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Evolutionary psychology: theoretical foundations for the study of organizations

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Abstract

This article provides an introduction to evolutionary psychology and its relevance to organizational design theory and practice. Evolutionary psychology assumes that human nature reflect adaptations to an ancestral environment that was intensely social, but differed profoundly from modern organizations in scale and complexity. Further, organizational structures and cultures co-evolved with human nature to deal with the different environmental challenges early humans faced. In this article, I present a concise review of the theoretical foundations of evolutionary psychology and convey how evolutionary psychology hypotheses about organizational design, culture, and leadership in organizations can be developed and tested. I also provide some directions for future research in this area and discuss implications for designing organizations that are perhaps better aligned with human nature than current structures.

Introduction

W.L. Gore and associates is an international manufacturing company with over 10,000 employees worldwide and an annual revenue of 3.2 billion dollars, which is best known for the development of waterproof, breathable fabrics. Less well known is their unique organizational structure and philosophy. When successful units reach the size of about 150–200 employees, the unit splits in two equal parts, occupying adjacent buildings. There are no managers or workers at Gore company, every employee is an associate. In choosing a new CEO, the company invites nominations from the associates and the candidate that attracts the most followers gets the job. All important company decisions are democratic, consensual, and peer-reviewed. Gore and associates' features are frequently on the list of "most desirable companies to work for", and overall job satisfaction is high, and job turnover, low.

Gore's organizational structure may seem unusual to modern standards, but it reflects the social structure of ancestral humans who lived as hunter-gatherers in small-scale, egalitarian societies (Von Rueden and Van Vugt, 2015). In fact, humans spent approximately 99% of their history as a species, living in small, semi-nomadic bands with no formal leaders, no permanent hierarchies, and little or no wealth or power differences between members. Evolutionary psychologists argue that (a) such structures reflect adaptations to particular environmental challenges that early humans faced and (b) human nature has

been shaped by the challenges of living in these small-scale societies (Buss, 2015). Both these elements have implications for organizational design, culture, and decision-making.

This article serves as a primer on evolutionary psychology for scholars in organization design and culture). In the following sections, I provide a brief history of evolutionary psychology and why it is relevant to study organizations. I then discuss the key assumptions of evolutionary psychology and some of its key theories and constructs as they are relevant to organizations. Building on this foundation, I will then illustrate how evolutionary psychology can be used as a heuristic framework for developing hypotheses and designing empirical research programs. I conclude by outlining some implications for organizational design and offer directions for future research. Organizational scholars have used evolutionary models before, for instance, to explain how firms adapt successfully to changing environments (Dekkers, 2005). Evolutionary psychology goes one step further by assuming that organizational structures are manifestations of a deeper psychology that was selected for by evolution as it enabled humans to respond adaptively to different environmental challenges. My approach in this primer is to shed light on how evolution via natural selection might have shaped the psychological foundations of organizational actors, thereby influencing aspects of organizational design and culture.

Organizations have been a part of human history for at least several millions of years. Like all primates, humans live in groups, although human groups tend to be larger and socially more complex. Our nearest relative, the common chimpanzee—with whom humans share a common ancestor some 5–7 million years ago—lives in groups of 30–50 individuals. Early humans tended to have group sizes that were substantially larger, around 50–150 individuals, but not nearly the size of modern complex societies (Foley, 1997). Although organizational structures do not fossilize, we know a lot about our ancestral past through studying current hunter-gatherer societies and through recent advances in knowledge from archeology, anthropology, behavioral genetics, neuroscience, evolutionary biology, and evolutionary psychology (Von Rueden and Van Vugt, 2015). Together, they paint a reliable picture of how human psychology and behavior evolved and in what kind of societies they evolved.

What is evolutionary psychology?

Evolutionary psychology studies the human brain and its behavioral products from an evolutionary perspective; it uses evolutionary theory (and insights from evolutionary biology) as a meta-theoretical framework to generate hypotheses about human psychology and behavior. Evolutionary psychology focuses on four key questions: (1) why is the brain designed the way it is, (2) how is it designed, (3) what are the functions of the human brain, and (4) how does input from the current environment interact with the design of the brain to produce behavior? (cf. Tinbergen, 1963).

