Evolutionary Industrial and Organizational Psychology:

Working with Human Nature

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1. Introduction

The Gallup *State of the Global Workplace* report found that workers worldwide are experiencing staggering rates of stress, disengagement, and unhappiness (Collins, 2022). Sixty percent of employees surveyed report being emotionally detached at work and 19% report being miserable in their jobs. In the U.S. specifically, 50% of workers reported feeling stressed at their jobs daily, 41% as being worried, 22% as sad, and 18% angry. Because a thriving workforce is good for people and profit, such figures are worrying. Although there are numerous explanations for the high rates of job stress and disengagement among workers, an evolutionarily-minded industrial and organizational (I/O) psychologist would consider the way the modern workplace differs from work in ancestral environments as the potential source of these problems. In fact, many aspects of our modern work culture may be experienced as dissatisfying, stressful, and unhealthy because they fall outside the range of work-relevant stimuli in our ancestral environment–and thus are mismatched with our evolved psychology.

Consider hospital nursing staff. Their job may be physically engaging, but it involves interacting and empathizing with strangers who need their daily care. Humans have evolved to be caring and empathic, especially towards people who are familiar to them (family and friends), so performing this kind of work may engender feelings of personal inefficacy, emotional exhaustion, and cynicism – what is referred to as burn-out (Maslach et al., 2001). Indeed, occupational burnout is most prevalent among the health professions as well as other jobs that require sustained empathizing with many strangers, such as teaching and coaching (Hakanen et al., 2006; Richards et al., 2014; Taris et al., 2005). Furthermore, the night shift work of the hospital nurse is an evolutionary mismatch because it goes against humans' natural biological rhythms and the evolved sleep-wake cycle. Humans have evolved to be

diurnal—awake and active during daylight hours and rest and sleep during the night. Night shift work disrupts this natural pattern and has been linked to numerous health issues such as sleep disorders, obesity, and mood disturbances (Boudreau et al., 2013). Night shift work also has adverse effects on cognitive function, attention, memory, and job performance (Coffey et al., 1988).

This example shows the scope and promise of viewing work and organizational behavior through the lens of evolutionary psychology (Van Vugt, 2017). Evolutionary psychology generates knowledge about the human mind and why it operates in the way it does. Knowledge about psychological adaptations that typify humans – in other words, human nature – and their relation to how we work is essential for designing effective, engaging workplaces, and improving the well-being and productivity of workers. The purpose of this chapter is to examine the field of I/O psychology through a gene-culture co-evolutionary lens by discussing key concepts, theories, and research findings. Co-evolution is a two-way process that involves both genes influencing culture and culture influencing genes (Richerson et al., 2010).[1] Our focus in this chapter is how our genetic makeup allows us to develop and transmit culture and how this can help us adapt to and cope with evolutionary mismatches operating in modern organizations (see Figure 1).

[1] Although not part of our chapter, it is important to note that culture can also influence genes. A current example is population decline. Cultural factors (e.g., materialism and consumerism, women's economic liberation from men, status associated with work outside the home, fewer good jobs for less-educated men), are contributing to women having fewer babies. In fact, the birth rates in many developed countries are below replacement rates (Jarzebski et al., 2021). If this trend continues, there may be a shift in population genomes resulting from the traits of those who continue to have children. A more prosaic example comes from changes in human lactose tolerance (Beja-Pereira et al., 2003). About 8,000 years ago, as northern European populations started domesticating cows and extracting milk as a food source, lactose tolerance –a feature which earlier human adults did not have – began to spread. The cultural practice of using milk as a food source for adults altered the distribution of genes affecting lactose tolerance.

We first examine some challenges to why I/O psychology has been slow to "evolutionize." Next, we briefly delve into the evolutionary history of work to examine the psychological adaptations that evolved genetically in humans to engage in work; we also indicate how modern work is organized differently from ancestral work activities in hunter-gatherer societies. Third, we introduce the concept of evolutionary mismatch to highlight ways in which the modern workplace may be at odds with human-evolved work psychology, causing a host of problems. Fourth, we explain how insights from theories about cultural evolution can be used to overcome mismatches and create more effective and engaging workplaces. Finally, we review some key research topics in I/O psychology through a co-evolutionary lens, and we offer suggestions for research questions in I/O psychology based on the co-evolutionary approach.

2. Challenges to an Evolutionary Industrial/Organizational Psychology

Despite the promise of evolutionary theories and methods, applied psychologists studying work and organizational behavior have been slow to adopt them into their toolkits. I/O psychology is an applied field that uses psychological theory, research, and methods to help managers make more effective decisions about workers, organizational design, and human resource systems. However, unlike other areas of applied psychology such as marketing, politics, health, and sustainability (Colarelli & Dettman, 2003; Roberts, 2012; Van Vugt et al., 2021), I/O-psychology has not yet been "evolutionized" to the same extent (Colarelli & Arvey, 2015; Colarelli et al., 2021). We believe there are several reasons for this lack of integration. One is that I/O psychology tends to focus on the present. There is little in this field that looks at work and organizational behavior as the products of deep (evolutionary) time, unlike what evolutionary social scientists tend to do (Suzman, 2020). The focus of I/O psychology is on current problems (e.g., productivity, recruitment, turnover, work stress, remote/hybrid working, diversity and inclusion). In addition, scientific I/O psychology is

primarily concerned with understanding the proximate ("how") mechanisms causing these challenges (e.g., how abusive supervision leads to job dissatisfaction and turnover) rather than their ultimate ("why") evolutionary causes (e.g., why employees dislike abusive, intimidating supervisors in the first place). Thus, we believe that an awareness of our evolved work-related psychology will bring a deeper understanding that is critical to designing and implementing interventions in the workplace.

Moreover, much of I/O psychology is still wedded to the Standard Social Science Model–in the sense that it views the psychology and behavior of workers and managers as flexible and malleable, for example, through training and development (cf. Colarelli & Arvey, 2015). This position is ideologically -- and perhaps commercially-- more appealing than to view workers and managers as having a set of adaptations (genetically coded traits and preferences) that influence how they respond in different work situations. Yet the reality is that most leadership development programs are unsuccessful (Pfeffer, 2015), and organizational change efforts, such as mergers and acquisitions, often fail because they ignore individual, social, and institutional constraints (DellaVigna, Kim, & Linos, 2022; Koi-Akrofi, 2016). Finally, the bulk of science that is brought to bear on a problem in I/O psychology is statistical methodology, rather than fundamental theory (Colarelli, 2003; Roberts, Hulin, & Rousseau, 1978). Although rigorous theory development is common in other fields like biology and economics (Muthukrishna & Henrich, 2019), it is lacking in I/O psychology. Most research papers in I/O psychology draw from a multiplicity of mini theories in the social and behavioral sciences, and one is hard-pressed to find a unifying theoretical framework across multiple journal articles. Because the field has yet to develop a general theoretical framework, there has been little theoretical progress made in I/O psychology, and the usefulness of I/O interventions pales in comparison to those of other applied science fields like medicine, health, and economics.

3. A Short Evolutionary History of Work

To grasp the implications of the transition to the modern workplace, it is essential to begin by examining the role of work in human evolution. In a broader evolutionary context, work can be defined as capturing energy from the environment which organisms need to survive, and reproduce (Suzman, 2020). By this definition, all living organisms work. Evolutionary biology expands upon this concept of work by emphasizing the optimization of energy gains, while minimizing energy expenditure. This principle finds its basis in optimal foraging theory (OFT), which makes predictions on the strategies organisms use to maximize their energy intake, while minimizing the effort required to locate and process caloric resources (Pyke, 2019). This theory aligns with the conservation-of-resources theory, a prominent framework in I/O psychology, to understand why and how humans work (Hobfoll et al., 2018).

Humans have evolved a set of psychological adaptations, an adaptive work psychology, including cognitive mechanisms that enable them to allocate time and energy to different work-related activities, choose trustworthy collaboration partners, and invest in building expertise in activities that optimize the search for and processing of energy resources. Understanding the evolution of work and organizational behavior over deep time is crucial for a co-evolutionary analysis of work. Table 1 offers a comparative analysis of key work and organizational characteristics during different historical eras, encompassing the ancestral period of foraging (hunter-gatherer) societies, industrial, post-industrial, and digital eras (see also Colarelli et al., 2021; Nicholson, 2012).

The journey of human work reveals the profound transformations that have marked our species' history (Suzman, 2020). From the cooperative efforts of hunter-gatherer societies (Kelly, 2013; Marlowe, 2010) to the industrialization and the digital revolution of our modern age, our relationship with work has evolved alongside our understanding of productivity, efficiency, and the allocation of time. While technology has offered new possibilities and

freedoms, it has also presented fresh challenges, such as the blurring of work-life boundaries and ongoing debates about the distribution of benefits in the workplace (Van Vugt, Colarelli & Li, 2024). The concept of adaptive work psychology underscores that, at our core, humans have always sought to maximize their energy gains while minimizing expenditure. As we move forward in this digital age, it is essential to reflect on the wisdom of our evolutionary past while shaping the future of work to ensure a balance that promotes individual well-being, organizational success, and societal progress.

4. Evolutionary Mismatch in Work Organizations

The concept of evolutionary mismatch is a fundamental principle in evolutionary psychology, which examines the human mind as a product of evolution occurring over deep time. Mismatch refers to situations in which the pace of environmental change is faster than the time it takes for our genetically evolved psychological mechanisms to catch up (Gluckman & Hanson, 2019). The human suite of psychological traits - encompassing communication, cooperation, culture, technology use, and many other behaviors relevant to work - evolved primarily during the Pleistocene when humans were hunter-gatherers, accounting for more than 95% of human evolutionary history (Wilson et al., 2023). The subsequent transitions to agricultural, industrial, and, most recently, digital work, have likely created substantial disparities from this ancestral lifestyle, resulting in a wide diversity of different work-related evolutionary mismatches (Giphart & van Vugt, 2018). Evolutionary mismatch explanations have been invoked in relation to a range of modern societal issues, including lifestyle diseases like high blood pressure, diabetes, and obesity, as well as mental health problems like chronic stress, burnout, and depression (Li et al., 2020). These health issues are rare in contemporary hunter-gatherer societies (Marlowe, 2010), validating a mismatch explanation.

