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Commentary The design of work—an evolutionary perspective

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An Instructive Encounter

Nearly 40 years ago I was a young PhD researcher along with a colleague studying absence from work, in 16 UK factories. In one of them, a clothing plant, I had an instructive exchange with a woman machinist. Having duly absorbed the latest thinking and research on job design, I wondered at her experience of the repetition and monotony of sewing the hems on the same garment countless times per hour, day after day for long production runs. ''Isn't it more enjoyable,'' I asked, ''when there are more frequent changes of style and different garments to work on?'' She shot me a glance that mixed amusement with contempt at my ridiculous naivety. ''Of course not—it costs me money every time that happens, and besides, I don't like the interruption.'' Further conversations confirmed that this was not just a perverse consequence of the piece-work payment system. She and all her co-workers we interviewed were united not just by the uncertainty around outcomes but also by a profound dislike of the disturbance alterations brought to the rhythm of their working day. The experience of these women was that they found a simple but fundamental gratification from making a reliable wage alongside other women from the local community by doing something that involved the exercise of a well-practiced skill.

This story illustrates one of the main themes in the literature that have begun to surface in recent decades: The need to put job design into context (Morgeson & Humphrey, 2008). The neo-Darwinian perspective, known today as evolutionary psychology (EP) takes this further takes this further, in two directions—historical and interdisciplinary—that can help to support the current trend in the literature, which seems to be seeking to free the study of job design from the confines of the traditional work psychology approach.

Job Design in Historical Context—the Design of Work and the Design of Man

The history of the topic immediately reveals that job design is an odd idea: It is a classic product of the mid-20th century concern about the demotivating effects of the technologies of factory and office

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production. This starts with the definition of job design in terms of ''positions'' (Morgeson & Humphrey, 2008). The whole notion of the ''job'' invokes a world of discrete tasks embedded in organizational structures, and ''job design'' implies agents—employers—who determine the shape and location of these positions. This is a very localized and top-down view of the world, which is hard to reconcile with much of (a) what preceded the industrial age, (b) what people do in the name of work outside the contexts of conventional employment, and (c) what has developed since in the new economy.

What one witnesses in the contemporary job design literature seems to be a race to catch up with the latter development, packing more and more features into job design theory to capture the new multiplex reality (Grant, Fried & Juillerat, in press). To an outsider, this makes the area look in danger of becoming over-complicated and losing its focus. This perhaps mirrors the contemporary nature of work, but amid all this complexity what seems to be missing is a unifying conception of the meaning of work.

Before I discuss this one should note that the industrial–administrative reality around which job design as a field came of age continues to thrive in many parts of the world. Let us not imagine that the ''old economy'' is yet dead. In this context, the simple and startling truths of traditional job design theory and research, about the psychological and material benefits of enriched job experience, continue to hold (Hackman & Oldham, 1976).

But I have deliberately called this commentary ''the design of work'' rather than ''job design'' to capture the broader contexts, historically and experientially, and to engage with my central theme—meaning.

An evolutionary perspective first urges us to look beyond the confines of industrialization and consider the relationship between the design of work and the design of man, for clearly they are interdependent. In fact, the story of human work is a story of co-evolution (Boyd & Richerson, 1985). It begins in ancient prehistory with our hominid ancestors. What is the ''design of work'' for an animal? It is the functionality of how its features and behaviors serve its biological needs. The smartest animals—the higher apes—pioneered the use of tools (McGrew, 1992), and the origins of job design for humans can perhaps be found in the hand axes and flint knives that the first bipedal primates developed, and which—and this is the co-evolutionary point—their use changed the context in which they would be used (Janicki & Krebs, 1998; van Schaik & Pradham, 2003). Tools made possible more sophisticated domestic environments, which in turn spawned fresh adaptations. It has even been argued that this virtuous cycle was a principal driver in the steadily increasing brain size and power of successive races of hominids—the descent of man (Ikiri & Sakura, 2008; Megarry, 1995).

Most striking and significant perhaps is the increasing sophistication of tools that our species—*Homo sapiens*—developed, to the point, some 40 000 years ago, where they revealed our relationship with them had become qualitatively different from the tool use of our nearest relatives, the chimpanzees, or even the Neanderthals, in what has been called ''The Great Leap Forward'' (Pinker, 1997). The most visible manifestation of this was adornment. The use of art to embellish tools is not just the sign of maturing human culture—it also signifies a changed relationship between people and objects, embodying a number of key aspects of the meaning of work: One is aesthetic sensibility and symbolism. Another is reverence and metaphysical belief systems. Ownership is also a theme of adornment, and last but not least is personal identity—for the tools of work are also objects of self-creation. A human's sense of his or her own power and functionality changes as soon as a tool is placed in hand.

