

Economic Subelves:
Fundamental Motives and Deep Rationality

Douglas T. Kenrick, Yexin Jessica Li, Andrew E. White, & Steven L. Neuberg

Arizona State University

ABSTRACT: Classic economic models presumed that human decision-makers are rational, making self-serving strategic choices based on full information about alternatives. Behavioral economic models assume decision processes are bounded by limited information, leading to biased and irrational choices that are often based on immediately salient cues. An evolutionary perspective builds on behavioral economic models by adding the presumption that biases that seem superficially irrational may be based on a deeper rationality – revealing heuristics that generally inclined decisions in ways that were adaptive for our ancestors. We presume further that those heuristics reflect not one set of biases, but several different sets of biases, each tailored to particular recurring problems. Our model posits several somewhat dissociated subelves, each serving a particular fundamental motivational system. This model is derived from a program of research that has linked fundamental motives (e.g., self-protection, mate acquisition, status, or affiliation) to simple cognitive processes (attention, encoding, memory) and downstream social behaviors (aggression, conformity, creative displays). In this paper, we review more recent research linking these motives to various economic decisions and behaviors (e.g., conspicuous consumption, loss aversion, budget allocations).

What is the psychology of economic decision-making? The prevailing answers to that question have focused on the extent to which human decisions are flawed and irrational. We will suggest instead that many common biases and heuristics reflect a deeper adaptive rationality. We will further suggest that instead of a single human mind constrained by a single set of biases and striving toward a monolithic goal of utility maximization, our brains contain several distinct subselves, each with a different set of priorities, pursuing a different set of utility functions. We will also consider a number of testable hypotheses that flow from this perspective.

Econs versus Humans versus Morons

Over the last few decades, the fusion of ideas from economics and psychology has led to the emergence of the field of behavioral economics. Behavioral economists have stressed that economic decision-making is severely constrained by the information processing limitations of the human brain (Kahneman, 2008; Simon, 1955; 1956). Because conscious processing is limited to 7 ± 2 bits of information, and cannot therefore take account of all potentially relevant costs and benefits, decision makers must rely on simple heuristics (Tversky & Kahneman, 1974). Behavioral economists take issue with a central assumption of traditional economics – that people’s decision are eminently “rational” – in the sense of maximizing future satisfaction (Vohs & Luce, 2010). Along these lines, some behavioral economists make a distinction between “econs” and “humans:”

“If you look at economics textbooks, you will learn that *homo economicus* can think like Albert Einstein, store as much memory as IBM’s Big Blue, and exercise the willpower of Mahatma Gandhi. Real people have trouble with long division if they don’t have a calculator, sometimes forget their spouse’s birthday, and have a hangover on New Year’s Day. They are not *homo economicus*; they are *homo*

sapiens.” (Thaler & Sunstein, 2008, p. 10 or so, *I have an electronic version, so page numbers don't exist*).

Behavioral economists are fond of recounting the ways real people are “susceptible to irrelevant influences from their immediate environment, irrelevant emotions, shortsightedness, and other forms of irrationality...” (Ariely, 2008, p. 240). Ariely’s (2008) book *Predictably Irrational* provides an entertaining compendium of people’s decision-making foibles. For example, merely exposing someone to a randomly high (or randomly low) number that has absolutely nothing to do with the purchasing decision (such as the last 3 digits of their social security number) will inspire him or her to pay much more (or much less) for the same item (Ariely, Loewenstein, & Prelec, 2003). Such findings suggest that real people making real decisions are not the omniscient economic savants of classic models; indeed, one could easily get the impression that real humans are rather dim-witted decision-makers.

Although there is no doubt that human information processing is limited, and that people are possessed of numerous irrational biases, we will argue that actual humans are somewhere midway between econs and morons. Our general approach here is consistent with other researchers who have begun to consider decision-making as reflecting underlying adaptive biases (e.g., Cooper, 1987; Gandolfi, Gandolfi, & Barash, 2002; Wang, 2002; Wang & Dvorak, 2010; Kanazawa, 2001; Todd & Gigerenzer, 2007). As Todd and Gigerenzer and their colleagues have pointed out, accurate and efficient choices may be more likely to follow if people use of simple heuristics than if they instead try to deeply consider all possible sources of information relevant to a given decision. Consider, for example, that learning a few simple heuristics can allow a person to win chess games against opponents who exert much greater cognitive effort considering all possible next moves of all pieces on the board.

We agree that decision-making is influenced by heuristics and other psychological biases, but we propose that these biases are anything but arbitrary and irrational. Instead, those biases are outputs of mental and emotional mechanisms designed to maximize not immediate personal satisfaction, but long-term genetic success. Furthermore, we incorporate the notion of modularity in a central way. Rather than a single rational decision-maker operating according to a single set of utility-maximizing rules, our view presumes that all of us have a number of different decision-making subselves inside our heads. Each of our subselves pays attention to different costs and benefits and weights them differently, in ways designed to deal with the most prominent threat or opportunity on our life's horizon. Together, these proposals create a model of human decision-making that is grounded in what we refer to as *Deep Rationality* (Kenrick, Griskevicius, Sundie, Li, Li, & Neuberg, 2009).

