Business and Society Review **107:3** 283–308

Evolutionary Social Contracts

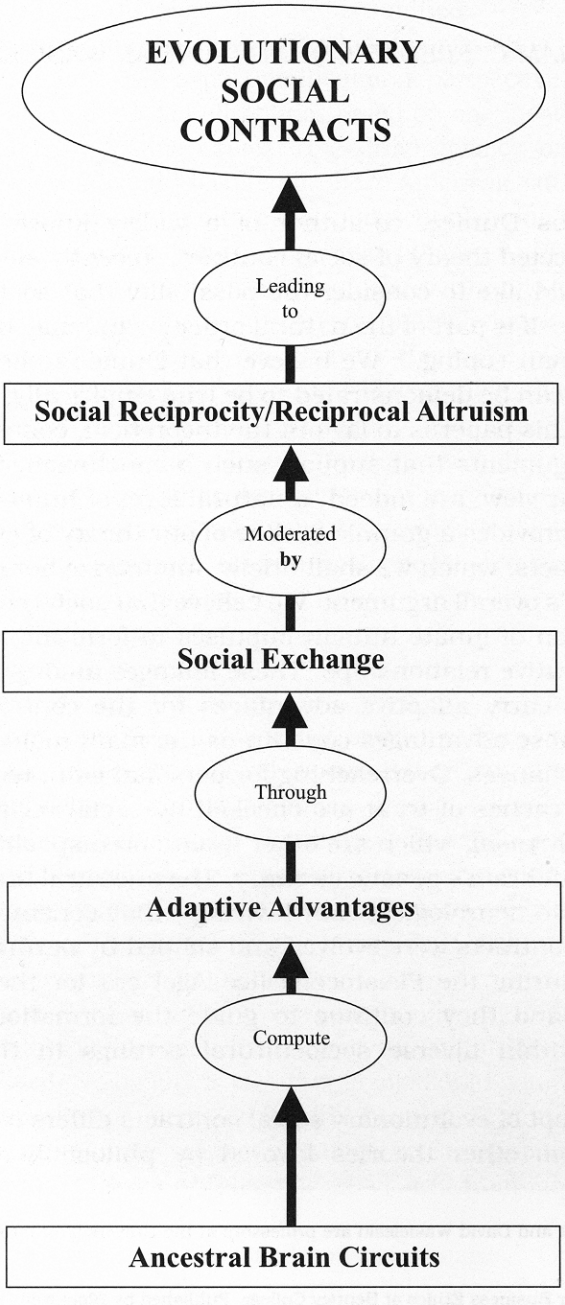
WILLIAM C. FREDERICK AND DAVID M. WASIELESKI

Thomas Dunfee, co-author of a widely known and well-respected theory of social contract,[1] recently stated that he "would like to consider the possibility that social contract reasoning itself is part of the natural order . . . and may be a natural form of human coping."[2] We believe that Dunfee's observation is correct and can be demonstrated to be true empirically; hence, our purpose in this paper is to lay out the theoretical, conceptual, and research arguments that support such a conclusion. Social contracts, in our view, are indeed "a natural form of human coping."[3]

Figure 1 provides a graphic outline of our theory of evolutionary social contracts, which we shall briefly summarize here as a guide to the paper's overall argument. We believe that social contracts are an expression of innate human impulses to form mutually beneficial cooperative relationships. These linkages among individuals and groups carry adaptive advantages for the contractors, and achieving those advantages constitutes the main motivating drive of social exchanges. Overreaching for personal gain, tendencies to cheat, or breaches of trust are checked by social reciprocity and reciprocal altruism, which are other innate predispositions rooted in the human brain's genetic circuitry. The ancestral brain circuits (i.e., cognitive neurological "hard-wiring") that generate and sustain social contracts were evolved and shaped by natural selection pressures during the Pleistocene (Ice Age) era for their survival advantage, and they continue to guide the formation of social contracts within diverse sociocultural settings in the modern world.

Our concept of evolutionary social contracts differs in important respects from other theories favored by philosophers, political

FIGURE 1 Derivation of Evolutionary Social Contracts



scientists, sociologists, and organization theorists whose principal orienting disciplines are formal logic and various social science disciplines.[4] We believe that these conventional formulations of social contract theory can be enriched in positive, supportive ways by integrating the perspectives of philosophers and social scientists with the theoretical concepts and empirical research of natural scientists. Our paper is intended to be a step in that direction by clarifying the natural foundations of social contracts.

THE EVOLUTIONARY BACKGROUND

Biological theories of social contract are derived from several key concepts drawn largely from evolutionary biology, cognitive neuroscience, and evolutionary psychology. We outline each of these briefly, as a preliminary to setting forth our own definition of evolutionary social contracts.

Evolutionary Biology and Natural Selection

Evolutionary biologists identify traits that have survival value for all forms of organic life. Especially important are those features that enable a plant, animal, or human to reproduce itself. Organic species evolve over time through a process of variation, caused by sexual mating and genetic mutations, and natural selection. Some kinds of organic features (strong muscles, keen eyesight) have survival value—that is, they are selected *for*—while others (frail bones, defective heart) fail to contribute to survival and reproduction—and are selected *against*. Organisms, including humans, are constantly faced with such adaptive problems and must develop traits of structure and behavior to deal with evolutionary pressures if they are to survive. The form of these adaptations follows from the function they serve. The structures that served a useful adaptive function to our ancient ancestors were selected for and perpetuated because they solved a survival problem, and their presence allowed individuals to propagate.[5] Thus, natural selection engineers a fit between the structure of the organism and the function that structure serves.

These insights from evolutionary biology have been applied to the study of the human brain and how it has evolved, especially

how its cognitive architecture has been shaped over long stretches of evolutionary time.[6] The brain is an evolved system that was formed through natural selection. If organisms' brains evolved through natural selection, it follows that the same evolutionary logic organized the design of the brain's neural circuits.[7] Thus, evolutionary biology forms the foundation of cognitive neuroscience and the models of neural mechanisms in the brain.

Cognitive Neuroscience and the Human Brain

To truly gain insight into the behavior that is directed by the cognitive structures of the mind, the form or design of these circuits must be sketched. Why is the brain formed the way it is? Only when and not before the answer to that question is discovered can scientists really understand the design layout of the brain and the outcomes it produces. If form follows function, then the form's meaning cannot be determined until we figure out what functions or problems the brain was designed to solve.