Chronic work stress has roots in evolutionary mismatch. Stress is a physiological response necessary for survival, designed to react to immediate threats, such as physical harm or the loss of a valuable resource (Nesse et al., 2016). However, stressors in modern workplaces involve relentless demands on workers that are unrelated to physical threats (such as performance targets for call-center employees), which constitute a mismatch with our evolutionary heritage. I/O psychologists studying chronic work stress have explored various types of mismatches, considering factors like the discrepancy between job demands and resources (Demerouti et al., 2001) or the mismatch between an individual's needs and what the work environment offers as stress inducers (Harrison, 1978). Yet, the field has overlooked the valuable concept of evolutionary mismatch in explaining why certain work practices are inherently more stressful than others (e.g., night shifts) and what evolutionary factors drive people's work habits and preferences.

Evolutionary matches arise in two primary ways (Li et al., 2018). First, when individuals are placed in entirely novel settings that contrast with the environment in which humans lived and worked throughout evolutionary history. For instance, being compelled to work in sedentary office environments in which the bodily inputs into working (e.g., running after a prey animal) are missing or doing night shift work which is misaligned with our natural sleep-wake cycle. Second, novel cues and stimuli can also hijack psychological mechanisms, leading to behaviors that do not align with the original purpose of the mechanism. For example, in our ancestral environment, work-inducing stimuli consisted of concrete features from local surroundings–low supplies of food and water, broken tools, and shelter. Once a satisfactory state was achieved, work would cease – until needed again. In our modern digital work environment, however, employees are inundated with work-related stimuli on their computer screens, even though much of this is irrelevant. This hijacks our psychological mechanisms, making individuals feel *as though* more work needs to be

accomplished, keeping them tethered to their screens. Thus, people find it difficult to disengage, resulting in chronic work stress and anxiety (Van Vugt et al., 2024).

We can hypothesize a number of different evolutionary mismatches pertaining to the modern (digitalized) work environment. A physical mismatch arises as work in the (home) office environment requires minimal physical input, and as humans have evolved to be "energy savers" according to OFT, leading to chronic inactivity and reduced stress-countering mechanisms because of the decoupling of physical and psychological stress. A cognitive mismatch occurs due to constant stimuli, interruptions, and distractions, causing work-related stress (Marsh et al., 2022). A social mismatch is amplified as digital work lacks inputs from frequent face-to-face interactions with familiar others (which were common in ancestral work), impeding trust and cooperation between co-workers who sometimes work in different locations or even in different time zones. Privacy constitutes another digital mismatch (Sharrif, Green & Jettinghoff, 2021), with workers often unaware that their online activities are in principle visible to the whole world, leading to regrettable online behaviors (e.g., sending angry emails, sharing obscene content). Competence mismatches arise as specialized skills are needed, but these skills age much quicker than the skills our ancestors needed to work, posing challenges for especially older workers to keep up. Additionally, status mismatches result from unclear connections between work inputs and work outputs, making promotions and access to other kinds of resources (e.g., mortgages) confusing and inconsistent.

As a consequence of these mismatches, our evolved psychological mechanisms receive inputs from the modern work environment that they are ill-equipped to handle, leading to heightened stress and anxiety– often followed by chronic physical and mental health problems (Estevez-Mujica & Quintane, 2018; Marsh et al., 2022). The continuous nature of these modern stressors, such as those resulting from 24/7 connectivity,

compounding the problem by taking a toll on employee well-being (Hasson et al., 2022). Employers also bear the brunt of these mismatches, which often lead to increased absenteeism, higher medical claims, employee disengagement, and burnout, all of which are prevalent challenges in modern workplaces (Collins, 2022). The potentially debilitating effects of these evolutionary mismatches on the way we work and organize work underscore the need for smart cultural adaptations in work organizations to overcome the challenges brought about by an increasingly digital and virtual workplace.

5. From Mismatch to Match: Culturally Evolving Organizations

The way humans work and organize their work are ultimately products of a co-evolutionary process in which genetically evolved psychological mechanisms interact with local, cultural processes (Boyd & Richerson, 1988; Nicholson, 2012). Cultural evolution involves the creation, transmission, and selection of ideas, norms, artifacts, practices, and social structures. Work organizations themselves are cultural adaptations that help structure and coordinate people to achieve goals—for example, making a product or offering a service as their output (Brahm & Poblete, 2022). Cultural evolution can mitigate against the impact of evolutionary mismatches in organizations by creating and redesigning workplaces in which employees are productive, grow and thrive.

The theory of cultural evolution (e.g., Boyd & Richerson, 1988; Campbell, 1975; Henrich, 2016; Mesoudi, 2011) is a framework used to understand how organizational cultures change and develop over time, much like biological evolution explains changes in the genetics of humans over generations. It focuses on the transmission, variation, selection, and adaptation of cultural traits (including ideas, values, social norms, practices, knowledge, and technology) as they are passed down socially from one generation to the next. Cultural transmission can occur through various means, such as language, written records, observation, imitation, and teaching. Just as genetic variation drives biological evolution,

cultural “traits” can vary among individuals and organizations. Variation in organizational cultures can result from innovations and adaptations to different ecological conditions (“evoked culture”) or biases in cultural learning (“transmitted culture;” Lonati & Van Vugt, 2023; Tooby & Cosmides, 1992). Humans especially attend to cues of success, prestige, and shared group membership (sex, dialect, ethnicity) in picking individual role models they can learn from (Henrich, 2016). Certain cultural traits are favoured and spread more widely than others due to the benefits or advantages they may offer in efficiency and productivity.

A hallmark of human cultural evolution is its cumulative nature (Van Schaik & Burkart, 2011). Over time, knowledge and practices tend to accumulate, leading to more complex and advanced cultural achievements (Henrich, 2016). Each generation builds upon the cultural achievements of the previous generation (cf. Newton’s “standing on the shoulders of giants” metaphor). Cultural variation and the introduction of new ideas and practices can lead to the exploration of innovative solutions and adaptations to changing environments (Colarelli, 1998). Cultural evolution allows for relatively rapid adaptation to changing conditions. While genetic evolution is a slow process and can take many generations to produce significant changes, cultural evolution can lead to rapid adjustments within a few generations. Over time, organizations develop intricate systems of knowledge, technology, and social behavior.

Theories of cultural evolution can offer valuable insights into how organizations can address and mitigate evolutionary mismatches (Brahm & Poblete, 2021; Colarelli, 1998, 2003; Henrich, 2016). They offer insights into how organizations have developed – from early hunter-gatherer cultures to contemporary work organizations – to cope with environmental challenges. These theories can guide research and intervention for aligning work environments more closely with human adaptive psychology to improve employee productivity and well-being.

One approach is Wilson's theory of *intentional cultural change* (Wilson, 2016). It starts by identifying desired goals (e.g., improving employee mental health, a more collaborative workplace). From our perspective, these would consist of goals that reduce both symptoms of and causes of mismatch typically found in modern organizations. The next step is to try a variety of approaches to achieve the goals. This assumes – correctly in our opinion – that no one intervention can guarantee success in complex organizations. Thus, it is important to try different interventions, monitor the results, and then select and retain the approach that is most effective—essentially guided cultural evolution. Another approach is *induced variation* (Colarelli, 1998, 2003). With induced variation, the focus is more on increasing variation than identifying goals. Because organizations constrain variation (Carroll & Hannan, 1995; Schneider; 1987), this limits the introduction and use of new cultural variants, which are necessary for adaptation and change. Increasing cultural variation is an insurance policy against an uncertain future. By inducing more variation than typically occurs, organizations increase the probability that some of these cultural variants will help the organization adapt and thrive in ways that cannot be predicted. Below are examples of goals related to mismatch in modern organizations as well as interventions – products of cultural evolution – that can be helpful in reducing mismatch.

Ergonomic workspaces. Sedentary office work can be mismatched with our evolutionary need to save energy, resulting in physical immobility, and increasing the prevalence of neck- and back problems as well as lifestyle diseases like obesity. To address this, workplaces are adopting a variety of ergonomic design principles such as standing desks (MacEwan et al., 2015**)**, adjustable chairs (Underwood & Sims, 2019), and spaces that promote movement throughout the day (Yancey et al., 2004**)**. Also, allowing workers to take frequent breaks and walk around can combat the negative effects of prolonged sitting and

promote better physical health (Taylor, 2005). For home office workers organizations should consider applying similar ideas.

Mental health awareness. Our evolved stress and anxiety responses to acute threats are often mismatched with the chronic demands of high-pressure work environments. Understanding the mental health implications of evolutionary mismatches, organizations should invest in employee well-being programs and provide psychological support to address chronic stressors. Organizations are implementing a variety of wellness programs, mental health support systems, and stress management initiatives to ensure their employees are healthy and happy. Stress reduction programs for workers, combined with training to create mental health awareness among management, seem promising avenues for intervention (Van Vugt et al., 2024). Some of these interventions appear to work; others not so much (Tetrick & Winslow, 2015). However, by using a variety of stress reduction programs, organizations are more likely to find those that work, are easy to implement, and that employees feel comfortable participating in.

Collaboration and teamwork. Humans have evolved to work in social groups and thrive through cooperation. However, traditional workplaces that encourage competition and individual performance can create a social mismatch. To address this, many workplaces are shifting their culture to foster collaboration, teamwork, and a sense of community. This includes encouraging open communication, promoting cross-functional collaboration, and recognizing collective achievements. Working synchronously online with colleagues (e.g., via Google Docs) can also improve trust and connectivity. Regular in-person gatherings in which there is room for recreational activities for employees are other ways to foster meaningful contact and longer-term relationships (Grant et al., 2007).

Flexible work schedules. The rigid 9-to-5 office work schedule can be a mismatch with our individual circadian rhythms and varied energy levels. To address this mismatch, many workplaces are embracing flexible work schedules that allow employees to work during their most productive hours. This can include options for flexible start and end times, compressed workweeks, or hybrid work arrangements.

Work-life integration. Traditional work models often emphasize strict separation between work and personal life, creating a mismatch with our natural inclination for a more integrated approach. Many organizations are now evolving their culture to promote work-life integration, offering flexible policies that allow employees to blend their personal and professional lives. This could include flexible scheduling, family-friendly policies, and the ability to work remotely. Yet these arrangements may be more suited for individuals who have an integrated work-private-lifestyle than so-called segmenters, who tend to focus on one task at a time (Kniffin et al., 2021). Again, by having a variety of options, organizations are more likely to find those that work for them.

