J Bioecon (2009) 11:23–42
DOI 10.1007/s10818-009-9056-y

Evolutionary perspectives on salary dispersion within firms

Kevin M. Kniffin

Published online: 25 February 2009
© Springer Science+Business Media, LLC. 2009

Abstract In contrast with neoclassical economic models that assume that individuals hold preferences independently of others, there exist growing bodies of research demonstrating that preferences are often interdependent and based upon relative comparisons. This paper reviews research concerning salary dispersion within firms through the framework of four hypotheses that are generated by evolutionary perspectives. Contrary to some characterizations of evolutionary social science, this review presumes that there exist multiple evolutionary perspectives that have applicability to matters of practical importance. Basic findings include recognition of a strong evolutionarily-sensible preference for relatively high salary standings that is independent of absolute salary amounts. Synthetic findings include identification of research problems that future, directed studies can profitably address. For practical application, my review finds that evolved preferences appear more aligned with salary structures that are dispersed relatively evenly among co-workers when compared with tournament-style compensation patterns.

Keywords Behavioral economics · Relative fitness · Egalitarianism · Evolutionary psychology · Anthropology · Trans disciplinary · Compensation · Sex differences · Age · Labor unions

JEL Classification J31 · D31 · M52 · Z10

K. M. Kniffin (✉)
Department of Anthropology, University of Wisconsin-Madison, 1180 Observatory, Drive, 5240 Social Science Building, Madison, WI 53706, USA
e-mail: kmkniffin@wisc.edu

1 Introduction

Cross-cultural, empirical studies that are designed to test hypotheses drawn from evolutionary perspectives have contributed significantly to our understanding of economic behavior (e.g., Henrich et al. 2001). The value provided by evolutionary explanations for economic analyses is sensible since there is no reason to expect economic behavior to be exempt from the kinds of evolutionary processes that influence other kinds of behavior. The basic contributions made by evolutionary hypotheses have included challenges to neoclassical economics and its assumption of 'atomistic individuals unconnected to others by ties of kinship, ethnic or social ties' (Landa and Wang 2001, p. 217). In contrast to such models of a selfish, rational *Homo economicus*, evolutionists assume on the basis of robust empirical evidence that social ties are central to human economic behavior.

The subject of within-group 'positional concerns' illustrates a phenomenon that evolutionary models would assume and neoclassical economics would not predict. As Niman (2006) reviews, the importance of relative standing among peers for any endeavor is central to evolutionary processes based on selection. Evidence of this observation is found in studies of contemporary industrial populations as well as non-literate hunter-gatherer communities. In both sets of environments, evolutionists typically focus their attention on the impact of economic behavior on reproductive success although the currencies that are important within any specific group vary significantly. For example, while income derived from work has importance in contemporary industrial societies, it is commonly found that meat derived from large-game hunting is prized among hunter-gatherers.

In recent years, researchers from within—and outside of—economics have considered the impact of 'positional concerns' in their analyses of international data concerning income, happiness, work-leisure balances, and stress (e.g., Marmot 2004; Bowles and Park 2005; Layard 2005), often integrating their results with evolutionary perspectives (e.g., Wilkinson 2000). Less commonly, the same set of questions about the impact of positional concerns has been applied to intra-national data that control for neighborhood-level effects (e.g., Luttmer 2005). Most generally, these researchers tend to find evidence across scales of organization that: (1) people do tend to aspire to the consumption-levels demonstrated by their reference groups; and (2) there are costs to such aspiration that include negative stress at both the personal, biological (e.g., Dressler and Bindon 1997; James and Brown 1997) and social, family levels (e.g., Luttmer 2005).

In this paper, I apply multiple evolutionary perspectives to consider the subject of salary dispersion within contemporary firms. My analysis is rooted in anthropological research that suggests a deep ambivalence to inequality within groups (e.g., Boehm's 2004) and builds on earlier work (e.g., Frank 1984a,b; Frank and McKenzie 2006; Niman 2006) to review the importance of within-firm salary dispersion. Unlike earlier studies that focus on singular evolutionary perspectives such as the importance of sex-based differences or the importance of social environment (e.g., Frank 1984a,b), this paper considers a broad array of evolutionary perspectives on salary dispersion within firms and finds reasons to identify a specific model of within-firm compensation as relatively aligned with evolved preferences. To structure a review of relevant

literatures, I consider four hypotheses that are generated by evolutionary perspectives concerning individual and social attitudes to within-firm salary dispersion.

2 Ambivalence towards within-group relative standing

To summarize anthropological evidence of ambivalence to inequality within groups, one can borrow and paraphrase popular sayings to conclude: while it can be good to be king or queen, it can also be lonely and dangerous at the top. These conclusions are based on studies across a wide range of human social environments where: (1) those with relatively high within-group standing reap important benefits that carry evolutionary consequence such as reproductive success; and (2) if one's relatively high standing is going to last for any extended period, it needs to be maintained vis-à-vis others with similar competing interests. Outside of these generalizations, the ways in which people compete for relatively high standing—and the targets that they pursue—is very context-sensitive.

While archaeological records provide a partial basis for understanding life during the Environment of Evolutionary Adaptedness [EEA] (Bowlby 1969; Tooby and Cosmides 1992; Foley 1995/1996), anthropologists commonly consider the environments of nomadic hunter-gatherers to approximate the conditions and pressures that shaped the great proportion of human evolution. Consistently across these groups, researchers find that individuals who gain relatively more status (e.g., through hunting success) also have higher reproductive fitness (e.g., Hawkes and Bliege-Bird 2002; Smith 2004). Among marine foragers on the South Pacific island of Mer, for example, successful turtle hunting is the means through which males appear to gain status and reproductive advantage (Smith et al. 2003). In one review of ethnographies about foraging and small-scale societies, relatively high standing appears to be gained through excellence in activities such as combat, oration, farming, supernatural or healing knowledge, and hunting large game (Henrich and Gil-White 2001, p. 181).

Lest anyone expect that competitions for relatively high standing and reproductive success are simple, however, evidence shows that 'winners' need to be careful. Lee (1969), for example, reports that the Kalahari !Kung would regularly derogate successful hunters among them precisely to help avoid dominance by skilled hunters and to enforce humility in would-be braggarts. In one review of the roles of status in 48 ethnographic accounts of small-scale 'traditional' bands from across the globe whose subsistence bases included hunting, gathering, horticulture, and herding, Boehm (1993) concludes that people in positions of 'high status' are subject to regular negotiation since dominant leaders who behave overly assertive, or 'bossy', do so at their own peril. In fact, in 11 of the societies, Boehm (1993, p. 231) reports that mean or ungenerous leaders were subjects of assassination.

To compare these findings with life in contemporary industrial populations, one needs to recognize that inequality within nation-states is incomparably greater and maintained by 'the force of law.' Despite this significant environmental difference, there is evidence that suggests that the ambivalence found among hunter-gatherers towards relative standing reflects itself in contemporary workplaces. In his study of salary structures across a sample of contemporary work environments, Frank (1985a) finds

that people appear to make trade-offs between salaries and status. Frank reports that in relatively interactive or social organizations, high-performers tend to be paid less—and low-performers tend to be paid more—than would be predicted by traditional economic, pay-for-performance models. Frank concludes that (1) high-performing individuals who work closely with peers accept lower-than-predicted salaries in exchange for higher within-firm status while (2) lower-performing co-workers endure lower within-firm status in exchange for higher-than-predicted salaries. While Frank finds the 'traditional' pattern where co-workers do not interact closely with each other (where individuals with high salaries also have high status), his findings for highly-social workplaces are reminiscent of the anthropological findings reported above where individuals with lower status actively guard against any of their nearby peers gaining too much power or income. Frank's (1994, p. 516) findings suggest that in closely-knit workplaces, people 'who choose low-ranked positions receive compensating payments from [the productivity of] their co-workers' in exchange for their lower status. To say this another way, high-ranked workers pay lower-ranked workers to stay around since their 'high' rank depends upon the company of the lower-ranked (see, example, Cassill 2003, 2006).