"Cognitive neuroscience is the study of the design[8] of minds that were produced by the evolutionary process."[9] It is specifically concerned with mapping the information-processing structure of the human mind, "and to discover how this computational organization is implemented in the physical organization of the brain."[10] These "information-processing devices are designed to solve problems . . . by virtue of their structure."[11] In order to explain the structure of these information-processing devices, it is useful to identify the problem the device solves and to determine why and how it solves that particular dilemma over others.[12] The human mind must solve certain adaptive problems efficiently if the individual is to survive. Therefore, these information-processing mechanisms, or algorithms,[13] must be "ecologically rational," which means a person must be able to understand one's immediate environment and be able to approach and resolve problems encountered, with reliability, economy, and precision.[14] In this way, the brain's cognitive algorithms are matched functionally to the adaptive challenges that arise from the surrounding ecological/environmental system and so determine the cognitive structure of the brain.

The Adaptive Ancestral Brain

Our Pleistocene (Ice Age) ancestors were faced with very specific challenges (e.g., foraging for food) and dangers (e.g., avoiding predators) that threatened their chances of survival. Which particular berries, nuts, fruits, and roots can be safely eaten, and which avoided? Which animals are a threat to humans, and which can be befriended? What defenses are best: climbing a tree, running, shouting, fighting? Computational brain circuits matched to such particular survival problems were selected because expertise leads to faster and more precise problem-solving behavior.[15] Darwin had said that the more important the adaptive problem facing an individual, the more "intensely selection should have specialized and improved the performance of the mechanism for solving it."[16] Behavioral generality in evolution is not helpful in solving *particular* threats or situations facing an individual. These Darwinian algorithms are "specialized learning mechanisms that organize experience into adaptively meaningful schemas or frames."[17] Within stable, long-lasting ecological systems, any deviation from the specialized problem-solving strategies developed in the cognitive structure of the brain will result in large fitness costs to an individual. Over long periods of evolutionary time, these various specialized domains have become embedded into our cognitive architecture and are now called upon, perhaps problematically, to solve modern-day dilemmas.

Social Exchange and Human Cooperation

Humans are social animals by nature.[18] This innate behavior is an outgrowth of the necessities of survival when many of the tasks facing our ancestors could only be accomplished through social interaction. "Some of the most important adaptive problems our ancestors had to solve involved navigating the social world," say Cosmides and Tooby.[19] Since various tasks or goals could not always be achieved by acting alone, cooperative behaviors proved to be selectively adaptive thereby enhancing the probability of survival. Such "high levels of social intelligence" among Ice Age humans were most likely an extension of similar traits possessed by the much earlier common ancestors of chimpanzees and humans.[20]

Oftentimes, humans inflicted costs upon one another, but at other times, they helped each other through social exchanges. Social exchange is defined by evolutionary psychologists as "the cooperation between two or more individuals for mutual benefit."[21] It is deeply rooted in evolutionary history and has long pervaded human social life. "Social exchange is not a recent cultural invention . . . [and is] universal and highly elaborated across human cultures, presenting itself in many forms."[22]

Most of these social exchanges occur *conditionally*, however, so that much behavior is contingent upon the actions and reactions of another party. "People conditionally help each other in reciprocal, dyadic, co-operative interactions; they conditionally threaten each other; and they form coalitions, defined by mutually understood contingencies of within-group co-operation and between-group competition."[23] It follows that an ancestral selection pressure for understanding and detecting these contingencies was profound, resulting in cognitive algorithms specialized for reasoning about social exchange.

The rules governing conditional social exchanges give us a first approximation of social contract as defined by evolutionary psychologists. "A social contract relates perceived benefits to perceived costs, expressing an exchange in which an individual is required to pay a cost to an individual in order to be eligible to receive a benefit from that individual (or group)."[24] For this kind of transaction to occur, each exchange partner needs to assess the costs and benefits involved, which depend on the presence of neural algorithms (i.e., modular circuits) capable of making such calculations and judgments. Exchanges that produce more cost to an individual than benefit will be avoided. The brain's cognitive architecture must contain modules for performing a cost/benefit analysis (i.e., a computation) not only of forthcoming social situations but also, in retrospect, of social exchanges.

This concept of social exchange involves some key cognitive abilities that must be present for social contracts to be agreed upon between two or more individuals or groups.[25] First, one must be able to recognize many different individuals who are actual or potential exchange partners. Familiarity and frequent contacts help. Next, people need to be able to communicate their exchange needs to one another if an exchange is to occur. The needs of others must be decoded and analyzed through observation and learning from experience. Third, a person has to remember the history of

interaction with another person or group, whether they were a cheater or a cooperator in previous interactions. Detection of cheaters and avoiding them are aided by neural algorithms that help identify individuals who accept a benefit without incurring a cost to themselves or who impose a cost without returning a benefit.

Reciprocal Altruism

When these cognitive capacities have evolved and become stabilized in a species, a particularly important kind of cooperative social behavior emerges. Biologists call it *reciprocal altruism*, which occurs when an individual acts in a self-sacrificial way toward others with the expectation that its positive actions will be reciprocated at some time in the future.

Biologists and philosophers define altruism differently.[26] An altruistic act is understood by philosophers to include a deliberate, conscious effort by a person to act benevolently toward another, even if at the expense of one's own interests. By contrast, biologists define altruism as an organism's actions that prevent it from reproducing itself genetically (and thus failing to project its genes into the future) while promoting the ability of others to replicate their own genes. An example would be female ants who feed and protect the colony's egg-laying queen but do not lay eggs of their own. Conscious intent is involved in the philosophical view, while only reproductive outcome is involved in the biological version. The reciprocal altruism that occurs among unrelated organisms may or may not involve conscious benevolent intent (depending on the species involved), but its evolutionary (biological) effect is positive for the individuals involved and the social group in which they live.