Learning and adaptation. Work organizations can foster a culture of continuous learning and adaptation. In response to the fast-paced and ever-changing business landscape, workplaces could promote a culture of continuous learning and growth. Organizations are appealing to workers if they provide a variety of employee training programs, mentorship opportunities, and encourage personal and professional development. This includes providing opportunities for employees to acquire new skills and stay up to date with technological advancements to minimize competence mismatches.

Innovation, variation, and experimentation. Cultural evolution acknowledges the importance of experimentation in adapting to changing environments (Colarelli, 1998). Organizations can encourage innovation and experimentation in their work processes,

allowing employees to find new, more adaptive ways of working. For example, an experiment during COVID-19 compared three work teams differing in days spent in the office over a nine-week period. Of everyone who participated, the teams that came into their office either one or two days a week ended up creating higher quality work, compared to the others (Choudhury et al., 2022).

Adaptive leadership. Leaders in organizations should be aware of the impact of evolutionary mismatches and be willing to adapt their leadership styles and strategies. Leadership can evolve to support employees in dealing with novel challenges effectively. For instance, a directive leadership style from management might help to promote workplace safety in the face of an infectious disease threat, whereas an open, participative leadership style may be less effective in an organizational ecology that fosters innovation and experimentation (compare hospitals vs universities; Lonati & Van Vugt, 2023).

Privacy and ethical considerations. In dealing with privacy mismatches, organizations can focus on ethical guidelines and respect for employees' digital privacy. Policies can be put in place to protect personal boundaries in digital work environments, for example, by restricting the use of electronic performance monitoring (EPM) systems which have proliferated in the digital age. While they can increase productivity, they also increase employee stress, anxiety, burnout, and exhaustion (Ravid et al., 2020).

Recognition and reward systems. Organizations can revisit their recognition and reward systems to ensure that employees' contributions are valued and acknowledged. Differentiated pathways for career progression and status enhancement for men and women (especially for women with young children) can reduce status mismatches. Also, the emergence of the gig economy (e.g., Uber, Airbnb) enables those who want to work independently to do casual, short-term, on-demand work for which they are directly

compensated (Cropanzano et al., 2023). This type of work is attractive because it offers a direct link between the inputs and outputs from work. Thus, gig work may be particularly appealing to individuals with a fast life-history strategy, whereas those with a slow life history strategy might prefer the security of a long-term contract.

In summary, the theories of cultural evolution offer a lens through which modern work organizations can better understand how to adapt to the challenges posed by some critical evolutionary mismatches. By embracing the principles of cultural evolution and applying them to work, organizations can, via intentional cultural change (Wilson, 2016; Wilson et al., 2023), create more adaptive, employee-centered environments that better align with human nature.

6. Current Themes in Evolutionary I/O Psychology and Future Research Questions

For the remainder of this chapter, we will apply an evolutionary lens to review some topical research themes within the I/O psychological literature that can benefit from adopting a co-evolutionary perspective. Although we believe that I/O psychologists have much to gain from embracing theories, insights, and methods from evolutionary psychology, it also works the other way. By studying work organizations, evolutionary psychologists and anthropologists can test their hypotheses about human nature–for example, about the evolution of cooperation, leadership, hierarchy, inclusion and exclusion and psychological sex differences within a natural, high stakes setting (see Table 2 for examples).

Cooperation in Teams and Organizations. Analyzing cooperation in work teams and organizations from the joint perspective of biological (genetic) and cultural evolution provides insights into the origins, mechanisms, and variations of cooperation across organizations and industrial sectors. Human cooperation has deep evolutionary roots of course (Johnson & Colarelli, 2019; Fehr & Fischbacher, 2003). In ancestral foraging

societies, cooperation was essential for survival, as individuals who formed alliances, shared resources, and worked collectively had a better chance of survival. These cooperative traits have obvious genetic underpinnings. Evolutionary biological theories, particularly kin selection, explain altruistic cooperation within families. Individuals share a sizeable portion of their genes with close relatives, making it advantageous to help kin. This genetic predisposition for altruism extends to cooperative behaviors within family-owned firms that are estimated to account for 90% of the business worldwide (Nicholson, 2008). It would be interesting to compare the trust and organizational commitment of workers in family businesses with those in non-family businesses operating in the same sector to see if there is a difference. The downsides of working in a family-owned business (e.g., nepotism and the challenge of succession) should also be studied (Sprager et al., 2012).

Reciprocal altruism is a general mechanism where individuals cooperate with the expectation of future benefits. Genetically evolved predispositions (e.g., social intelligence, the ability to recognize trustworthy partners, a sense of fairness and punitive sentiments towards non-reciprocators) also influence cooperation in work settings. Genetic factors also play a role in conflict resolution and the ability to cooperate in resolving disputes, which contribute to a cooperative work environment (De Dreu & Van Vianen, 2001; Jehn, 1995). Friendships are a unique and important form of cooperation (Hruschka, 2010). Recent work on workplace friendships finds that they make beneficial contributions to employee physical and mental health and positive work attitudes, as well as to job performance, knowledge sharing, and innovation (Mirando et al., 2024), making this an important focus of further research.

In addition, cultural evolutionary processes have shaped the norms, values, and expectations about cooperation within work organizations, making large-scale cooperation beyond kinship and reciprocity possible. Cultural norms influence how cooperation is

perceived, practiced, and enforced in the workplace. Cultural evolution has led to the development of various organizational constraints and structures - such as formal hierarchies, job descriptions, promotion criteria, task divisions, and team-based structures - which define the roles and responsibilities of individuals within an organization. These in turn influence cooperative behaviors. At the same time, the transmission of cultural knowledge, including cooperative norms and practices, occurs through social learning and interactions. Employees thus learn how to cooperate within the specific cultural context of their organization. Cultural evolution is responsible for variations in leadership styles that can either facilitate or hinder cooperation. Prestige-based leadership, such as through adopting a charismatic or servant leadership style (Van Vugt & Smith, 2019), can promote cooperation in teams by establishing prosocial norms (Henrich et al., 2015).

On the other hand, some evolved psychological mechanisms work against cooperation. Reproductive interests mitigate against cooperating with mating competitors (Buunk & Fisher, 2009) as well as those with reproductive limitations (Fitzgerald & Colarelli, 2009). Making in-group/out-group distinctions - often over trivial differences - continues to plague humanity (Clark et al., 2019). Evolved disgust mechanisms mitigate against cooperating with outsiders and those with disabilities (Kurzban & Leary, 2001). Yet there may be simple cultural innovations that can effectively mitigate some of these apparently intractable problems. These include changing coalitional markers to minimize racial categorizations (Kurzban Tooby, & Cosmides, 2001), and providing disabled individuals with companion dogs, which increase interaction and comfort (Mader, Hart, & Bergin, 1989).

The joint perspective of genetic and cultural evolution helps us to better understand cooperation in work organizations. Effective cooperation is influenced by our genetic predispositions for altruism, reciprocity, and conflict resolution, as well as the cultural norms

and practices that have evolved over time and spread because they were successful at fostering organizational cooperation. Given the importance of cooperation and collective action to organizational survival and effectiveness, evolutionary I/O psychologists should focus more attention on interventions that promote cooperation in modern organizations.

Leadership and Hierarchy. Analyzing leadership from a co-evolutionary perspective can provide a comprehensive understanding of how leadership roles and practices have developed and continue to shape the dynamics of contemporary work organizations. This co-evolutionary approach acknowledges that leadership and followership, are influenced by both our genetic heritage and the cultural environments in which we operate. There is little doubt that leadership and followership have deep evolutionary roots (Van Vugt, 2006). All group-living species have individuals – leaders -- who exercise a disproportionate influence on the collective behavior and decision-making within groups, whether it involves challenges of group movement or conflict resolution (Smith et al., 2016). Across many species, the dominant alpha individual often takes on the leadership role – for example, in intervening in fights between subordinate group members -- but this is certainly not always true (Van Vugt & Smith, 2019). Throughout human evolution, individuals who exhibited effective leadership by displaying their competence, social intelligence, emotional stability, ability to cooperate, and physical prowess contributed to the success of these groups and, in return for the services, they provided they received status and prestige (Price & van Vugt, 2015). These leader qualities have a genetic basis and are present to varying degrees in individuals, maintained by the mechanism of frequency-dependent selection (Buss, 2009; Van Vugt, 2006).

Evolutionary models also inform our understanding of sex differences in leadership. In ancestral foraging societies, men often assumed roles involving intergroup conflict and external defense, while women engaged in collaborative, group-maintenance activities (Von

Rueden & Van Vugt, 2015). These deep historical roles still influence, and constrain, contemporary leadership dynamics as evidenced in the near-universal preference for male leaders or leaders with masculine traits (e.g., dominance, assertiveness) at times of intergroup conflict (Laustsen et al., 2023). Evolutionary theory also points at a fundamental ambivalence that individuals experience toward leaders. When people relinquish their freedom to follow a leader there is always the risk of them being exploited by the leader. Humans have evolved anti-exploitation mechanisms, which include preferences for leaders who display credible pro-social qualities like being honest, fair, and altruistic (Van Vugt & Ahuja, 2011). Furthermore, effective groups have levelling mechanisms in place to control their leaders and replace them when they are aggressive or self-serving (Boehm, 1999).

While these deeper evolutionary processes function as constraints on leadership in modern work organizations, there is also important variation, and cultural evolution has significantly shaped leadership preferences in various societies. The development of complex organizations led to the emergence of more rigid leadership roles and hierarchies (i.e., management). These structures are informed by cultural norms, and often serve to manage larger groups efficiently. Different national cultures may emphasize different leadership qualities, depending upon local past or present ecological conditions (Lonati & Van Vugt, 2023). For instance, in countries that historically rely more heavily on agriculture, the ideal manager is bossier and domineering. This cultural leadership ideal is derived from the need to coordinate food production processes as well as to defend agricultural land from intrusions (Lonati, 2020). In addition, countries with a history of infectious diseases have tighter social norms and people in these societies value conformity and obedience to authority (Gelfand, 2021; Murray et al., 2013). Cultural evolution theory also highlights the role of cultural transmission in shaping leadership behaviors and preferences. Leadership practices are often passed down through generations within a culture, and individuals learn how to lead by

observing and interacting with prestigious role models (e.g., presidents, CEOs, parents). For example, preferences for authoritarian leadership may be passed down from fathers to sons via imitation and this process may happen regardless of the current ecological context.

