

**Economics**

## **Money and Monkey Business**

**By Mark Buchanan**

**When it comes to money, it turns out we're no more rational than our primate cousins. But knowing this could pay dividends...**

The capuchin monkeys working with economist Keith Chen and psychologist Laurie Santos know a good bargain when they see one. They use metal chips as money, buying bits of apple or cucumber from humans, and they seem to know what they're doing. When the researchers make apple cheaper than cucumber – offering more food for the same number of chips – the capuchins opt for the better-value food, as any savvy shopper would. Yet it is not the monkeys' good economic sense that Chen and Santos find most interesting. Rather, it is their tendency, on occasion, to make an irrational deal – and to do so in a distinctively human way.

Over the past three decades, economists have come to accept that people aren't the purely "rational" and "selfish" individuals that classical theorists once imagined. Numerous experiments have shown that we often let apparently irrelevant factors influence our economic decisions: frame the same set of choices differently, and we choose differently. Other experiments show that most of us have a deep sense of justice and care about others as well as ourselves. Forget theoretical simplicity – we are complex economic beings with a style all our own.

Or that's what we like to think. But now growing interest in the economic habits of other primates is revealing that we may be less special than we imagined. The capuchins studied by Chen and Santos, for example, often make decisions as wisely as any good businessperson, yet in other cases they appear to succumb to the same irrational temptations we do. And a sense of fairness? Pay one monkey less than another for equal work, and you are likely to get a screeching tantrum, seemingly in protest at gross economic injustice. Such similarities suggest that our human economic dispositions probably have deep evolutionary origins. What's more, it is possible that a better understanding of how other primates behave could help us to manage our own finances more effectively.

Chen began working with monkeys five years ago when he was a graduate student at Harvard University and now works in Santos's lab at Yale. "It is strange for a management professor," he admits, "but I'm interested in what monkeys can teach us about our own behaviour." The first surprise was just how readily they took to the idea of money. Despite the fact that capuchins do not usually display social learning – picking up skills or habits from other members of the group – it took just a few months for Chen and his colleagues to teach them that small silver discs could be used to buy treats. The monkeys' appreciation for money even extends to trying to counterfeit it – by using slices of cucumber instead – and hiding their own stash, suggesting they understand that it has intrinsic worth. In these respects capuchins seem to have an innate economic wisdom much like our own.

They act like people in other, more subtle ways too. In one experiment, Chen and colleagues had the monkeys choose between two apparently different but actually identical gambles. In the first, for the price of one disc, the monkeys got one grape

and also a 50-50 chance of getting a second grape, with the outcome determined by a coin flip. Alternatively, the monkeys could choose to start with two grapes but then risk losing one on the flip of the coin. Again, this led to a 50-50 chance of getting either one or two grapes. The monkeys were able to distinguish between the available bargains because they interacted with two experimenters, each one always offering the same deal. As the chances of ending up with two grapes or one are the same in both bargains, a "rational" individual would be indifferent about which to take. The real monkeys chose the experimenter offering one grape plus the chance of another about 75 per cent of the time. "We were surprised," says Chen. "Psychologists we talked to thought the monkeys would simply trade with whomever initially showed the most food."

There seems to be a parallel in human behaviour. Although the gambles were strictly equivalent, the second involved a potential loss and the first a potential gain, leading Chen to conclude that his capuchins are showing the very same "loss aversion" that researchers have found in humans. Although economic rationality suggests that we should give equal weight to small gains or losses, countless experiments indicate that the pain associated with a loss tends to outweigh the pleasure of an equivalent gain. For example, if you give each of a group of people an object - a mug, say - and then ask how much money they would want to give it up, they usually demand much higher amounts than others are willing to pay to obtain the same mugs.