3 Disciplinary accounting and evolution's transdisciplinary nature

While Frank's original studies strike against the grain of economic models that assume people operate selfishly and atomistically, his findings are not surprising in the context of other disciplines. For example, the robustness of human preference for status and relative standing is a foundational concern of social psychology (Festinger 1954). As Hoffman et al. (1954, p. 156) conclude on the basis of earlier experiments, people are 'strongly motivated by a concern about their comparability to other members of the group' and such comparisons form a basis for inter-individual competition where status and relative standing are prized alongside—or above—rewards such as cash that are more objectively important.

It is not surprising that a foundational concern of one discipline informs a relatively novel introduction for another discipline since academic fields have different foci and tend to function as relatively independent social communities. It is also, however, not surprising that evolutionary thinking helps bring together and further develop thoughts and findings from across disciplines. As Dennett (1995, p. 521) writes, 'Darwin's idea is a universal solvent, capable of cutting right to the heart of everything in sight.' Wilson (2005, p. 2063) adds, 'Evolutionary theory provides an escape from the extreme specialization that characterizes so much of the rest of science. It transcends taxonomic boundaries because organisms as different as plants, insects, and mammals can be similar in terms of their adaptations….' The central importance of evolutionary perspectives to bioeconomics is clear in this light as Ghiselin (2005, p. 40) states that 'students [of bioeconomics] should be made aware of the opportunity for thinking in economic terms about all aspects of living beings' including 'plants, fungi, and bacteria' alongside mammals.

In this paper, I embrace the transdisciplinary nature of evolutionary science and focus on the specific subject of salary dispersion within firms or industries. This

review centers on research about individuals sharing common employers or trades since they are more likely to compare themselves and their salaries with one another than with individuals working for a different employer in a different industry (Frank 1984a,b, 1985a,b).

Among economists who have researched the role of relative standing within firms with or without evolutionary perspectives and whose work is described below, there is broad agreement that the nature of relative-income effects has been understudied (Easterlin 1995, p. 44; Clark and Oswald 1996, p. 360; Solnick and Hemenway 1998, p. 374; Ferrer-i-Carbonell 2005, p. 1005). In their review of compensation research that draws more heavily on the work of management researchers, Gerhart and Rynes (2003, p. 259) also identify pay dispersion within firms as a subject needing closer attention. Regarding more general questions about the role of relative status within firms, numerous researchers assert that the topic has been undeservedly neglected as a subject of sustained study (e.g., Pearce 2001; Ravlin and Thomas 2005).

In one related area, it is important to acknowledge that management researchers focusing on organizational justice have studied the implications of salary dispersion within firms (e.g., Greenberg 1987; McFarlin and Sweeney 1992; Tekleab et al. 2005); however, such analyses have tended to favor observation more than explanation. As pursued here, the comparative nature of evolutionary studies—across temporal and spatial dimensions—helps to shed light on the basic reasons why salary dispersion tends to be important to people and consequently should have value for applied researchers.

4 Two models of within-firm salary dispersion

Salary dispersion within a given firm, or unit within a firm, refers to the spread or disparity in salary among workers. Salary dispersion is measured 'vertically' from high-ranking to low-ranking positions and 'horizontally' across individuals sharing comparable positions (Shaw et al. 2002). Vertical distances that have been studied include the CEO to Vice Presidents or Top Management Team (Conyon et al. 2001; Henderson and Fredrickson 2001; Carpenter and Sanders 2004), top managerial levels to low-ranked employees (Cowherd and Levine 1992; Brown et al. 2003; Lallemand et al. 2004), and managers to unionized, subordinate employees (Colvin et al. 2001). Horizontal distances have been studied among workers across a wide range of industries including teammates on professional sporting teams (Bloom 1999; Depken 2000; Frick et al. 2003; Jewell and Molina 2004) since their payroll and performance data tend to be uniquely transparent.

This review focuses on 'horizontal' studies since they most conservatively consider the effects of salary dispersion given that dispersion among workers sharing job classifications will tend to be less significant than the spread in salaries awarded to CEOs and low-ranking employees. This paper considers salary dispersion instead of 'wage dispersion' since Alpizar et al. (2005) have shown that benefits such as insurance can be 'positional' goods similar to income from wages.

Researchers who have considered salary dispersion within firms fall roughly into two schools of thought, which Henderson and Fredrickson (2001) attribute to

'economists' and 'behavioralists' respectively. The utility of this dichotomy is increasingly diminished thanks to the work of behavioral economists (Frank 1988, 2000, 2004; Thaler 1992; Henrich et al. 2001; Kahneman 2003) whose empirical studies are better at assessing the bounds of rational choice (Simon 1982) within and across cultures (e.g., Henrich et al. 2001). In Henderson and Fredrickson's (2001) distinction, economists tend to support 'tournament' models of salary dispersion while behavioralists recommend relatively less-dispersed, more cooperative models.

The tournament model of compensation within firms distrustfully presumes that employees function primarily as opportunistic agents who require the prospect of large prizes to motivate against shirking (Lazear and Rosen 1981). The 'high stakes' tournament model accounts for the practice of large US corporations paying their CEOs as much as 60–140% more than a given firm's highest-ranked Vice Presidents (Conyon et al. 2001).

Behavioralist models of compensation within firms do not presume the same degree of individual selfishness among firm employees; instead, authors of these models predict that greater commitment from employees can be facilitated if compensation is allocated more evenly across co-workers (Akerlof and Yellen 1990; Levine 1991). Behavioralist models argue that highly-dispersed salary structures breed inefficient competition ranging from indirect absence of synergies to direct sabotage among co-workers.

Implicit in both models of within-firm salary dispersion is the notion that workers measure themselves against one another according to their relative salaries. The tournament model seeks to motivate workers to 'catch up' to their significantly-better-paid superiors while behavioralist models expect that cooperation and commitment from workers becomes more likely when salary dispersion among co-workers is minimized. From an evolutionary perspective, one can observe that both models predict that workers view their salaries as reflections of their relative standing.

Building on the theorizing created by Festinger (1954), earlier frameworks provided by equity theory (Adams 1963) also start with the recognition that workers tend to view their salaries as measures of relative standing. Previous theories tend to move forward from that starting point to consider the implications and outcomes of salary dispersion within firms. Evolutionary perspectives, on the other hand, focus more on 'why' while looking backwards and broadsides through comparative analyses that help show reasons for the importance of relative standing.

5 Hypotheses generated by evolutionary perspectives

Retrospective evolutionary analyses of human behavior have drawn new perspectives from ethnographic records of hunter-gatherer (e.g., Boehm 1996, 2001) and merchant communities (e.g. Landa 1999), historical archival materials (e.g., Richerson and Boyd 1999; Wilson 2002), and general, contemporary social surveys (e.g., Freese 2002; Kanazawa 2002, 2003a). Evolutionary explanations can provide a common framework for viewing phenomena that contrast with the historically-particular or idiosyncratic cataloguing that is sometimes normal practice for social scientists. The

generalizations or patterns detected from evolutionary analyses can create an added, synthetic value when compared with the original observations.