Life History Theory: Economics isn't all about money

At the broadest level, economics is about how people allocate scarce resources to attain utility (or expected satisfaction) (e.g., Bronfenbrenner, Sichel, & Gardner, 1990; Mas-Collel, Whinston, & Green, 1995). When most of us think about economics we think about money, and how people allocate financial budgets in exchange for goods or services on the market. Much of the field of economics is in fact concerned with the exchange of money, and with mathematical models describing how quantities of money are exchanged at the individual and aggregate levels. Money is in fact a convenient and quantifiable way to represent the otherwise squishy concept of "utility." Money makes it possible to put a precise numeric value on the expected satisfaction that a consumer will derive from an apple, a pear, a Macbook air, or a jewel-encrusted iPhone.

But in everyday life, many if not most of our decisions about scarce resources do not involve the exchange of cash; more commonly, people have to determine how to allocate limited time budgets and decide whether to burn caloric energy on one task as opposed to another.

People's budget allocation decisions often involve whether or not to invest time and effort in salvaging particular social relationships, maintaining their homes and yards, traveling to visit relatives and friends who live in distant cities, increasing their own human capital (by further education, reading, attending conferences), and so on. Indeed, before our ancestors ever had money in any form, they made economic decisions.

Looked at in this light, even nonhuman animals engage in economic decision making – continually facing decisions about how and when to allocate their inherently limited budgets of time and energy. In fact, a whole subfield of biology, called *life history theory*, is devoted to studying such decisions (e.g., Kaplan & Gangestad, 2005; Stearns, Allal & Mace, 2008). Life history theory describes how organisms make decisions about the allocation of scarce resources over the lifespan, and attempts to answer questions such as: Why do organisms invest relatively more or less time and energy developing their bodies before reproduction? (Humans and elephants spend over a decade in pre-reproductive development, for example, whereas other mammals take only a few months). Once an animal becomes reproductively mature, does it devote all its resources to one short reproductive burst (as in the case of salmon or century plants), or spread its reproductive efforts over several episodes spanning months or years (as in the case of oak trees and humans)? Does the organism allocate resources to caring for its offspring after they are born, and if so, how much care should be invested before leaving offspring to fend for themselves? Life history models assume that resources are always limited, and that development involves trade-offs in when and how to allocate those scarce resources. What constitutes a favorable or unfavorable trade-off depends on a dynamic interaction of environmental pressures (current threats and opportunities), inherited predispositions (useful traits and constraining traits the animal inherited), and the animal's current stage of development.

Life histories are commonly divided into two broad categories: *somatic effort* and

reproductive effort (Alexander, 1987). Somatic effort is the energy expended to build and maintain the body. It is analogous to making investments to build a larger bank account. Reproductive effort is analogous to spending that bank account in ways that will replicate the individual's genes. Reproductive effort can be further divided into *mating*, *parental care*, and *investment in other relatives* (Alexander, 1987). Investment in other relatives is considered reproductive effort because grandchildren, siblings, nieces, nephews, or cousins share common genes.

The key life-history tasks can be arranged into a simple developmental hierarchy. Somatic efforts form the necessary developmental base required before mating efforts can unfold, and parenting efforts build upon the base of earlier somatic and mating efforts. In any species reproducing more than once, these goal systems do not replace one another. For example, adult mammals divide current resources between somatic effort (eating, drinking, and protecting themselves), attracting and keeping mates, and caring for offspring. Given that resources are inherently finite, time and energy invested in one activity must be taken from others. For example, more mating effort means fewer resources available for parenting.

Combining ideas from life history theory with emerging ideas about modular motivational systems (to be discussed in more detail below), we have suggested some architectural modifications to Maslow's familiar pyramid of motives (see Figure 1). Young children devote their energy resources mainly to satisfying very simple somatic needs, such as hunger, thirst, and the need for warmth. Highly dependent on their parents, young children initially invest little in social capital (as in making friends or trying to win respect). In the preschool years, children begin to invest resources in social capital via developing affiliative networks. Once the child has developed a few friends, he or she begins to invest energy to gain respect (one first needs friends before caring what they think about you). Humans do not invest

energy in mating goals until they have reached puberty. Parenting motives are necessarily later, since one can not invest in offspring until one has found someone with whom to mate. Although different motivational systems come on line at different developmental phases, early developing systems do not disappear, but remain available when particular environmental challenges arise. And this view is inherently economic, conceptualizing human motivational systems as sets of plans for efficiently allocating resources to achieving different goals, in ways that ultimately maximize the odds of successful reproduction.

