

Renovating the Pyramid of Needs: Contemporary Extensions Built Upon Ancient Foundations

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Abstract

Maslow's pyramid of human needs, proposed in 1943, has been one of the most cognitively contagious ideas in the behavioral sciences. Anticipating later evolutionary views of human motivation and cognition, Maslow viewed human motives as based in innate and universal predispositions. We revisit the idea of a motivational hierarchy in light of theoretical developments at the interface of evolutionary biology, anthropology, and psychology. After considering motives at three different levels of analysis, we argue that the basic foundational structure of the pyramid is worth preserving, but that it should be buttressed with a few architectural extensions. By adding a contemporary design feature, connections between fundamental motives and immediate situational threats and opportunities should be highlighted. By incorporating a classical element, these connections can be strengthened by anchoring the hierarchy of human motives more firmly in the bedrock of modern evolutionary theory. We propose a renovated hierarchy of fundamental motives that serves as both an integrative framework and a generative foundation for future empirical research.

Keywords

motivation, evolutionary psychology, development, life-history theory, humanistic psychology, positive psychology

Almost 70 years have passed since Abraham Maslow's classic 1943 *Psychological Review* paper proposing a hierarchical approach to human motivation. Maslow's model had an immense influence on the field of psychology, including the subfields of personality, social psychology, psychopathology, developmental psychology, and organizational behavior, and it continues to be cited widely in textbooks (e.g., Kreitner & Kinicki, 2008; Myers, 2009; Nairne, 2003). Indeed, the powerful visual image of a pyramid of needs (see Fig. 1) has been one of the most cognitively contagious ideas in the behavioral sciences.

Unfortunately, many behavioral scientists view Maslow's pyramid as a quaint visual artifact without much contemporary theoretical importance. We suggest, on the contrary, that the idea can take on a new significance when combined with later theoretical developments. In this article, we revisit the idea of a hierarchical approach to human motivation, suggesting some renovations to Maslow's approach. This revised model not only provides useful connections to current innovations in

psychology (e.g., evolutionary and positive psychology) but also raises a number of broader empirical questions for future research.

We propose an updated and revised hierarchy of human motives, building on theoretical and empirical developments at the interface of evolutionary biology, anthropology, and psychology (e.g., Cosmides & Tooby, 1992; Crawford & Krebs, 2008; Dunbar & Barrett, 2007; Gangestad & Simpson, 2000; Haselton & Buss, 2000; Kaplan & Gangestad, 2005; Kenrick, Li, & Butner, 2003). This revision retains a number of Maslow's critical insights, including the hierarchical structure and several original needs such as physiological, safety (self-protection), and esteem (status). However, we update the model

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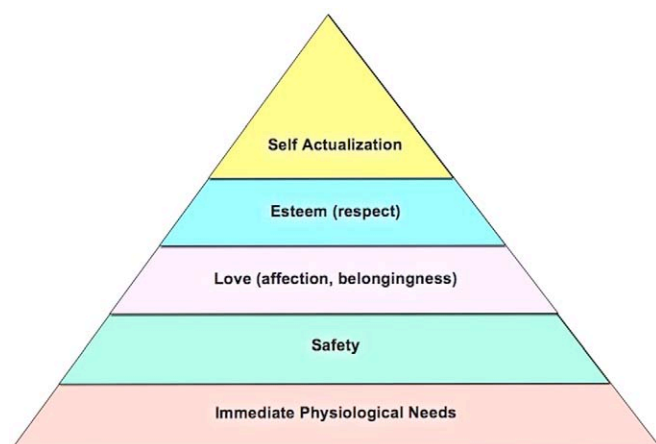


Fig. 1. Maslow's classic hierarchy of needs.

in several important ways. Most important, we believe it useful to examine basic human motives at three different levels of analysis often conflated in Maslow's work: (a) their ultimate evolutionary function, (b) their developmental sequencing, and (c) their cognitive priority as triggered by proximate inputs.