To be valuable, retrospective evolutionary analyses should reorganize findings from earlier work in ways that facilitate new explanations. Towards these ends, I identify and use a set of four hypotheses in the following sections to review salary dispersion research conducted by management researchers, economists, and other social scientists who are typically innocent of evolutionary perspectives. This review organizes findings that are sometimes tangentially relevant in earlier, non-evolutionary analyses in order to develop evolutionary explanations for observed preferences and values (cf. Henrich et al. 2001).

I identify and consider four hypotheses derived from evolutionary perspectives to demonstrate the plurality that can exist among evolutionists. Most research that applies evolutionary lenses to contemporary human thought and action carries the label of 'evolutionary psychology'; however, the field of human evolutionary studies draws upon researchers trained in each of the social sciences and has room for competing hypotheses. For example, while sex-based differences have shaped significant research programs within the evolutionary social sciences (e.g., Daly and Wilson 1988; Buss 1992; Singh 1992), evolutionary social science is not exclusively about the study of sex-based differences. In this review, Hypotheses 1–4 concern general salary preferences as well as the potential impacts of age, sex, and social environment on relative preferences.

6 Hypothesis #1: Individual salary preferences are relative within workplace-based peer-groups

While *Homo economicus* is assumed to adopt and pursue preferences that are self-maximizing and independent of others' preferences (Hodgson 1993; Fehr and Schmidt 1999), casual observation is enough to dismiss the assumption as unrealistic (Schor 2000). Instead, whether one calls it 'keeping up with the Joneses' (e.g., Frank 2000), 'leapfrogging' (e.g., Gerhart and Rynes 2003), the 'hedonic treadmill' (Brickman and Campbell 1971), 'Veblen effects' (e.g., Bowles and Park 2005), the 'Red Queen effect' (Van Valen 1973), or runaway selection (e.g., Miller 2000), it is clear that people tend to prefer higher salaries, fancy cars, and larger homes. In each case, independent of the preference's impact on individual happiness (Castronova 2004), people tend to want 'more' and 'better', which tends to be defined in contrast to one's peers or comparables.

Both field and laboratory studies have considered questions related to salary dispersion within firms. In their analysis of the field-based British Household Panel Survey (BHPS), for example, Clark and Oswald (1996, p. 360) find that 'workers' reported levels of well-being are at best weakly correlated with absolute income alone' and 'measures of comparison income are significantly negatively correlated with reported levels of happiness at work.' These findings and the BHPS draw upon data collected from workers employed across industries.

Two studies of salary dispersion among individuals sharing comparable, or horizontal, positions within *in situ* firms have yielded findings of close relevance to

Hypothesis 1. Based on his review of individual and team salaries for Major League Baseball players between 1985 and 1993, Bloom (1999) tests for relationships with measures of individual and team performance that can be reasonably interpreted as proxies for individual preferences and satisfaction. Bloom finds that salary dispersion within teams correlates negatively with composite measures of individual performance across a range of tasks (fielding, hitting, and pitching). More precisely, when separating individuals on the higher and lower ends of the salary gradients, Bloom (1999, p. 32) reports that salary dispersion—independent from other variables— correlates positively with the performance of higher-paid individuals and negatively with the performance of those who are on the lower end of the salary gradient. In effect, Bloom finds that people on the high end of a salary gradient seem to prefer more unequal wages while those on the low end appear to prefer more equal wages.

In a different study of more than 17,000 faculty surveyed across more than 600 academic departments, Pfeffer and Langton (1993) find that salary dispersion negatively correlates with employee satisfaction. In finer detail, they report that 'the most unhappy are those who earn less money and are in more dispersed salary distributions' while 'the most satisfied are the high earners in more dispersed distributions, because these are the people who are comparatively the best off' (1993, p. 399). What is noteworthy in the context of Hypothesis 1 is not that lower-paid professors are less satisfied or higher-paid professors are more satisfied, but that there appears to exist an independent effect of increased salary dispersion that exacerbates the relationship between satisfaction and relative salary standing.

Consistent with the findings reported above, there is evidence that public knowledge of salary information can (1) exacerbate reactions to relatively low salary standing (Pfeffer and Langton (1993, p. 401); Case 2001) as well as (2) potentially function as a pressure against greater salary dispersion. For example, in their review of salary differences among faculty, Brennan and Tollison (1980, p. 355) predict that 'strong pressures to equalize the salaries of academic equals will result from salary publication.' While these findings and predictions are sensible, any effects created by the formal publication of salary information would be difficult to disentangle from the effects of informal social interaction that are featured in Frank (1985a) comparison of closely- and loosely-knit workplace groups. Indeed, the primary findings reported by Frank as well as Pfeffer and Langton predict that knowledge gained formally and informally will affect responses to within-firm salary dispersion.

Gerhart and Rynes (2003, p. 258) challenge the interpretations of both Bloom (1999) and Pfeffer and Langton (1993), arguing that their findings are artifactual. Gerhart and Rynes criticize the teamwork variable that Bloom (1999) employs and specify that Pfeffer and Langton's (1993) findings appear to apply mainly to 'unexplained' salary dispersion (e.g., dispersion unrelated to productivity). Gerhart and Rynes argue that future research is needed that pays closer attention to the components of salary dispersion within firms. Independent of Gerhart and Rynes' challenges to field studies of salary dispersion, however, there exist robust lab-based findings that are relevant to Hypothesis 1.

The primary stream of lab-based studies (Bazerman et al. 1992, 1994; Solnick and Hemenway 1998; Hsee et al. 1999; Tenbrunsel and Diekmann 2002) presents subjects with hypothetical scenarios intended to understand how relative salary information

impacts employee job-selections. In these experiments, subjects are asked if they would accept jobs at salary X (e.g., $80,000) if others with comparable experiences were offered the same jobs at salaries equal to—or greater than—salary X. Consistently, subjects report a willingness to accept salaries less-than-X (e.g., $70,000) from firm A when firm B is offering both salary X (e.g., $80,000) and salaries greater-than-X (e.g., $85,000) to other individuals with comparable experience.

Blount and Bazerman (1996) present a comparable albeit less consequential set of options to subjects who are asked to consider whether to participate in an experiment that: (a) pays everyone $7; or (b) pays focal subjects $8 and other subjects $10. In this case, subjects tend to choose to participate in the study that paid them—and all other subjects—$7.

In reviewing several of these hypothetical studies, Hsee et al. (1999, p. 582) conclude that 'most people, we surmise, would find an unequal treatment (especially when it is in favor of the other party) highly unattractive.' While these studies tend to be based on the narrow question of applicants responding to competing job offers, they do support the hypothesis that individual salary preferences are relative within workplace-based peer groups. Further, these studies quietly demonstrate the value of evolutionary approaches since they do not consider why salary preferences appear to be relative within groups. Hypothesis 1, in contrast, is based upon an expectation and explanation that concern for relative standing within groups will manifest itself in contemporary business organizations as concern for relative within-firm salary standing. The breadth and depth of evolutionary perspectives is required for this hypothesis and explanation.

7 Hypothesis #2: Younger individuals are more preoccupied with relative salary standing within workplace-based peer-groups

Across the life cycle, young adults tend to have the highest degrees of reproductive potential. If individuals are going to take advantage of their endowed reproductive potential, it is reasonable to expect heightened sensitivity to positional contests among young adults. While this hypothesized sensitivity can take myriad shapes and forms (e.g., achievement in scientific enterprises [e.g., Kanazawa 2003b]), it is useful to test whether young adults are more concerned than others in their workplaces about salary dispersion.