----- Figure 1 about here -----

Subselves and Fundamental Motives

On our view, different motivational systems are associated with different sets of decision biases, each designed to deal with particular environmental threats and opportunities (Ackerman & Kenrick, 2008; Kenrick et al., 2003; Kenrick, Griskevicius, Neuberg, & Schaller, 2010; Neuberg, Kenrick, & Schaller, in press; Schaller et al., 2007). Situations involving affiliation, status, self-protection, mate acquisition, mate retention, kin care, and disease avoidance thus invoke different, and sometimes incompatible, cognitive biases. Our model follows upon several decades of research demonstrating that humans have different domain-specific systems for dealing with different types of adaptive problems, including learning aversions to different types of objects, language learning, long-term memory for different types of objects, facial recognition, spatial location, object perception, and fear conditioning (e.g., Barrett & Kurzban, 2006; Domjan, 2005; Klein, Cosmides, Tooby, & Chance, 2002; Sherry & Schacter, 1987).

One can think about these fundamental motivational systems in terms of Martindale's (1980) notion of "subselves"—as sets of subprograms for dealing with general categories of adaptive problems, linked in associative networks (Kenrick, 2006; Kenrick & Shiota, 2008; Kurzban & Aktipis, 2007). For example, seeing an attractive member of the opposite sex can

prime a network of thoughts and feelings involving one's own partner and one's own mate value, activate strategies designed to increase or decrease commitment to the relationship, and so on (e.g., Gutierrez et al., 1999; Maner, Rouby, & Gonzaga, 2008; Roney, 2003). Being on a dark street in a strange city, on the other hand, triggers a self-protective motivational system (Ohman & Mineka, 200x; Neuberg et al., in press; Schaller et al.), and increases attention to, and memory for, angry male strangers, leads one to perceive out-group members as especially dangerous (Becker; Schaller refs. Here). Concerns about disease trigger a different, yet functionally specific, system of avoidant behaviors and cognitions (Mortensen, et al., 2010; Schaller).

How many different motivational subsystems are there? If one takes a “massive modularity” position, the mind is composed of a large number of independent functional information-processing systems – one for avoiding poisonous snakes, another for avoiding poisonous foods, yet another for avoiding dangerous people, and so on. Another approach is analogous to that which has guided the study of emotions since Darwin's time. Adaptationist models of emotion posit broader executive systems that deal with general classes problems (e.g., Plutchik; Scott). Although these broad-level systems can be further divided into sub-components, and may even share many sub-components, we have found it heuristically useful to think about a small set of motivational systems linked to the key tasks of social life:

1. Self-protection: Our human ancestors frequently faced threats not only from nonhuman predators (such as large cats and wolves), but also from members of other human groups and from ingroup members, who posed threats to status and material resources (Daly & Wilson, 1988). Human beings have unique motivational systems for dealing with various types of threats. For example, people are quick to learn associations to stimuli that would likely have threatened our ancestors, as well as attentional systems attuned to angry expressions, particularly

on the faces of unfamiliar males, who would have posed an especially great threat (Ackerman et al., 2006; Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007; Ohman & Mineka, 2001).

A key feature of modern evolutionary analyses is the consideration of trade-offs (e.g., Gangestad & Simpson, 2000; Kaplan & Gangestad, 2005; Stearns, Allal, & Mace, 2008); a functional analysis of any behavioral proclivity requires an assessment of the perils and prospects associated with performing different behaviors within any particular ecological context. On the one hand, fearful avoidance is necessary when confronted with predatory or poisonous animals or when outnumbered by hostile strangers. On the other hand, fear can lead people to avoid risky situations that, if confronted, could yield payoffs (e.g., gaining access to new resources). Because the risk of physical damage is highly costly, threat-avoidance systems are likely to be set like smoke alarms, favoring false positive alarms rather than false negative complacency (Haselton & Nettle, 2006; Nesse, 2005; Rozin & Royzman, 2001); it is better to unnecessarily flee a misperceived potential threat than to mistakenly remain in a dangerous situation.

2. Disease avoidance: Other people not only pose direct threats to human survival via their potential for violence, they also pose indirect threats via their role in transmitting disease. In modern times, millions of people die every year from infectious diseases transmitted from humans to humans (e.g., influenza, tuberculosis, HIV/AIDS World Health Organization (2004). The threat of diseases from other human beings has existed throughout history (Ewald, 1994; Wolfe, Dunavan, & Diamond, 2007). In the 1500s, European travelers introduced exotic diseases (e.g., smallpox, measles, and typhus) into the Americas that, by some estimates, killed over 75% of the population of Mexico (Dobson & Carter, 1996).

Most disease-causing pathogens are not visible to the human eye, but their effects on the human body can be seen in visible cues, such as morphological changes (e.g., rashes, skin

lesions) and other behavioral anomalies (e.g., vomiting, diarrhea, ill-coordinated movements). Just as the physiological immune system sometimes misidentifies harmless “invaders” as pathogenic threats, the behavioral immune system sometimes misidentifies objectively harmless features of others as implying the threat of infectious disease, such as facial disfigurement. Recent research suggests that people heuristically associate a variety of physical features with disease threat, including obesity, physical disability, facial manifestations of aging, and unpleasant human odors (Ackerman, Becker, Mortensen, Sasaki, Neuberg, & Kenrick, 2009; Duncan & Schaller, 2009; Park, Faulkner, & Schaller, 2003; Park, Schaller, & Crandall, 2007; Tybur, Bryan, Magnan, & Caldwell-Hooper, in press).

