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Evolutionary Psychology and Economics

C. Monica Capra and Paul Rubin

INTRODUCTION

How does evolution shape behavior? Economists believe that individuals have well defined preferences over actions and consumption that they can rank. For example, an individual who enjoys wine should be able to say if she likes red wine more than white wine and if she likes white wine more than beer. Such ranking or ordering of preferences follows certain intuitive properties that allow economists to represent preferences by means of a utility function.[1]

A utility function stipulates a relationship between an action and a value. Indeed, if an individual prefers red wine to white wine, then presumably the value she derives from drinking a glass of red wine is higher than from drinking a glass of white wine. All other things constant, she will always choose red wine over white wine. Thus, from the point of view of economics, preferences determine behavior and behavior is aimed at choosing an action that achieves the highest possible value. That is, the utility function is an objective function and individuals choose an action so as to maximize utility subject to constraints. However, are the concepts of preferences and utility consistent with evolutionary psychology? That is, is it reasonable to suppose that evolution endowed us with preferences and utilities?

Rather than preferences, which are intermediate to behavior, one can think of evolution as prescribing rules that program or 'hard-wire' us for behavior. Given that evolution is concerned with reproductive success, all we need is a set of rules that tell us what to do in each possible circumstance we face. For example, the rules would tell us that if we find high-caloric food, we should eat it right away. If we find a snake, we should avoid it. A problem with this view, however, is that the circumstances we face can change quickly. If one were being observed by a potential competitor, for example, the snake may be something to approach rather than to avoid, so as to signal bravery to a mate. If evolution 'hard-wired' us for behavior, we would need to have a rule for avoiding snakes, a rule for approaching snakes, and a rule for deactivating other rules. Prescribed rules for behaving in such a manner would require an adjustment process that is faster than we know it to be and for a milieu of an unimaginable number of situations (Robson, 2001a, b).

It makes more sense to see evolution as having equipped us with general goals or motivations that helped our ancestors achieve successful reproduction. These general goals or motivations should be coupled with mechanisms for adjusting behaviors (Samuelson and Swinkels, 2006). Adjustment mechanisms allow us to continuously learn and to respond to circumstances in the best way. For example, a goal such as status, along with the ability to learn which behavior is most likely to achieve this goal, will lead us to approach a snake in some circumstances, even if it is dangerous to do so. Under this framework, there is no need for rules that tell us what to do in each possible case; instead, all we need are general preferences and utilities coupled with learning algorithms.

At a more fundamental level, it seems reasonable to care about caloric foods and sex, but why do we need to care about status, beauty, or friends? That is, why should evolution prescribe a preference for anything other than successful descendants? Samuelson and Swinkels (2006) answer this important question. The authors posit that it is impossible for humans to have an accurate understanding of the causal and statistical structure of the world. For example, we don't know the exact probability of achieving a successful offspring from a sexual encounter, and humans cannot sample enough offspring to learn these probabilities. By attaching value or utility to beauty as represented by strength and symmetric features, for example, it is possible to 'learn' that age and health correlate with reproductive success. To compensate for the inability to perfectly know the world, evolution would equip us with a utility function that would provide the goal for our behavior, along with a learning mechanism that would help us pursue that goal. As Samuelson and Swinkels (2006: 120) say: 'Defining utilities in terms of intermediate goods such as consumption gives us an objective that only approximates evolution's in return for giving us the means to effectively learn how to accomplish this objective'.

Despite being endowed with a learning mechanism, our understanding of the world is driven by our sensory perceptions. Because survival often depended on our understanding of the physical world, our brains adapted to make sense of things for which we have sensory perception. For example, we understand that when the Sun is out, temperatures tend to increase. We understand that because we feel warmer. We can therefore infer that sunlight brings warmer temperatures. A causal relationship can then be established between the intensity of sunrays and temperature. So, through sensory experience, we can make sense of our surroundings. Despite this having been an extremely useful tool, it has limitations in a modern world, as sensory perceptions are impossible to obtain in complex interactions.