Although Hypothesis 2 has not been tested directly in working environments, it is striking that salary preference studies relying upon responses to hypothetical scenarios tend to draw upon undergraduate college students who are typically young adults (Blount and Bazerman 1996; Johansson-Stenman et al. 2002; Tenbrunsel and Diekmann 2002; Alpizar et al. 2005; Hill and Buss 2006; Shore et al. 2006). An evolutionary perspective highlights the fact that these studies could be yielding results that should not be generalized for older or younger individuals. It is also true that samples of young adults attending college might be more attentive to positional concerns than those not pursuing college degrees.

In a lab-based test of Hypothesis 2, Solnick and Hemenway (1998) draw upon a sample of university students, faculty, and staff to answer a series of hypothetical

scenarios. Though they do not intend to consider the effect of age, Solnick and Hemenway (1998, p. 379) report that 'students were more likely to make positional choices than either faculty and staff.' One can speculate that their study finds evidence in support of Hypothesis 2 (since students tend to be significantly younger than faculty and staff) and one can otherwise see clearly that evolutionary perspectives are not central (or even peripheral) to most of the salary dispersion research reviewed in this paper. Solnick and Hemenway (1998, p. 380), for example, acknowledge their regret for not asking respondents whether they were married since, without offering any possible explanation, they expect there might be an important effect. In light of Hypothesis 2, any effect of marriage would need to control for the possible confounding effect of age.

In a more recent lab-based test of Hypothesis 2, Pingle and Mitchell (2002) ask a relatively diverse sample of university students to rank their preferred income and leisure levels in contrast to imaginary others. While Pingle and Mitchell primarily investigate the relationship between preferences for income and leisure, they do find that being a relatively young adult increases the likelihood that one considers income to be a positional good. In other words, they report that older adults are less preoccupied with their relative salary standing.

Future studies that consider Hypothesis 2 should test for age-effects among groups with a broader range of educational and work experiences and should also consider whether this effect varies as a function of basic income or wealth. Given that findings in support of Hypothesis 2 could also be explained by a desire for younger, poorer individuals to assert themselves against older, relatively wealthy individuals (Gerhart 2005), future tests should split samples to include young and older individuals with real or imagined poverty and wealth. Hypothesis 2 generates the more specific hypothesis that youthfulness will correlate with heightened concern about relative salary standing independently of wealth levels.

8 Hypothesis #3: Men are more preoccupied than women with relative salary standing within workplace-based peer-groups

Because males have significantly greater variation in the potential number of offspring that they can produce than females, a conventional evolutionary perspective predicts that males will be more sensitive than females to their relative standings, which can be measured in workplace settings through salary dispersion. As Perusse (1993) reviews, while males who are successful in contemporary (post-)industrial pursuits do not necessarily have significantly more offspring than less successful males, they do tend to have greater status and mating success. In spite of the disconnection between mating and reproductive fitness that exists in many contemporary environments through contraception and monogamy (Perusse 1993), the greater sensitivity of males to their relative standing remains well-demonstrated through measures such as homicide rates (e.g., Daly and Wilson 1988).

While researchers and policymakers have investigated sex-based differences in salary (e.g., Ridgeway and Correll 2004; Kanazawa 2005; Still 2006), the narrow set of questions regarding salary dispersion within firms has received considerably less

attention. Several studies that have considered variants of Hypothesis 3 have produced mixed results.

In one study that does not rely upon hypothetical responses from undergraduates, Balkin and Gomez-Mejia (2002) consider how a sample of 194 female and male professors of management from across a range of colleges and universities responded to actual pay increases. Balkin and Gomez-Mejia report that males were less satisfied than females by given pay increases after controlling for other variables including base salaries.

In a different study focused on job satisfaction and gender, Donohue and Heywood (2004, p. 223) consider data from the National Longitudinal Survey of Youth in the US and find that 'women derive less of their job satisfaction from earnings or from their position in an earnings hierarchy.' Donohue and Heywood's data do not use firm-specific earnings hierarchies but instead rely upon region- or industry-specific estimates. While neither Balkin and Gomez-Mejia (2002) nor Donohue and Heywood (2004) consider evolutionary perspectives, their findings conform with Hypothesis 3.

In their report of contrary findings, Alpizar et al. (2005) draw upon the responses of 325 students from The University of Costa Rica to hypothetical questions concerning the positional nature of goods such as income and fringe benefits. When comparing the responses of female and male students, Alpizar et al. (2005, p. 417) find evidence that 'suggest[s] that women care more about relative income and consumption than men do.' Acknowledging that this finding is 'a bit surprising', Alpizar et al. (2005, p. 417) speculate that the relatively subordinate roles accorded to women in Costa Rica might heighten their sensitivity to relative standings.

In a study of Swedish students, Johansson-Stenman et al. (2002) present subjects with hypothetical choices involving the relative standing they would prefer for their imagined grandchildren. While they find important concerns for relative standing as studies reviewed above have shown (e.g., Bazerman et al. 1992), they report no significant difference between males and females with regard to positional concerns. Johansson-Stenman et al. (2002, p. 382) do not discuss this non-finding; however, they do recommend attempts to replicate their findings (and presumably their non-findings) 'in other countries, where the preferences for equality and status may differ.'

In a study of students in the United States, Hill and Buss (2006) ask subjects to choose between a pair of hypothetical salaries that are: (a) relatively greater than the average of one's comparables; and (b) absolutely greater but relatively lower than the average of one's comparables. In conformity with Hypothesis 1, Hill and Buss report a strong preference for salaries that are relatively greater. They do not, however, find a significant between-sex difference (2006, p. 135).

Apart from the mixed results that are found for Hypothesis 3, when compared with the significant attention paid to between-sex variation by evolutionary social scientists, perhaps the most striking relevant fact is the silence it is accorded by most economists who have studied the impacts of relative standing most closely. Among those whose work is described in this paper as focusing on concerns about relative standing, Frank (1984a,b, 1985a), Bazerman et al. (1992), Blount and Bazerman (1996), Hsee et al. (1999), Shore et al. (2006), and Tenbrunsel and Diekmann (2002) do not consider any gender- or sex-based differences in their samples or models. Future experimental

economics research (e.g., Henrich et al. 2001) would do well to include tests of variable preferences (e.g., on the basis of age, sex, or gender) for relative standings across cultures. It is plausible, for example, that the impact of any sex-based difference in salary preferences diminishes with age (Hopcroft 2006).

9 Notes on evolutionary perspectives of sex-based differences

When reviewing evolutionary explanations that are based upon the importance of sex and age differences, it is important to state clearly that such hypotheses and explanations are not intended as justifications for inequities based on sex and age. Instead, evolutionists commonly argue that explanations are needed to support fuller diagnoses in order to produce improved responses and solutions. Evolutionary social science should not advance a variant of the naturalistic fallacy and argue that what is observed is evolved. These positions are consistent with Yarbrough's (2005, p. 8) observation that 'ethical obligations [demand] that instructors [of bioeconomics] need to be sensitive to the history of differential treatment of men and women.'