Reciprocal altruism is a giant step beyond the kind of gene-driven cooperative behavior found among closely related kin, such as family groups or the social insects, which produces an inclusive fitness or survivability for the related family or colony members. When extended beyond the family, reciprocal altruism makes possible social exchanges among *non-kin strangers*, thereby laying the basis for social contracts. A kind of proto-morality and a sense of fairness based on reciprocally altruistic exchanges have been observed among chimpanzees and bonobos[27] and is hypothesized as being present in the early life of *Homo sapiens*.[28]

For biologists and evolutionary psychologists, natural selection will favor altruistic behavioral tendencies because they ultimately benefit the living being performing the act.[29] Altruistic behavior may seem on the surface to be disadvantageous and counter to Darwinian logic. Cost/benefit analyses are performed by each of the partners in a social exchange transaction, aided by appropriate neural circuitry. When costs to one partner consistently exceed benefits, social exchange would seem unlikely in repeated transactions. How then can altruistic behavior have been selected in those cases when an altruist's costs are necessarily greater than any benefits received in exchange? The answer is that benefits may be bestowed on an exchange partner, and costs imposed on oneself, in expectation of future return of benefits, regardless of the genetic relationship to the other contractor. Although reciprocity often does not manifest itself immediately, it is expected to occur among people living continuously with one another over an extended period of time. Thus, for any given exchange partner, altruistic actions and social exchanges are sustained by the long-term balancing of costs and benefits.

Since form follows function in the evolutionary world of natural selection, the human brain would seem to have a design that enhances the ability to behave in a reciprocally altruistic manner that contributes to the formation of social exchanges and human survival.

A DEFINITION OF EVOLUTIONARY SOCIAL CONTRACTS

From the outset, we want to make clear that our meaning of "social contract" is derived from evolutionary forces and not the received versions from philosophy and political science. We specifically reject the idea that social contracts are or can be the socially *a priori* outcome of rational deliberation among contractors for the purpose of establishing fair, just, and liberty-inducing conditions.[30]

"Evolutionary social contracts" are *(1) dynamic social exchange relationships and (2) the biological and social processes that produce them, (3) governed by ancestrally shaped neural circuits/computational modules (4) keyed to achieve individual and/or group advantage in (5) a context of social reciprocity.* This definition embraces five major components identified by the respective

numbers; each in turn is discussed in the following paragraphs. (Figure 1 depicts the five interrelated components.)

(1) *Social exchange relationships are common* among the members of human groups and are observed in other hominoid primates as well. As noted above, they are a very ancient form of interaction, generated by environmental challenges calling for unified, cooperative group action. Such interchanges are *dynamic*, always exhibiting actual or potential instability in the terms and conditions that have brought the exchange parties together. The negotiations that bring social exchanges into existence are themselves a potential source of disruption as exchange partners calculate and recalculate their anticipated and realized benefits and costs. Emergent technologies produce perhaps the largest measure of dynamic instability, aided by the many nonlinear complex processes found in evolving ecosystems.

(2) Social exchanges—of food, sex, shelter, protection, nurturance, intangible favors—are the natural outgrowth of *biologically adaptive life-seeking and life-supporting activities* of the exchange partners. They arise within ecological contexts where human existence is made possible only through interconnected and mutually beneficial actions. Hence, the exchange itself is only the core of a much wider set of patterned interactions that exceeds in importance the exchange act which is never a socially isolated, independent phenomenon.

(3) Social exchanges are moderated by *problem-specific neural circuitry* evolved during the Pleistocene (Ice Age) period as adaptive responses to ecological challenges confronting the several emergent species of the *Homo* genus during that span of time, from 2 million years ago to 10,000 years ago. Human neural architecture has been shaped by the problems anciently encountered in making a living, and the human brain has emerged as a genetically based computational problem-solver that is the end product of natural selection pressures felt over long stretches of evolutionary time. That ancestrally derived neurological system is present in contemporary *Homo sapiens* and continues to guide its human carriers in coping with today's problems, including those domains where social exchange algorithms are activated.

(4) People engage in social exchanges for *personal and/or group advantage* but are restrained by the self-same kind of behavior by their exchange partner(s). Social exchanges carry both benefits and costs for the two sides and will be undertaken when each party

believes the benefits to be taken away outweigh the costs incurred. Being able to perceive one's own anticipated benefits and costs, as well as those of the exchange partner, is a critical element in all social exchanges, because both parties must feel there is clear advantage on both sides if a viable "social contract" is to be agreed upon. Though mutual benefit may be the eventual outcome, neither exchange partner enters into the contract for that purpose. Rather, the belief that such an outcome is possible and likely is only a precondition for going forward with an arrangement from which one can gain an advantage not otherwise available.

(5) *Reciprocating behavior* is common among several primate species, including chimpanzees, bonobos, and humans. Favors are returned. So are punishments. Food is shared. Sex is rationed according to rank, privilege, and various social markers. Reciprocal grooming occurs frequently among some primates. *Reciprocal altruism* is a long-established behavior pattern in primate communities and a type of social glue that holds groups, clans, tribes, and societies together. A climate of *social reciprocity* pervades human consciousness and acts as a powerful constraint on the self-seeking actions of the partners in any social exchange. Individual and group advantage, activated by adaptive survival impulses, thus tends to be channeled and constrained by yet other adaptively significant human tendencies toward reciprocity.

Hence, evolutionary social contracts are sculpted from these five features of the natural world, each of the five an organismic adaptive response to ecological-environmental pressures experienced during a process of continuing evolutionary change. As such, evolutionary social contracts display three additional characteristics that give them a special significance in human affairs.

First, evolutionary social contracts are actual relationships between contractors, not formal or hypothetical agreements "arrived at" in a socially *a priori* manner after interest-free, rational, goal-focused deliberation. Their genesis is the activation of neural algorithms responsive to ecological challenges, not simply the application of context-independent human logic or "reason." The "terms" are set by the ever-shifting interplay of interests of the exchange partners as limited by the general strictures of social reciprocity. Evolutionary social contracts first appeared and continue to do so in many cases without the need for a "contract" *per se*, or a formal document; nor is an imagined or hypothetical "understanding" required, no "social consensus" beyond the

self-defined interests of the individuals and groups engaged in such exchanges. Formal, written, legally binding contracts are one form taken by evolutionary social contracts, as are various regional and international compacts, protocols, and treaties addressing trade between nations and such environmental issues as global warming, depletion of ocean fish stocks, and control of weaponry. These elaborated kinds of evolutionary social contracts take their form and meaning from the same natural substrate that sustained the earlier, more rudimentary ways of making social contracts.