The history of this field begins with Charles Darwin, who was interested in how species emerge, how they change, and why they appeared so well designed to their natural environments. He wanted to explain why particular traits of organisms like the giraffe's long neck, the wings of the birds, or the shape of a pine tree came to be. His answer to all puzzles of life was the theory of evolution via natural selection which contains three simple premises. First, within a species, individuals vary in all kinds of ways, both physically and behaviorally. Second, some of these variations are heritable in the sense that offspring resemble their parents. Third, some of these variations enable their bearers to compete more successfully for resources such that they produce more offspring than

others do. Each of these premises has received overwhelming scientific evidence (Dawkins, 2009) and lead to an inescapable conclusion: Over time, organisms (and species) become adapted to their environments.

A number of different forces led to the development of evolutionary psychology as a scientific field with the ambition to offer a new paradigm for integrating the social and biological sciences. First, there was biologist E. O. Wilson's landmark 1975 book, *Sociobiology*, in which he synthesized recent theoretical advances in evolutionary theory to explain social behavior in animals, including humans. As most evidence came from studies of animals far remote from humans (e.g., fruit flies), it led to a storm of protest from social scientists who could not see the relevance of evolutionary theory for understanding human behavior. Wilson was accused of biological reductionism, because he tried to explain complex cultural phenomena such as religion and warfare in terms of simple biological laws. In addition, Wilson made no attempt to explain what was happening inside the black box, the human mind. This changed with the cognitive revolution in psychology which emphasized the importance of studying the human brain as an information-processing mechanism.

In their 1992 book "The adapted mind," Barkow, Cosmides, and Tooby (1992) popularized the term evolutionary psychology. They argued that the human mind contains psychological mechanisms (e.g., for mate preferences, cheater detection, leadership, status) that emerged because they enabled humans to solve different adaptive problems in the environments in which humans evolved (the EEA, see next section "Assumptions"). This book formed the basis for evolutionary psychology as a scientific field that has since made inroads in all fields of psychology, from social to cognitive and from developmental to industrial/organizational psychology. This would have been much to the delight of Charles Darwin himself who wrote: "In the distant future, I see open fields for more important researches. Psychology will be based on a new foundation." Nowadays, evolutionary psychology is not only recognized for its role in unifying psychology as a scientific discipline and for generating many novel hypotheses. It is also recognized for its applied contributions to other fields, such as law, medicine, political science, marketing, leadership, management, and organizational sciences (e.g., Colarelli and Arvey, 2015; Saad, 2011; Van Vugt and Ahuja, 2010).

Assumptions

Evolutionary psychology makes a number of assumptions about human nature. First, all species have a nature and that nature is different for each species (e.g., a cat has a different nature than that of a dog). Each species has faced somewhat unique selection pressures during its evolutionary history and therefore has confronted a different set of adaptive problems. This is reflected in how their brains operate. The brain is an information-processing organ which contains (a large number of) psychological mechanisms that evolved because they solved a specific problem of survival or reproduction in a species' evolutionary history. For instance, in order to survive in food-scarce environments, ancestral humans evolved food preferences that made them seek out foods that were particularly rich in calories. The result is a universal human preference for sweet and fatty foods that, incidentally, may no longer be adaptive in food-rich environments (Griskevicius, Cantu, and van Vugt, 2012).

Second, humans are not rational-economic decision-makers. Instead, their actions are guided by a deeper rationality that (1) enables them to fulfill their evolutionary goals (of

survival and reproduction) and (2) operates through the activation of evolved psychological mechanisms to achieve these goals, which may deviate from utility maximization. For instance, in the interests of survival, it makes sense for humans to weigh potential losses more heavily than gains. However, when a mating opportunity arises, it pays for humans, and especially for men, to weigh a potential gain more heavily than a loss (Li, Kenrick, Griskevicius, and Neuberg, 2012).

Evolved psychological mechanisms operate as fast, automated, non-conscious, conditional decision rules, or heuristics that respond to specific environmental inputs by producing certain adaptive outputs (Tooby and Cosmides, 2015; cf. System 1 Kahneman, 2011). For instance, humans have an evolved fear-of-snakes mechanism that is activated by stimuli that have the features of a snake, which then produces a quick, automated response to cope with this threat. Outputs are directed towards the solution of the problem—avoiding snakes in this case—and these outputs can be physiological (stress), affective (fear), behavioral (running away), or a combination.

A fourth assumption is that human nature is intensely social. Early humans evolved in savannah-like environments in Africa where predation risks were high and resources were scattered (Foley, 1997). To overcome these challenges, humans needed to organize themselves into highly cooperative foraging groups nested within larger tribal structures. Evolutionary psychologists assume that this tribal history is reflected in how human brains are designed. Humans have a considerably larger neo-cortex than other primates, arguably because it enabled early humans to live and thrive in large, complex social groups (the social brain hypothesis; Dunbar, 2003).