### ***Origins of economics***

To some researchers, the similarity in human and capuchin behaviour suggests an ancient evolutionary origin. "It's not credit cards and gas prices that make us act irrationally," Santos suggests, "but something more fundamental that we share with other species." And if our bias towards loss aversion does have deep origins, it may well be that a behaviour that seems irrational today could have been wise for our ancestors living in very different circumstances. One possibility, Santos believes, is that a heightened fear of losses could have helped our ancestors survive in fluctuating environments. "It may have been a good idea to evaluate your current standing relative to where you were before," she says. It might be great to find 20 pieces of food in an environment usually delivering 10, but awful in one where 40 was the norm. Framing gains and losses in relative terms would allow rapid response to trends that threaten survival.

There could be other factors at work. Primatologist Ronald Noe of Louis Pasteur University in Strasbourg, France, suggests that the monkeys may make their decisions by "translating" the unnatural experimental setting into the familiar terms of primate social life. In the first instance, the interaction with the experimenter is tolerant or benign, whereas in the second the removal of a piece of fruit seems aggressive and combative. "If one counts socially positive and negative acts," Noe argues, "the behaviour of the capuchins becomes perfectly rational."

Nevertheless, Chen believes that economists should already be thinking about the possible implications of these experiments. Loss aversion makes us do some silly things - it explains, for example, why stock market investors hold on to falling stocks too long and why homeowners may be reluctant to sell their houses at a loss, even when that would be the sensible thing to do. A close evolutionary link between human and capuchin behaviour, Chen suggests, would imply that such behavioural peculiarities may be "hard-wired" into us, rather than being learned. As a

consequence, economists and policy-makers may find it difficult to alter such behaviour with the usual economic incentives.

### ***Stock responses***

Take savings and investments. Most people save too little for retirement, and loss aversion seems to be a primary cause. To begin with, people who do save conscientiously tend to invest less in risky stocks than in safer securities such as bonds, even though stocks, historically, have earned more in the long run. "Loss aversion is one of the most plausible reasons," says Chen, because stock values fluctuate more strongly than bonds and so an investor in stocks has a greater chance of experiencing a painful loss, even if gains will more than balance it eventually. More fundamentally, putting money away today means losing funds you could spend now, in return for the uncertain prospect of more money in the future. Because many people feel present losses more than the thought of future security, they systematically under-invest.

But by accepting loss aversion as a part of human nature, policy-makers may be able to encourage better decisions. One idea, proposed by economists Richard Thaler of the University of Chicago and Shlomo Benartzi of the University of California, Los Angeles, goes under the slogan of "Save More Tomorrow". Under this scheme, individual employees can elect to have more of their pay put toward their retirement, but only starting next year, with the rate of contribution then rising gradually. In real-world trials, Thaler and Benartzi found that pushing the investment decision into the future, so that the loss feels less painful now, significantly increased the overall investment people made toward retirement.

And this is not the only economic lesson we can draw from monkey behaviour. "Classical economic reasoning," says economist Ernst Fehr of the University of Zurich, Switzerland, "is typically based on the assumption that people are exclusively motivated by material self-interest." But in careful experiments, researchers are finding that many people - and monkeys, too - seem to care about fairness and justice, as well as their own greedy interests.

Two decades ago, economist Werner Güth, now at the Max Planck Institute of Economics in Jena, Germany, devised a simple game to explore human sharing behaviour. In his "ultimatum game", an experimenter gives a person a sum of money on condition that they share it with a second person. The first "player" makes an offer — any amount is possible — which the second either accepts or rejects. If the offer is accepted, both players get their money. But if it is rejected, neither gets anything. Self-interest on the part of second players should lead them to accept any offer, no matter how small. But researchers have found that people across cultures care about more than self-interest. Typically, most people will reject offers less than about 20 per cent. And when deciding how much to offer, many people give about half of the money. "In addition to their own material payoffs," says Fehr, "most people seem to care strongly about fairness."

Monkeys behave similarly. For two decades, primatologist Frans de Waal of Emory University in Atlanta, Georgia, has studied capuchins and other monkeys in laboratory experiments. Everything he has seen has convinced him that basic behaviours which are key to human economic lives - cooperation, the equal sharing of group rewards, and so on - are not limited to our species. "These behaviours

probably evolved in other animals for the same reason they evolved in us," says de Waal: namely, to help ensure the function of the groups that support our existence.