Second, the exchange relationships that constitute evolutionary social contracts assume a variety of forms reflective of the several different cultures in which they occur. This leads to a necessary power law: Any given evolutionary social contract must be compatible in the long run with the sociocultural system where it originates. The benefits sought and the costs incurred will be defined by the culture's economy and polity; calculations of equity and fairness in the exchange will be strongly conditioned by a society's social class system; and the shape taken by expressions of reciprocal altruism will reflect long-established conventions and traditions concerning the meaning of trust and justice.[31] Many of these cultural features will have been encoded as laws, and a society's jurisprudential systems will act to safeguard the integrity of the most important social exchanges, while other exchanges will continue to rely for their integrity and enforcement upon the less formal but still powerful algorithms of social exchange, cheater detection, and pragmatic adaptive reasoning.

Third, evolutionary social contract morals—who gets what and how much—are actual, real-world, *negotiated* morals, not imaginary, abstract, ideal, imposed, rational, thought-experiment calculations often proposed by social contract philosophers. Contractual understandings are consciously deliberated, not merely inferred or implied. Distributive justice is reflective largely of a society's prevailing distribution of power and privilege, as well as the negotiating skills of the social contractors and the pragmatic goals they seek. Obligations, permissions, shares, and requirements are filtered through the biological lens of reciprocal altruism, refracted by a society's particular history and culture. In every sense of the word, the moral principles that emerge during social exchanges are pragmatic—that is, they are practical, workable guides to attaining the adaptive goals sought by the exchange partners and permitted by the wider constraints of the culture.[32]

OTHER NATURALISTIC VIEWS OF SOCIAL CONTRACT

We are not the first to use evolutionary concepts to discuss the origin, meaning, and function of social contracts in a business context. In this section, we refer to other social contract theorists whose diverse disciplinary approaches incorporate evolutionary perspectives.

Banded Social Contracts: Timothy Fort and James Noone

Fort and Noone[33] have used natural science concepts to explain the appearance of social contracts and the need for them in today's business firms. Their "banded social contracts" are a direct expression of several convergent natural processes operating over evolutionary time. The bands they refer to are the small groups of hunter-gatherer peoples of the Pleistocene era who relied upon the natural impulse of reciprocal altruism to establish social solidarity, provide for cooperative endeavors, and define a social status and moral identity for each member of the band. The small size of these ancestral bands, ranging from 25 or so members and subsequently evolving into larger clans of 100 to 250 people, established a natural boundary for cooperation and solidarity among familiar persons. The limited size of these early human groups is consistent with recent research showing the ratio of size of neocortex (the evolutionarily most recent and advanced part of the human brain) to the maximum number of persons in any given social group capable of sustaining itself over time.[34] Under these ancestral conditions, social contracts were a natural feature of day-to-day activities, from rearing offspring to finding food, providing and sharing shelter, and protecting the group from threats both human and environmental.

Fort and Noone see the social contract process as creating not just the conditions necessary for pragmatic cooperation in meeting the practical problems of survival but also as an essential means of defining one's personal moral identity, creating a coherent sense of community, and, beyond even that, serving as a pathway toward a state of metaphysical transcendence. For them, today's corporate governance systems should be reconstructed to acknowledge the positive influence that these small-scale "banded social contracts"

can have on an organization's ethical actions. They favor internal organizational reform that would allow the sense of morality and reciprocal empathy generated within small groups of interacting workers to find its way into the upper-level, controlling, stratified layers of corporate bureaucracy. Their suggestions carry an historic, Jean-Jacques Rousseau–like ring by using social contract to justify reform of one of today's leading institutions.

Social Contracts as a Game of Nature: Kenneth Binmore

In two volumes of game theory esoterica, economist Kenneth Binmore[35] offers a naturalist-evolutionary interpretation of social contract. He is not the first to have done so, for game theorists, biologists, and some philosophers have had a long association dating from the 1970s.[36] We focus here principally on those parts of his interpretation that reveal the natural traits of social contracts.[37]

The central interest and goal of game theorists is to analyze the actions and motives of multiple parties—they can be individuals, groups, or coalitions—who engage in social exchange. Because each of the exchange partners enters the transaction for the purpose of advancing one's own interests, there is a sense in which their respective goals are, or may be, at odds. However, an ideal exchange would satisfy the needs of each side and would therefore be considered acceptable.

Game theorists see such encounters as "games" that require each party to have a strategy for getting the highest expected payoff one can, knowing that the other side also thinks the same way. It boils down to deciding whether to cooperate with one's exchange partner so that both may come out ahead or to dupe the other by cheating or not living up to an expected bargain. The tendency is to cooperate until one side cheats, which will lead the injured party to retaliate in the next round of exchanges, possibly by refusing to agree to any exchange at all. As in the famous Prisoners' Dilemma case where the game is played numerous times, both sides stand to gain by cooperating, but if cheaters are found out they are punished because others will not trust them to play fair in future exchanges.[38] A reputation for honesty and trust promotes the likelihood of exchanges that both sides will accept as appropriate.

A social contract is therefore what game theorists call an "equilibrium" established between two individuals or groups who

have reason to interact in cooperative-coordinative ways. These interactions are simply the kinds of things one normally does in the course of making one's way through life: mating, nurturing the young, finding food and shelter, playing, working, forming organizations, and similar social activities. "We are all players in the game of life, with divergent aims and aspirations that make conflict inevitable. In a healthy society, a balance between these differing aims and aspirations is achieved so that the benefits of cooperation are not entirely lost to internecine strife .... It is such a system of coordinating conventions that I shall identify with a social contract."[39]

Binmore's social contract is decidedly *not* the philosopher's imagined presocietal agreement reached by dint of pure reason and rationality in dividing up social shares among the citizenry. Neither do game theorists believe that an *a priori* sense of common purpose holds human society together. To the contrary, it is the enlightened self-interest of each party to the multitude of social contracts that laces a society into a coherent whole. "The mechanism is *reciprocity*."[40]

Here then is the core idea of genetically embedded social contract algorithms activated when social exchange partners calculate the anticipated benefits and costs of a transaction. Wanting the "fruits of cooperation," they enter a social contract fully aware of the penalties that follow from a failure to reciprocate in kind. It is the neurological circuitry of reciprocal altruism, not some supposed *a priori* common purpose, that constrains social exchanges within acceptable limits of gain and loss.[41]