Avoidance of other people can also be triggered by situational cues of disease. For example, after seeing photographs that make germs and infections salient, people view themselves as less extraverted and less open to new experiences (Mortensen, Becker, Ackerman, Neuberg, & Kenrick, 2010). Disease-linked social avoidance is directed toward individuals perceived to be potential carriers of disease, such as foreigners from exotic unknown places, and this inclination is especially pronounced in those who dispositionally view themselves as highly vulnerable to disease (Park, Faulkner, & Schaller, 2003). Some individuals are more sensitive to such concerns (Duncan, Schaller, & Park, 2009), and such sensitivity can vary within a person. For example, during the first 10 weeks of pregnancy (when vulnerability to infection is highest), women show an enhanced sensitivity to disgust and stronger xenophobic attitudes toward subjectively foreign groups (Navarrete, Fessler, & Eng, 2007).

When the disease avoidance subself is active, therefore, people are attuned others who are heuristically associated with disease, and are likely to respond by avoiding contact.

3. Affiliation: Many animal species live relatively solitary lives outside the mating season. However, our hunter–gatherer ancestors lived in groups, as did most of the primates from

which they evolved (Lancaster, 1976). Consistently, people are highly sensitive to cues of social rejection, and respond to such cues using some of the same neural circuits used to register physical pain (Eisenberger, Lieberman, & Williams, 2003; MacDonald & Leary, 2005). There are numerous adaptive functions of affiliating with others (Baumeister & Leary, 1995; Boyd & Richerson, 1985; Sedikides & Skowronski, 1997; Stevens & Fiske, 1995; Wisman & Koole, 2003), and there appear to be some general oxytocin-based neurophysiological systems associated with social attachment (Brown & Brown, 2006; Carter, 1992; Hazan & Zeifman, 1999; Taylor et al., 2000).

The inclination to befriend others, like all behavioral inclinations, is not free, but involves trade-offs. For example, interacting with others carries costs such as competition over local resources, socially transmitted diseases, and exploitation by fellow group members. At the same time, there are also great benefits to social life, and humans everywhere profit from sharing extensive resources, knowledge, and parenting chores with other group members (e.g., Henrich & Boyd, 1998; K. Hill & Hurtado, 1989).

When the affiliative subself is in control, a person is tuned in to information about which of his or her acquaintances might make good friends, whether he or she is being accepted or rejected by those people, and whether he or she is getting along with old friends.

4. Status: Around the world, “dominant” versus “submissive” is one of the two primary dimensions with which people categorize members of their groups (White, 1980; Wiggins & Broughton, 1985). As in other animals, higher status results in benefits for both men and women because it often translates into others performing favors for them. Being respected by others brings numerous survival and reproductive benefits; being disdained carries some serious costs. Status also has an additional benefit for human males in increasing their access to mates (Betzig,

1992; J. Hill, 1984; Li & Kenrick, 2006; Sadalla, Kenrick, & Vershure, 1987; Turke & Betzig, 1985). This helps explain why males are often more willing to take social and physical risks to attain status, a proclivity that is enhanced when mating motives are salient (Griskevicius, Goldstein, Mortensen, Cialdini, & Kenrick, 2006; Griskevicius, Tybur, et al., 2009; Wilson & Daly, 1985). But there are trade-offs associated with status as well, and respect does not come for free. Leaders have to give to the group more than followers do, and people do not like it when their friends step over them.

When the status subself is active, a person is tuned in to where he or she stands in the dominance hierarchy and to who is above and below him or her.

5. Mate acquisition: Given that differential reproduction is central to natural selection, decisions about mating have significant adaptive consequences. The problems of mate selection can be divided into two categories – those involving relationship type (short-term versus long-term, for example), and those involving mate characteristics (physical attractiveness, status, etc.). Because of differences in obligatory parental investment (with females being required to invest more in potential offspring), there are a number of sex differences in mate acquisition motives. For example, women are more reticent about entering short-term relationships, and more selective about the minimum characteristics they will accept in a partner for such relationships. Because men and women contribute different resources to the offspring of long-term relationships, there are also sex differences in criteria for mate choice, with women prioritizing status and resources, and men prioritizing physical attractiveness (e.g., Li & Kenrick, 2006).

When mating goals are salient, people are attentive to features of potential mates, the interest expressed by desirable others, and the prevalence and quality of potential same-sex competitors.