De Waal has observed that capuchins readily display a sense of obligation toward those with whom they have cooperated to gain food. In experiments, he and his colleagues set pairs of capuchins a task where cooperation would pay off. Pulling a spring-loaded metal bar would bring food within their reach, but success required teamwork, as neither could pull the bar alone. In one memorable incident, after the pair had pulled the bar close, a capuchin named Sammy grabbed her food portion and let go of the bar so quickly that it slammed back out of reach before the other monkey, Bias, could grab her portion. A wailing protest soon followed. "Bias screamed her lungs out for half a minute," says de Waal, "before Sammy approached her pull bar again." Seemingly out of a sense of gratitude or indebtedness, Sammy helped to pull the bar again for Bias's benefit, even though Sammy's cup was now empty.

Two years ago, de Waal teamed with anthropologist Sarah Brosnan, also at Emory University, to explore this sense of justice more systematically. They taught capuchin monkeys to trade small rocks for food rewards, serving two monkeys side by side so that each could see the trades offered to the other. At first, the experimenters always gave the monkeys cucumber for their rocks. But then they began giving one monkey a grape, which capuchins greatly prefer to cucumber, or even a free grape without requiring a rock in exchange. They observed that the slighted monkeys often reacted by refusing to trade: effectively, going on strike. "In some cases," says Brosnan, "they'd throw the tokens or rewards back at us." In others, they would not even eat cucumber they had already "bought". "The moral of the story," as Brosnan puts it, "is that cucumbers are only bad when someone else just got something better."

"Capuchin monkeys seem to measure rewards in relative terms," says de Waal, who suggests that emotions of some kind probably lie behind this behaviour, as in people. In ultimatum experiments, for example, individuals who refuse small offers often report feeling insulted and hope to punish the other person by their refusal. Such punishing behaviour helps sustain cooperation, for example, by making cheating more costly. There are, however, differences between capuchin and human behaviour, as anthropologist Joe Henrich, also at Emory University, points out. When people in ultimatum experiments reject offers below 50 per cent, the other person loses more than they do. This is unlike some of the capuchins, who reject the cucumber even when this has no effect on the food for the other monkey. "Rejecting the cucumber increases inequality," says Henrich, "rather than decreasing it."

It may be possible to design an experiment for monkeys that is more like the ultimatum game. Meanwhile, however, the broad-brush similarity between humans and capuchins regarding equal treatment suggests that something like a preference for fairness could be a deep evolutionary adaptation in primates, rather than something only we humans have learned. If so, Fehr suggests, this is another behavioural characteristic that could be put to good use by those who understand it.

Classical economics suggests that employee performance can be improved by the threat of sanctions. But our sense of fairness leads to some surprises. In experiments, Fehr and his colleagues have found that the use of sanctions often leads to a decrease in employees' efforts, as they respond to perceived unfair

treatment. It is a lesson, Noe points out, learned long ago by animal trainers. "They've known for ages that rewards work better than sanctions."

That's not to say that sanctions are useless. Fehr and colleagues have found that they can have a beneficial effect, but only if they are not used. In further experiments, they found that employees respond best when sanctions are in principle possible - spelled out in a contract, for example - but management never or very rarely uses them. Employees see this as a cooperative act and respond out of gratitude with increased effort, greater even than in the absence of any sanctioning possibilities. For de Waal, this is similar to what monkeys and apes do, giving food or comforting grooming to others who have helped them in the past, seemingly out of a sense of gratitude.

This could just be the beginning of a new trend that sees the "irrational" behaviour of monkeys helping us to be more sensible in our own economic lives. But policy-makers who want to cash in on such insights should beware. Not everyone is equally irrational, and policies designed to encourage more people to behave rationally and for the greater good should not unwittingly, hamper the minority who already make good decisions. Any perceived injustice could build resentment - and even a monkey knows that's not good for business.