While cultural evolution plays a significant role in shaping leadership, it is not entirely detached from our genetic makeup. Different organizational cultures may emphasize distinct leadership styles and behaviors. These variations are influenced by the interplay between our genetically evolved preferences and cultural adaptations. Understanding these differences is crucial for effective leadership in diverse organizational settings. Adaptive leadership practices that align with our evolved psychological mechanisms may be most effective. For instance, a CEO with a compassionate, participative style of leadership might be preferred by employees overall, as this resonates with the evolved fairness psychology of followers. Yet, in case of a hostile take-over, workers may want a dominant CEO to protect their interests vis-à-vis the rival company. As environments and cultures change, so do the expectations about leadership, and these cultural variations require further study.

Workplace Diversity and Inclusion. Analyzing diversity and inclusion in work organizations from the joint perspective of biological (genetic) and cultural evolution provides a comprehensive understanding of how these trends are influenced by both our biological predispositions and the cultural dynamics that evolved over time. This approach sheds light on the complexities of diversity and inclusion in the workplace (Browne, 2023). From a biological perspective, humans have evolved a natural tendency to form in-groups and out-groups. This genetic predisposition can lead to biases and prejudices in diverse workplaces based on factors such as ethnicity, nationality, race, and gender, provided that these categories are perceived as coalitional groups (Kurzban et al., 2001). Further, genetic factors related to altruism and cooperation can hinder workplace diversity and inclusion because cooperation tends to be biased toward familiar others (family and friends). However,

our capacity to develop a more flexible social identity, for example, based on being a member of the same department or organization, can influence an individual's perception of their own group and include those from diverse backgrounds within their in-group.

Additionally, cultural evolution has shaped the norms and values of organizations related to diversity and inclusion (Page, 2007). These cultural norms influence how diversity is perceived and managed within the workplace. Cultural evolution has led, for instance, to the development of legal and policy frameworks aimed at promoting diversity, equity, and inclusion (DEI, e.g., affirmative action policies; Yang et al., 2006). These frameworks are responses to changing cultural norms related to diversity. Cultural evolution is also responsible for the transmission of cultural knowledge and the socialization of individuals into the values and practices related to diversity and inclusion. Successful role models from diverse backgrounds are particularly effective at changing norms. For example, an experiment that examined the effects of a constitutionally mandated reservation of village-leader positions for women in India found that it narrowed the gender gap in aspirations of parents for their daughters and of the daughters themselves: teenage girls spent more time in school and less on household chores in women-led villages (Beaman et al., 2012).

Sexual harassment is also a part of DEI: women are unlikely to feel included and work effectively in organizations where sexual harassment occurs. While there has been considerable research (in the I/O psychology and management literature) on sexual harassment (McDonald, 2012), less research exists on harassment from an evolutionary psychological perspective (for exceptions see, Browne, 1997; Colarelli & Haaland, 2002; Studd & Gattiker, 1991). While awareness and training are helpful, a co-evolutionary perspective would suggest stronger medicine, given the fundamental biological motivations involved in sex and mating.

Understanding diversity and inclusion from a co-evolutionary perspective helps recognize that while genetic factors may contribute to implicit out-group biases, cultural interventions can mitigate these biases through policy changes, structural changes, as well as education and awareness programs. Further, genetic predispositions for cooperation can be harnessed to promote diversity and inclusion by highlighting the benefits of diversity for team and organizational performance (Rafaqat et al., 2022). Organizations can implement cultural interventions that counteract genetic biases and promote inclusive practices. These interventions can include mentoring programs, inclusive leadership, and awareness training, although there are concerns about the effectiveness of implicit bias training programs (Pritlove et al., 2019). This co-evolutionary perspective explains how cultural norms and values regarding diversity and inclusion can evolve over time. As societal attitudes change, so do the cultural norms within work organizations. Evolutionary I/O psychology research that studies the interplay between genetic and cultural factors can inform the development and spread of successful diversity and inclusion practices that address both evolved psychological biases and culturally shifting norms and expectations.

However, diversity interventions are likely to fail or to achieve modest results if they are based on a limited or erroneous understanding of evolved mechanisms that influence how we perceive different others and if they assume that all it takes is persuasion, training, and education to overcome biases. It will often require structural or policy changes, and these generally meet with considerable resistance. For example, the idea of randomly selecting job or university applicants or political leaders (who meet minimum qualifications) has never gained traction (Grant, 2023). Yet, random selection above a threshold has a significant diversity advantage: people from many diverse categories - race, sex, religion, sexuality, political views, and so on - have a probability of being selected in proportion to their representation in the applicant pool. Moreover, random selection (above a threshold) is likely

to result in choices of equal quality as a top-down selection approach (Colarelli et al., 2012). Perhaps a less palatable approach is quotas. Nevertheless, some countries now mandate specific gender quotas in legislative bodies (e.g., Rwanda, Senegal, Mexico) and corporate boards (e.g., France, Norway) (Longman, 2006; Murray, 2004; Zetterberg, 2008).

Workplace Design. Analyzing the organizational environment from a co-evolutionary perspective offers insights into the most effective workplace design for employees to be productive and thrive. Evolutionarily-based theories of environmental preferences make the following assumptions: (a) the habitat an animal exists in exerts considerable influence over its survival and reproductive success; (b) over time, animals evolve adaptive responses to cues in their environments that provide probabilistic information about resources, safety, and threat; (c) these responses primarily take the form of (positive or negative, approach or avoid) reactions to features of the environment (Orians, 1986; Orians & Heerwagen, 1992; Ulrich, 1983). In general, most animals (including humans) will evaluate an environment in three stages (Orians & Heerwagen, 1992). They first make a general determination if the environment is favourable or unfavourable, worthy of exploration or not. Second, a more detailed assessment is made about the risks involved in further exploration. Third, the animal will determine whether to spend extended time in the environment. Applying these principles to a co-evolutionary analysis of workplace design, people are likely to react to the visual stimuli in workspaces based - in large part - on evolved mechanisms for perceiving safety, comfort, resource quality, and health (see van Esch et al., 2019). This conjecture can help evolutionary I/O psychologists to develop predictions on why people react favourably or unfavourably to different work environments, how (to some extent) the design of workplaces changes over time, and how the design of workplaces is culturally changing to become more compatible with our evolved psychology.

Many studies have now documented the positive effects of exposure to nature on both mental (Geary et al., 2023) and physical health (Grahn & Stigsdotter, 2003; Ulrich, 1984). Recently, researchers have been expanding this finding into the workplace. In a study of employees in both the USA and India, An and colleagues (2016) found that natural elements and sunlight exposure related positively to job satisfaction and organizational commitment, and negatively to depressed mood. In addition, the relationships between job stressors and job satisfaction or organizational commitment were weaker for individuals with greater exposure to natural elements. Van Esch et al. (2019) found that the amount of nature in office window views was positively associated with restoration and job satisfaction, and negatively associated with emotional exhaustion, turnover intent, and apprehension. The authors of a recent review on the effects of the physical office on mental health (Bergefurt et al., 2022) concluded that there is a significant increase in research teams examining how the physical workplace influences mental health outcomes. Many features of the physical office space that map onto natural stimuli- sunlight, plants and views of nature, air, and acoustic quality - all had an impact on employee well-being. This research and its applications are part of a co-evolutionary cycle in which the design of workplaces gradually culturally adapts to evolved human environment preferences.

Finally, an area for further inquiry by evolutionary I/O psychologists is the role of pet animals in the workplace. Animals have always been part of the human environment. Dogs were the first domesticated animal–humans and dogs have had a unique symbiotic relationship for at least 15,000 years (Vilà et al., 1997). Thus, the presence of dogs creates an atmosphere where people behave in a more trusting, friendly, and cooperative manner. Recent research suggests that these effects of companion dogs also occur in the workplace. In a series of two experiments with small groups, Colarelli et al. (2017) found that the presence of a companion dog increased team cohesion, physical intimacy, and cooperation; in addition,

people's behavior in dog-present groups was rated as more cooperative, comfortable, friendly, active, enthusiastic, and attentive. Not only is more research being done on companion animals in the workplace, particularly dogs (Junça-Silva, 2022; Junça-Silva et al., 2022), but there appears to be an increase in pet friendly workplaces (Janowitz, 2023; Quan & Schabram, 2023) that require further scrutiny. Here again, we see a co-evolutionary process whereby workplaces are intentionally culturally changing to be more compatible with evolved human nature. Going a step further, some have suggested that an analysis of how humans interact with animals may provide useful cues for the design of machines and robots. Humans may be more comfortable and take more pleasure working with robots when they behave like companion animals, which presents interesting avenues for future research (Quan et al., 2023).

Personnel Selection. Analyzing personnel selection from a co-evolutionary viewpoint provides insights into the most effective hiring practices. Prior to the twentieth century, hiring decisions were made by traditional hiring methods (Colarelli, 2003). These methods are based on evolved psychological mechanisms and are therefore accessible to ordinary people. Traditional methods are characterized by face-to-face interaction and observation of skilled behavior; they tend to provide diffuse information about a job applicant and be relevant to specific jobs. Importantly, they rely - to a large degree - on evolved psychological mechanisms for assessing other people. Toward the beginning of the twentieth century and expanding into the 21st century, more organizations began using analytical hiring methods (e.g., IQ-tests, personality tests). Analytical approaches are formal and explicit. They use formal rules and algorithms that are typically comprehensible to experts. Analytical methods are characterised by expert-developed tests that typically assess one or a few traits, often can apply to multiple jobs, and experts are required to interpret the tests results. These methods can be efficiently used at scale. The analytic approach is new, yet it has had a

profound impact on hiring policies in many government and business organizations. Even so, as evolutionary I/O psychologists could have predicted, traditional selection practices persist and, in many organizations, remain more widely used than analytical practices (Colarelli, 1996).

Throughout human history people have made "hiring" decisions. In all human societies, past and present, people have been making decisions about who can join their groups and who can fulfill different roles within groups. The ability to accurately assess other people is a critically important part of our evolved psychology. Adults (and children) placed in new groups quickly assess their own and others' abilities (Fisek & Ofshe, 1970) and people can make accurate judgments of others' emotional states within a few seconds (Ambady & Rosenthal, 1992; DePaulo, 1992). These probabilistic judgments of others are remarkably accurate, because they were (and are) adaptive for survival and reproduction. Although hunter-gatherers did not select people into their groups in the way that modern organizations select new employees, selection took place within groups when competence was critical to a group's success or was associated with elevated status, as would be the case with warfare and hunting.