Social contractors tend to abide by the rules of a biologically mediated reciprocal altruism that can reward exchange partners who, in pursuing their own interests, respect the interests of the contractors on the other side, and conversely will punish those who do not reciprocate. This is equivalent to recognizing that the bonds of social contracting, though appearing to be sociocultural, are primarily natural. That is, social contracts—the games people play that lead to social cooperation, coordination, and a sense of fairness— reflect and reproduce natural values that are selectively adaptive for human communities. Such social contracts are self-enforcing by dint of the combined influence of the neural algorithmic impulses of social exchange, cheater-detection, and reciprocal altruism.[42]

Psychological Contracts: Denise Rousseau

Organization theorist Denise Rousseau,[43] in developing the idea of "psychological contracts," most probably did not intend to root her analysis in the soil of natural science, and indeed she does not do so in any deliberate or conscious way. However, we want to argue that psychological contracts are nothing other than evolutionary social contracts writ large upon the variable face of human culture. Rousseau's contribution is to reveal the myriad psychological and organizational subtleties at work in modern society as social contracts are formed and carried out (or broken), especially those between an organization and its employees.

"The psychological contract is individual beliefs, shaped by the organization, regarding terms of an exchange agreement between individuals and their organization."[44] Each party in such an employment relationship perceives some level of obligation to the other party.[45] This feeling of obligation can be expressed implicitly or explicitly, although the psychological contract deals mostly with implicit commitments between worker and employer. Out of such understanding, psychological contracts arise and are given form through purely cognitive and perceptual processes, which is only another way of acknowledging that embedded cognitive algorithms regulating social exchange relationships are at work as social contract "deals" are made. Psychological contracts are thus a type of social exchange as defined by evolutionary psychologists.

When employer and employee acquiesce to a psychological contract, each party offers and accepts promises based on how each *perceives* and understands both sides of the obligation. However, when the perceptions of social contractors diverge, Rousseau reveals the ever-ready presence of the cheater-detection algorithm poised to safeguard the interests of each exchange partner. So too does Rousseau acknowledge that social reciprocity conditions all social contracts: "One universal norm is that of reciprocity. This ancient and pervasive cultural belief has two minimal demands: People should help those who have helped them and should not injure those who have helped them."[46] This is the notion of reciprocal altruism, which evolutionary biologists have long insisted is the social process that channels exchanges toward mutually beneficial outcomes.

Denise Rousseau's concept of psychological contract is a sophisticated step beyond the views of evolutionary psychologists, for she realizes there is more to social contracts than the primitive fact of social exchange per se, with its emphasis on the importance of being able to detect potential cheaters. As she says, there is a *perception* of mutuality between the social exchange partners, but perceptions differ and are conditioned by prevailing social and cultural standards of justice, which themselves are subject to various interpretations. In the modern business firm where change is constant and driven by new technologies, mutuality is particularly difficult to establish and tends to be fleeting and ephemeral, hence jeopardizing the most sincerely conceived social contracts. Recall the bitterness, disappointment, disenchantment, and defensiveness engendered by corporate downsizing, outsourcing, job-destroying mega-mergers, reductions of healthcare benefits, and ramped-up hours of work piled on the survivors, and it is easy to understand why so many are so cynical about the "mutuality" of social contracts devised within the business arena.

The lesson to be taken from Denise Rousseau's work is that today's social contractors appear to be expressing a broad range of diverse logics—some primitive, basal, and ancient, others linked closely to life in the modern business world—and all of them a function of evolutionary forces driving humans to promote their own and their fellows' well-being, sometimes effectively, other times disastrously.

UNRESOLVED QUESTIONS AND NEEDED RESEARCH

The theoretical and conceptual case for evolutionary social contracts is an impressive one, but to date its supporters leave unanswered a number of questions having profound significance for the entire idea of social contracts, their origin, and their moral function. In this section, we identify some of these theoretical and methodological issues.

* **How stable and enduring are social contract algorithms?** Is it true that these computational modules have endured unaffected since the Pleistocene? What proof do we have that those ancient neural pathways are still active in today's world? How can

evolutionary psychologists show that modern humans continue to think the way our ancient ancestors did?

The Wason selection task, developed in 1966 as a logical reasoning test, has been adapted by evolutionary psychologists to test for the presence of "reasoning specializations designed to operate on social conditionals."[47] Such conditionals are important because social contracts are essentially conditional agreements between people, such as "if you give me that in exchange, I'll give you this in return." If test subjects do well on a Wason test of social contract reasoning, it can be inferred that they have cognitive adaptations "specialized for detecting cheaters in situations of social exchange."[48]

Test results are striking: Most people are not very good logical reasoners when presented with abstract choices to make, but most of them reason with great skill when thinking about making a social contract with someone. Even more dramatic is their talent for sniffing out the possibility of being cheated by one's exchange partner. Over and over again in these tests, cheater-detection has emerged as a dominant reasoning ability for most human respondents, which means that they want to know, and will try to calculate the chances, that a conditional promise made by another person will actually be honored. The research evidence then is strong for the existence of a human cognitive ability to enter into and to sustain social contracts, while remaining vigilant for the possibility that the contract's terms may be breached.[49] In spite of these empirical findings, one might wish for additional ways of discovering just how much our modern brains continue to reflect Ice Age minds.

* **How are social contract algorithms projected into, that is, how do they become, cultural practices?** How do you get from neurological circuit to Denise Rousseau's psychological contracts, or as some would put it, from biological nature to cultural expression? If the input at one end—the brain—is an electrochemical firing of nerve circuits, what determines the shape and function and strength of the sociocultural output at the other end? For example, social contracts vary greatly in form and content from one society to another, which necessarily means that the neural algorithm's expression is variable and presumably depends significantly on the sociocultural environment in which it emerges from the contractors' central nervous system.