The prime age of tool use was the long period of human history as clan dwelling hunter–gatherers. However, the main tool of human development has always been other people. The power to organize—in hierarchies of control and authority and in horizontal divisions by function or task—underlies all human creations. Interestingly, paleontologists and anthropologists have concluded that

DOI: 10.1002/job

hunter–gatherer hierarchies were fluid in character (Erdal & Whiten, 1996; Whiten, 1998)—akin to the autonomous work groups promoted by job design researchers (Wall et al., 1996) and some of the more radical business experiments in self-organized workforces, such as in W H Gore (the Gore-Tex family firm) (Hamel, 2007).

Our primate cousins also rely on their organic sociality to master their environments but humans have two additional tools—language and the self-concept. The two are interconnected—each is a necessary but not a sufficient condition for the other. Neanderthals had language but never progressed culturally, probably because they lacked the organ of the self—that is the ability to imagine and hence implement future states; an ability that possession of a sense of a personal identity confers upon humans (Leary, 2004). It has been argued (Humphrey, 1980) that the self evolved as a mechanism for reading other minds. The capacity to infer others' mental states enables the uniquely high degree of sociality that humans possess, incorporating the capacity for cheater-detection, free-rider punishment, altruism, reputational dynamics, and complex coalitions with non-kin (Barrett, Dunbar, & Lycett, 2002).

Around 10 000 years ago, the proto-agricultural practices of our intelligent ancestors developed into the first fixed agrarian settlements (Tudge, 1998), triggered by a mix of climate change (creating population pressure), and a confluence of enabling environmental conditions in the fertile crescent of Mesopotamia (Diamond, 1998). The design of work changed radically at this point. Labor on the land became organized around collective tasks linked with the cycles of the seasons—agriculture and animal husbandry—and around tasks associated with the establishment, maintenance, and growth of fixed settlements. The capacity to accumulate and store wealth led to more fixed hierarchies of subordination and more refined divisions of labor, culminating in slave states where job design amounted to the use of humans as disposable factors of production. At the same time, various hierarchies of crafts proliferated.

The monasteries were arguably the first truly modern organizations, in terms of integrated management and production systems, but it was not until the industrial revolution that the concept of the job as a voluntary contracted position became a meaningful entity, and it is not until the middle of the 20th century that the notion and practice of job design became the subject of study.

Co-evolution and the Meaning of Work

One could say that up to that point co-evolutionary processes had been shaping the institutions of work and the adaptive processes of social organization and culture. Social science's growth through the 20th century can be seen as co-evolution becoming self-conscious—an explicit concern for accommodation of work to human capacities, and *vice versa*. The latter point is important, since the evolutionary perspective notes that we human beings are more adaptive than is always good for us (Nicholson & De Waal Andrews, 2005); i.e., we are able to endure and tolerate conditions that are impairing to the human frame and damaging to the human spirit. This is caused by the triumph of economics over psychology—or rather the willingness of humans to sacrifice their long-term personal welfare and interests for the sake of short-term material benefits. Of course, this is actually profoundly psychological in the sense that these benefits are secured under the logic of what in evolutionary theory is called inclusive fitness, or kin selection (Hamilton, 1964). This is the idea that the ultimate goal of all species—reproductive fitness—can be served by selfless devotion to advancing the interests of your own kin, even when it imposes a cost on your own reproductive fitness.

The meanings of work are therefore various, but always in train with human goals and capabilities. This is the analytical starting point for a Darwinian analysis—the nature of the goals that work serves.

DOI: 10.1002/job

The success of job design research in its early days and its shortcomings from a contemporary perspective come from its rooting in I/O psychology traditions of mid-range theorizing. This focus is appropriate where the focus is clear and the outcomes obvious—such as equipment design, the effectiveness of workgroups, the scheduling of tasks within an operation and such like. But when one steps outside of this range, theory has to reach for a confusing array of augmenting concepts: Job crafting, informal work design, career stage moderators, social architecture, configural job characteristics, nonlinear effects, self-efficacy, prosocial motives, and the effects of time (Clegg & Spencer, 2007; Fried, Grant, Levi, Hadani & Slowik, 2007; Grant, 2007; Parker et al., 2001). All are valuable and reasonable ideas but they leave one grasping for a handhold when confronted with the reality of people's experience of work—the menu is too rich and lacks an organizing and directing theme.