6. Mate retention: Because human infants are helpless and slow to develop, the continued inputs of both parents are often essential to ensure the offspring's survival (Geary, 1998; Hrdy, 1999). Although human mating arrangements vary from culture to culture, all involve long-term cooperative relationships in which both the male and female contribute to the offspring's welfare (Daly & Wilson, 1983; Geary, 1998). Hence, a key adaptive problem for both sexes, involving issues beyond mate choice, is to maintain mating bonds with desirable partners (Buss, 2007; Hazan & Diamond, 2000).

When mate retention goals are salient, people will be attentive to the presence and the characteristics of potential same-sex interlopers, and also to signals of satisfaction or dissatisfaction in one's partner.

7. Kin care: As we just noted, parental care is critical to the survival of human offspring (Geary, 2000; Hrdy, 1999). However, the motivation to nurture offspring is not a constant across all parents. Evolutionary theorists have hypothesized that decisions about caring for any particular offspring are contingent on various factors that affect the payoffs for their parental investment (Alexander, 1979; Daly & Wilson, 1980; Hrdy, 1999). Children are more likely to receive care to the extent that they are biologically related to their parents, and people make smaller investments in step-children and in children for whom there is lower certainty of paternity (Daly & Wilson, 19xx; Laham, Gonsalkorale, and Von Hippel, 20xx).

When the kin-care subself is active, people will be attentive to the well-being of their children and other close relatives, particularly young relatives who are dependent upon their care.

Distinctions Between Different Motivational Subselves

A number of findings from our labs and others have supported general assumptions regarding functionally distinct motivational systems, suggesting that these different motives

orchestrate attention, memory, and social inference in functionally specific ways (Kenrick, Neuberg, Griskevicius, Becker, & Schaller, 2010). For example, people are especially accurate and rapid in detecting threats from other people who might be dangerous (such as angrily expressive male strangers; Becker et al., 2007). Likewise, memory is enhanced for other people who might be threatening: Although outgroup members are normally poorly remembered, this reverses if those outgroup members are angry males (Ackerman et al., 2006). People are also especially good at making difficult cognitive judgments if the results of such judgments might result in catching cheaters on social contracts (Cosmides & Tooby, 1992). Attention and encoding are enhanced for opposite sex targets with mating-relevant characteristics, and for same-sex competitors with desirable mating-relevant characteristics (Dijkstra & Buunk 1998; Gutierrez, Kenrick, & Partch, 1999; Kenrick, Neuberg, Zierk, & Krones, 1994; Maner et al., 2003). These biases are also presumed to vary depending on relevant contextual features in interaction with individual differences relevant to life history strategies (Haselton & Nettle, 2006).

We have thus found this general approach fruitful in generating hypotheses regarding basic cognitive processes, and have begun exploring implications for downstream social behaviors. For example, although both men and women increase conformity and desire to fit in with others' judgments when they are motivated by self-protection, mating motivation leads to displays of independence and creativity in males, but not females (Griskevicius, Goldstein et al., 2006; Griskevicius, Cialdini, & Kenrick, 2006). Also in line with such models, males, but not females, primed with mating-relevant motivations over-attribute sexual intention to attractive strangers of the opposite sex (Maner et al., 2005).

On a strict modular view, mental mechanisms or systems (such as the motivational subselves we are discussing) are completely encapsulated and even physically distinct from one

another. However, very few modern evolutionary theorists believe that these criteria apply to most psychological systems, instead preferring a view of functional modularity (Barrett & Kurzban, 2006; Kenrick, Sadalla, & Keefe, 1998). The fact that there are numerous domain-specific mechanisms does not exclude the possibility that there are also domain-general mechanisms. We suspect, for instance, that different motivational systems share the same constituent processes—e.g., attention, encoding—even while they input different aspects of this information into these processes and operate on this information using somewhat different decision rules. Even though there may be some degree of sharing of general mechanisms, the specifics of how they operate may change in important ways in different motivational systems governing the solution of different problems.

Economic aspects of the different motivational systems

The implication of the work on domain-specificity is that, although it may make some sense to try to equate different kinds of utility, the human mind does not equate them. In fact, it responds to different kinds of utility using different cognitive processing rules, and applies those rules in flexible, but predictable, ways across different contexts. Thus, whereas the idea that utility = fitness suggests that human decision-making is geared to maximize fitness generally, the idea of *deep rationality* suggests that human decision-making is geared specifically toward different fitness-enhancing solutions to recurring adaptive problems in different domains. The notion of deep rationality builds on previous work showing that human decision biases can be better understood by considering the ecological context for which such biases evolved (e.g., Gigerenzer, 2000; Haselton & Nettle, 2006).

To appreciate the importance of domain specificity to economic decision-making, consider what a typical *prisoner's dilemma* would look like if you were playing with different partners, such as a brother or a child or a romantic partner instead of an anonymous stranger.

Recall that a prisoner's dilemma is a situation in which the immediate payoff for each individual is such that defection yields a higher reward than cooperation. What makes it a dilemma is that the joint interests of both players are best served by cooperating, but from an individual's "rational" perspective, the most rational decision is to defect.