Evolutionary psychology assumes further that humans have evolved a rich repertoire of (social) psychological mechanisms to reap the benefits of group living, while mitigating its costs. Humans have evolved specific psychological adaptations to negotiate status hierarchies, overcome coordination challenges, form cooperative coalitions, solve group decision-making problems, and deal with members of out-groups (Van Vugt and Kameda, 2012). These adaptations are domain-specific and context-dependent. Differences between group cultures and structures emerge as the same psychological mechanisms respond adaptively to different environmental conditions. In situations where (food) resources are predictable, concentrated, and contestable, hierarchical relations likely emerge as some individuals can dominate the rest by monopolizing resources. In contrast, in situations in which (food) resources are variable, dispersed and can only be obtained through collective effort (e.g., hunting a large game), more egalitarian structures emerge (Pierce and White, 1999).

A final assumption is that these psychological mechanisms are optimally designed to deal with the problems in ancestral human environments in which they were selected. That means that they may not be currently adaptive, especially when physical or social environments change rapidly. Such was the case with the Dodo, the giant flightless bird that went extinct in the seventeenth century on the island of Mauritius. Because there were no natural predators on the island, the Dodo had lost its ability to fly, so it could not escape when the ships with hungry seamen from Europe arrived on their way to the Far East. Similarly, human society has changed quite dramatically since the agricultural revolution some 10,000 years ago, yet our brains have not changed much in this relatively short period, creating the possibility of mismatch (Van Vugt and Ronay,

2014). As evolutionary psychologists Cosmides and Tooby (1997) state: “Our modern skulls house a Stone Age mind.”

Criticisms and controversies

Evolutionary psychology has had its fair share of criticism over the years, some of which is valid and some appears to be the result of misunderstandings. First, we discuss some common misconceptions (for details, see Hagen, 2005). Evolutionary psychology is often accused of genetic determinism: All of our behaviors are predetermined by our genes and cannot be changed by culture, learning, or our own volition. This accusation is simply not true. According to evolutionary psychology, the environment plays a crucial role in the decisions humans make. For instance, men may have evolved certain predispositions to physical violence, but whether they carry out such acts depends upon local factors such as poverty, education, or the presence of a culture of honor. Critics also accuse evolutionary psychology of being reductionist. Yet, reductionism is one of the core features of the scientific enterprise because it forces researchers to develop parsimonious theories that uncover fundamental relationships between phenomena at different levels of explanation (e.g., how brains, hormones, and genes interact to influence aggression). Evolutionary psychology makes an important distinction between ultimate and proximate levels of explanation. Understanding the conditions under which egalitarian work structures emerge in organizations is a different question to why humans evolved the capacity for egalitarianism in the first place. The proximate and ultimate questions complement each other (Van Vugt, Hogan, and Kaiser, 2008). A third criticism is that evolutionary psychology hypotheses are untestable, because we do not know what past environments looked like. Granted, there is no time capsule that brings us back to the ancestral environment of humans. Yet, by combining knowledge from a range of different fields such as evolutionary biology, anthropology, primatology, and paleo-archeology, we have a pretty good picture about what ancestral human organizations looked like (Dunbar, 2003).

As with any productive field of science, there are also controversies in evolutionary psychology. One concerns the question whether evolutionary explanations should focus on describing the evolved psychological mechanisms causing behaviors or on the ultimate functions of the behavior itself. The first approach is characteristic of evolutionary psychology, and the second, of human behavioral ecology (HBE). For instance, in explaining people’s desire to obtain status, a HBE-scholar would examine the link between holding a high-status position and reproductive success (e.g., numbers of children, grandchildren) whereas an EP-scholar would search for the cognitive mechanisms that enable individuals to compete for status (e.g., psychological systems to assess and improve one’s status; Van Vugt and Tybur, 2015). These approaches are compatible and complimentary (Sear, Lawson, and Dickins, 2007). Another dispute is if the brain comprises of many specialized in-built psychological mechanisms that respond to specific inputs (e.g., snake, food, enemy) or a smaller number of domain-general mechanisms enabling people to (culturally) learn to associate specific inputs with specific outcomes (snake means danger). A third controversy concerns the question whether many human traits and behaviors are psychological adaptations themselves or are, in fact, byproducts of other adaptations. For instance, some evolutionary psychologists claim that rape is an adaptation that enables men of low mate value to obtain access to sexual partners, whereas others in the field disagree, claiming