The implications of this three-level analysis are significant. Among other things, considerations at the functional level of analysis suggest that, although self-actualization may be of considerable psychological importance, it is unlikely to be a functionally distinct human need. Consequently, we have removed self-actualization from its privileged place atop the pyramid and suggest that it is largely subsumed within status (esteem) and mating-related motives in the new framework. Consideration of the developmental level of analysis led us to draw on the biological framework of life-history theory. Following this perspective, the top of the pyramid includes three types of reproductive goals: mate acquisition, mate retention, and parenting. And consideration of a proximate level of analysis along with life-history theory led us to change the way in which the goals are depicted in the pyramid: Rather than depicting the goals as stacked on top of one another, we instead depict them as overlapping (see Fig. 2). This change explicitly reflects the assumption that early developing motives are unlikely to be fully replaced by later goals but instead continue to be important throughout life, depending on individual differences and proximate ecological cues.

We end by discussing some of the broader questions raised by these renovations and their implications for the humanistic elements underlying Maslow's approach to human motivation. Modern evolutionary theory and research provides a new perspective on two key features of the traditional humanistic approach. First, it is now clear that human beings indeed have an array of diverse motivational systems not well represented by invoking only a few general motives shared with laboratory rats. Second, evolutionary logic is perfectly compatible with a humanistic emphasis on positive psychology. Indeed, a fuller understanding of evolved motivational systems—and their dynamic connection to environmental opportunities—can be used to enhance human creativity, productivity, kindness, and happiness.

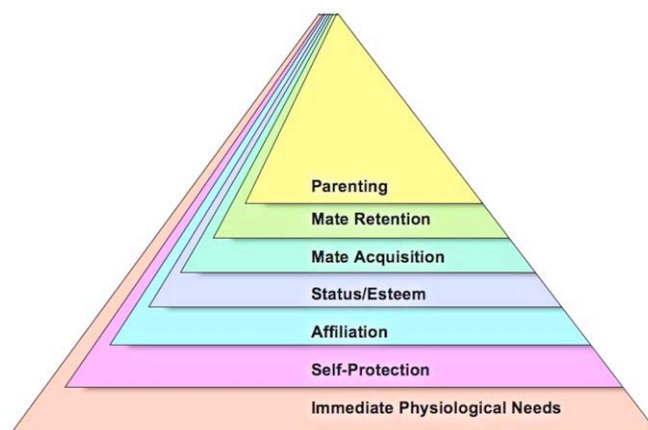


Fig. 2. An updated hierarchy of fundamental human motives. This figure integrates ideas from life-history development with Maslow's classic hierarchy. This scheme adds reproductive goals, in the order they are likely to first appear developmentally. The model also depicts the later developing goal systems as overlapping with, rather than completely replacing, earlier developing systems. Once a goal system has developed, its activation will be triggered whenever relevant environmental cues are salient.

Maslow's Motivational Pyramid

At the core of Maslow's theory of motivation are two important ideas: (a) there are multiple and independent fundamental motivational systems and (b) these motives form a hierarchy in which some motives have priority over others.

Multiple Fundamental Motivational Systems

Maslow's proposal of multiple and independent motivational systems was advanced partially as an alternative to the influential behaviorist view championed by Watson, Skinner, and Dollard and Miller. In the middle of the 20th century, the accepted view was that there were only a handful of "primary drives," such as hunger and thirst. These few primary drives were presumed to be present early in life and to provide the foundation for later "secondary drives" that are learned via simple conditioning principles. For example, a child's mother is always present during nursing, and she continues to provide intermittent food rewards even after weaning. Because of the repeated association between food and social contact, the child learns to desire contact with other people.

In contrast to the prevailing behaviorist view, Maslow (1943, 1970) proposed several independent sets of basic human needs. He presumed a universal set of distinct motives related to physiology, safety, affection, esteem, and self-actualization. Maslow's ideas about independent motives built upon the research of his graduate advisor, Harry Harlow, who found that rhesus monkeys raised in isolation came to prefer contact with a soft, cuddly surrogate mother, even when they were fed exclusively at a nearby wire surrogate (e.g., Harlow & Zimmerman, 1959). Harlow's work demonstrated that the motivation to obtain contact comfort was independent of conditioning experiences with hunger satisfaction. These findings undergirded

Maslow's conclusion that "... we could never understand fully the need for love no matter how much we might know about the hunger drive" (Maslow, 1970, p. 21). Research since that time has lent support to the notion of multiple motivational and learning systems, showing that systems controlling human food preferences, food aversions, fears, and other motivations operate using different rules and that they are sometimes controlled by architecturally distinct areas of the brain (e.g., Barrett & Kurzban, 2006; Cosmides & Tooby, 1992; Garcia & Koelling, 1966; Öhman & Mineka, 2001; Pinker, 1994; Sherry & Schacter, 1987; Wilcoxon, Dragoin, & Kral, 1971).