If you think in evolutionary terms, playing with a brother changes the payoff structure. Because you share half your genes with your brother, your bank of inclusive fitness points gets to add half of his gains to your gains (and also to subtract half of his losses to your losses). The evolutionary banker in my head gives me 50 percent rebate for every dollar I spent on a brother. Figure 2 shows how that works for one set of typical payoffs.

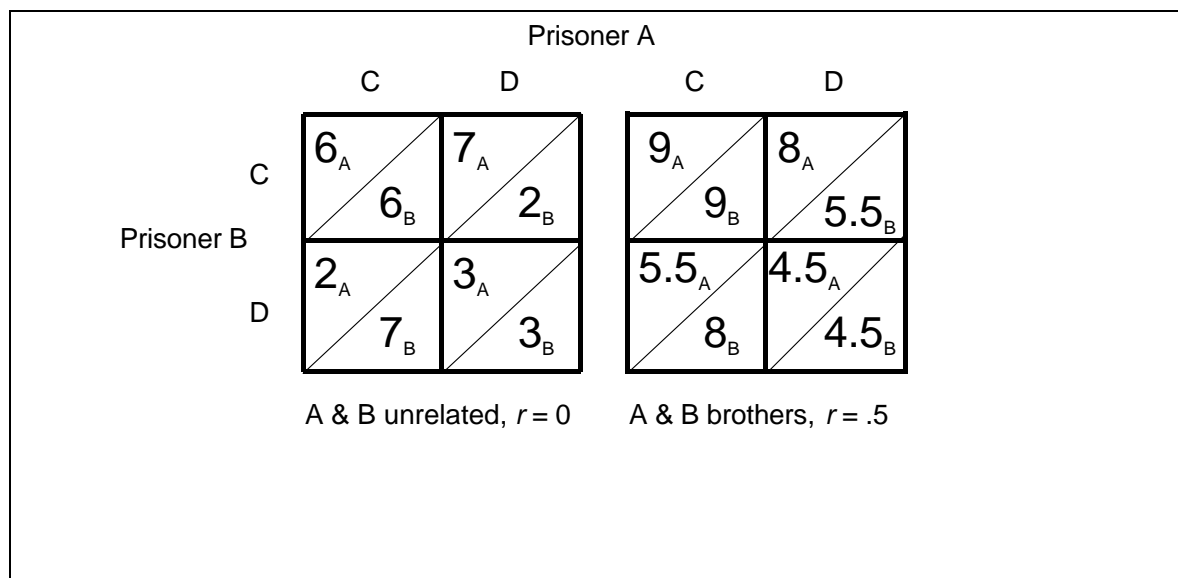


Figure 2. The left box depicts the standard prisoner's dilemma. The payoffs for player A are above the diagonal, those for player B are below. For player A, the best payoff always comes from defecting (choosing option D) rather than cooperating (choosing option C) (7 vs. 6 if B cooperates; 3 vs. 2 if B cooperates). If the two players are brothers, however, then each prisoner's payoffs can be recalculated to include half of his brother's gains (because they share half their genes). In this case, then, the best choice is to cooperate, regardless of his brother's choice (as shown on the right).

A child and parent share half their genes, just as two brothers do. Because the aging parent has decreasing reproductive potential, and the child has increasing potential, the parent benefits more from cooperating than the child does, leading to a different matrix of payoffs, with the child more likely to defect, and the parent more likely to cooperate. This evolutionary math helps us understand why in everyday life, parents give and children take. Male and female parents have slightly different weights to consider. As females age, their reproductive potential decreases more rapidly than does males (older men can still reproduce for decades after females pass menopause). Also, there is some uncertainty in the relatedness between a father and a child; none for a female. These considerations should lead women to be more willing to sacrifice for their children than are males (see Kenrick, Sundie, and Kurzban, 2008, for more discussion of these issues).

The classic economic models presume that people are interacting with strangers in the marketplace, people who have neither reciprocal alliances nor shared genes. The evolutionary life history model suggests that people will calculate economic utility in very different ways, and exercise different biases in decision-making, when their current problem involves instead caring for kin. Still another set of biases should be involved in cooperating with nonrelatives, likewise for forming relationships with new mating partners, getting along with those with whom one has already had children, or negotiating a status hierarchy. Each set of problems involves different patterns of outcomes that will yield anticipated satisfaction or avoid anticipated dissatisfaction.

Table 1 depicts some of the biases associated with each subself, and also examples of outcomes likely to yield differential utility when different subselves are activated (for more discussion of these issues, see Kenrick, Griskevicius, Sundie, Li, Li, & Neuberg, 2009). In the

next sections, we review two illustrative lines of recent research exploring how activation of different fundamental motivational subselves can influence a range of economic behaviors.