that rape is a byproduct of a general aggressive male tendency towards women—naturally, these competing evolutionary hypotheses can be tested against each other. Also, there are disagreements in the field about the relevance to humans of particular evolutionary theories. For instance, some evolutionary scientists believe that many unique human behaviors such as cooperation, language, and warfare are the result of natural selection at the level of competing groups (Wilson et al., 2008). Others vehemently disagree with this viewpoint, arguing that natural selection in humans can operate only through individual competition (Pinker, 2015). Finally, some evolutionary psychologists claim that the human brain has evolved gradually over a long stable evolutionary period (the “EEA”, see below), whereas others believe that the human brain has been subject to rapid genetic and cultural changes. These controversies notwithstanding, there is wide agreement in the field about the usefulness of an evolutionary perspective to human behavior (Buss, 2015; Laland and Brown, 2011; Sear et al., 2007).

Key concepts and theories in evolutionary psychology

Evolutionary psychologists use evolutionary theory (and evolutionary biology) as a meta-theoretical framework to generate hypotheses about human psychology and behavior. Here, we introduce some of the main theories and concepts from evolutionary psychology that may be relevant to the study of organizations.

Costly signaling

Like all organisms, humans communicate with each other via signals. But what signals should one pay attention to and which ones should one ignore? The idea is that the more costly a signal is, the harder it is to fake, and so the more attention should receivers pay to it. An animal example is the peacock’s tail which is costly to grow and serves as an honest signal of the genetic quality of the male. In humans, an academic degree serves as an honest signal to employers about the work qualities of job candidates (Spence, 1973).

EEA

It stands for the environment of evolutionary adaptedness, a key construct in evolutionary psychology. The EEA refers to a particular time period in our evolutionary history where an adaptation emerged, yet for each trait, the EEA may be different (e.g., the EEA for the eye is 60 million years old, but for bipedalism, it is probably 2–4 million years ago). For many of the human adaptations we are interested in here, the EEA refers to a stable period from approximately 2.5 million years to about 10,000 years ago in which hominids lived in relatively small, relatively egalitarian, kin-based societies leading a hunter-gatherer lifestyle. Specific human adaptations for language, reciprocity, leadership, culture, cohesion, social structure, and intergroup relations were likely shaped during that period.

Evolutionary mismatch

This is the idea that whenever organisms face novel environmental challenges, their evolved mechanisms may no longer produce adaptive responses. As an example, in the EEA, it was advantageous for humans to be impulsive in acquiring high-calorie foods (such as honeycombs). Yet, in a modern day environment with supermarkets loaded with superfatty, supersweet foods, such impulsive food intake may backfire causing modern “lifestyle” diseases such as obesity and diabetes. Similarly, many modern, complex organizational structures may be ill-fitted to our evolved small-scale psychology (Van Vugt and Ronay, 2014).

Gene-culture coevolution

For several million years, humans acquired two kinds of information, one from genes and the other from culture. How do genes and culture interact? Whereas some evolutionists believe that genes hold culture on a leash, others argue that culture can in fact change the gene frequencies in a population. For example, evolved mechanisms for cultural learning in small scale societies enabled humans to develop cultural practices (e.g., social institutions, governance) to foster cooperation in large groups. This paved the way for modern complex societies to emerge on the back of selection pressures for these cultural dispositions. The resultant of this gene-culture co-evolutionary process is what is known as cultural group selection (Richerson and Boyd, 2005).

Kin selection

An evolutionary strategy favoring the reproductive success of an organism's relatives, even at the cost of the organism's own survival and reproduction is kin selection. This strategy can benefit altruistic actions towards family members and has been widely observed in the animal world. Likewise, people tend to favor helping kin over non-kin and close kin over distant kin. The prevalence of family businesses around the world can be viewed in terms of a kin selection strategy.

Multilevel selection

This theory assumes that selection can happen at two levels, the individual and the group. When there is variation in the (reproductive) success of individuals within groups, but not between groups, then selection for all kinds of traits occurs primarily at the individual level. Yet, when the variation in success is larger between groups than within groups, group selection can be a potent force. Multilevel selection may account for some of the peculiar aspects of human nature such as altruism, morality, and inter-group competition (Wilson, Van Vugt, and O'Gorman, 2008). Biologists Wilson and Wilson (2007) stated: "Selfishness beats altruism within groups. Altruistic groups beat selfish groups. Everything else is commentary."