Hierarchical Organization of Motives

Probably the most enduring aspect of Maslow's theory is his idea of organizing fundamental motives into a hierarchy. The hierarchical arrangement suggested that some motives take precedence over others, which in turn take precedence over others. If a person is starving, for example, the desire to obtain food will trump all other goals and dominate the person's thought processes. This idea of *cognitive priority* is represented in the classic hierarchy shown in Figure 1.

In addition to suggesting that some motives take cognitive priority over others, Maslow's scheme also assumed that an individual's priorities shifted from lower to higher in the hierarchy as the person matured. That is, Maslow's hierarchy also reflected *developmental priority*. For example, infants are only concerned with physiological needs, such as hunger and thirst, and concerns about affection presumably emerge later in development. After a person accomplishes the goal of winning affection, he or she focuses increasingly on gaining esteem, and concerns about affection are presumed to fade into the background.

Maslow also proposed that the goal at the top of the hierarchy is self-actualization—fulfilling one's creative potential. Self-actualization might mean different things to different people (e.g., a musician would pursue music, an artist would pursue painting, a researcher would pursue knowledge in a specific area). According to Maslow's hierarchical approach, self-actualization only becomes a priority after all other needs are satisfied. Maslow's focus on self-actualization combines two recurring themes in his approach: the emphasis on positive aspects of human psychology over negative aspects and the belief that some human motivations are not directly linked to physiological needs of the homeostatic variety, implying that they are therefore not well understood by studying hungry rats.

Motivational Hierarchies at Multiple Levels of Analysis

In Maslow's theory, the ideas of cognitive priority and developmental priority were sometimes blurred together on the presumption that the two types of priorities move in synchrony with one another. But cognitive and developmental priorities may not, in fact, overlap perfectly. For example, physiological needs were placed at the bottom of the hierarchy and are

therefore presumed to arise early in development. This certainly is true of needs such as hunger and thirst, but other physiological needs, such as the hormonally driven desire for sexual satisfaction, do not become active developmentally until adolescence. At the same time, sexual desire, as well as other physiological needs such as hunger, can be suppressed by social concerns (e.g., esteem) even when those physiological needs are salient. Hence, the developmental hierarchy need not correspond precisely to the cognitive hierarchy. Moreover, the cognitive hierarchy might change dynamically with context at any point in an individual's life. For example, although a successful artist is normally motivationally focused on higher concerns and can ignore physiological needs that would monopolize an infant's attention, most artists focus on food if they are truly starving. Thus, the order of the development of fundamental motives, and a person's currently conscious priorities, are two separable issues.

Maslow acknowledged that there was an imperfect correspondence between the developmental order and the current prioritization of needs, though he frequently treated the discrepancies as noise in an otherwise orderly system. We will argue that it is worthwhile to explicitly separate these issues and to add at least one more level of analysis within which to consider motivational hierarchies. In what follows, we will consider motivational hierarchies at three levels of analysis: evolutionary function, developmental sequencing, and current cognitive priority (the proximate level).

In behavioral biology, historical controversies have been fueled by failures to distinguish between different levels of causation, with some theorists mistakenly suggesting developmental or immediate cognitive triggers as "alternatives" to functional accounts. As a consequence, there has been extensive discussion of the importance of distinguishing evolutionary function, ontogenetic development, and proximate determinants of any given behavior (e.g., Sherman, 1988; Simpson & Gangestad, 2001; Tinbergen, 1963). As an example, consider the question of why mammalian mothers nurse their offspring. This question can be answered correctly at three different levels of analysis. First, functional or evolutionary explanations are concerned with the ultimate adaptive purposes of behavior. An explanation in terms of evolved function might suggest that mothers nurse offspring because this behavior increases offspring survival rates.¹ Second, developmental explanations are concerned with life-span-specific inputs that sensitize the organism to particular cues. A developmental explanation might suggest that mothers nurse offspring because pregnancy and childbirth trigger puberty-dependent shifts in hormones and milk production in mammalian females. Finally, proximate explanations focus on the immediate triggers for a given behavior. A proximate explanation might suggest that nursing occurs because an infant has begun suckling on the female's nipple, which leads to immediate hormonal changes that stimulate milk release.