UTILITY FUNCTIONS

As mentioned in the previous section, evolution seems to have endowed us with preferences for intermediate goods, such as consumption. Evolutionary psychologists presume human behaviors reflect the influence of physical and psychological predispositions that helped human ancestors survive and reproduce. In the evolutionary view, any animal's brain and body are composed of mechanisms designed to work together to facilitate success within the environments that were commonly encountered by that animal's ancestors. We can think of consumption as satisfying an evolutionary need. That is, the utility function of humans is essentially the evolutionary fitness function – a fitness function is a particular kind of objective function that summarizes how close a given solution is to achieving set aims. This framework is dynamic and stipulates that preferences and the corresponding utility function guide us in taking actions that would have caused our predecessors to successfully survive and reproduce.

If we think about utility functions as an evolutionary fitness function, then there are some important implications to our understanding of economic behavior. For example, thinking of utility as a fitness function can give us a theoretical framework for making sense of differential behaviors across age groups and between men and women. In general, it is widely documented that older individuals and women are more likely to reject fair gambles[2] than younger individuals and men, respectively (see Albert and Duffy, 2012; Carstensen et al., 2006; Croson and Gneezy, 2009). However, despite of the evidence, economists have not provided a satisfactory explanation for these observed differences (Capra and Rubin, 2011).

In contrast, Rubin and Paul (1979) provide an evolution-based framework for explaining different risk preferences between younger men and older men. The authors postulate a theory called life-history theory, which suggests that behaviors can be best understood in terms of effects of natural selection on the reproductive characteristics over the life cycle. In this context, young males need to acquire resources to obtain a mate so as to ensure they have offspring. Those who have no mates will not breed and will not leave any genes for the future. With this in mind, the general preference for taking a risky gamble over a safe one may be necessary. If the risky gamble pays off, it will enable the individual to breed. However, if the gamble results in losses (perhaps even resulting in death), then it will leave the young male's genes no worse off than if the risky gamble had been refused. That is, a young male who has no mate will always benefit from taking gambles. On the other hand, an older male who has offspring does not have that pressure. Once a male gets older, it pays to become risk averse and avoid even fair gambles – particularly in a Malthusian world where survival is at risk.

As Rubin and Paul (1979) show, an advantage of seeing utility as an evolutionary fitness function is that it allows us to make the structure of the utility function more precise. In other words, it can give us a theoretical framework for making sense of why younger males are more risk prone than older ones. With respect to sex differences in risky behaviors, we can stipulate that males would be more risk seeking than females. Since successful males can have virtually unlimited numbers of offspring and successful females have much more limited fertility, under an evolutionary framework, males would be more willing to gamble than females.[3]

Evidence on sex differences in lottery-choice tasks is extensive. Byrnes et al.'s (1999) meta-analysis of 150 studies of male and female participants showed that male participants are more likely to take risks than female participants. The mean effect size for a given kind of risk taking was significantly greater than zero. However, the authors also found that sex differences varied according to context (e.g., driving vs smoking) and age; the gap peeked in adolescence and got smaller over time. In a survey of the experimental evidence, Filippin and Croseto (2016) also find that the magnitude and significance of sex differences in risk taking is task specific.

An evolutionary psychological approach to sex differences in risk taking would predict context-dependent preferences. For example, recent experiments[4] show that women – even highly successful Harvard MBA students – are less likely than men to enter profitable tournaments (Gneezy et al., 2003; Niederle and Vesterlund, 2007). This is the case in both intersexual and intrasexual competition; thus, females 'shy away' from competition. However, the source of these intriguing results may lie in evolutionary forces that have shaped sex differences in risk-taking behaviors. As such, there should be a difference in intensity of competition with respect to the kind of reward and the kind of task participants compete over. For example, Cassar et al. (2016) study intersex and intrasex competition of mothers and fathers. The results of the experiment show that when incentives are switched from money to offspring benefits, mothers competed as intensely as fathers, erasing any sex difference in competition that were observed when the reward was monetary. From an evolutionary perspective, the results make sense. Indeed, looking at reproductive outcomes, we can see that both men and women have been subject to intense selection pressures (Knight, 2002). If competitive traits derive from selection pressures, then both men and women should each have evolved competitive traits. This may have been further facilitated by the successful spread of monogamous marriage norms.[5]