Niche construction

This evolutionary theory describes the process whereby individuals through their activities, choices, and interactions with others can modify their environments, resulting in new selection pressures (Laland, Odling-Smee, and Feldman, 2000). An animal example is the beaver dam that, once built, changes the physical environment in such a way (the river becomes a lake) that organisms must adapt to these changing environments, thereby constructing new niches for themselves and other species. Similarly, the transition from a hunter-gatherer to an agricultural lifestyle created new niches for humans whereby new organizational structures could flourish. The transition from informal to formal leadership arrangements may be a manifestation of niche construction by creating new ways of organizing that enabled the expansion towards large, complex societies in our history (e.g., empires, multinationals; Spisak, O'Brien, Nicholson and Van Vugt, 2015).

Reciprocity

Cooperative hunting, group defense, and communal child care were problems in the EEA that required humans to work together with genetic strangers. Humans have evolved

mechanisms that enable them to cooperate with genetic strangers on the basis of reciprocity. This happens when a first cooperative move is returned at some point in the future either by the recipient (direct reciprocity) or by the group (indirect reciprocity). On the back of this mechanism, a suite of psychological adaptations emerged that enable humans to determine the costs and benefits of transactions, identify potential cheaters, memorize interactions with a number of different individuals, establish a good reputation in their group, and possess social emotions that track reciprocal interactions (e.g., anger towards cheaters, loyalty towards cooperators, guilt towards one's own transgressions).

Social/sexual selection

Natural selection refers to adaptations that emerge in response to pressures from the physical environment such as the ability to walk upright as a physical adaptation to a savannah lifestyle. Yet, as a group living species, many human traits are likely to be the result of selection pressures in the social environment—the competition and cooperation with other humans—and these may be particularly relevant for management scholars. Social selection includes psychological mechanisms that make individuals better coalition partners and mechanisms to compete for and acquire sexual mates. The latter is called sexual selection—after natural selection, the second pillar of Darwin's theory.

Research toolbox of evolutionary psychology

Once clearly formulated, hypotheses have been derived from these theories and concepts in evolutionary psychology, the next step is to test them empirically. Evolutionary psychologists have a wide array of scientific methods at their disposal. The scientific foundation of evolutionary psychology, as we will see, rests not on a single method, but rather on convergent evidence from a variety of methods and sources.

Comparing species

Comparing species that differ along particular dimensions (Brosnan, Newton-Fisher, and van Vugt, 2009) is a powerful method for testing hypotheses about adaptive function. If we take an emergent organizational structure as the manifestation of evolved psychological mechanisms responding to differing environmental conditions (cf. Puranam et al., 2014), we can make comparisons between humans and non-humans. As an example, gorillas live in ecologies (jungles) in which reproductive resources (food, mates) are concentrated and highly contested, and physically strong males can monopolize access to these resources. This results in a social structure that is hierarchical and a psychology that is ultracompetitive: The alpha male can dominate the troop until he is dethroned by a rival male. In contrast, humans have occupied ecologies (savannahs) where resources were dispersed and some highly prized foods, such as meat, could only be obtained through cooperative efforts (hunting a big game). This has led to more egalitarian, network structures, and an evolved psychology that is geared towards cooperation, consensus-building, and democracy (cf. Pierce and White, 1999).

Archeological records

A second source of information comes from stones, skulls, and bones. Analyses of stone materials can give us an idea of the kind of food they were processing, and bones can tell

us something about diets and diseases. Skulls and bones can reveal information, for example, about brain size, social practices (burial), and group sizes, hence indirectly about their social organization (Dunbar, 2003). Through carbon-dating techniques, we can analyze the evolutionary trajectory of brain size and social structure development among different hominids such as *Homo habilis*, Neanderthals, and *Homo sapiens*.

Models and simulations

These can be used to test evolutionary hypotheses about human social interaction. Agent-based models reveal that in groups with heterogeneity in preferences yet a limited time to reach consensus, informal leaders emerge (Gavrilets, Auerbach, and Van Vugt, 2016). The position of a leader is then taken by the most stubborn group member—the individual least willing to shift their position. Game theory and computer simulations can help in identifying conditions under which groups move from an egalitarian structure with consensus-based leadership to a hierarchical structure with an institutionalized leadership—one critical factor is resource abundance which compensates leaders for taking up coordination roles (Hooper et al., 2010). Together, these analytic results inform us about the transition from small-scale societies to larger, complex societies after the agricultural revolution (Powers and Lehman, 2013).