Sometimes there is an obvious connection between all three levels of analysis. In the case of nursing, for instance, the developmental changes in lactation capacity accompany the

other changes during pregnancy, and the infant, who receives obvious functional benefits from the nursing, triggers the immediate proximate release of milk. But connections between the three levels of analysis are not always clear. Consider the question of why birds migrate each year. A proximate explanation is that birds migrate because days are getting shorter—the immediate cue that triggers migration. The ultimate reason for such migration, however, is survival and reproduction; the distribution of desirable food and mating sites varies seasonally. Yet birds do not likely have any awareness of the indirect connections between day length and survival. There are two key implications here: (a) animals, including humans, need not be consciously aware of the ultimate function of their behavior, and (b) the connection between long-term goals and immediate goals is often indirect.

In what follows, we consider the notion of motivational hierarchies at each of these three levels of analysis. Considered at the level of evolutionary function, there is a natural hierarchical relationship between survival and reproductive goals, with survival goals undergirding reproductive goals. There is also evidence suggesting independent motivational systems designed to deal with different functional threats and opportunities, thus supporting Maslow's distinctions between central motives, albeit in a slightly reframed and expanded fashion. At the developmental level of analysis, Maslow's distinctions can be integrated with those offered by biological life-history models, which focus on how organisms confront different goals at different phases of the life span. This integration can expand both approaches in theoretically productive ways. At the proximate level of analysis, this integrative approach emphasizes that there is a continual dynamic interplay between motivational systems, cognitive appraisals, and environmental threats and opportunities.

Functional Level of Analysis

At the broadest level, an evolutionary approach implies that all behavior is goal-oriented, resulting from psychological adaptations that were designed by natural selection to deal with recurrent threats and opportunities. A considerable body of comparative and neuropsychological evidence now supports the assumption of multiple motivational and cognitive systems. There is also reason to presume some degree of hierarchical relationship between functional motivational systems. We elaborate on these points of agreement with Maslow's general approach below, and we also propose a reframing of Maslow's ideas in light of subsequent theory and evidence. Such a reframing suggests some important additions to and expansions of Maslow's model of fundamental human motivational systems.

At the simplest level, modern evolutionary theorists presume that if one observes a recurrent pattern of behavior in an animal species, it is likely to reflect the operation of mechanisms that were selected because they increased our ancestors' reproductive success. In more technical terms,

evolutionary biologists presume that all living organisms have been selected to promote their *inclusive fitness*, which means their relative success at passing genes into future generations via either direct reproduction or helping kin reproduce. Inclusive fitness is presumed to underlie all evolved mechanisms, including any innate systems that contribute to an animal's survival and ultimate reproductive success. Evolutionary analyses of behavior sometimes directly consider the influence of inclusive fitness on behavior, as in studies of selective investment of resources in grandchildren (Laham, Gonsalkorale, & von Hippel, 2005). Other analyses focus on reproductive behavior, as in studies of criteria for mating partners (e.g., Durante, Li, & Haselton, 2008; Garver-Apgar, Gangestad, & Thornhill, 2008; Li & Kenrick, 2006; Schmitt, 2003). However, promoting the ultimate goal of inclusive fitness also requires the pursuit of many other goals that contribute indirectly to survival and reproductive success.

Domain-Specificity of Motivational Mechanisms

Successful reproduction involves a great deal more than accomplishing a goal of sexual satisfaction. In the service of reproduction, an animal must accomplish many subsidiary goals. Any social animal—such as a prairie chicken, a chimpanzee, or a human being—must negotiate a set of complex interactions with other members of its species, establish and maintain a network of alliances, and attract a mate, which may require first gaining status or acquiring territory. Evolutionary analyses of behavior tend to consider behavioral mechanisms in terms of the specific problems they are designed to solve. Such analyses focus on the domain-specific mechanisms that solve specific adaptive problems. Different problems often require different, and often incompatible, solutions, which can often be better solved by independent motivational and cognitive systems.