Cultural evolutionary processes influenced the increase in the use of modern analytical hiring methods. They arose from developments in science and psychology, from the industrial and post-industrial revolutions and the two World Wars. Many scientists and intellectuals believed that using applications of scientific psychology could improve upon and replace traditional selection methods. Moreover, there was a tremendous growth of large organizations, which meant that assessment and hiring needed to be done at scale. Yet, for the past 50 years, progress in personnel selection has been inconsistent, with changing estimates about the usefulness of selection tests, and with the upper limits of validity coefficients remaining relatively flat (Colarelli, 2003; Hinrichs, 1978; Morgeson et al., 2007; Roberts,

Hulin, & Rosseau, 1978; Sackett et al., 2022). Ironically, the most recent evidence is that more traditional selection methods - the structured employment interview, job knowledge, and work sample tests - have been found to have among the highest predictive validities (Sackett et al., 2022). This may be a result of the co-evolutionary process–whereby selection methods that are most compatible with evolved psychological mechanisms are ultimately the most effective and thus become most widely used.

There are several implications from this co-evolutionary analysis for studying personnel selection practices in work organizations. First, it is important not to discount the evolved psychological mechanisms for assessing people. The evidence is overwhelming that people are reasonably accurate in their assessments of others in situations where they can directly observe them or their work products. In these situations, traditional methods may be preferable (Hinrichs, 1978). Second, in large organizations where hiring must be done at scale, analytical methods may be more appropriate because their increased efficiency can compensate for their lower validity coefficients. Over time organizations culturally learn what selection methods work best with the nature of the organization and its jobs.

Job Learning and Training. A co-evolutionary perspective provides insights into how workers learn and the most effective job training practices. Despite new training technologies and resources devoted to the design of training programs, people can, and do, learn complex skills without formal training programs and instruction. The best example is language (Pinker, 2003). The language skills of the average 5-year-old are remarkable. By the time most children reach age five, they have 2,500-word vocabularies and they speak in complete sentences (Health Information Library, 2001). Children learn language by imitating others around them, particularly their peers (Pinker, 2003). A co-evolutionary perspective offers important insights into the relationships between evolutionary mismatch, learning, and effective learning systems. Humans evolved in small groups where people gathered

information and learned about their physical and social environments from observation, teaching, and face-to-face interaction. Over evolutionary history, psychological mechanisms evolved that are receptive to information acquired from conversation and observation and which are efficient when processing those types of information (Henrich, 2016). Face-to-face interaction allows continuous and extensive feedback about performance. A smile or a frown, a word of praise or criticism, helps keep employees on track and potentially motivated. Face-to-face interactions, in combination with verbal instruction and extended periods of practice, allow workers to develop a rapport with one another, learn about each other's personalities, and to develop a master-apprentice relationship. People also learn by watching and imitating other people, particularly people of high status (Bandura, 1977; prestige bias; Henrich, 2016). It is easier to learn most skills by imitating people who are competent at them than by reading a description of each element of skilfull performance. Watching skilfull performers not only allows students to imitate effective performance routines, but it also helps them learn about the habits, motivations, values, and identities of skilful performers (Lave & Wenger, 1991).

A problem with these methods is that they are labor intensive and do not scale up well. This is why there has been significant investment and experimentation in learning and training methodologies since the middle of the 20th century. This was the time period when there was a confluence of the growth of large corporations as well as rapid technological change. Over time, we see how the use and staying power of different training methods occurred. Co-evolution is an appropriate general framework for understanding why organizations use the employee training practices that they do. Research informed by a co-evolutionary perspective asks how a practice is compatible with evolved human preferences as well as how they might be functional within its organizational context. An activity is functional to the extent that it produces consequences that help in the cultural adaptation of an organization. Traditional HR-perspectives assume that valid training practices are

effective across most situations and that nonvalid training practices are ineffective and used out of ignorance. The co-evolutionary approach, however, hypothesizes that the frequency and effectiveness of training practices are context-specific and that organizations tend to use training practices that are functional within their contexts. The use of a training practice evolves over time as organizations go through a process of trial and error and learn what practices work for them (Colarelli & Montei, 1996).

One of the most remarkable examples of co-evolution in training and learning is YouTube (Colarelli & Astorga, 2024). The first YouTube video was posted on April 23, 2005. In less than 15 years it has become the second most viewed website in the world (just after Google). Available throughout the world, YouTube receives over 30 million visitors per day and 2 billion per month (Donchey, 2020; YouTube, 2020). "How-to" videos are amongst the most popular videos on Youtube, bringing in over a billion views per day (Utz & Wolfers, 2022). A significant reason for the popularity of YouTube's how-to videos is that how-to videos tap into evolved psychological adaptations related to learning. YouTube how-to videos mimic ancestral stimuli related to learning: people engaged in, demonstrating, explaining, and teaching skilful behavior. Evolutionary-minded I/O psychologists would be advised to use these media platforms to study how people learn work-specific skills and whether these platforms are as good or better than on-the-job-training.

Organizational Change. A co-evolutionary perspective on work also brings much to bear on how organizations are designed and the extent to which they can be changed via human intervention. Although it is often assumed that organizations can undergo substantial and rapid changes through top-down interventionist efforts (often led by "change management specialists"), organizational development and change interventions (e.g., mergers) have notoriously low success rates (Koi-Akrofi, 2016; Robertson et al., 1992). This is likely because change management specialists possess a fundamental misunderstanding of

the nature of social systems in that they believe that the component parts of an organization relate to one another in a straightforward, rational, predictable fashion (Colarelli, 1998). An evolutionary perspective, on the other hand, would suggest that organizations are primarily characterized by emergent factors–that is, the whole is greater than the sum of its constituent parts. Given that biological systems are also often typified by emergence because of genetic evolution (Holland, 1995), it is not difficult to imagine that the process of cultural evolution would lead to the development of emergent properties in social systems such as work organizations.

Organizational change is made even more difficult by what Hannan and Freeman (1989) have termed structural inertia. Structural inertia denotes the natural tendency of an organization to stagnate and become inflexible to external environmental changes. This occurs because, as an organization solidifies as a social system, the various cultural and procedural norms that characterize the organization become routinized and transform from explicit knowledge into tacit knowledge. Once procedures become routinized, they also become more difficult to change; at this point, routines essentially constitute the cultural "DNA" of the organization. A corollary of this is that established organizations are extremely difficult to change with conscious planning to any substantial extent– "DNA" cannot be changed.

The co-evolutionary perspective would therefore argue that the process of variation, selection, and retention should–and will–dictate which organizational structures and processes should be kept, and which should be discarded. As Henrich (2016) contends, "Humans are bad at intentionally designing effective institutions and organizations…we should take a page from cultural evolution's playbook and design 'variation and selection systems' that will allow alternative institutions or organizational forms to compete" (p. 331). In other words, organizations should "hedge their bets" by ensuring that there is enough

variation in their structures, processes, and personnel, as doing so would allow organizations to adapt to unpredictable future circumstances more easily. Take the traditional "top-down" method in personnel selection (i.e., the "top" applicant is offered the job first, the next-best candidate is then extended the offer if the top applicant rejects the offer, etc.). It may create greater homogeneity in personnel within an organization due to similarity biases, whereas hiring qualified applicants at random above a specified threshold may increase the range of dispositions and skills that are subsequently acquired by the organization. This would be an interesting test to conduct for an evolutionary HR-researcher.

The co-evolutionary perspective would also imply that, although rapid and radical attempts at organizational change are likely to fail, small, incremental, and narrowly targeted attempts at change are more promising. In accordance with the principles of both genetic and cultural evolution, gradual change interventions can build on existing skills, processes, and structures, rather than trying to create entirely new ones. An incremental approach to change engenders environmental stability, whereas radical approaches to change promote environmental turbulence (Tushman & Anderson, 1986). This does not necessarily mean that radical attempts at innovation always fail, but it does mean that radical changes entail far higher risk of failure than incremental changes do (Colarelli, 1998; Crossan & Apaydin, 2010). Thus, organizational leaders might be wise to adopt a gradualist orientation toward change when planning interventions rather than make audacious attempts at organizational upheaval.

Additionally, because personnel are ultimately the source of the deeply embedded routines that constitute the cultural DNA of the organization – the people do seem to "make the place," after all (Schneider, 1987) – it might be in the best interest of a stagnant organization to simply remove the employees who most strongly dictate the norms of the organization (e.g., senior leaders) and replace them with new employees who possess novel

approaches, ideas, and perspectives. Although tacit knowledge is incredibly difficult to deliberately alter through conscious planning, it is well within the power of the organization to remove and replace the people who most strongly embed the tacit knowledge in the first place. Finally, another change that organizations may be able to implement pertains to the sheer size of the organizations and the social units nested within them (e.g., departments, units, teams, etc.). Large, multi-national organizations are deeply mismatched with how human social groups have been structured throughout our ancestral history (Dunbar, 1992; Li et al., 2018). For instance, humans have a hard limit on how many people they can truly "know" (i.e., how many people they can have meaningful social relationships with at any one time), which tends to fall between 100 and 200 people, with an average of about 150 (Hill & Dunbar, 2003). Thus, if organizations exceed this limit in terms of the number of organizational members, feelings of atomization and alienation might ensue among employees, which could be assessed. A solution to this might be to limit the number of people that can comprise one business unit or department within an organization to promote cohesion among members within the unit or department. For instance, if a department begins to exceed 150-200 people in total, organizational leaders may decide to move some members to a separate department or begin a smaller unit, or even a team. In turn, employees may feel more embedded and socially included in their organization, even if the organization has millions of members worldwide (Narayan, Puranam, & Van Vugt, 2022)

7. Conclusion

In sum, evolutionary psychology has much to offer for I/O psychology, both theoretically and practically. For instance, both genetic and cultural evolution wield considerable influence over organizational operations in a reciprocal fashion–through co-evolution. This perspective affords organizational researchers a greater understanding of *why*–rather than just *how*–individuals and groups behave within an organization, as well as how organizations as a

whole work as social systems. It also grants insight into the universal features of organizations and the individuals working in them and why these universals exist. For example, why is it that a trait such as integrity is valued in organizational leaders across time and cultures? It is because, in our ancestral history as humans, integrity afforded a competitive advantage to the group that was being led; in return, the leader was conferred greater prestige and esteem among group members (De Waal-Andrews & Van Vugt, 2020; Price & van Vugt, 2015). At the same time, I/O psychology can also help evolutionary psychologists in testing their hypotheses about the evolution of work, cooperation, leadership, diversity and inclusion, and many other themes in a real-world high stakes environment, the modern workplace (see Table 2 for examples).