Our reading of Richard Dawkins's[50] and Susan Blackmore's[51] notion of cultural "memes"—replicated symbolic forms passed mentally from one person to another—may hold part of the answer. Dawkins and Blackmore say that culture consists of symbols (memes) that people copy (that is, learn) from one another and that therefore move from brain to brain much the way genes are copied by moving from parent to child over successive generations. Cultural copying occurs through learning, while gene copying is a biological process. This means that human culture emerges from the activation of built-in neurological signals and is then sustained through time by the replication, transmission, and learning of symbolic memes. Therefore, the variability of biologically initiated social contracts found within diverse cultures will most likely depend upon a particular society's unique history and the set of cultural conventions (memes) that has evolved over time.

We contend that all social contracts found throughout human societies everywhere—whatever form they take, however many contractors are involved, and whatsoever range of issues may be encompassed—rest upon, are derived from, and ultimately find their justification in the biology of social contracting. Their outward form and substantive content, on the other hand, are cultural expressions that vary widely across the world's diverse sociocultural landscape. The same is true of standard theories of social contract, each one mirroring either prevailing or sought-after cultural concepts of social justice and fair exchange. It remains for social contract theorists to acknowledge the debt their theories owe to biology and for evolutionary psychologists to expand their theoretical categories to include the cultural content of social contracts. What is needed is a viable way to empirically demonstrate these biological-cultural interrelationships.

* **What is the relative strength of the primitive, basal social contract algorithms and the more flexible, diverse cultural phenotypes spawned by them?** Can culture override and neutralize biology? In the history of social contract thinking in the West, both Thomas Hobbes and Jean-Jacques Rousseau famously grappled with this question and reached famously contrasting answers. Evolutionary psychologists have built their case around the idea that nature still rules logic when people find themselves in a social contract situation. Others note the relatively sudden blossoming of *Homo sapiens* culture in the Upper Paleolithic

(40,000 to 50,000 years ago), perhaps signaling the emergence of a human world ruled largely by symbolic culture, though laid on top of and still dependent upon underlying neural algorithms.[52] Speaking of the strength and persistence of cheater-detection algorithms, evolutionary psychologists Cosmides and Tooby acknowledge that "[i]t is possible that they are, in some carefully delimited sense, learned. However, the mental processes involved appear to be powerfully structured for social contracts, yet weakly structured for other elements and relations drawn from common experience. This implies that the 'look for cheaters' procedure is either itself innate, or else the product of a learning process that is guided and structured by innate algorithms that are specialized for reasoning about social exchange."[53]

In the end, one may find that evolutionary psychologists are correct to emphasize the continuing presence and strength of social contract algorithms, while others who prefer to assign a prominent role to culturally derived logical systems of thought may have an equally persuasive case. Knowing which is the stronger—biology or culture, nature or nurture, genes or memes—may well be the central issue confronting humankind in its current search for moral direction. Are people in bondage to an unyielding nature or are they free to shape nature to human purposes? Can humanity contract with nature for mutual benefit? These questions call for more than philosophical speculation. Can empirical science rise to this challenge?

* **Do, or can, social contract algorithms produce cultural universals, that is, predispositions, behaviors, and sociocultural forms that keep appearing in human societies regardless of size, location, and stage of cultural development?** Could the ever popular search for a global ethic,[54] for The Golden Rule and its equivalent, for ethical hypernorms,[55] for fundamental international rights,[56] for a culture of ethics,[57] and all similar efforts be an extension, an expression, an aspiration stemming from the operation of the innate neurological circuitry of social contract thinking? We are inclined to believe so but have no ready way to argue the case nor are we able to cite any definitive research that would provide a confident answer. Cosmides and Tooby,[58] noting the absence of confirming empirical research across a wide spectrum of the world's cultures, argue that a second-best test is to see if the cheater-detection ability can be found to exist in a culture that "is

as different from our own along as many dimensions as possible." Such a group, the Shiwiar, Amazonian hunter-horticulturalists in Ecuador, "showed the same pattern of responses as one finds in American college students," which suggests that neural algorithms remain vibrant even among cultures of great variability. Untangling the intertwined threads of nature and culture is difficult enough, but it is an essential task if we are to know whether the search for moral universals is a hidden natural resource or is dependent on the frailties of human culture. Whatever may be revealed by future empirical research about the relative roles of biology and culture, we feel confident that those who advocate such global rules of conduct would have a stronger argument to support their ethical aspirations for fair and just social contracts if the evolutionary psychologists are proven right.

We conclude by returning to Thomas Dunfee's[59] suggestion, quoted at the beginning of the paper, that social contracts and the reasoning that produces them are manifestations of natural forces. If this be true—and we have made every effort to show that it is—then both theorists and practitioners of business ethics have reason to celebrate: theorists because of the more comprehensive grounding of theory in both nature and culture, and practitioners because in making social contracts with others they ground their ethical commitments in natural processes that have helped bring the human species to this point in evolutionary time.

NOTES

1. Thomas Donaldson and Thomas W. Dunfee, *Ties That Bind: A Social Contracts Approach to Business Ethics* (Boston: Harvard Business School Press, 1999).

2. Thomas W. Dunfee, "Continuing the Conversation: Dunfee re: Frederick: Nature and Norms," *Business and Society Review* 105(4) (2000), 493–501, p. 497.

3. Using biology to explain business and economic phenomena is not a new approach. Ken Baskin (*Corporate DNA: Learning from Life*. Boston: Butterworth-Heineman, 1994) used DNA as a metaphor to describe how corporations function and survive in market environments. Gareth Morgan (*Images of Organization*, 2nd ed. Thousand Oaks, CA: Sage, 1997) stated that organizations behave like living organisms in the way they are structured and the ways they transform and interact with their environments. Biological analogies were