Individual Differences in the links between Mating and Conspicuous Consumption

In his 1899 classic *Theory of the Leisure Class*, Thorstein Veblen coined the term “conspicuous consumption” to refer to the tendency to buy and show off expensive goods – with the main goal of impressing others with one’s wealth or status. Although conspicuous consumption is sometimes regarded as a symptom of modern capitalist society, flashy displays of wealth have been common across human societies and throughout history (Egyptian and Incan societies are perhaps the most salient, but even in less absolutely wealthy societies, high status individuals have frequently displayed their relative wealth, by giving away beaded necklaces, pigs, blankets, or whatever is locally valued). A number of studies have linked conspicuous consumption to sexual selection, and suggested that conspicuous displays of wealth may be linked to efforts to signal to the opposite sex (Sundie et al., 2011). This research begins with the assumption that human conspicuous consumption may be what biologists call a “costly signal,” designed to communicate: “I am healthy and resourceful enough to be able to throw resources away, hence I have good genes, and you should pick me as a mate.” If frivolous spending is linked to mating, it ought to become more prominent when mating motives are active. And such displaying ought to be more prevalent amongst males, especially when they are following a short-term, low-investment approach to mating.

As part of a series of studies designed to test this idea, people were asked to think of a time when they had witnessed someone engaging in conspicuous consumption (Sundie et al., 2011). The majority of subjects thought of a man—buying a flashy car or picking up an oversized group tab at a restaurant, for example. This is not because men simply have more money to consume things in general. When a similar group of subjects was asked to think of the

person they knew who was most liked to shop, the majority nominated a woman. So people perceive women as liking to spend money, but men as liking to throw it around in conspicuous ways.

To examine the possibility that men's conspicuous consumption was a form of showing off linked to mating, Sundie et al. (2011) ran several experiments. In one, they asked participants to imagine they had just received an unexpected windfall of \$2,000. The research examined how much of the money subjects would spend on purchases that might convey their newfound wealth, such as a \$1900 Tag Heur watch, a \$139 Ralph Lauren shirt, or taking ten friends out for a night on the town (as compared to shopping more carefully). Before asking subjects how they would spend the money, the researchers put some of the subjects in a mating frame of mind, by having them look at dating profiles of fellow students who were not only single and available but also highly attractive. Other subjects looked at photos of campus dormitory buildings.

Romantic motivation had a different effect on men than on women: Women's spending was unaffected by mating motivation. Men in a romantic frame of mind, though, blew more of their newfound two grand on conspicuous purchases. Moreover, consistent with hypotheses, this effect was found mainly for men inclined toward a low-investment mating strategy—who scored as “unrestricted” on the Sociosexual Orientation Inventory, meaning they agreed with statements such as “sex without love is OK,” and “I can imagine myself enjoying sex with more than one partner at a time.” Another study extended this finding, by having participants imagine either a short-term or a long-term romantic relationship. Conspicuous consumption was boosted only among men who imagined a short-term relationship, and who were also temperamentally inclined toward low investment relationships.

A final study in the series demonstrated that conspicuous consumption communicates the intended message. Women find men who spend frivolously desirable as short-term dating partners, but not as long-term mates.

Loss Aversion by Domains

Kahneman and Tversky's (1979) classic work on loss aversion demonstrated that a loss of a given size (say \$100) has more psychological impact than a gain of the same size. This idea has now made its way into introductory economics textbooks and has been amply supported by research. Indeed, one recent review concludes, "There has been so much research on loss aversion that we can say with some certainty that people are impacted twice as much by losses as they are by gains" (Vohs & Luce, 2010). But why the bias, and is it the same for every type of gain and loss?

Ancestral humans would have survived better if they put a higher priority on avoiding losses than on acquiring gains because they frequently lived close to the margin of survival; whereas extra food would have been nice, insufficient food could have been deadly. Consistent with this idea, loss aversion has been found not only in humans but also in other species whose ancestors, like ours, would have suffered more from falling below the line of subsistence than they would have profited from an overabundance of resources. This is a plausible functional hypothesis about past conditions, but it does not fully exploit the scientific strengths of the modern evolutionary approach, which we can use to generate specific new hypotheses about when and how loss aversion should ebb and flow with functionally important motivations.

For example, the usual inclination toward loss aversion should be erased or even reversed when a mating motive is activated—but only for males. This is because women, as female mammals, have an intrinsically high minimum investment in their young, which inspires them to be relatively more selective in choosing mates (Kenrick et al., 1990; 1993; Li & Kenrick, 2006).

As a consequence, males must compete to be chosen as mates. One method is to flash a noticeably wasteful display (such as a peacock's feathers or a Porsche Carrera); another is to directly out-compete the other males (butting horns or politicking for the well-appointed executive office). To beat out the competition, it helps to take risks, and male mammals indeed become especially risky during the mating season. It follows that men primed to think about mating should act like bighorn sheep during the rutting season, when too great an aversion to losses would prevent the kind of risky competition that can beat out the other males.