In economics, social preferences are represented by utility functions that include others' consumptions as arguments. Fehr and Schmidt (1999) introduced the idea of inequality aversion. An individual is said to be inequity averse if he dislikes the outcomes that are perceived as inequitable. The judgment that an outcome is unfair or inequitable, however, depends on comparing what one has to what others have. That is, relative payoffs matter. Clark and Oswald (1996), using a large sample of British individuals, show that comparison incomes have a significant impact on overall job satisfaction. Loewenstein et al. (1989) asked subjects to ordinally rank outcomes that differ in the distribution of payoffs between the subject and a comparison person. On the basis of these ordinal rankings, the authors estimated how relative material payoffs enter the person's utility function. The results show that subjects exhibit a strong and robust aversion against disadvantageous inequality.

Modern humans appear to care about both real income and relative income. Obviously, it matters how much my income can buy, but why should I care about how much your income can buy? With respect to how individuals value others' consumption, evolutionary psychology can provide a useful framework. Status matters, because evolution has shaped traits that helped us survive and reproduce (Frank, 1985). Although absolute wealth helps the individual and his offspring survive, only relative wealth helps attract potential mates. In our evolutionary past, there is one resource that was in fixed supply and of enormous importance for male reproductive success: women. The ability to persuade one woman or more to produce children depended on a man's resources – material and otherwise – relative to those of the other men against whom he was competing. Similarly, the ability of a woman to persuade a man to produce children with her and help support them depended, in part, on her status vis-a-vis the other women on whose children that man might spend his limited resources. Thus, we would expect both relative status and real income to play important roles in the individual utility function produced by evolutionary selection.

Other authors such as Saad and Gill (2001) show that it is possible and fruitful to use evolutionary psychology as a framework to understand sex differences in bargaining. In the context of the ultimatum game (Güth et al., 1982), the authors found that men tend to offer better deals to women than to other men. In a bargaining field experiment in Peru, where confederate taxi riders followed a prescribed bargaining script, Castillo et al. (2013) found that women got lower ride fares than men for the exact same service. All taxi drivers were men.

ADAPTED MECHANISMS IN THE BRAIN

The idea that evolution endowed us with adaptive mechanisms is also consistent with the current understanding of neurobiology. The brain is a physiological system that evolved from natural as well as sexual selection to solve problems that we faced in our evolutionary past. As with all existing organic systems, our brains and their resulting decision strategies adapt to the environment.[6] It is generally thought that with the exception of the influence of learning to read and write, little evolution has happened since humans became civilized (about 10,000 years ago). Our current mental architecture is thought to have evolved from hunter-gatherer societies (Kline, 2000), and our minds are best adapted to such societies. As a consequence, the human brain is not a general-purpose computer able to perfectly compute optimal responses to problems, as researchers had previously thought. Instead, the brain contains specialized modules aimed at solving particular problems that are evolutionarily relevant (Barkow et al., 1992; Cosmides and Tooby, 1994). For example, there are modules associated with language (Pinker, 2003). There are also modules associated with sex and mating behavior (Buss and Greiling, 1999). There are even modules for the experience of anger, presumably developed in our evolutionary past to obtain advantages in bargaining (Sell et al., 2009). With respect to simpler social interactions, there is evidence that the evolved architecture of the human brain included specialization of reasoning for detecting cheaters. Leda Cosmides (1989) and Cosmides and John Tooby (1992) showed that participants who usually do very poorly in identifying logical rules, such as if P then Q, are remarkably accurate in identifying cheating in social exchanges, such as ‘if you help me, I help you’. Clearly, there is an evolutionary advantage for identifying cheaters versus cooperators, which requires the ability to make logical inferences; however, that ability is constrained by the context in which it is called into action.

