acting on the basis of a free and rational will. But some of the most daunting empirical insights into the nature of human choice have not come from studying *humans*. Over the last few years, researchers have begun to gain insights into the nature and origins of human choice by turning to our closest living evolutionary relatives: nonhuman primates. Such work has revealed that many surprising aspects of human choice appear to be shared fairly broadly across the primate order. Indeed, some of the

most counterintuitive aspects of human choice appear to be more evolutionarily ancient than we thought. Here, we review two of the most counterintuitive aspects of our own choices and discuss why understanding the evolutionary origins of these counterintuitive features can provide insights into how human choice really works.

THE CONSEQUENCES OF CHOOSING: HOW OUR DECISIONS LEAD OUR PREFERENCES ASTRAY

Imagine you have been asked to take part in a consumer rating study. You are presented with an array of different kinds of household items and asked to rate how much you like each of these items by marking a line on an eight-point scale. After rating all the different items, the experimenter running the study tells you that you will be able to take one of the items home at the end of the experiment. You are then allowed to choose between two of the objects that you have rated about equally. After deliberating for a bit, you make your choice and are given your item.

Intuitively, this sort of choice situation seems pretty straightforward. It is easy to imagine rating a set of items on the basis of our preferences and then choosing one of two possible items. What is unintuitive, however, is what happens to our preferences *after* we make our choice. Instinctively, one might assume that our preferences are stable features of our psychology, and thus nothing about them should change after making one little decision. To explore whether this intuitive model is accurate, Brehm (1956) presented people with this very situation and looked at what happened to people's preference ratings after they made their choice. Interestingly, he found that people's preferences after their choice were not the same as they were before the choice—people changed their preferences to match their decision. Specifically, participants rated the item they had chosen more highly than they had originally, and they rated the rejected item lower than in their original ratings. Although people fail to realize it, the act of choosing against an item seems to have consequences—choosing changes our future preferences by altering them to better fit with our decision, even in cases in which the decision itself is arbitrary (see also Sharot, Velasquez, & Dolan, 2010).

In the 50 years since Brehm's original observations, researchers have seen countless examples of these choice-induced preference changes in

action (see review in Egan, Bloom, & Santos, 2010; Harmon-Jones & Mills, 1999). Until recently, however, little work had explored the origins of this strange tendency. Could it be that this process is a fundamental aspect of the way we make decisions? Or is this phenomenon instead more experience-dependent, one that emerges from the kinds of complex decisions we make over our life course? To get at this issue, we (Egan, Santos, & Bloom, 2007) explored whether choice-induced preference change is exhibited in a population that lacks experience with human choices: brown capuchin monkeys (*Cebus apella*). Capuchin monkeys are a small New World primate that last shared a common ancestor with humans approximately 35 million years ago. As such, they represent one of our evolutionarily distant relatives, and are thus a perfect population in which to study the evolutionary origins of choice-induced preference changes.

To explore whether monkeys' preferences are affected by their decisions, we adapted Brehm's famous choice task for use with our nonverbal capuchin subjects. We first found a set of objects for the monkeys to choose between: different-colored M&Ms candies. We then allowed our monkeys to make a choice between two M&Ms of different colors—let's say red and blue—and then tested how this choice affected monkeys' preference for the color they chose against. To test this, we gave the monkeys a second choice between an M&M of the color they rejected and another M&M of a third color (e.g., green). We found that monkeys' preference for the rejected M&M changed after making a choice against it. Monkeys reliably preferred the novel colored M&M color over the rejected color, suggesting that choosing against an item might change the monkeys' preferences as well. Importantly, we found that such preference changes do not occur in cases in which the monkeys *themselves* are not involved in the choice. In a control condition in which the experimenter made the choice for the monkey, our subjects did not show any subsequent preference changes, suggesting that it is the act of choosing that causes the monkeys to alter their future preferences.

The capuchin results provide striking evidence that choice-induced preference changes are not an evolutionarily recent phenomenon. In particular, these findings suggest that members of a species that lacks experience with the complex choices of humans still demonstrate an identical process of altering their preferences to fit with their decisions. In this way, the primate findings

provide important insight into our understanding of human choice processes. Finding qualitatively similar biases in a distantly related monkey species demonstrates that this counterintuitive aspect of human choice behavior seems to be a very basic process, a part of our psychological machinery that evolved long ago and thus may be an integral part of how our decisions operate.

THE CREDULITY OF CHOICE: WHEN THE RESULTS OF OUR CHOICES ARE NOT WHAT THEY SEEM

Another intuitive aspect of our choices that has come under recent empirical fire is the extent to which we have insight into the preferences that bear on our choices. Instinctively, it seems obvious that we *know* what we prefer and what we do not. However, recent empirical work has called even this basic intuition into question (see Arieli & Norton, 2008 for a review). In a recent demonstration, Johansson and colleagues (2005) presented people with two photographs of women's faces and asked them to choose the one that was more attractive. After people made their choice, the experimenter removed the rejected photo and then asked participants to describe why they chose the photo they did, giving them a second chance to look at the chosen photo. Through a bit of sleight of hand, the experimenter sometimes replaced the chosen photo with the rejected one. This means that when participants began their explanation, they were unknowingly looking at the photo they had rejected, not the one they had selected. Surprisingly, the majority of participants did not notice the switch, suggesting that people fail to remember which photograph they actually preferred. In this and other studies (e.g., Hall et al., 2010), people seem oblivious to choices they have made just moments before.