As my introductory vignette illustrated, these are all potentially relevant, but to do justice to the experience of people such as my factory machinists, the traditional I/O psychology approach will not suffice—we need the injection of biology, economics, sociology, and anthropology, plus a more full-on psychological approach that entertains notions of unique persons, rather than atomized invented attributes such as ''growth need strength.'' Such a holistic approach to the meaning of work is uniquely supplied by evolutionary psychology (EP).

Evolutionary Psychology, Human Goals, and Self-regulation

The new Darwinism bears the name EP because it focuses on the notion of an evolved human nature (Nicholson, 1997). Our susceptibilities, biases, instincts, and drives adapted just as much as did our physical frame to support our reproductive fitness under the conditions that prevailed for most of long prehistory. That is, we have retained many of the sensibilities of hunter-gatherers in a very different world. Yet the most critical feature of the human context remains unchanged—our dependence on other self-aware and self-willed humans in a variety of familiar contexts around shared labor, nurturance, and entertainment. Indeed, to call the new Darwinism ''psychology'' is a partial misnomer since a fundamental precept is consilience (Wilson, 1998)—the abandonment of what has been called the standard social science model, in which the knowledge bases of discrete disciplines become impermeable walls (Tooby & Cosmides, 1992). Evolutionary theory claims the power of a ''universal acid'' to dissolve these intellectual barriers in the pursuit of synthetic truths about phenomena (Dennett, 1995).

To use the example of my introductory vignette to get at the true meaning of work to the machinists, we need to understand how the brain and its messengers (the neurotransmitters) respond positively to work that has a compelling motivational rhythm, noted by the sociologist Baldamus over 50 years ago, who called it ''traction'' (Baldamus, 1951). We also need to analyze the incentive effects of payment systems and the sociology of the family in the South Wales valleys of the 1970s in order to see how the meaning of work to them is framed by instrumental incentive values. We also need to comprehend enough about the life chances, individual differences, and networks of affiliation that apply to these women at their respective life stages, to appreciate what kinds of novelty at work might or might not be appreciated.

On the latter point, EP draws attention to the fundamental importance of individual differences. Genotypic variations result from the differential selective pressures that bear down on us from diverse environments. Many of these environments are human constructions, hence the co-evolutionary logic of the changing nature of work. Selection operates on the phenotype, the bearer of genes, not least via

DOI: 10.1002/job

sexual selection—how reproductive opportunities are affected by the possession of specific traits and attributes. These follow normative values—some attributes are intrinsically more valuable than others (e.g., health)—and comparative values—the idea, known as frequency dependent selection, that there is a comparative advantage in possessing attributes that are different from others' (Nettle, 2007). Both are context-dependent i.e., the co-evolutionary argument that the basis for the value of attributes changes historically. Thus there are forces at work toward both uniformity (excellence) and diversity (difference). The latter supports two forms of assortment: A differentiated economy of activities, and assortative mating.

The starting point for an EP analysis is human goals—proximate and distal. The distal are the largely unconscious goals encoded in the genotype that promote reproductive fitness, the ultimate goal of all organisms (Ridley, 1999). For self-aware humans, these goals are nested hierarchies around the purposes that will achieve them (Buss, 1999). For example, the proximate goal of looking attractive or achieving success serves the unconscious distal goal of securing the transmission of our own genes or supporting the reproductive fitness of our close kin. Proximate goals—our conscious desires—are transacted with all relevant environments (Nicholson, 2005). The nature of the goals themselves and the strategies for achieving them are developed and enacted according to the payoffs and promises located in the immediate context (time and place). These are also socially embedded, such that the chain of strategic goal-seeking action incorporates goals to do with inducing the cooperation or non-interference of other agents.

The self-regulation perspective conceives of the self as an evolved organ with three bundles of tasks: To aid us in reading the minds of others and predicting their behavior; to balance and prioritize competing goals; and to look after itself, e.g., by managing moods and self-identity conceptions (Carver & Scheier, 1998; John & Gross, 2004; Karoly, 1993). Elements of the self-regulation system are therefore the self-, distal, and proximate goals, perceptions, and a tool kit of available actions (Kuhl, 1992; Powers, 1973). These operate with a dynamic equilibrium. An example would be that perceptions (e.g., of risk) may change in order to support action (e.g., risk-taking) in order to achieve a goal (e.g., winning). Another would be that goals may change (e.g., achievement) in order to become congruent with perception (e.g., danger from competition) and self-identity (e.g., lowered self-efficacy). Self-regulation theorists have simplified such models into promotion versus prevention of focus modalities (Higgins, 2002), but other strategies are clearly possible. We need to see the self as a part of wider systemic adaptive processes.