drawn from simian social groups to explain organizational variations in business (Barbara Decker Pierce and Roderick White, "The Evolution of Social Structure: Why Biology Matters," *Academy of Management Review* 24(4) (1999), 843–853). On the strategic side, a form of "natural capitalism" was postulated to solve many environment problems by simply recognizing, understanding, and utilizing natural principles governing production (Amory B. Lovins, L. Hunter Lovins, and Paul Hawken, "A Road Map for Natural Capitalism," *Harvard Business Review* May–June (1999), 145–158; Paul Hawken, Amory B. Lovins, and L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution.* Boston: Little, Brown, 1999). Natural selection principles were used to explain the survival and death of individual firms and products (Andrew D. Henderson, Ithai Stern, and Jungzheng Ding, "An Evolutionary Perspective on Internal and External Selection." Academy of Management Conference, Washington, D.C., 2001). Drawing upon complexity theory, Thomas Petzinger, Jr. (*The New Pioneers: The New Men and Women Who Are Transforming the Workplace and Marketplace.* New York: Simon and Schuster, 1999) maintained that firms and their employees act like, and are in fact, complex adaptive systems seeking a niche in fitness landscapes. Nigel Nicholson ("How Hardwired Is Human Behavior?" *Harvard Business Review* July–August (1998), 135–147) pointed out that much organizational behavior is modeled on biological impulses. Values in business were shown to be created and driven by physical and biological processes (William C. Frederick, *Values, Nature, and Culture in the American Corporation.* New York: Oxford University Press, 1995). Long-time strategy theorist Paul Lawrence (Paul Lawrence and Nitin Nohria, *Driven: How Human Nature Shapes Our Choices.* New York: Jossey-Bass/Wiley, 2001) argues that four biological drives underlie much human and business behavior. Michael Rothschild (*Bionomics: Economy as Ecosystem.* New York: Henry Holt, 1990) and Jane Jacobs (*The Nature of Economies.* New York: Modern Library, 2000) are but two among several economists who have used natural forces to explain economic systems.

4. Examples include David Gauthier, *Morals By Agreement* (Oxford: Clarendon Press, 1986); Michael Keeley, *A Social-Contract Theory of Organizations* (Notre Dame, IN: University of Notre Dame Press, 1988); David Gauthier and Robert Sugden (eds.), *Rationality, Justice and the Social Contract* (Ann Arbor: University of Michigan Press, 1993); Robert C. Solomon, *A Passion for Justice: Emotions and the Origins of the Social Contract* (Reading, MA: Addison-Wesley, 1990); Elliott Sober and David Sloan Wilson, *Unto Others: The Evolution and Psychology of Unselfish Behavior* (Cambridge, MA: Harvard University Press, 1998); and Donaldson and Dunfee. Due to space limitations, we make only minimal efforts here to relate our concept to these earlier works.

5. James Q. Wilson, *The Moral Sense* (New York: Free Press, 1993).

6. John Tooby and Leda Cosmides, "Toward Mapping the Evolved Functional Organization of Mind and Brain," in Michael S. Gazzaniga (ed.), *The Cognitive Neurosciences* (Cambridge, MA: MIT Press, 1995), 1185–1196, p. 1186.

7. William H. Calvin, *The Cerebral Code: Thinking a Thought in the Mosaics of the Mind* (Cambridge, MA: MIT Press, 1996); Leda Cosmides and John Tooby, Introduction, in Michael Gassaniga (ed.), *The Cognitive Neurosciences* (Cambridge, MA: MIT Press, 1999), 1163–1166, p. 1164.

8. Saying that minds are "designed" may seem to imply that the "design" results from the actions of a Designer or Creator. However, "design" in this case refers simply to the natural outcome of evolutionary processes operating over long time periods. For theoretical clarification of this point see Richard Dawkins's *The Blind Watchmaker* (London: Longmans, 1986).

9. Cosmides and Tooby, "From Function to Structure: The Role of Evolutionary Biology and Computational Theories in Cognitive Neuroscience," in *The Cognitive Neurosciences* (1995), 1199–1209, p. 1202.

10. Tooby and Cosmides, 1185.

11. Cosmides and Tooby, "From Function to Structure," 1199–1200.

12. David Marr, *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information* (San Francisco: Freeman, 1982).

13. A cognitive algorithm of the kind discussed in this paper consists of the actions of a group of interconnected neurons involved in calculating or computing a response to a problematic situation (Stuart Kauffman, *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity*. New York: Oxford University Press, 1995, p. 21). At times, we label these algorithms as "modules" or "circuits," meaning a cluster of neurons engaged in calculation.

14. Leda Cosmides and John Tooby, "Dissecting the Computational Architecture of Social Inference Mechanisms: Characterizing Human Psychological Adaptations," *Ciba Foundation Symposium* 208 (1997), 132–161. Chichester, U.K.: Wiley.

15. Leda Cosmides and John Tooby, "The Cognitive Neuroscience of Social Reasoning," in *The Cognitive Neurosciences,* 1259–1270, p. 1261.

16. Leda Cosmides, "The Logic of Social Exchange: Has Natural Selection Shaped How Humans Reason? Studies with the Wason Selection Task," *Cognition* 31(1989), 187–276, p. 193.

17. Ibid., 195.

18. Wilson, 121.

19. Cosmides and Tooby, "Cognitive Neuroscience," 1259.

20. Steven Mithen, "From Domain Specific to Generalized Intelligence: A Cognitive Interpretation of the Middle/Upper Paleolithic Transition," in Colin

Renfrew and Ezra B. Zubrow (eds.), *The Ancient Mind: Elements of Cognitive Archaeology* (Cambridge: Cambridge University Press, 1994), 29–39, p. 33.

21. Cosmides, 187.

22. Cosmides and Tooby, "From Function to Structure," 1202.

23. Cosmides and Tooby, "Dissecting the Computational Architecture," 140.

24. Cosmides, 197.

25. Cosmides and Tooby, "Evolutionary Psychology and the Generation of Culture, Part 2: A Computational Theory of Social Exchange," *Ethology and Sociobiology* 10(1989), 51–97.

26. Michael Ruse, *Evolutionary Naturalism: Selected Essays* (London: Routledge, 1995).

27. Frans de Waal, *Good Natured: The Origin of Right and Wrong in Humans and Other Animals* (Cambridge, MA: Harvard University Press, 1996); and *The Ape and the Sushi Master: Cultural Reflections of a Primatologist* (New York: Basic Books, 2001).

28. Mithen.

29. Robert Trivers, "The Evolution of Reciprocal Altruism," *Quarterly Review of Biology* 46(1971), 33–57.

30. The futility of making such an assumption of *a priori* rationality is acknowledged by a leading philosopher of virtue ethics (Alasdair MacIntyre, *Dependent Rational Animals: Why Human Beings Need the Virtues.* Chicago: Open Court, 1999, p. 162): "It follows that someone who was able and willing at some point in her or his life to separate her or himself, in practice as well as in theory, wholly and not only in part, not in this or that stage or aspect of her or his life, but in all her or his activities and in all her or his sufferings, from those social relationships that are informed by the norms of giving and receiving, and from the virtues that sustain those relationships, including that of just generosity towards and gratitude to the able and the disabled alike, would by rejecting all the relevant moral commitments have also cut her or himself off from participation in any common work of rational enquiry and criticism."