Anthropological studies

Cross-cultural methods provide valuable tools for testing evolutionary hypotheses. The most obvious method pertains to adaptations that are hypothesized to be universal such as the basic emotions, adaptations for cooperation, leadership, and status. Comparing different cultures, particularly those that are WEIRD (Western, Educated, Industrialized, Rich and Democratic) to non-WEIRD cultures can be informative about the universal aspects of human nature (Henrich, Heine, and Norenzayan, 2010). Current hunter-gatherer societies such as the Hadza in Tanzania, the Kung-San in Namibia, or the Ache in Paraguay are the best model that we have of our ancestral world and studying their social structures can be particularly informative (Von Rueden and Van Vugt, 2015).

Psychological experiments

Psychological experiments can be useful to test hypotheses about evolved psychological mechanisms too. In experiments, people are randomly assigned to an experimental condition in which they are exposed to a manipulation or to a control group. For instance, an experiment using the well-known Wason selection task compared two conditions (Cosmides and Tooby, 1997). The task was presented to one group of students as an abstract logic task, whereas to the other, it was presented in an ecological manner, namely as a social contract that was being violated. Comparisons of these two versions showed a vast improvement in performance on the ecological version. Apparently, people do much better at these tasks if they are framed in terms of social norm violations, suggesting that humans have an evolved a “cheater detection” mechanism (although this conclusion has been disputed; Liberman and Klar, 1996).

Neuroscience methods

Neuroscience methods can be used to identify the biological substrates of psychological mechanisms and test hypotheses about design features of these adaptations. One study found, for example, that individuals with high basal testosterone perform better when placed in a high-ranked organizational position, but worse in a low-ranked position (Josephs et al., 2006). The reverse is true for individuals with low basal testosterone. This suggests that testosterone triggers a status drive in humans that makes them more effective in achieving dominant roles in organizations. Studies on cortisol, the “stress hormone”, reveal that individuals in higher positions within firms have lower levels of cortisol than lower ranked positions presumably because they have more autonomy (Sherman et al., 2016). Finally, brain imaging techniques are also increasingly used to test evolutionary psychology hypotheses about, for example, domain-specific adaptations for altruism, cheater detection, punishment, morality, and leadership.

Genetics

Traditional behavior genetics such as twin studies and adoption studies can be used to test evolutionary hypotheses, for instance, on the heritability of entrepreneurship (Shane, 2010; Zhang et al., 2009). Behavior genetic methods can determine whether individual differences in entrepreneurship are environmentally mediated, genetically mediated, or—what seems likely—a combination. Molecular genetic methods are relatively new and promising. They are designed to find genes that underlie hypothesized psychological adaptations. Individual variations in the alleles of DRD4 provide an illuminating example (Ebstein, 2006). The 7R allele (version) of this gene is linked to traits such as novelty seeking and extraversion. This gene version occurs at dramatically different rates in different geographical regions and has been hypothesized to be advantageous in exploiting resources in novel environments. That this gene version is substantially more common in (a) nomadic than in sedentary populations and (b) in societies that have undergone recent mass migration (e.g., the USA) supports this evolutionary hypothesis.

Testing evolutionary psychology hypotheses in organizations

In this section, while keeping in mind the theoretical and methodological foundations laid out above, we turn to a more practical question: how to design and implement research projects in organizations, using evolutionary psychology hypotheses (for a summary, see Table 1).

Mismatches in organizations

Modern organizations are in many ways different from the small-scale societies in which humans evolved, especially regarding their scale and complexity (Von Rueden and Van Vugt, 2015). This means that human-evolved small-scale psychology may not be optimally designed to navigate these modern organizations, and this may produce mismatch. Studying such organizational mismatches, and their consequences, could be an important future research domain for organizational design.

Appeal of non-hierarchical organizations

One manifestation of mismatch is that there is a popular dislike for hierarchical structures in work organizations. Non-hierarchical organizations, as embodied in open production

Table 1 Examples of theories and methods from evolutionary psychology contributing to the study of organizations

Research question	Evolutionary theory	Evolved mechanism	Methodology
Do family businesses perform better in certain markets? How do organizations manage nepotistic biases?	Kin selection	People trust and cooperate with kin more than non-kin	1. Comparing family businesses with corporations 2. Simulations 3. Genetics
Do people dislike working in steep hierarchical structures?	Mismatch	People have a small-scale social psychology	1. Surveys in organizations 2. Psychological experiments 3. Anthropological records
Are organizations in new, competitive markets more egalitarian?	Multilevel selection	People invest more in group when competition between groups is strong	1. Models and simulations 2. Case studies 3. Archeological data
Do more entrepreneurial leaders create more entrepreneurial organizational cultures?	Cultural evolution	People copy the behavior of high-prestige models	1. Psychological studies 2. Neuroscience 3. Organizational surveys
Are there more sexual relationships and sexual conflicts and harassment in gender-diverse work places, based on particular sex ratios?	Sexual selection	People compete with the same sex rivals for the opposite sex	1. Psychological experiments 2. Comparative organizational studies