Discrimination against women in the workplace has been documented to occur through a wide range of means (Ridgeway and Correll 2004) including lower salaries, reduced expectations, and less power. In recent years, evolutionists (e.g., Colarelli et al. 2006; Kanazawa 2005; Browne 2006; Still 2006) have tested explanations for sex-based workplace discrimination and found that: (1) there do exist significant sex-based differences that reflect evolved preferences; and (2) workplaces need to recognize and accommodate this diversity. Colarelli et al. (2006, p. 179) conclude that evolutionary perspectives provide 'an opportunity for scholars and practitioners to develop new avenues for power that can effectively and realistically allow talented women greater power in organizations.' Still (2006) draws similar conclusions and identifies adequate parental leave and better-funded quality childcare as needed reforms.

In addition to being sensitive to the roles of sex-based discrimination in any review of workplace activity, it also bears observation that while many evolutionary social scientists have focused their research programs almost exclusively on the differences between heterosexual males and females, there are evolutionists who challenge that focus. Wilson (1994, p. 299), for example, charges that a non-trivial proportion of evolutionary social science treats sex differences as if two species were being compared. Additional criticisms of evolutionary (and non-evolutionary) studies of human sex differences argue that much of the research has been misinterpreted (Buller 2005), over-extended (Levy 2004), and oversold (Hyde 2005). Indicative of the fact that evolutionary social science can, at least, apply a pluralism of methods and hypotheses and that tests of 'individual differences' are not proposed as substitutes for hypothesizing sex- or age-based differences, evolutionary social scientists studying variable perceptions of physical attractiveness (Kniffin and Wilson 2004) and the relationship between emotions and social norms (Wilson and O'Gorman 2003) report the presence of individual differences while also finding patterns of sex-based differences predicted by evolutionary perspectives.

Despite the fact that inter-individual variation that is independent of sex and age is less discrete, less superficially-accessible, and less dramatic, there are sound

reasons for evolutionary social scientists to consider its importance. Wilson (1994, p. 220), for example, argues that 'sexual dimorphisms are so obvious and so universally appreciated that we tend to forget what they are: complex polymorphisms that adapt members of the same species to different circumstances.' In this view, just as evolutionary pressures have selected for some sex-specific traits, one should expect other traits to be selected on the basis of circumstances that are not sex-specific. Indeed, one can imagine that individuals (of any species) whose offspring is capable of a broad range of trait-expressions would outperform individuals whose endowments are more uniformly constricted in rapidly changing environments. With regard to the degree to which humans are either shy or bold, Wilson (1994) points to evidence from non-human species to demonstrate the existence of 'niches' where, respectively, individuals who are relatively shy or bold would be favored.

Wilson (1994) presents variation along the dimension of shyness and boldness as a case where:(1) there does exist variation among individuals independent of sex and age; and (2) there do exist circumstances where either shyness or boldness have greater value. In particular, Wilson recognizes that individuals are often served for displaying one trait or another (e.g., shyness or boldness) as a function of trait frequencies within their relevant population(s). In this model, which draws on empirical studies conducted by Kagan et al. (1988), some individuals appear to be predisposed to either shyness or boldness persistently through early years of development; however, a significant number of people demonstrate sufficient phenotypic plasticity that can accommodate a range of environments. Where environments include important aspects of change, it is sensible to expect that phenotypic plasticity, which is increasingly recognized as an important part of human development (e.g., Gottesman and Hanson 2005), would evolve.

10 Hypothesis #4: Individual concerns with relative salary standing are frequency-dependent within workplace-based peer-groups independent of age and sex

As demonstrated by evolutionary studies of age-based differences and non-sex-specific traits such as shyness and boldness, human evolutionists do not assume an isomorphic or 1:1 relationship between genotypes and phenotypes. In the affirmative, evolutionary studies do accommodate important space for recognizing the impacts of learning, local environments, and individual agency (e.g., Boyd and Richerson 1985; Durham 1991; Wilson and Kniffin 1999). Hypothesis 4 reflects this fact and expects that one's concerns with relative within-firm salary standing will vary across social environments on the basis of others in the firm.

There exists significant indirect evidence in support of Hypothesis 4 that the competition (e.g., to keep up with Joneses) that underlies preoccupation with relative salary standing can be minimized where collective action prevails. Following Freeman and Medoff (1984); Frank (1985b) interprets the role of labor unions as mutual agreements created by co-workers to self-regulate their competition. Consistent with this interpretation, Frank and, more recently, Card et al. (2004) find that unions tend to negotiate less dispersed salary structures and safer workplaces. Frank (1985b) also

finds that unions tend to negotiate unobservable and non-positional goods such as pension benefits while not accepting bonuses, which tend to provide employers with the discretion to award people individually thus increasing the chance of increased salary dispersion.

To consider alternative compensation structures in workplaces where salaries are not bargained collectively, individuals would incur risk to stop caring about their relative salary standing assuming that most others continued to pursue relatively higher standing. Through collective bargaining agreements, unions appear to minimize this risk through mutual—and frequency-dependent—agreement. As reported above, unions appear to facilitate a muting of the 'arms race' of co-worker competition. Given that younger and older men and women form unions, this effect of social environment appears independently important.

The findings that are hypothesized and explained by Hypothesis 4 demonstrate that co-workers are able to intentionally stop the arms race that keeping up with the Joneses motivates. These findings can be generalized to workplaces that are not presently unionized through collectivist compensation structures. Steps that employers can take to de-emphasize competition among co-workers and build community include eliminating individualistic awards (e.g., Employee of the Month) and repartitioning incentive structures so that rewards are allocated partly on the basis of group-level performance (Campbell 1994; Kniffin and Wilson 2005). More generally, such steps can help create shared fates within and among workplace units for the mutual benefit of employees and firms.

In regards to any lab-based studies of relevance to Hypothesis 4, psychologists interested in 'individual differences' have come closest to questions of salary dispersion in Schwartz et al.'s (2002) distinction between 'maximizers' and 'satisficers'. They find that, independent of sex and age, individuals tend towards either of the end points, one of which (maximizers) are very concerned with 'never settling for second best' while the other (satisficers) tend to be less concerned with their relative standing. Their findings are consistent with Trank et al.'s (2002) report of variable compensation and promotion preferences across individuals as well as Solnick and Hemenway's (1998, p. 380) speculation that it could be possible to 'discover the point for each individual at which' relative and absolute salary preferences balance against each other. As with research that distinguishes between 'shy' and 'bold' individuals, however, an acknowledgment is needed that intra-individual change is possible if not likely as environments change. Hypothesis 4 recommends that such studies of individual differences take into account the context-specific changes that frequency-dependent pressures can effect.

11 Conclusion

While strategic planners often talk about looking at problems from the 10,000-foot level, evolutionists can be said to look at problems from the 100,000-year level. The breadth and depth of this analytical frame helps to place contemporary phenomena (e.g., salaries) into the more general context of currencies, which include status alongside dollars, ducats, and dinero. An evolutionary perspective also helps one understand

why millionaires, for example, often negotiate at great expense for higher salaries after they have already accumulated enough wealth to fund basic food, shelter, and clothing needs for one or several households indefinitely. As described and explained above, such behavior makes sense in light of evolutionary perspectives that conclude salaries are about much more than money.

Basic findings of this paper's review include the evolutionarily-sensible observations that: (1) individuals tend to prefer high relative salary standing even if entails significant costs in absolute standing; (2) young adults tend to be more concerned with their relative position than others; (3) there is mixed evidence for sex-based differences in response to salary dispersion; and (4) individual salary preferences can change as a function of one's social environment. In particular, there is evidence that co-workers can cooperate to minimize competition and within-firm salary dispersion. There also exists reason to expect that employers can organize compensation structures in ways that minimize competition among co-workers.