31. In their Integrated Social Contracts Theory, Donaldson and Dunfee refer to these sociocultural features as "microsocial contracts."

32. Frederick (William C. Frederick, "Pragmatism, Nature, and Norms," *Business and Society Review* 105(4) (2000), 467–479) has made a similar argument for the centrality of pragmatic reasoning in business ethics. A failure to locate social contracts within pragmatically specific, identifiable personal and organizational contexts frequently leads to demands being made of people or organizations who have not consented to be bound by such contractual terms. Hence, the general claim that business has a "social contract" with society—e.g., to protect the environment, to charge fair prices, to compete fairly—is supportable *as a social contract* only if and when both sides

promoting the contract have agreed to be so bound, usually by the acceptance and enforcement of laws to that effect.

33. Timothy L. Fort and James J. Noone, "Banded Contracts, Mediating Institutions, and Corporate Governance: A Naturalist Analysis of Contractual Theories of the Firm," *Law and Contemporary Problems* 62(3) (1999), 163–213; Timothy L. Fort, *Ethics and Governance: Business as Mediating Institution* (Oxford and New York: Oxford University Press, 2001).

34. Robin Dunbar, *Grooming, Gossip and the Evolution of Language* (London: Faber and Faber, 1996); Fort and Noone, 188; Fort, 50–51, 142–143.

35. Kenneth Binmore, *Game Theory and the Social Contract, Volume I: Playing Fair* (Cambridge, MA: MIT Press, 1994); *Volume II: Just Playing*, (1998).

36. Peter Vanderschraaf, "Game Theory, Evolution, and Justice," *Philosophy and Public Affairs* 28(4) (2000), 325–358, p. 327.

37. Game theorist and philosopher Brian Skyrms's *Evolution of the Social Contract* (Cambridge: Cambridge University Press, 1996) provides another, closely parallel evolutionary interpretation of social contract. For a variety of perspectives on social contract and business ethics see *Business Ethics Quarterly* 9(1) (1999), "A Special Issue Devoted to Game Theory and Business Ethics."

38. Gerd Gigerenzer and Klaus Hug, "Domain-Specific Reasoning: Social Contracts, Cheating, and Perspective Change," *Cognition* 43 (1992), 127–171; Vanderschraaf, 346–347.

39. Binmore, *Game Theory and the Social Contract, Volume I*, p. 6.

40. Ibid., 24, 30.

41. Ibid., 30, 133–134.

42. For additional illustrations of reciprocal altruism in economic games see Samuel Bowles and Herbert Gintis, "Behavioural Science: *Homo reciprocans*, " *Nature* 415, 6868 (January 10) (2002), 125–128; Ernst Fehr and Simon Gachter, "Altruistic Punishment in Humans," Ibid., 136–140; and Bruce Bower, "A Fair Share of the Pie," *Science News* 161(February 16) (2002), 104–106.

43. Denise M. Rousseau, *Psychological Contracts in Organizations: Understanding Written and Unwritten Agreements* (Thousand Oaks, CA: Sage, 1995).

44. Ibid., 9.

45. S. Robinson, M. Kraatz, and D. M. Rousseau, "Changing Obligations and the Psychological Contract: A Longitudinal Study," *Academy of Management Journal* 37 (1994), 137–152, p. 138.

46. Rousseau, 13.

47. Cosmides and Tooby, " The Cognitive Neuroscience," 1264.

48. Ibid.

49. The Wason test presents the subject with a conditional rule, *If P, then Q*. A choice of *P, not-Q* violates the rule. Four cards contain real-world descriptions for *P, not-P, Q,* and *not-Q*. Test subjects are shown the four cards, each one representing a single person on one side of the card and an action taken by that person on the card's other side. The four cards are randomly arranged and displayed, some turned with the person side up and others with the action side up. The subject is asked to choose the card or cards that would tell whether that person, or the action taken, has violated the rule *If P, then Q*. The task is correctly solved when the subject chooses a true antecedent (*If P*) with a false consequent (a *not-Q*), thereby showing that the rule has been violated. To do this, the person has to turn over a *P* card to see if there is a *not-Q* on the other side (which would violate the rule), or the person has to pick a *not-Q* card to see if there is a *P* on the flip side (which also violates the rule). Repeated tests show that fewer than 10 percent of subjects have done this abstract reasoning task correctly.

A modified Wason task involves putting the cards in the context of a social contract where benefits and costs are calculated by the contractors. To isolate a "look for cheaters" procedure, the respondent would have to choose a *cost-not-paid/benefit-accepted* card (an action that would violate the social contract). This kind of choice situation is just another example of being faced with a conditional *If P, not-Q* situation, i.e., having to judge whether the conditions for exchange, *P*, have been met, *Q*, or not met, *not-Q*. If a person can do well on this task it is interpreted as evidence that reasoning is guided by innate social exchange algorithms. Subjects typically do this task well 70 to 90 percent of the time. More details on the finer points of Wason test methodology are found in Cosmides and in Gigerenzer and Hug.

50. Richard Dawkins, *The Extended Phenotype: The Gene as the Unit of Selection* (Oxford: W. H. Freeman, 1982).

51. Susan Blackmore, *The Meme Machine* (Oxford: Oxford University Press, 1999).

52. James Cooke Brown and William Greenhood, "Paternity, Jokes, and Song: A Possible Evolutionary Scenario for the Origin of Language and Mind," *Journal of Social and Biological Structures* 14(3) (1991), 255–309; C. Karlin and M. Julien, "Prehistoric Technology: A Cognitive Science?" in Colin Renfrew and Ezra B. Zubrow (eds.), *The Ancient Mind: Elements of Cognitive Archaeology* (Cambridge: Cambridge University Press, 1994), 152–164; Jean-Pierre Changeux and Jean Chavaillon (eds.), *Origins of the Human Brain* (Oxford: Clarendon Press, 1995); Phillip V. Tobias, "The Brain of the First Hominids," in Changeux and Chavaillon, 561–583.

53. Cosmides and Tooby, "Evolutionary Psychology," p. 92.