communities, like Linux or Wikipedia, and boss-less organizations such as W.L.Gore, Semco, or Valve Software enjoy a great deal of popularity despite their relative numbers and size (Valve featured in a special JOD issue on the Organization Zoo series; Puranam and Håkonsson, 2015). Mismatch makes clear that because humans evolved in non-hierarchical organizations, it is likely that a preference for informal, egalitarian structures is an integral part of human nature. Indeed, social psychological studies show that perceptions of fairness are an important predictor of job satisfaction and having a “voice” produces behavioral compliance (procedural justice; Tyler and Lind, 1992). Yet, although flatter, boss-less structures may be better fitted to human nature, it is unclear whether they are useful structures to organize complex activities that require greater top-down coordination and a larger span of control, like manufacturing companies (Puranam and Håkonsson, 2015). Case studies of boss-less work organizations could provide an answer as to the strengths and limitations of this kind of organizational structure as may controlled simulation studies (Ethiraj and Levinthal, 2004) and surveys looking at preferences for flat versus steeper organizational hierarchies.

Leadership

Following a leader is an adaptive solution to ancestral coordination challenges (Van Vugt, Hogan, and Kaiser, 2008). Extrapolating from current hunter-gatherers, leadership in the EEA was informal, charismatic, and domain-specific. For example, people followed a more aggressive leader during wartime and a younger leader during change. Such heuristics still affect humans today. Political studies show that voters prefer more masculine, dominant-looking leaders during wartime than during peacetime and they want younger aged leaders

in times of change (Van Vugt and Grabo, 2015). Yet, although these heuristics may have had adaptive utility in ancestral environments, they may be mismatched to modern organizations in which leadership is no longer a physical job. As leaders have a disproportionate influence on organizational culture, it would be interesting to see whether people are still biased towards certain leaders based on such physical cues of age or masculinity. For instance, do CEO's in highly competitive markets have more masculine traits? Are younger CEO's indeed more innovating by adopting new technologies more quickly than old-aged CEO's? Comparative organizational studies that zoom in on occupants of senior leadership roles could provide answers.

Decision-making biases

A different mismatch pertains to decision-making biases in organizations. In an ancestral environment with plenty of dangers, humans evolved psychological mechanisms to make fast decisions. A decision rule such as “follow the individual that appears confident” was usually backed up by information about a person's competence as everyone knew each other well. Yet in modern organizations, competence information is often lacking about managers and CEOs and so, people tend to mistake cues of confidence for competence. This then selects for leaders who are overconfident, but not necessarily competent in their decision-making (Van Vugt and Ronay, 2014). Selection and feedback methods that raise the awareness of biases in leader decision-making may prevent these errors. Other biases (Kahneman, 2011) such as loss aversion, fundamental attribution error, or the inability to make probability judgments—thinking in terms of percentages rather than in absolute numbers—could also be interpreted as adaptive heuristics that were perfectly fitted to ancestral environments, but work less well in modern environments (Nicholson, 1997).

Cultural evolution

Gene-culture coevolution models may shed light on the emergence of different organizational designs and cultures. Co-evolutionary models hypothesize that different social structures arise from the same evolved individual psychological mechanisms responding to different environmental cues. Humans possess adaptive biases for social learning such as a tendency to imitate high-status people (Henrich and Gil-White, 2001; Richerson and Boyd, 2005). Such biases can give rise to different social institutions and cultures, depending upon what role models are available (Johnson, Price, and Van Vugt, 2013). Organizations with senior managers with narcissistic, overbearing personalities may develop toxic organizational cultures as lower ranked employees copy these behaviors. Organizations with male-biased sex ratios are expected to have a more competitive, risk-taking, and hierarchical organizational culture than organizations with a women-biased sex ratio that may be more caring and egalitarian. Such predictions remain to be tested.