Our co-evolutionary lens allows us to identify mismatches between the demands of modern organizations and our ancestrally adaptive work-related psychological mechanisms. This, in turn, would enable organizational change specialists and organizational leaders to attempt to close the most detrimental gaps between evolved work psychology and organizational structures and processes. Cultural evolution can also go far in explaining how and why organizations undergo cultural changes, that is, it explains how cultural adaptations in organizations follow the same principles of variation, selection, and retention that characterize genetic evolution.

From a practical standpoint, the co-evolutionary framework can potentially present guidance for organizational leaders and change specialists on how best to approach intentional cultural change (Wilson, 2016). Fundamentally, change interventions are much more likely to work when they are based on a sound understanding of human nature (Colarelli & Arvey, 2015), and change agents would do well to keep this principle in mind when designing interventions (Narayan et al., 2022). For example, an evolutionary I/O psychological perspective would suggest that caring for kin is one of humans' foundational

motivations. Organizations may therefore design their workplaces so that employees with young children have the option to work from home to fulfill the duties of both work and family. Furthermore, organizations may benefit by including natural elements in employees' work environment, such as plants, windows, or even paintings or photographs of natural landscapes, as this would be more matched with the natural environments that ancestral humans evolved to appreciate. However, the evolutionary perspective also implies that there are limits on what cultural interventions can accomplish; that is, there are some features of human nature that are universal, evolved, and thus difficult to change. This is why it is more important to attempt to adapt interventions to human nature, rather than vice versa, for instance, by creating ergonomic and playful workspaces. Finally, an understanding of the principles of cultural evolution can foster an appreciation for "tried and true" methods of personnel selection, such as the unstructured interview, letters of recommendation, and work samples. Although some of these selection methods are not as predictive of performance as other methods, they provide other forms of insight into applicants that go beyond mere job performance, such as person-organization fit and personality. In other words, these selection methods have remained popular for good reasons, even if those reasons are not necessarily immediately obvious.

Overall, then, we believe that an evolutionary I/O psychology, based on the principles of genetic and cultural evolution, holds a lot of promise for not only improving the overall productivity and performance of organizations through research and intervention, but also for enhancing the well-being and satisfaction of the workers and managers that inhabit them.

References

Ambady, N., & Rosenthal, R. (1992). Thin slices of expressive behavior as predictors of interpersonal consequences: A meta-analysis. *Psychological bulletin*, *111*(2), 256.

An, M., Colarelli, S. M., O'Brien, K., & Boyajian M. E. (2016). Why we need more nature at work: Effects of sunlight exposure and natural elements on employee well-being. *PLOS ONE, 11,* e0155614.

Bandura, A. (1977). *Social learning theory*. N. Y.: Prentice-Hall.

Beaman, L., Duflo, E., Pande, R., & Topalova, P. (2012). Female leadership raises aspirations and educational attainment for girls: A policy experiment in India. *Science*, *335*(6068), 582-586.

Bergefurt, L., Weijs-Perrée, M., Appel-Meulenbroek, R., & Arentze, T. (2022). The physical office workplace as a resource for mental health–A systematic scoping review. *Building and Environment*, 207, 108505.

Boehm, C. (1999). *Hierarchy in the forest: Egalitarian society and the evolution of democratic politics.* Harvard University Press.

Boudreau, P., Dumont, G. A., & Boivin, D. B. (2013). Circadian adaptation to night shift work influences sleep, performance, mood, and the autonomic modulation of the heart. *PloS one, 8(7),* e70813.

Boyd, R., & Richerson, P. J. (1988). *Culture and the evolutionary process*. University of Chicago press.

Brahm, F., & Poblete, J. (2021). The evolution of productive organizations. *Nature Human Behaviour*, *5*(1), 39-48.

Brahm, F., & Poblete, J. (2022). Cultural evolution theory and organizations. *Organization Theory*, *3*(1), 26317877211069141.

Browne, K. R. (1997). An Evolutionary Perspective on Sexual Harassment: Seeking Roots in Biology Rather than Ideology. *J. Contemp. Legal Issues*, *8*, 5.

Browne, K. R. (2023). The disjunction between evolutionary psychology and sex-discrimination law and policy. *Evolution and Human Behavior*, *44*(3), 284-295.

Buss, D. M. (2009). How can evolutionary psychology successfully explain personality and individual differences? *Perspectives on Psychological Science*, *4*(4), 359-366.

Buunk, A. P., & Fisher, M. (2009). Individual differences in intrasexual competition. *Journal of Evolutionary Psychology*, *7*(1), 37-48.

Campbell, D. T. (1975). On the conflicts between biological and social evolution and between psychology and moral tradition. *American psychologist*, *30*(12), 1103.

Choudhury, P., Khanna, T., Makridis, C., & Schirmann, K. (2022). Is hybrid work the best of both worlds? Evidence from a field experiment. *Harvard Business School Technology & Operations Mgt. Unit Working Paper*, (22-063), 22-063.

Clark, C. J., Liu, B. S., Winegard, B. M., & Ditto, P. H. (2019). Tribalism is human nature. *Current Directions in Psychological Science*, *28*(6), 587-592.

Coffey, L. C., Skipper Jr, J. K., & Jung, F. D. (1988). Nurses and shift work: effects on job performance and job-related stress. *Journal of advanced nursing*, *13*(2), 245-254.

Colarelli, S. M. (1996). Establishment and job context influences on the use of hiring practices. *Applied Psychology*, *45*(2), 153-176.

Colarelli, S. M. (1998). Psychological interventions in organizations: An evolutionary perspective. *American Psychologist*, *53*(9), 1044.

Colarelli, S. M. (2003). *No best way: An evolutionary perspective on human resource management*. Greenwood Publishing Group.

Colarelli, S. M., & Arvey, R. D. (Eds.). (2015). *The biological foundations of organizational behavior*. University of Chicago Press.

Colarelli, S. M., & Astorga, A. (2024) A. *YouTube and practical learning.* Unpublished manuscript. Department of Psychology. Central Michigan University. Mt. Pleasant, Michigan, USA.

Colarelli, S. M., & Dettman, J. R. (2003). Intuitive evolutionary perspectives in marketing. *Psychology and Marketing*, 20, 837-865.

Colarelli, S. M., & Haaland, S. (2002). Perceptions of sexual harassment: An evolutionary perspective. *Psychology, Evolution & Gender*, *4*(3), 243-264.

Colarelli, S. M., McDonald, A. M., Christensen, M. S., & Honts, C. (2017). A companion dog increases prosocial behavior in work groups. *Anthrozoös*, *30*(1), 77-89.

Colarelli, S. M., Monnot, M., Ronan G., & Roscoe, A. (2012). Administrative assumptions and some assumption violation effects in top-down selection. *Applied Psychology: An International Review, 61*, 498-512.

Colarelli, S. M., & Montei, M. S. (1996). Some contextual influences on training utilization. *The Journal of Applied Behavioral Science*, *32*(3), 306-322.

Colarelli, S. M., Yang, C., & Mirando, T. J. (2021). *Evolutionary industrial and organizational psychology*. In T. K. Shackelford (ed.). *The SAGE Handbook of Evolutionary Psychology (pp. 114-151).* Thousand Oaks, CA: Sage.

Collins, L. (2022, August 12). Job unhappiness is at a staggering all-time high, according to Gallup. https://www.cnbc.com/2022/08/12/job-unhappiness-is-at-a-staggering-all-time-high-according-to-gallup.html

Cropanzano, R., Keplinger, K., Lambert, B. K., Caza, B., & Ashford, S. J. (2023). The organizational psychology of gig work: An integrative conceptual review. *Journal of Applied Psychology*, *108*(3), 492.

Crossan, M. M., & Apaydin, M. (2010). A multi-dimensional framework of organizational innovation: A systematic review of the literature. *Journal of management studies*, *47*(6), 1154-1191.

De Dreu, C. K., & Van Vianen, A. E. (2001). Managing relationship conflict and the effectiveness of organizational teams. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, *22*(3), 309-328.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, *86*(3), 499.

DePaulo, B. M. (1992). Nonverbal behavior and self-presentation. *Psychological bulletin*, *111*(2), 203.

DellaVigna, S., Kim, W., & Linos, E. (2022). *Bottlenecks for evidence adoption* (No. w30144). National Bureau of Economic Research.

de Waal-Andrews, W., & van Vugt, M. (2020). The triad model of follower needs: Theory and review. *Current opinion in psychology*, *33*, 142-147.

Donchey, D. (2020, December 30). 37 Mind Blowing YouTube Facts, Figures and Statistics – 2020. https:fortunelords.com/youtube-stats/

Dunbar R. I. M. (1992). Neocortex size as a constraint on group-size in primates. *J Human Evolution, 22*, 469–493.

Estévez-Mujica, C. P., & Quintane, E. (2018). E-mail communication patterns and job burnout. *PLoS One*, *13*(3), e0193966.

Fehr, E., & Fischbacher, U. (2003). The nature of human altruism. *Nature*, *425*(6960), 785-791.

Fisek, M. H., & Ofshe, R. (1970). The process of status evolution. *Sociometry*, 327-346.

Fitzgerald, C., J., & Colarelli, S. M. (2009). Altruism and reproductive limitations. *Evolutionary Psychology*, *7*, 234-252.

Geary, R. S., Thompson, D., Mizen, A., Akbari, A., Garrett, J. K., Rowney, F. M., ... & Rodgers, S. E. (2023). Ambient greenness, access to local green spaces, and subsequent mental health: a 10-year longitudinal dynamic panel study of 2· 3 million adults in Wales. *The Lancet Planetary Health*, *7*(10), e809-e818.

Gelfand, M. J. (2021). Cultural evolutionary mismatches in response to collective threat. *Current Directions in Psychological Science*, *30*(5), 401-409.

Giphart, R., & Van Vugt, M. (2018). *Mismatch: how our stone age brain deceives us every day (and what we can do about it)*. Robinson.