Adaptation as a Function of Time and Individual Differences

This perspective underlines the importance of (a) time and (b) individual differences in relation to job design. Time, as has been recently pointed out (Fried et al., 2007), determines the changing salience of goals and needs. We know that a young employee at the start of his/her career will happily endure onerous conditions for short-term benefits or for the investment it represents in a brighter future; conditions that would not be acceptable to a middle-aged worker trying to make a living and maintaining a balanced life style. The deeper underlying point is agency. This is that job design has traditionally promoted a model of individual employees in states of enforced adaptation to circumstances over which they have minimal control (Grant et al., in press). This may be an empirical truth about many working conditions, but, as has been pointed out, workers under even the most constrained work schedules will create opportunities for informal acts of self-determination (Wrzesniewski & Dutton, 2001). People will shape even the most microscopic aspects of their work routines to better satisfy their unique psychologies.

DOI: 10.1002/job

This brings us to individual differences. One of the most important at a categorical level is sex. Men and women differ in their needs for security, chances to compete and achieve, belonging, status, and group affiliations (Geary, 1998). These differences are predicted within evolutionary theory by the fact that men and women need to adopt different strategies for reproductive fitness, given their uneven reproductive capacities (Buss, 1998). Co-evolution exploits these differences both in the social constructions that apply to work, and gendering of jobs in line with the different goals and capacities of men and women (Browne, 2006). The job design literature seems largely gender neutral, with the possible exception of Lippa's work (1998). It is indeed the case that for large parts of the modern economy men and women perform equally well in a wide range of roles. However, that they may be bringing to such roles different orientations and wants seems something that deserves more recognition and exploration by job design researchers.

This would need to be linked with organizational and occupational contexts. It is widely accepted that occupations are gendered (Jacobs, 1989), but less often recognized that organizations are also (Aaltio-Marjosola & Mills, 2002; Haveman, Broschak & Cohen, 2008). Again, a co-evolutionary perspective points to how such arrangements have served the psychological, economic, and social needs of men and women, and that as the ecology of organizations changes, so will the selection biases (Cordes, Richerson, McElreath & Strimling, 2008).

For both sexes, heritable individual differences are also important to how people respond to work environments (Ilies, Arvey & Bouchard, 2006). Differential need strength (not just for growth, but a myriad of other drives) assign critical values and thresholds to the self-regulatory equation, making some people much more prepared to endure challenging work assignments, make personal sacrifices for pro-social investments, intentionally seek to craft job design to meet their needs, and negotiate with partners the parameters of work roles. This list is not exhaustive!

The job design literature needs to take individual differences a lot more seriously and in much greater depth.

Job crafting is a case in point. It is of particular importance for rebalancing job design from an implicit view of employees as the passively reactive objects of work roles toward seeing them as the proactive subjects of their roles. The idea, though welcome, is not new. The early literature on occupational socialization recognized that new incumbents often role innovate (Van Maanen & Schein, 1979), which the present writer developed into a general theory about the outcome of transitions (Nicholson, 1984). It is true that job crafting as a phenomenon is likely to be most marked at such junctures, when a new jobholder is seeking to optimize fit with the role. In many environments—especially low discretion mechanized ones—crafting will be minimal and subtle, toward the goal of meeting performance objectives and personal well-being. Psychological outcomes are highly subject to individual differences, as discussed earlier, not least in variations in employees' desire to maintain a sense of agency. In higher discretion roles, crafting is a more visible and universal phenomenon. Here a variety of goals may come into play, for example, to appear demonstrably distinctive and valuable in one's role in order to secure future status and rewards. This is a contested territory in many organizations and therefore subject to risk. Individuals have to run the personal calculus of probability of success from crafting against the risks of failure. The nature of the surrounding occupational and organizational culture is critical in setting the parameters (a) for innovation and (b) for risk.

The Design of Work in Context

The evolutionary perspective also urges us to achieve a deeper appreciation of the context in which work is embedded. For many workers this is a contractual relationship that has a formal and an informal

DOI: 10.1002/job

psychological aspect. There are two observations that we can make about the organizational side of the relationship. One is community, the other is about status. One unites, one separates, one may say. Definitions of community are various but they generally imply shared interests, networks of communication, governance, and heritage. EP places a psychological limit on community as the number of people one can keep tabs on as active members of one's network. As Dunbar (1992) discovered, there is a direct correlation between primates' troupe size and brain size, which for humans indicates an active network capacity of around 150. Modern human communities are often more virtual than co-located, and with many more changes of membership than in our ancestral societies, but the degree to which a work organization can create the conditions of community among its workers will enjoy benefits of organic solidarity (Nicholson, 2008). One may expect job design to be much more (a) a result of a ''negotiated order'' by members (Strauss, 1978), and (b) to be associated with outcomes that combine personal and communitarian utilities. The parameters of traditional job design theory may need to be flexed considerably to apply to such qualities.