Synthetic findings of this paper's review include the observations that: (1) research based on undergraduate subject pools risks artifactual exposure to evolved age-based preferences; and (2) economists studying the importance of relative salary standing tend to ignore consideration of sex differences. Each of these findings makes sense against the backdrop of neoclassical economics and its assumption that people are uniformly self-interested and rational (Kanazawa 2006).

While some of this review's findings may appear unrelated, it is important to recognize their commonalities and relationships. For example, Hypotheses 2, 3, and 4 consider the effects of specific individual and environmental traits on responses to within-firm salary dispersion; however, it is within the larger theoretical framework of evolutionary perspectives that one can explain why concerns with relative salary standing ultimately exist. In the jargon of evolutionists, Hypotheses 2, 3, and 4 consider the role of proximate variables as contrasted with ultimate reasons—reviewed through Hypothesis 1—that provide more basic explanations.

A general recommendation for practitioners that emerges from my review draws upon the observation that tournament-like salary structures are less aligned with our evolved preferences than compensation patterns that are dispersed relatively evenly among workers sharing comparable job classifications. Given the facts that: (1) the model of *Homo economicus* as a rational, self-interested agent underlies the tournament model of salary dispersion; and (2) evolutionary studies have found economic behavior to be more complicated, this suggestion is sensible. My recommendation is also consistent with Boehm's (2004) conclusion that humans tend to seek the reduction of variance within groups when compared with more steeply hierarchical alternatives.

While 'many economists would be happier' (Hopkins and Kornienko 2004, p. 1087) for the sake of theoretical consistency to not recognize the influence of evolved preferences, this review elaborates an important case in which the model of *Homo economicus* is found lacking. This review of salary dispersion research re-affirms the work of experimental and evolutionary economists to develop more realistic models of economic behavior.

In the same way that this review seeks to juxtapose and integrate findings from across the social sciences, future research should recognize that other species might also demonstrate behaviors and preferences similar to those described above. In studies

of non-human primates in multiple species (e.g., Brosnan et al. 2005), researchers have found that they also 'seem to measure rewards in relative terms, comparing their own rewards with those available, and their own efforts with those of others' (Brosnan and de Waal 2003, p. 299). Retrospective evolutionary analyses such as this review help to demonstrate that cross-fertilization across the disciplines should provoke and encourage new areas of inquiry and understanding. My review also helps demonstrate that the application of evolutionary perspectives to problems of contemporary business carries implications for researchers and practitioners alike.

Acknowledgements The author thanks Paul Edwards, Barry Gerhart, Satoshi Kanazawa, Janet Landa, Randall Peterson and anonymous reviewers for comments on earlier versions of this manuscript.

References

Adams, J. S. (1963). Toward an understanding of inequity. *Journal of Abnormal Psychology, 67*, 422–436.

Akerlof, G. A., & Yellen, J. L. (1990). The fair wage-effort hypothesis and unemployment. *The Quarterly Journal of Economics, 105*, 255–283.

Alpizar, F., Carlsson, F., & Johansson-Stenman, O. (2005). How much do we care about absolute versus relative income and consumption? *Journal of Economic Behavior and Organization, 56*:405–421

Balkin, D. B., & Gomez-Mejia, L. R. (2002). Explaining the gender effects on faculty pay increases: Do the squeaky wheels get the grease? *Group & Organization Management, 27*, 352–373.

Bazerman, M. H., Loewenstein, G. F., & White, S. B. (1992). Reversals of preference in allocation decisions: Judging an alternative versus choosing among alternatives. *Administrative Science Quarterly*, *37*, 220–240.

Bazerman, M. H., Schroth, H. A., Shah, P. P., Diekmann, K. A., & Tenbrunsel, A. E. (1994). The inconsistent role of comparison others and procedural justice in reactions to hypothetical job descriptions: Implications for job acceptance decisions. *Organizational Behavior and Human Decision Processes, 60*, 326–352.

Bloom, M. (1999). The performance effects of pay dispersion on individuals and organizations. *Academy of Management Journal, 42*, 25–40.

Blount, S., & Bazerman, M. H. (1996). The inconsistent evaluation of absolute versus comparative payoffs in labor supply and bargaining. *Journal of Economic Behavior and Organization, 30*, 227–240.

Boehm, C. (1993). Egalitarian behavior and reverse dominance hierarchy. *Current Anthropology 34*, 227–240.

Boehm, C. (1996). Emergency decisions, cultural selection mechanics, and group selection. *Current Anthropology, 37*, 763–778.

Boehm, C. (2001). *Hierarchy in the forest: The evolution of egalitarian behavior*. Cambridge, MA: Harvard University Press.

Boehm's, C. (2004). What makes humans economically distinctive? A three-species evolutionary comparison and historical analysis. *Journal of Bioeconomics, 6*, 109–135.

Bowlby, J. (1969). *Attachment and loss*. Londan: Hogarth Press.

Bowles, S., & Park, Y. (2005). Emulation, inequality, and work hours: Was Thorsten Veblen right? *The Economic Journal, 115*, F397–F412.

Boyd, R., & Richerson, P. J. (1985). *Culture and the evolutionary process*. Chicago, IL: University of Chicago Press.

Brennan, H. G., & Tollison, R. D. (1980). Rent Seeking in Academia. In J. M. Buchanan, R. D. Tollison, & G. Tullock (Eds.), *Towards a theory of the rent-seeking society* (pp. 344–356). College Station, Texas: Texas A&M University Press.

Brickman, P., & Campbell, D. T. (1971). Hedonic Relativism and Planning the Good Society. In M. Appley (Ed.), *Adaptation-Level Theory* (pp. 215–231). New York: Academic Press.

Brosnan, S. F., & de Waal, F. B. M. (2003). Monkeys reject unequal pay. *Nature, 425,* 297–299.

Brosnan, S. F., Schiff, H. C., & de Waal, F. B. M. (2005). Tolerance for inequity may increase with social closeness in chimpanzees. *Proceedings of the Royal Society of London: Biological Sciences, 272*, 253–258.

Brown, M. P., Sturman, M. C., & Simmering, M. J. (2003). Compensation policy and organizational performance: The efficiency, operational, and financial implications of pay levels and pay structure. *Academy of Management Journal, 46*, 752–762.

Browne, K. R. (2006). Evolved sex differences and occupational segregation. *Journal of Organizational Behavior, 27*, 143–162.

Buller, D. J. (2005). *Adapting minds: Evolutionary psychology and the persistent quest for human nature*. Cambridge, MA: MIT Press.

Buss, D. (1992). *The evolution of desire: Strategies of human mating*. Basic Books, New York.

Campbell, D. T. (1994). How individual and face-to-face-group selection undermine firm selection in organizational evolution. In J. A. C. Baum & J. V. Singh (Eds.), *Evolutionary dynamics of organizations* (pp. 23–38). New York: Oxford University Press.

Card, D., Lemieuz, T., & Riddell, W. C. (2004). Unions and wage inequality. *Journal of Labor Research, 25*, 519–562.

Carpenter, M. A., & Sanders, W. G. (2004). The effects of top management team pay and firm internationalization on MNC performance. *Journal of Management, 30*, 509–528.

Case, J. (2001). When salaries aren't secret. *Harvard Business Review, 79*, 37–49.

Cassill, D. L. (2003). Skew selection: Nature favors a trickle-down distribution of resources in ants. *Journal of Bioeconomics, 5*, 83–96.

Cassill, D. L. (2006). Why skew selection, a model of parental exploitation, should replace kin selection. *Journal of Bioeconomics, 8*, 101–109.