Gluckman, P., & Hanson, M. (2019). *Ingenious: The Unintended Cost of Human Innovation*. Harvard University Press.

Grant, A. (2023, August 21). The worst people run for office. It is time for a better way. *New York Times*. https://www.nytimes.com/2023/08/21/opinion/elections-democracy.html

Grant, A. M., Campbell, E. M., Chen, G., Cottone, K., Lapedis, D., & Lee, K. (2007). Impact and the art of motivation maintenance: The effects of contact with beneficiaries on persistence behavior. *Organizational Behavior and Human Decision Processes, 103,* 53-67.

Hannan, M. T., & Carroll, G. R. (1995). *An introduction to organizational ecology*. In G. R. Carroll and M. T. Hannan (eds.), *Organizations in industry: Strategy, structure, and selection* (pp. 15-31). New York: Oxford University Pres.

Hannan, M. T., & Freeman, J. (1989). *Organizational ecology*. Harvard university press.

Harrison, R. V. (1978). Person-environment fit and job stress. *Stress at work*, 175-205.

Hasson, R., Sallis, J. F., Coleman, N., Kaushal, N., Nocera, V. G., & Keith, N. (2022). COVID-19: Implications for physical activity, health disparities, and health equity. *American journal of lifestyle medicine*, *16*(4), 420-433.

Health Information Library. (2001). Speech Development in 2-5 Year Olds. Retrieved July 14, 2001, from the World Wide Web: http://www. covenanthealth. com/Features/Health/Child/CHIL3085.HTM

Henrich, J. (2016). *The secret of our success: How culture is driving human evolution, domesticating our species, and making us smarter*. Princeton University press.

Henrich, J., Chudek, M., & Boyd, R. (2015). The Big Man Mechanism: how prestige fosters cooperation and creates prosocial leaders. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 370(1683), 20150013.

Hill, R. A., & Dunbar, R. I. (2003). Social network size in humans. *Human nature*, *14*(1), 53-72.

Hinrichs, J. R. (1978). An eight-year follow-up of a management assessment center. *Journal of Applied Psychology*, *63*(5), 596.

Holland, J. H. (1995). Hidden order. *Business Week-Domestic Edition*, 21.

Hruschka, D. J. (2010). *Friendship: Development, ecology, and evolution of a relationship* (Vol. 5). Univ of California Press.

Janowitz, K. (2023) Pet-friendly workplaces are on the rise. Here's why Fuse said yes to pets. *California Business Journal*. https://calbizjournal.com/pet-friendly-workplaces-are-on-the-rise-heres-why-fuse-said-yes-to-pets

Jarzebski, M. P., Elmqvist, T., Gasparatos, A., Fukushi, K., Eckersten, S., Haase, D., ... & Pu, J. (2021). Ageing and population shrinking: Implications for sustainability in the urban century. *Npj Urban Sustainability*, *1*(1), 17.

Jehn, K. A. (1995). A multimethod examination of the benefits and detriments of intragroup conflict. *Administrative science quarterly*, 256-282.

Johnson, M. J., & Colarelli, S. M. (2019*) Selection for Cooperative Relationships*. In T. K. Shackelford & V. A. Weekes-Shackelford. Encyclopedia of Evolutionary Psychological Science. Meteor Springer: Berlin and Heidelberg, Germany. doi:10.1007/978-3-319-16999-6_3494-1

Junça-Silva, A. (2022). Friends with benefits: the positive consequences of pet-friendly practices for workers' well-being. *International Journal of Environmental Research and Public Health*, *19*(3), 1069.'

Junça-Silva, A., Almeida, M., & Gomes, C. (2022). The role of dogs in the relationship between telework and performance via affect: A moderated moderated mediation analysis. *Animals*, *12*(13), 1727.

Kniffin, K. M., Narayanan, J., Anseel, F., Antonakis, J., Ashford, S. P., Bakker, A. B., ... & Vugt, M. V. (2021). COVID-19 and the workplace: Implications, issues, and insights for future research and action. *American Psychologist*, *76*(1), 63.

Koi-Akrofi, G. Y. (2016). Mergers and acquisitions failure rates and perspectives on why they fail. *International Journal of Innovation and Applied Studies*, *17*(1), 150.

Kurzban, R., & Leary, M. R. (2001). Evolutionary origins of stigmatization: the functions of social exclusion. *Psychological bulletin*, *127*(2), 187.

Kurzban, R., Tooby, J., & Cosmides, L. (2001). Can race be erased? Coalitional computation and social categorization. *Proceedings of the National Academy of Sciences*, *98*(26), 15387-15392.

Laustsen, L., Sheng, X., Ghufran Ahmad, M., Al-Shawaf, L., Banai, B., Pavela Banai, I., ... & van Vugt, M. (2023). Cross-Cultural Evidence that Intergroup Conflict Heightens Preferences for Dominant Leaders: A 25-Country Study. *Unpublished working paper*.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.

Li, N. P., van Vugt, M., & Colarelli, S. M. (2018). The evolutionary mismatch hypothesis: Implications for psychological science. *Current Directions in Psychological Science*, *27*(1), 38-44.

Li, N. P., Yong, J. C., & Van Vugt, M. (2020). Evolutionary psychology's next challenge: Solving modern problems using a mismatch perspective. *Evolutionary Behavioral Sciences*, *14*(4), 362.

Lonati, S. (2020). What explains cultural differences in leadership styles? On the agricultural origins of participative and directive leadership. *The Leadership Quarterly*, *31*(2), 101305.

Lonati, S., & Van Vugt, M. (2023). Ecology, culture, and leadership: Theoretical integration and review. *The Leadership Quarterly*, 101749.

Longman, Timothy. 2006. "Rwanda: Achieving Equality or Serving an Authoritarian State?" In Women in African Parliaments, ed. Hannah Britton and Gretchen Bauer. Boulder: Lynne Rienner, 133–50.

MacEwen, B. T., MacDonald, D. J., & Burr, J. F. (2015). A systematic review of standing and treadmill desks in the workplace. *Preventive medicine*, *70*, 50-58.

Mader, B., Hart, L. A., & Bergin, B. (1989). Social acknowledgments for children with disabilities: Effects of service dogs. *Child Development, 60*, 1529-1534.

Marlowe, F. (2010). *The Hadza: hunter-gatherers of Tanzania* (Vol. 3). Univ of California Press.

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual review of psychology*, *52*(1), 397-422.

Marsh, E., Vallejos, E. P., & Spence, A. (2022). The digital workplace and its dark side: An integrative review. *Computers in Human Behavior*, *128*, 107118.

McDonald, P. (2012). Workplace sexual harassment 30 years on: A review of the literature. *International Journal of Management Reviews*, *14*(1), 1-17.

Mesoudi, A. (2011). Variable cultural acquisition costs constrain cumulative cultural evolution. *PloS one*, *6*(3), e18239.

Mirando, T., Colarelli, S. M., Han, K., Vespi, C. (2023) Workplace friendships: Effects on individuals and organizations. Unpublished manuscript. Department of Psychology, Central Michigan University, Mt. Pleasant, Michigan, USA.

Morgeson, F. P., Campion, M. A., Dipboye, R. L., Hollenbeck, J. R., Murphy, K., & Schmitt, N. (2007). Reconsidering the use of personality tests in personnel selection contexts. *Personnel psychology*, *60*(3), 683-729.

Murray, R. (2004). Why didn't parity work? A closer examination of the 2002 election results. *French Politics*, *2*, 347-362.

Murray, D. R., Schaller, M., & Suedfeld, P. (2013). Pathogens and politics: Further evidence that parasite prevalence predicts authoritarianism. *PloS One*, *8*(5), e62275.

Muthukrishna, M., & Henrich, J. (2019). A problem in theory. *Nature Human Behaviour*, *3*(3), 221-229.

Narayanan, J., Puranam, P., & Van Vugt, M. (2022). Human-centric Organizing: A Perspective from Evolutionary Psychology.

Nesse, R. M., Bhatnagar, S., & Ellis, B. (2016). Evolutionary origins and functions of the stress response system. *In Stress: Concepts, Cognition, Emotion, and Behavior: Handbook of Stress (pp. 95-101).* New York: Elsevier.

Nicholson, N. (2008). Evolutionary psychology and family business: A new synthesis for theory, research, and practice. *Family Business Review*, *21*(1), 103-118.

Nicholson, N. (2012). The evolution of business and management. *Applied evolutionary psychology*, 16-35.

Orians, G. H. (1986). The place of science in environmental problem solving. *Environment: Science and Policy for Sustainable Development*, *28*(9), 12-41.

Orians, G. H., & Heerwagen, J. H. (1992). Evolved responses to landscapes. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 555–579). Oxford University Press.

Page, S. E. (2007). Making the difference: Applying a logic of diversity. *Academy of Management Perspectives*, *21*(4), 6-20.

Pfeffer, J. (2015). Leadership BS: Fixing workplaces and careers one truth at a time. New York: Harper Business.

Pinker, S. (2003). *The language instinct: How the mind creates language*. Penguin UK.

Price, M. E., & Van Vugt, M. (2015). The service-for-prestige theory of leader-follower relations: A review of the evolutionary psychology and anthropology literatures. *Biological foundations of organizational behavior*, 397-477.

Pritlove, C., Juando-Prats, C., Ala-Leppilampi, K., & Parsons, J. A. (2019). The good, the bad, and the ugly of implicit bias. *The Lancet*, *393*(10171), 502-504.

Pyke, G. (2019). Optimal foraging theory: An introduction. In *Encyclopedia of animal behaviour* (pp. 111-117). Elsevier Academic Press.

Quan, S. X., Lam, C., Schabram, K., & Yam, K. C. (2023). All Creatures Great and Small: A Review and Typology of Employee-Animal Interactions. *Journal of Management*, 01492063231191090.

Quan, S. X., & Schabram, K. (2023, No. 13). Research: The benefits of a pet-friendly workplace. *Harvard Business Review*. https://hbr.org/2023/11/research-the-benefits-of-a-pet-friendly-workplace

Rafaqat, S., Rafaqat, S., Rafaqat, S., & Rafaqat, D. (2022). The Impact of Workforce Diversity on Organizational Performance: A Review. *Journal of Economics and Behavioral Studies*, *14*(2 (J)), 39-50.