Through extensive work with human and non-human animals, researchers have been able to identify the reward system or group of structures in the brain that is responsible for the processing of goals, motivation, value, and adaptation (Schultz, 2015). These structures are found along the dopaminergic or reward pathway that begins in the ventral tegmental area (VTA) and connects the basal ganglia to the prefrontal cortex. Reward cognition serves to increase the likelihood of survival and reproduction. Reward guides animals to learn, approach, and carry out actions that are correlated with positive emotions.

It is believed that rewarding stimuli can drive learning in both the form of classical conditioning (Pavlovian conditioning) and operant conditioning (instrumental conditioning). In classical conditioning, a stimulus causes approach and avoidance behaviors. In operant conditioning, a reward may act as a reinforcer, in that it increases or supports actions that lead to itself. The theory and data available today indicate that the phasic activity of midbrain dopamine neurons encodes a reward prediction error used to guide learning throughout the frontal cortex and the basal ganglia. Activity in these dopaminergic neurons is now believed to signal that a subject’s estimate of the value of current and future events is in error and to indicate the magnitude of this error (Glimcher, 2011). This new theory of reward as being processed in the frontal cortex and basal ganglia is consistent with the idea that our brain has evolved to include an adjustment or learning mechanism that helps us learn.

LIMITS OF ADAPTATION: FOLK ECONOMICS AND THE CHOICE OF ECONOMIC INSTITUTION

We previously argued that evolution has endowed humans with general goals and motives, specific modules for behavior and a reward system that shapes learning and behavior. Given this knowledge, economists can produce models of behavior that can be grounded in evolutionary psychology. Such models would include preferences that we developed in our evolutionary past and can capture with utility functions and learning algorithms that can allow us to model adaptation to the environment. Nevertheless, it is unlikely that the adaptive system that our brain is could have prepared us for today. As Pinker (2002) argues, our evolutionary past has not prepared us for our complex reality. It is highly unlikely that our brains have specific modules or tools to understand the complex modern economy. Instead, to navigate the modern economy, we probably utilize modules from our evolutionary past that helped us to conceive simpler social interactions. Thus, evolutionary forces that developed throughout most of our premodern human history have influenced and continue to influence our choice of political institutions.

Rubin (2003) advanced the idea of 'folk economics'. Folk economics refers to the notions that naïve or untrained individuals have about the economy. The idea is that during much of our evolutionary past, humans evolved in small groups of mobile hunter-gatherers. These groups not only were small, consisting of about 25 to 150 individuals, but they also had little social structure, had no food storage (were immediate consumers), and did not specialize, so division of labor was non-existent (Kelly, 1995). Anthropologists agree that there was very little room for investment in human capital; not even war resulted in specialization, as most attacks seem to have been unorganized raids on neighboring groups (Keeley, 1996). In addition, technological change and growth were also miniscule. In such an environment, the evolved economic module was essentially zero-sum. That is, if groups or parties engaged in interaction, there was always a winner and a loser.

In exchange, the sensory perception of having to pay somebody through currency or some other possessions, such as a cow or a chicken, is one of loss. A logical inference of a mind that has developed to identify simple causal relationships of physical phenomena based on sensory perception is that this exchange is not advantageous. Understanding that a sensory loss may actually be an economic gain does not come naturally. Yet, we all know that it is clearly possible to attain. There are three ways in which our brains can be trained to identify benefits from complex interactions that may not render immediate sensory stimulus. These are training, experience, and observation.

The zero-sum mentality has shaped and still influences our understanding of social welfare and our choice of political institutions. For example, a naïve individual may not intuitively see mutual advantages derived from exchange specialization and incentives. A poor understanding of these may explain our natural tendency to be suspicious of policies that encourage the liberalization of trade, labor, and finance. As Pinker (2018: 333) says, 'Authoritarian populism can be seen as a pushback of elements of human nature—tribalism, authoritarianism, demonization, zero-sum thinking—against the Enlightenment institutions that were designed to circumvent them'.