In addition to not noticing what we have chosen, we are also more susceptible than we realize to feeling as though we have made a choice when in fact our "choice" was actually predetermined (Nisbett & Wilson, 1977). In one recent example, Sharot and colleagues (2010) gave participants a cover story in which they were told about the possibility of making subliminal choices. She then presented them with an arbitrary choice between two strings of symbols that participants were led to believe was in fact a true "subliminal" choice between different vacation options that were masked behind the string. After choosing one of the two strings (presumably randomly), people

were then shown a particular vacation option that was meant to be what was behind the masked string. Participants not only bought into this manipulation, but even more surprisingly, they showed choice-induced preference changes after their manipulated choice. Specifically, in line with the Brehm (1956) effects discussed earlier, participants decreased their rating of vacation options that they believed they had chosen against.

In this way, people seem to be oblivious to the preferences that guide their choices. Indeed, people seem so blind to these manipulations that they allow illusions of choice to affect their future preferences. But could this counterintuitive feature of human choice also represent a basic, evolutionarily preserved aspect of human choice behavior? To get at this issue, we (Egan et al., 2010) decided to see whether capuchin monkeys could be similarly misled about the nature of their own choices and preferences. First, we developed a situation in which we could convince our capuchin subjects that they had made a real choice in cases in which they actually had no freedom to exercise a choice. We capitalized on an enrichment game that our subjects play in which pieces of food are placed into a bin filled with wood shavings. The monkeys are allowed to search the bin and retrieve whichever food rewards they choose before being asked to leave the testing enclosure. Typically, monkeys will retrieve some but not all of the food, suggesting that they see this foraging game as a chance to make a choice about which foods they really want. In our study, we set up a "rigged" version of this foraging game; although it seemed to the monkeys that they had a choice over which of two possible foods to retrieve, the experimenter had surreptitiously rigged their choice by placing only one kind of food in the bin. More specifically, although it looked to the monkeys as though the experimenter had hidden pieces of two different kinds of food in the bin, in reality only one piece of food was available for them to find. In this way, when the monkeys foraged for the hidden food, they were forced to find a specific kind of food, despite the fact that it appeared as though they should have a choice. After monkeys underwent this foraging choice illusion, we then gave them a true choice between the kind of food they thought they left behind and a novel kind of food. In this subsequent choice, the monkeys had full visual access to both options and made their choice freely. In accordance with the results from human participants (Sharot et al., 2010), our capuchin subjects continued avoiding the kind of food they

thought they had chosen against. These results suggest that like people, capuchins may not fully grasp the nature of their own preferences and can thus become blind to the content of their past choices. Moreover, these results suggest that capuchins update their preferences after their choices even in cases where the choices themselves are not actually real decisions.

CONCLUSIONS: TAKING AN EVOLUTIONARY APPROACH TO CHOICE

Despite a lifetime of making choices, our intuitions seem to tell us little about how human decision making actually works. As reviewed earlier, recent work in social psychology suggests that real human decision making violates a number of maxims we believe our choices obey. First, we do not seem to know the preferences that guide our decision making and can fall prey to the illusion that we have made a choice even in cases where we had no freedom to make one. Second, our choices appear to shape our preferences more than we realize. Even the simple act of making one decision can alter the way we think about the options involved in that decision. Finally, we experience choice-based preference changes not just in cases of real decisions; recent work suggests that even the illusion of a choice can shape the way our future preferences work. In all these ways, the real psychological processes that constitute our choices and preferences violate many of our intuitions about how our decisions actually work.

Perhaps even more surprisingly, these irrational choice processes are not unique to our species. Our findings with capuchin monkeys suggest that nonhuman primate choice falls short in the same ways as human choice does. Like humans, monkeys allow their arbitrary choices to affect their future preferences. In addition, monkeys appear equally susceptible to illusions that they are free to choose; they too can be convinced that they made a choice in cases in which their hands were forced. In this way, the psychological processes that are foreign to our own intuitions appear to be central not just to our own decision making but to the choices of other primates as well. This pattern of results suggests our own biased choice strategies result from a long evolutionary history.

The discovery that human choice biases are shared across the primate order provides several important insights both into how these processes work and how they evolved. First, observing qualitatively similar choice biases in human and

nonhuman primates provides an important hint that these biases are incredibly robust. Capuchins and humans face strikingly different kinds of decisions and have different levels of cognitive complexity, yet both species demonstrate qualitatively similar decision-making processes. In this way, the capuchin findings suggest that human choice biases are likely to be deeply ingrained and fundamental to the way we make decisions. Moreover, the capuchin results hint that our own choice processes may be more impervious to explicit knowledge or top-down strategies than we would like to admit (see Lakshminarayanan and Santos, 2011 for more discussion of this issue).

The comparative study of choice processes also provides some clarity about the evolutionary history of these surprising processes. At first glance, the choice biases we have reviewed might appear to be rather poor strategies from an evolutionary perspective. Changing one's preferences to match one's decisions and forgetting the content of one's choices both appear to be relatively disadvantageous cognitive processes. Nevertheless, our capuchin studies suggest that such biased mechanisms have survived 35 million years of selection pressures, forces that surely would have selected against these mechanisms if they were indeed detrimental. In this way, the comparative work reviewed here hints that our choice biases may not be as detrimental as we might think. Indeed, it is possible that such biases may even be adaptive under some circumstances (see Lakshminarayanan & Santos, 2011) or result from some greater process that is itself adaptive.

The surprises we have encountered about the nature of our own choice processes are an important lesson in the problems of introspection more broadly. Luckily, psychologists have developed an amazing empirical tool-kit for objectively exploring the psychological mechanisms that make us who we are. The answers we have obtained sometimes shock us but are exceedingly valuable for a richer representation of how our preferences and decisions operate. As we are products of our evolutionary history, an understanding of similar processes in our close primate relatives provides yet another tool that can help us to advance our understanding of our own selves.

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