Castronova, E. (2004). Achievement bias in the evolution of preferences. *Journal of Bioeconomics, 6*, 195–226.

Clark, A. E., & Oswald, A. J. (1996). Satisfaction and comparison income. *Journal of Public Economics, 61*, 359–381.

Colarelli, S. M., Spranger, J. L., & Hechanova, M. R. (2006). Women, power, and sex composition in small groups: An evolutionary perspective. *Journal of Organizational Behavior, 27*, 164–184.

Colvin, A., Batt, R., & Katz, H. C. (2001). How high performance human resource practices and workforce unionization affect managerial pay. *Personnel Psychology, 54*, 903–934.

Conyon, M. J., Peck, S. I., & Sadler, G. V. (2001). Corporate tournaments and executive compensation: Evidence from the UK. *Strategic Management Journal, 22*, 805–815.

Cowherd, D. M., & Levine, D. I. (1992). Product quality and pay equity between lower-level employees and top management: An investigation of distributive justice theory. *Administrative Science Quarterly, 37*, 302–320.

Daly, M., & Wilson, M. (1988). *Homicide*. New York: Aldine De Gruyter.

Dennett, D. C. (1995). *Darwin's dangerous idea: Evolution and the meanings of life*. New York: Simon & Schuster.

Depken II, C. A. (2000). Wage disparity and team productivity: Evidence from major league baseball. *Economics Letters, 67*, 87–92.

Donohue, S. M., & Heywood, J. S. (2004). Job satisfaction and gender: An expanded specification from the NLSY. *International Journal of Manpower, 25*, 211–234

Dressler, W. W., & Bindon, J. R. (1997). Social status, social context, and arterial blood pressure. *American Journal of Physical Anthropology, 102*, 55–66.

Durham, W. H. (1991). *Coevolution: Genes, culture, and human diversity*. Stanford, CA: Stanford University Press.

Easterlin, R. A. (1995). Will raising the income of all increase the happiness of all? *Journal of Economic Behavior and Organization, 27*, 35–47.

Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics, 114*, 817–868.

Ferrer-i-Carbonell, A. (2005). Income and well-being: An empirical analysis of the comparison income effect. *Journal of Public Economics, 89*, 997–1019.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117–140.

Foley, R. (1995/1996). The adaptive legacy of human evolution: A search for the environment of evolutionary adaptedness. *Evolutionary Anthropology, 4*, 194–203.

Frank, R. H. (1984a). Are workers paid their marginal products? *The American Economic Review, 74*, 549–571.

Frank, R. H. (1984b). Interdependent preferences and the competitive wage structure. *Rand Journal of Economics, 15*, 510–520.

Frank, R. H. (1985a). *Choosing the right pond: Human behavior and the quest for status*. New York: Oxford University Press.
Frank, R. H. (1985b). The demand for unobservable and other nonpositional goods. *The American Economic Review, 75*, 101–116.
Frank, R. H. (1988). *Passions within reason: The strategic role of the emotions*. New York: Norton.
Frank, R. H. (1994). *Microeconomics and behavior*. 2nd edn. New York: McGraw-Hill.
Frank, R. H. (2000). *Luxury fever: Why money fails to satisfy in an era of excess*. Princeton, NJ: Princeton University Press.
Frank, R. H. (2004). *What price the moral higher ground: Ethical dilemmas in competitive environments*. Princeton, NJ: Princeton University Press.
Frank, S. A., & McKenzie, R. B. (2006). The male-female pay gap driven by coupling between labor markets and mating markets. *Journal of Bioeconomics, 8*(3), 269–274.
Freeman, R. B., & Medoff, J. L. (1984). *What do unions do*? New York: Basic Books.
Frick, B., Prinz, J., & Winkelmann, K. (2003). Pay inequalities and team performance: Empirical evidence from the North American major leagues. *International Journal of Manpower, 24*, 472–488.
Freese, J. (2002). Imaginary imaginary friends? Television viewing and satisfaction with friendships. *Evolution and Human Behavior, 24*, 65–69.
Gerhart, B., & Rynes, S. L. (2003). *Compensation: Theory, evidence, and strategic implications*. Thousand Oaks, CA: SAGE Publications.
Gerhart, B. (2005). Personal communication. October 19, Madison, WI, USA.
Ghiselin, M. T. (2005). Comment on Robert Yarbrough's 'teaching bioeconomics'. *Journal of Bioeconomics, 7*, 39–40.
Gottesman, I., & Hanson, D. (2005). Human development: Biological and genetic processes. *Annual Review of Psychology, 56*, 263–286.
Greenberg, J. (1987). A taxonomy of organizational justice theories. *Academy of Management Review, 12*, 9–22.
Hawkes, K., & Bliege-Bird, R. (2002). Showing off, handicap signaling, and the evolution of men's work. *Evolutionary Anthropology, 11*, 58–67.
Henderson, A. D., & Fredrickson's, J. W. (2001). Top management team coordination needs and the CEO pay gap: A competitive test of economic and behavioral models. *Academy of Management Journal, 44*, 96–117.
Henrich, J., & Gil-White, F. J. (2001). The Evolution of prestige: Freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evolution and Human Behavior, 22*, 165–196.
Henrich, J., Boyd, R., Bowles, S., Gintis, H., Camerer, C., Fehr, E., & McElreath, R. (2001). In search of Homo economicus: Experiments in 15 small-scale societies. *American Economic Review, 91*, 73–78.
Hill, S. E., & Buss, D. M. (2006). Envy and positional bias in the evolutionary psychology of management. *Managerial and Decision Economics, 27*, 131–143.
Hoffman, P. J., Festinger, L., & Lawrence, D. H. (1954). Tendencies toward group comparability in competitive bargaining. *Human Relations, 7*, 141–159.
Hodgson, G. M. (1993). *Economics and evolution: Bringing life back into economics*. Ann Arbor, MI: University of Michigan Press.
Hopcroft, R. L. (2006). Status characteristics among older individuals: The diminished significance of gender. *Sociological Quarterly, 47*, 361–374.
Hopkins, E., & Kornienko, T. (2004). Running to keep in the same place: Consumer choice as a game of status. *American Economic Review, 94*, 1085–1107.
Hsee, C. K., Blount, S., Loewenstein, G. F., & Bazerman, M. H. (1999). Preference reversals between joint and separate evaluations of options: A review and theoretical analysis. *Psychological Bulletin, 125*, 576–590.
Hyde, J. S. (2005). The gender similarities hypothesis. *American Psychologist, 60*, 581–592.
James, G. D., & Brown, D. E. (1997). The biological stress response and lifestyle: Catecholamines and blood pressure. *Annual Review of Anthropology, 26*, 313–335.
Jewell, R. T., & Molina, D. J. (2004). Productive efficiency and salary distribution: The case of US major league baseball. *Scottish Journal of Political Economy, 51*, 127–142.
Johansson-Stenman, O., Carlsson, F., & Daruvala, D. (2002). Measuring future grandparents' preferences for equality and relative standing. *The Economic Journal, 112*, 362–383.
Kagan, J., Reznick, J. S., & Snidman, N. (1988). Biological bases of childhood shyness. *Science, 240*, 167–171.