Under folk economics, prices are thought to allocate wealth only and don't influence the allocation or production of goods and services. Individuals who are influenced by folk economics would support price controls of necessary consumption items, such as flour, salt, sugar, electricity, and water. The lower the price, the better off one is perceived to be. This way of thinking ignores the fact that very low prices artificially supported by controls also affect consumption and production. With price controls, consumption will surely end up exceeding production. An unbalanced market outcome will cause scarcity, which can then lead to conflict and other social maladies.

In folk economics, efficiency gains from economic activity are ignored, as the emphasis is on the distribution of wealth and income. There is evidence that, with notable exceptions, wealth accumulation and income inequality are not seen positively. Yet, it is wealth accumulation that precedes economic growth, as capital can be made available for production and growth through credit markets. In the political economy literature, it is still debated whether the distribution is unequivocally positive (Aghion et al., 1999). Although high levels of income and wealth inequality coupled with lack of opportunities to develop human capital are detrimental to economic growth, redistribution in light of lower inequality and higher human development may also be detrimental.

The world of folk economics is a zero-sum world, where resources and the number of jobs are viewed as fixed. Because the number of jobs is seen as fixed, under folk economics, the act of buying from other nations, communities, or tribes is seen as a loss. The Survey of Americans and Economists on the Economy (SAEE), analyzed by Caplan (2001, 2002), shows that economists and more educated people tend to support free trade compared to the rest of the population. This sentiment is not new; Newcomb (1893) also indicated that the disagreement between economists and others is most profound with respect to trade. The argument against free trade is that it leads to job losses. In our evolutionary past, humans saw interactions with other tribes as zero-sum games, where the others' gains truly implied one's loss. However, in a modern economy, even if some people lose jobs, others gain jobs, and there are welfare benefits of free trade, such as lower prices of consumption goods.

Is it possible that folk economic beliefs are simply a representation of culture? This seems to be the approach that modern political economists are taking. Yet, this approach ignores evidence from biology and evolutionary psychology that there are innate tendencies driven by our genes that are basically the same across cultures. Today, mostly in developing countries – where training in economic reasoning even among elites may be limited by lack of opportunities, and limited experience in exchange may be due to infrequent and underdeveloped markets, infrastructure limitations, or political repression – folk economics has a very strong influence on the policies that policymakers implement. From an economic point of view, this is problematic since it hinders economic development. From the social point of view, this can generate instability, as unsustainable economic policies are likely to emerge. In fact, Marxist ideology, which is still surprisingly prevalent around the world, is a representation of folk economics.

Nevertheless, if we analyze the choice of economic and political institutions from the perspective of evolutionary psychology, we cannot but conclude that political economists face a difficult challenge in trying to get people to understand the mutual advantages derived from exchange, specialization, and incentives.

Notes

1 The properties of preference relations include reflexivity, completeness, transitivity, monotonicity, and convexity.
2 A fair gamble is a gamble whose price is equal to its expected monetary value. A fair gamble has actuarially fair odds. Individuals who reject fair gambles are considered risk averse.
3 See also Netzer (2009) for an evolutionary perspective on risk and time preferences.
4 We emphasize experimental data here because in the real world, many behavioral differences between men and women may be influenced by variables that are difficult to control for. The laboratory environment provides researchers with the ability to control the environment and more effectively isolate the variables of interest.
5 Henrich et al. (2012) argue that normative monogamy increases child investment, reduces intra-household conflict, and economic productivity by shifting male efforts from seeking wives to paternal investment.
6 Modern theories of the evolution of the mind indicate that our brains evolved to solve problems that persisted in the environment of evolutionary adaptation (EEA). The EEA is the period when our ancestors were becoming humans. This period lasted for a very long time, possibly between 1.6 million to about 10,000 years before the present.

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