Multilevel selection in markets

Multilevel selection theory makes predictions about trade-offs and consequences of within-firm versus between-firm competition. Competition among firms has been suggested to reflect the ruthless logic of the Darwinian selection. A free market is a struggle for survival where successful firms survive and unsuccessful ones die out. This fits with the views of Adam Smith's invisible hand that economic actors are primarily self-interested. Yet the view

from the multilevel selection theory is completely different as it suggests that organizations operate better to the extent that they are able to suppress the self-interest of individual members. Multilevel selection makes clear that when the competition between members of an organization (e.g., for salaries, promotions) is a stronger force than the competition among organizations, then the result is a high level of social inequality, power differences, poorly functioning teams, and authoritarian leadership. However, when competition between organizations is a stronger force then highly cooperating organizations emerge with strong norms of collaboration, teamwork, organizational citizenship, and consensual leadership (Johnson et al., 2013). Multilevel also makes predictions about the kind of unethical behaviors that we see. If within-group competition is a stronger force in an organization, then we would see evidence of aggression, theft, and individual fraud. Yet between-group competition, forces produce other kinds of transgressions such as collective fraud, tax evasion, and price settings.

Reciprocity and kin selection

Humans cooperate with each other based on either kinship or reciprocity. Nowadays, many people work in organizations with genetic strangers, so reciprocity is an important force. A suite of social emotions guide people in prioritizing their goals and actions in such cooperative arrangements. One example is in teamwork. People experience anger when working in an organization that fails to reciprocate their cooperative actions. Yet, people may experience guilt if they themselves fail to reciprocate. Policing the psychological contract of reciprocity seems of uttermost importance to foster a healthy organizational climate (Nicholson, 1998). Another line of inquiry could focus on kin selection. From a kinship perspective, family businesses are highly stable, cooperative units. The evolutionary strategy to favor kin over non-kin (nepotism) may be a double-edged sword in the corporate world, however. On the one hand, it explains the success of family firms where strong forms of trust and loyalty are underpinned by genetic relatedness. On the other hand, evolved nepotistic behaviors can be detrimental in terms of governance and in personnel selection. Finding out under what conditions family organizations flourish could be an important avenue for research (Nicholson, 1997).

Sexual selection in the work place

A final example of applying evolutionary insights to the work place is offered by sexual selection theory. Unlike in small-scale societies where division of labor among the sexes was common—the men were generally hunters and the women gatherers (Von Rueden and Van Vugt, 2015)—many organizations now have a gender-diverse work force. As men and women have evolved to compete for sexual partners, we can expect the modern work place to be a hotbed of sexual emotions, which might need to be regulated (Browne, 2006). It could be useful to study what sexual strategies (long-term versus short-term) men and women use in work organizations and how different sex ratios (male or female biased) affect these sexual strategies. From a practical viewpoint, developing organizational norms that promote gender diversity while preventing sexual harassment could be important.

Implications and conclusions

The study of organizations can benefit in several ways from interactions with evolutionary psychology. First, evolutionary psychology makes clear that people in organizations are not rational decision-makers. Instead, their behavior is guided by deeper evolutionary goals (e.g., mating, protection, autonomy, conformity) that may deviate from rationality and are often beyond conscious control. Second, evolutionary psychology generates many novel hypotheses about the evolution of specific organizational arrangements that cannot be easily generated by other more proximal theories. Evolutionary psychology makes predictions about the success of family firms, the effects of market competition on organizational structure, and the way organizational cultures are shaped and molded by senior managers. Granted, some of these hypotheses could also be derived from other theories. Yet, rather than having separate theories for separate phenomena, evolutionary psychology offers a single, integrative framework for understanding different kinds of organizational design questions that were previously unconnected. Finally, from an applied perspective, evolutionary psychology offers useful ideas for improving organizational design and practice. Mismatches in an organizational design are problematic. Human-evolved small-scale psychology may be ill-fitted to cope with the demands of modern, complex organizations in which interactions with genetic strangers in formal hierarchical relations are the norm. Many of the ills of modern organizations, such as CEO-overcompensation, alienation, bullying, job stress, and burn-out may be the manifestations of this mismatch. Data from small-scale human societies can aid the search for the design principles for the effective management of modern organizations (Wilson, Ostrom, and Cox, 2013).

Conclusion

Evolutionary psychology has evolved as a separate field of inquiry from the study of organizations, yet this need no longer be. To the extent that organizational structures and cultures are manifestations of human nature, responding adaptively to different environmental challenges, evolutionary psychologists have a lot to offer. Evolutionary psychology not only generates many novel hypotheses about organizational design but it also offers a richness of methods such as comparative approaches, cross-cultural methods, and organizational neuroscience techniques. By understanding how our small-scale social psychology operates in modern organizations, we may be able to figure out how we can design organizations that are perhaps better aligned with our nature than the current structures in which modern humans live and work.

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