Ravid, D. M., Tomczak, D. L., White, J. C., & Behrend, T. S. (2020). EPM 20/20: A review, framework, and research agenda for electronic performance monitoring. *Journal of Management*, *46*(1), 100-126.

Richards, K. A. R., Templin, T. J., Levesque-Bristol, C., & Blankenship, B. T. (2014). Understanding differences in role stressors, resilience, and burnout in teacher/coaches and non-coaching teachers. *Journal of Teaching in Physical Education*, *33*(3), 383-402.

Richerson, P. J., Boyd, R., & Henrich, J. (2010). Gene-culture coevolution in the age of genomics. *Proceedings of the National Academy of Sciences*, *107*(supplement_2), 8985-8992.

Robertson, P. J., Roberts, D. R., & Porras, J. I. (1992). A meta-analytic review of the impact of planned organizational change interventions. In *Academy of Management Proceedings* (Vol. 1992, No. 1, pp. 201-205). Briarcliff Manor, NY 10510: Academy of Management.

Roberts, K. H., Hulin, C. L., & Rousseau, D. M. (1978). *Developing an interdisciplinary science of organizations*. San Francisco: Jossey Bass.

Roberts, S. C. (Ed.). (2012). *Applied evolutionary psychology*. Oxford University Press.

Ruusila, V., & Pesonen, M. (2004, January). Interspecific cooperation in human (Homo sapiens) hunting: the benefits of a barking dog (Canis familiaris). In *Annales Zoologici Fennici* (pp. 545-549). Finnish Zoological and Botanical Publishing Board.

Schneider, B. (1987). The people make the place. *Personnel psychology*, *40*(3), 437-453.

Spranger, J. L., Colarelli, S. M., Dimotakis, N., Jacob, A. C., & Arvey, R. D. (2012). Effects of kin density within family-owned businesses. *Organizational Behavior and Human Decision Processes*, *119*(2), 151-162.

Studd, M. V., & Gattiker, U. E. (1991). The evolutionary psychology of sexual harassment in organizations. *Ethology and Sociobiology*, *12*, 249-290.

Suzman, J. (2020). *Work: A history of how we spend our time*. Bloomsbury Publishing.

Taris, T. W., Bakker, A. B., Schaufeli, W. B., Stoffelsen, J., & Van Dierendonck, D. (2005). Job control and burnout across occupations. *Psychological Reports*, *97*(3), 955-961.

Taylor, W. C. (2005). Transforming work breaks to promote health. *American journal of preventive medicine*, *29*(5), 461-465.

Tooby, J. & Cosmides, L. (1990). The past explains the present: Emotional adaptations and the structure of ancestral environments. *Ethology and Sociobiology*, *11*, 375-424.

Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. *The adapted mind: Evolutionary psychology and the generation of culture*, *19*, 19-136.

Tushman, M. L., & Anderson, P. (1986). Technological Discontinuities and Organizational Environments. *Administrative Science Quarterly*, *31*(3), 439-465.

Ulrich, R. S. (1983). Aesthetic and affective response to natural environment. In *Behavior and the natural environment* (pp. 85-125). Boston, MA: Springer US.

Ulrich, R. S. (1984). View through a window may influence recovery. Science, 224, 224-225.

Utz, S., & Wolfers, L. N. (2022). How-to videos on YouTube: The role of the instructor. *Information, Communication & Society*, *25*(7), 959-974.

van Esch, E., Minjock, R., Colarelli, S. M., & Hirsch, S. (2019). Office window views: View features trump nature in predicting employee well-being. *Journal of environmental psychology*, *64*, 56-64.

Van Vugt, M., & Ahuja, A. (2011). *Naturally selected: The evolutionary science of leadership*. HarperBusiness.

Van Schaik, C. P., & Burkart, J. M. (2011). Social learning and evolution: the cultural intelligence hypothesis. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *366*(1567), 1008-1016.

Van Vugt, M. (2006). Evolutionary origins of leadership and followership. *Personality and Social Psychology Review*, *10*(4), 354-371.

Van Vugt, M. (2017). Evolutionary psychology: Theoretical foundations for the study of organizations: JOD research primer series. *Journal of Organization Design*, *6*, 1-16.

Van Vugt, M., Dijkstra, P., & Buunk, A. P. (2021). Applying social psychology: From problems to solutions. *Applying Social Psychology*, 1-280.

Van Vugt, M., Griskevicius, V., & Schultz, P. W. (2014). Naturally green: Harnessing stone age psychological biases to foster environmental behaviour. *Social Issues and Policy Review*, *8*(1), 1-32.

Van Vugt, M., & Smith, J. E. (2019). A dual model of leadership and hierarchy: Evolutionary synthesis. *Trends in Cognitive Sciences*, *23*(11), 952-967.

Van Vugt, M., Colarelli, S. M. & Li, N. P. (2024). Virtually (Mis) Matched: Evolved Human Minds Operating in the Digital Workplace. Unpublished manuscript.

Vilà, C., Savolainen, P., Maldonado, J. E., Amorim, I. R., Rice, J. E., Honeycutt, R. L., ... & Wayne, R. K. (1997). Multiple and ancient origins of the domestic dog. *Science*, *276*(5319), 1687-1689.

Von Rueden, C., & Van Vugt, M. (2015). Leadership in small-scale societies: Some implications for theory, research, and practice. *The Leadership Quarterly*, *26*(6), 978-990.

Wilson, D. S. (2016). Intentional cultural change. *Current Opinion in Psychology*, *8*, 190-193.

Yancey, A. K., McCarthy, W. J., Taylor, W. C., Merlo, A., Gewa, C., Weber, M. D., & Fielding, J. E. (2004). The Los Angeles Lift Off: a sociocultural environmental change intervention to integrate physical activity into the workplace. *Preventive Medicine*, *38*(6), 848-856.

Yang, C., D'Souza, G., Bapat, A., & Colarelli, S. M. (2006). A cross-national analysis of affirmative action: An evolutionary psychological perspective. *Managerial and Decision Economics*, *27*, 203-216.

YouTube. (2020). YouTube for Press. https://blog.youtube/press/

Zetterberg, P. (2008). The downside of gender quotas? Institutional constraints on women in Mexican state legislatures. *Parliamentary Affairs*, *61*(3), 442-460.

Table 1. The Changing Context of Work and Organization Behavior Over Time

Ancestral (Hunter Gatherer) Work	**Industrial and Post-Industrial Work**	**Digital Work**
Fuzzy boundary between work and non-work. Actual working time estimated to be about 15- 20 hours per week.	Clearly demarcated boundaries between work and leisure time. Typical hours range between 35 and 45 hours per week.	Fuzzy boundary between work and non-work. Work often intrudes into non-work time via 24/7 digital technology, extending work time to well beyond 40 hours per week.
Close intertwining of consumption and production.	Units of production and consumption mostly separated in time and space.	Production and consumption mostly separate in space (less so in time); increasingly digital and symbolic.
Labor alongside and in cooperation with close and distant kinfolk.	Collaborative endeavors mostly with non-kin, and often with strangers (single interactions).	Collaboration mostly with non-kin and strangers, often occurring digitally without any social context.
Labor governed by informal agreements and norms of reciprocal exchange. Minimal division of labor (only by sex and age).	Labor governed by formal contracts specifying rights, obligations, and rewards. Significant division of labor (job specialization).	Increasing gig work with only transactional and temporary relationships with employers. Increasing specialization and division of labor.
Authority fluid and shared, based on availability, expertise, interest, or experience.	Authority vested in positions, often hierarchical, based on formal criteria.	Authority still vested in positions, often hierarchical, although greater emphasis on technical expertise and access to capital.
Skills developed by observation, imitation, and mentorship.	Skills developed primarily by on-the-job training and secondarily by formal education and training.	Skills developed by technical training, mentorship, less by formal education.
Rewards for labor that are intrinsic or collective (e.g., food-sharing).	Rewards are extrinsic and individual, mediated by agents and contracts.	Rewards are extrinsic and individual, mediated by agents and contracts.

Table 2. Examples of Research Questions, Hypotheses and Methodologies from an Evolutionary I/O Psychologist

Research question	**Evolutionary Theory**	**Psychological adaptation**	**Hypothesis**	**Methodology**
Why do modern workers make such long hours?	Optimal foraging theory and evolutionary mismatch theory	Humans have evolved to maximize energy gains	If no clear connection between work inputs and outputs, then people are working too much	Anthropological studies on labor in traditional and (market)economies, prevalence of chronic work stress across sectors and societies
Are workers in family-owned businesses more pro-socially motivated?	Kin selection theory	People cooperate with and trust family members more easily	Workers in family businesses are more trusting and engaged	Compare the workplace dynamics of family-businesses with non- family businesses via surveys, interviews, and observations
Do workers prefer more dominant managers when there is an external threat to the organization?	Evolutionary leadership theory, prestige-dominance model	Under threat, followers want their leaders to protect them	In case of a hostile take-over workers prefer to be led by a CEO with a dominant leadership style	Scenario-studies and survey data within specific organizations under threat of take-over
Cooperation within teams and organizations reduced when external competition is low	Multilevel selection theory	People cooperate more when internal competition is low and external competition is high	If a market is not competitive there will be more internal conflict and freeriding behavior in an organization	Team observations, agent-based modelling, archival data on conflicts in organizations
Is online training as effective in skills? development as in-person training?	Evolution of primary v secondary learning mechanisms	Evolved preferences for identified individual; imitation of high prestige and successful individuals (models); evolved mechanisms tied to narrative information	With similar skill-related content, people will learn more via a model on YouTube than from reading material	Experimentally expose individual to the two sources of information and compare learning levels

Are powerful men in organizations more inclined to sexually harass female employees and has #MeToo changed this?	Sexual selection-theory	Men are in competition with each other for status and power to attract mates	Male employees in position of power are more likely to show sexual over-perception than males in lower-ranked positions and women (regardless of rank)	Surveys and vignette studies into sexual over-perception in the workplace among employees of different ranks in mixed-sex teams and organizations
Do workers feel more alienated in organizations with a large number of employees?	The social brain hypothesis	Humans can "know" (i.e., remember the names or faces of) about 100 to 200 people	Employees in large organizations (more than 200 in one location) will report greater feelings of loneliness and depression than employees in smaller organizations.	Surveys to compare the self-reported mental health symptoms of employees in organizations of varying sizes

Figure 1. Co-Evolutionary Perspective on Work and Organisational Behavior