Kahneman, D. A. (2003). A psychological perspective on economics. *American Economic Review, 93*, 162–168.
Kanazawa, S. (2002). Bowling with our imaginary friends. *Evolution and Human Behavior, 23*, 167–171.
Kanazawa, S. (2003a). The relativity of relative satisfaction. *Evolution and Human Behavior, 24*, 71–73.
Kanazawa, S. (2003b). Why productivity fades with age: The Crime-genius connection. *Journal of Research in Personality, 37*, 257–272.
Kanazawa, S. (2005). Is 'discrimination' necessary to explain the sex gap in earnings? *Journal of Economic Psychology, 26*, 269–287.
Kanazawa, S. (2006). 'First, kill all the economists…': The insufficiency of microeconomics and the need for evolutionary psychology in the study of management. *Managerial and Decision Economics, 27*, 95–101.
Kniffin, K. M., & Wilson, D. S. (2004). Beauty as an assessment of overall fitness value: The effect of non-physical traits on the perception of physical attractiveness. *Evolution and Human Behavior, 25*, 88–101.
Kniffin, K. M., & Wilson, D. S. (2005). Utilities of gossip across organizational levels: Multilevel selection, freeriders, and teams. *Human Nature, 16*, 277–291
Lallemand, T., Plasman, R., & Ryex, F. (2004). Intra-firm wage dispersion and firm performance: Evidence from linked employer-employee data. *Kyklos, 57*, 533–558.
Landa, J. T. (1999). The law and bioeconomics of ethnic cooperation and conflict in plural societies of Southeast Asia: A theory of Chinese merchant success. *Journal of Bioeconomics, 1*, 269–284.
Landa, J. T., & Wang, X. T. (2001). Bounded rationality of economic man: Decision making under ecological, social, and institutional constraints. *Journal of Bioeconomics, 3*, 217–235.
Layard, P. R. G. (2005). *Happiness: Lessons from a new science*. New York: Penguin Press.
Lazear, E. P., & Rosen, S. (1981). Rank-order tournaments as optimum labor contracts. *Journal of Political Economy, 89*, 841–864.
Lee, R. B. (1969). *A naturalist at large: Eating Christmas in the Kalahari*. Natural History, December.
Levine, D. I. (1991). Cohesiveness, productivity and wage dispersion. *Journal of Economic Behavior and Organization, 15*, 237–255.
Levy, N. (2004). *What makes us moral?: Crossing the boundaries of biology*. Oxford: OneWorld.
Luttmer, E. F. P. (2005). Neighbors and negatives: Relative earnings and well-being. *The Quarterly Journal of Economics, 120*, 963–1002.
Marmot, M. G. (2004). *Status syndrome: How social standing affects our health and longevity*. New York: Times Books.
McFarlin, D. B., & Sweeney, P. D. (1992). Distributive and procedural justice as predictors of satisfaction with personal and organizational outcomes. *Academy of Management, 35*, 626–637.
Miller, G. (2000). *The mating mind*. London: Heineman.
Niman, N. B. (2006). Sexual selection and economic positioning. *Journal of Bioeconomics, 8*, 21–33.
Pearce, J. L. (2001). Less epistemology; More government and social status. *Human Relations, 54*, 85–89.
Perusse, D. (1993). Cultural and reproductive success in industrial societies: Testing the relationship at the proximate and ultimate levels. *Behavioral and Brain Sciences, 16*, 267–322.
Pfeffer, J., & Langton, N. (1993). The effect of wage dispersion on satisfaction, productivity, and working collaboratively: Evidence from college and university faculty. *Administrative Science Quarterly, 38*, 382–407.
Pingle, M., & Mitchell, M. (2002). What motivates positional concern for income. *Journal of Economic Psychology, 23*, 127–148.
Ravlin, E. C., & Thomas, D. C. (2005). Status and stratification processes in organizational life. *Journal of Management, 31*, 966–987.
Richerson, P. J., & Boyd, R. (1999). Complex societies: The evolutionary origins of a crude superorganism. *Human Nature, 10*, 253–289.
Ridgeway, C. L., & Correll, S. J. (2004). Motherhood as a status characteristic. *Journal of Social Issues, 60*, 683–700.
Schor, J. (2000). The new politics of consumption. In J. Cohen & J. Rogers (Eds.), *Do Americans shop too much?* (pp. 3–33). Boston, MA: Beacon Press.
Schwartz's, B., Ward, A., Lyubomirsky, S., Monterosso, J. White, K., & Lehman, D. R. (2002). Maximizing versus satisficing: Happiness is a matter of choice. *Journal of Personality and Social Psychology, 83*, 1178–1197.

Shaw, J. D., Gupta, N., & Delery, J. E. (2002). Pay dispersion and workforce performance: Moderating effects of incentives and interdependence. *Strategic Management Journal, 23*, 491–512.
Shore, T. H., Taschian, A., & Jourdan, L. (2006). Effects of internal and external pay comparisons on work attitudes. *Journal of Applied Social Psychology, 36*, 2578–2598.
Simon, H. A. (1982). *Models of bounded rationality*. Cambridge, MA: MIT Press.
Singh, D. (1992). Adaptive significance of female physical attractiveness: Role of waist-hip ratio. *Journal of Personality and Social Psychology, 65*, 293–307.
Smith, E. A. (2004). Why do good hunters have higher reproductive success? *Human Nature, 15*, 343–364.
Smith, E. A., Bird, R. B., & Bird, D. W. (2003). The benefits of costly signaling: Meriam turtle hunters. *Behavioral Ecology, 14*, 116–126.
Solnick, S. J., & Hemenway, D. (1998). Is more always better?: A survey on positional concerns. *Journal of Economic Behavior and Organization, 37*, 373–383.
Still, M. C. (2006). The opt-out revolution in the United States: Implications for modern organizations. *Managerial and Decision Economics, 27*, 159–171.
Tekleab, A. G., Bartol, K. M., & Liu, W. (2005). Is it pay levels or pay raises that matter to fairness and turnover? *Journal of Organizational Behavior, 26*, 899–921.
Tenbrunsel, A. E., & Diekmann, K. A. (2002). Job-decision inconsistencies involving social comparison information: The role of dominating alternatives. *Journal of Applied Psychology, 87*, 1149–1158.
Thaler, R. H. (1992). *The winner's curse*. New York; Maxwell Macmillan.
Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J.H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The Adapted mind: Evolutionary psychology and the generation of culture* (pp. 19–136). New York: Oxford University Press.
Trank's, C. Q., Rynes, S. L., & Bretz, R. D. Jr. (2002). Attracting applicants in the war for talent: Differences in work preferences among high achievers. *Journal of Business and Psychology, 16*, 331–345.
Van Valen, L. (1973). A new evolutionary law. *Evolutionary Theory, 1*, 1–30.
Wilkinson, R. (2000). *Mind the gap: Hierarchies, health, and human evolution*. London: Weidenfeld & Nicholson.
Wilson, D. S. (1994). Adaptive genetic variation and human evolutionary psychology. *Ethology and Sociobiology, 15*, 219–235.
Wilson, D. S. (2002). *Darwin's cathedral: Evolution, religion, and the nature of society*. Chicago, IL: University of Chicago Press.
Wilson, D. S. (2005). Evolution for everyone: How to increase acceptance of, interest in, and knowledge about evolution. *PloS Biology, 3*, 2058–2065.
Wilson, D. S., & Kniffin, K. M. (1999). Multilevel selection and the social transmission of behavior. *Human Nature, 10*, 291–310.
Wilson, D. S., & O'Gorman, R. (2003). Emotions and actions associated with norm-breaking events. *Human Nature, 14*, 277–304.
Yarbrough, R. M. (2005). Teaching bioeconomics. *Journal of Bioeconomics, 7*, 1–38.