If our logic is correct, the shape of that famous loss-aversion function should change in predictable ways for men under the influence of a mating motive. Men primed to think about mating ought to shift their attention toward gains and away from losses. In one experiment designed to test this hypothesis, we had some people (in the mating condition) think about a romantic first encounter with someone they found very attractive, whereas others (in the control condition) thought simply about organizing their desk.

After the motive manipulation, all our subjects answered a series of questions of the following sort: Imagine that you are at the 50th percentile of financial assets (in other words, half the population makes less money than you, and the other half makes more). How happy or unhappy would you be if you dropped to the 40th percentile? In other cases, they were asked how happy or unhappy they would be if they went up to the 60th percentile, or the 70th or 80th or 90th (and conversely, for drops to 30th, 20th, and 10th).

In the control condition people were inclined to be loss averse—that is, they expected their happiness level to change more after a loss than after a gain. A mating motive had no effect on women's responses, but it did have an impact on men's judgments. Men in a mating frame of mind focused more on the gains, and reduced their normal high sensitivity to losses—they changed in a way that would encourage them to be more risky. This finding with other findings

that activating a mating frame of mind increases risky behavior in men (e.g., Ronay & Von Hippel, 2010). The result is not a general effect of some simple psychological artifact, such as becoming more physiologically aroused. In a later study, people in a self-protective frame of mind—we had them imagine a scenario in which someone was breaking into their house—men, like women, became even more loss averse. More generally, these findings suggest a basic behavioral economic function – loss aversion – changes in response to fundamental motives in a way that makes adaptive sense.

Conclusion: Rationality, Irrationality, and Deep Rationality Revisited

Integrating behavioral economics with evolutionary psychology leads to a new way of thinking about economic rationality. Although behavioral economists have demonstrated that we are often “predictably irrational” (Ariely, 2008), this depiction captures only half of the truth. It is certainly true that people do not systematically calculate all the potential costs and benefits of various alternative choices and then reliably choose the one most likely to maximize their future gains; the behavioral economists are correct in pointing out that people instead use simple heuristics, ignoring a great deal of relevant information and thus making biased decisions that do not incorporate all the available options. At a deeper level, however, human biases reflect the influence of profoundly important functionally relevant motivations. Furthermore, people’s failures to make simplistically “selfish” choices reflect the powerful influence of a deeper rationality.

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Table 1: Each executive subself is associated with particular decision biases, and particular priorities likely to alter perceived utility of different outcomes. The table entries are only illustrative examples.

Subself	Typical decision biases	Outcomes yielding relative utility	Outcomes yielding relative <i>dis</i>utility
<i>Affiliation</i>	Propensity to affiliate and conform when feeling fearful Sensitivity to reciprocity violations.	Proximity to alliance partners Equal sharing of resources among alliance partners	Social exclusion Reciprocity violations
<i>Status</i>	Risky status-yielding activities more attractive for young unmated men and less attractive for women.	Dominating competitors (relatively more for men) Basking in reflective glory of group members' achievements	Deference to more powerful others Public losses of relative status
<i>Self-Protection</i>	Rapid detection of anger in male (versus female) faces Enhanced memory of angry outgroup male faces.	Higher ratio of ingroup to outgroup members when threats salient. Barriers to outgroup members (e.g., walls, locks)	Being in a numerical minority when threat salient Presence of threatening outgroup members who are male and/or large.
<i>Disease Avoidance</i>	Sensitivity to behaviors (e.g., sneezing) and morphological cues (e.g. open sores) associated with contagious diseases.	Avoidance of individuals from exotic foreign places Avoidance of individuals with overt cues suggesting pathology	Contact with strangers Contact with people perceived as likely to carry disease (e.g., poorer people or elderly individuals)

<p>Mate Search</p>	<p>Males take more risks and resist conformity when mating opportunities are salient.</p> <p>Females are more publicly (but not privately) generous under mating motivation.</p>	<p><i>For males judging females:</i> Cues to youth, health and fertility</p> <p><i>For females judging males:</i> Cues to investment as long-term mates, social dominance and physical symmetry in short-term mates.</p>	<p>Poor health, aging cues, asymmetry.</p> <p>Conformity and deference to other males among potential male mates.</p>
<p>Mate Retention</p>	<p>Attention by women to other physically attractive women.</p> <p>Attention by men to other socially dominant men</p>	<p>Communal sharing with relationship partner, rather than equality-based sharing</p> <p>Investment in partner's offspring</p>	<p>Cues to emotional infidelity <i>(relatively more salient to females judging males)</i></p> <p>Cues to sexual infidelity <i>(relatively more salient to males judging females)</i></p>
<p>Kin Care</p>	<p>Grandparental investment highest by grandmother in daughter's offspring (tracking paternity certainty).</p>	<p>Benefits to offspring, and to other relatives (discounted by degree of relatedness)</p>	<p>Threats to kin versus non-genetically related alliance partners</p> <p>Perceived favoritism of one's parent towards one's siblings</p>

Figure 1. A hierarchy of fundamental motives. See Kenrick et. al. (2010) for more discussion.