Status takes us in a different direction. The evolution of human communities has moved from the fluid organic hierarchies of hunter-gatherer clans to quite rigid orders where wealth, opportunity, health, well-being—in other words a confluence of fitness enhancing utilities—accrue to those in superior positions (Nicholson & De Waal Andrews, 2005). As was recognized in the early days of the job design field superior positions are associated with enhanced discretion and opportunities for self-determination in one's approach to work (Jaques, 1961). Contemporary approaches to management seek to decouple this association by means of the empowerment and democratization of the workplace. However, such initiatives generally have limited scope and they do not nullify the other utilities of status. Therefore, the issue of executives and professionals chronically overworking, i.e. people voluntarily impairing their fitness in a Faustian bargain for higher status jobs, remains a challenge for job design theory to recognize.

Finally, little of the above has dealt with the social context of work. Critical interdependencies with co-workers and supervisors are elements of the design of work to which we should pay attention. EP focuses attention on competition and cooperation, and evolutionary theorists have identified how these are induced by how resources are distributed in the environment (Pierce & White, 1999; 2006). Regarding competition, the EP perspective suggests that we should pay attention to how resources and the outcomes of performance are configured in seeking to understand employee reactions to job demands. Regarding cooperation, providing opportunities for collaborative endeavor and subsequent ''food sharing'' plays into an area of conspicuous human aptitude (Gintis, Bowles, Boyd & Fehr, 2003), as long as efficient solutions can be found for the free-rider problem (Price, Tooby & Cosmides, 2002).

Leadership is also relevant, especially where in effect the supervisor's edicts and intentions determine the job design of the subordinate. There would appear to be scope for attention to processes of mutual influence and exchange as a source of the parameters of job design and its consequences.

Conclusion

The evolutionary perspective suggests that job design field can be recast around a search for the meaning of work in terms of the adaptive challenges it presents and the strategies people enact to meet those challenges. Evolutionary theory provides a compelling way of reframing the current field, and suggesting ways in which it may be extended or emphasis refocused. Within specific areas it can help to develop a range of novel testable hypotheses. The broad directions that the foregoing analysis recommends are as follows:

DOI: 10.1002/job

1. Goals: Job design models need to take greater account of goals that motivate and direct job incumbents, and how they alter according to life circumstances. This could benefit from a self-regulatory frame that would enable the prediction of the different adaptive strategies (shift goals, alter perceptions, change behaviors, modify self-appraisal) that individuals may deploy when taking on a role, or over the duration of extended incumbency.
2. Individual differences: A deeper appreciation is needed for the role of stable individual differences in people's adoption and performance of work roles. This would be especially appropriate in assessing the degree to which job incumbents actively seek to ''craft'' or more radically alter their jobs, and how they appraise the risks of doing so.
3. Sex: Various predictions could be tested around the preferences and choices men and women characteristically make around some of the main parameters of work roles, including modes of enactment, responses to incentives, pursuit of status, and other outcomes.
4. Status: As a primary goal of most employees (subject to gender and individual differences variation), this probably deserves more separate attention than it has received, since it is critical not just to the familiar parameters of job design, such as discretion, but also to a range of valued outcomes. The likelihood of status seeking impairing other aspects of person–job fit in particular could be investigated.
5. Group context: How jobs are embedded in networks of interaction and association is also a key consideration for understanding how people respond to pressures, incentives and rules. Cooperative and competitive behaviors are readily induced by management frameworks. The role of supervisors as active elements in the co-evolution of job incumbents' responses to work is also implicated.
6. Wider context: The co-evolutionary argument is that work environments operate as cultures, and sometimes communities, within which different strategies for optimizing person–job fit may be enacted. The evolutionary approach requires the integration of levels of analysis and can help the field to integrate the plethora of current mid-range theorizing around topics in job design.

Given the amount of theorizing about job design it would be an unfair test of evolutionary theory to come up with entirely novel predictions. That is not wherein its strength lies, but in helping to avoid the atomization of job design into semi-autonomous sub-disciplinary provinces, by providing a unified framework for sense-making and the integration of theory and research findings.

Author biography

Nigel Nicholson has been a Professor of Organizational Behaviour at London Business School since 1990, where he has held the positions of Research Dean and subject area chair. He has pioneered the introduction of the ideas of evolutionary psychology into OB, and has conducted research into many areas of the field. His current work focuses on leadership, culture and the field of family business.

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