Following Harlow's early work, later research has revealed the presence of distinct learning systems tuned to specific adaptive pressures faced by particular animal species. For example, Wilcoxon et al. (1971) found that both rats and quail condition aversions to foods that are followed by nausea. Whereas rats condition aversion to gustatory rather than visual cues associated with the novel foods, quail do the reverse, conditioning aversion more readily to visual cues rather than gustatory cues. These learning biases make adaptive sense because rats search for food in the dark using smell and taste as cues, whereas quail use vision to search for food during the day and eat many foods that do not contain strong scent cues, such as seeds. Many other findings support the notion that different kinds of information are acquired and stored very differently, albeit in ways that make adaptive sense (Rozin & Kalat, 1971; Sherry & Schacter, 1987). For example, birds use very different and often incompatible rules, sometimes controlled by different brain areas, to store information about food location, species song, and foods that made them sick (Sherry & Schacter, 1987). Findings from

human cognitive neuroscience have converged with findings from comparative biology to suggest that human beings, like other animals, have distinct neurological and motivational systems for dealing with different problems, such as learning about physical safety threats, detecting cheaters, and finding mates (e.g., Barrett & Kurzban, 2006; Cosmides & Tooby, 1992; Kurzban & Aktipis, 2007; Öhman & Mineka, 2001; Sherry & Schacter, 1987).

Fundamental Needs in Functional Perspective

Maslow believed that the motives in his hierarchy were probably universal features of human nature. In Maslow's time, however, psychologists interested in human nature did not tend to think in terms of functional adaptations. Modern evolutionary analyses begin by considering how a particular motivation might be linked to a recurrent adaptive problem, the solution of which would tend to serve survival or reproductive goals. Maslow's taxonomy of important human motivations is consistent with later functional analyses (e.g., Bugental, 2000; Kenrick et al., 2003). These analyses are consistent with his suggestion that there are different domain-specific motivational systems for physiological needs, safety (self-protection) needs, esteem (status) needs, and belongingness (affiliation) needs. As we discuss below, however, a functional analysis suggests that Maslow sometimes lumped together functionally (and psychologically) distinct needs into single, overly broad categories. Furthermore, a functional analysis suggests that self-actualization is not a functionally distinct need at all.

Physiological motives The adaptive function of what Maslow called physiological needs is fairly straightforward; he included here homeostatic needs such as hunger and thirst, which are obviously essential for survival. Logically, the satisfaction of such physiological needs is foundational to other motives. Maslow also considered sexual desire in the same category, although he acknowledged that the satisfaction of sexual desire was likely linked to other social motives as well. In what follows, we suggest that sexual motivation should be treated distinctly from basic survival needs such as hunger and moved to a different position in the hierarchy. Maslow also noted emerging research on "specific hungers," which indicated that even a motive as apparently simple as hunger might be more complex than it appeared. That research suggested that people and other animals might come to crave foods rich in particular nutrients that had been lacking in their diets (e.g., Hughes & Dewar, 1971; Hughes & Wood-Grush, 1971; Rozin & Kalat, 1971). Conversely, pregnancy sickness seems to involve the avoidance of foods that could damage the developing fetus, occurring most frequently during the period of fetal organ development and most likely to be elicited by vegetables containing toxins and meats that carry bacterial infections (Fessler, Eng, & Navarrete, 2005; Profet, 1992). The bottom line of these findings is that physiological cravings are designed to be adaptive and involve specific environmental tuning, but they are unlikely to have been learned according

to simple processes such as classical conditioning or to be the product of conscious computation.

Self-protection and safety motives Once people meet their basic physiological needs, Maslow reasoned that safety needs become the next priority. Later research supports the suggestion that human beings have unique motivational systems for dealing with threats. These systems include rapid learning of associations for stimuli that would likely have threatened our ancestors, as well as attentional systems attuned to angry expressions, particularly on the faces of unfamiliar males, who would have posed an especially great threat (Ackerman et al., 2006; Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007; Öhman & Mineka, 2001).

A key feature of modern evolutionary analyses is the consideration of trade-offs (e.g., Gangestad & Simpson, 2000; Kaplan & Gangestad, 2005; Stearns, Allal, & Mace, 2008). No behavioral inclination is likely to operate without costs, and fear reactions are a good example. On the one hand, fearful avoidance is necessary when confronted with predatory or poisonous animals or when outnumbered by hostile strangers. On the other hand, fear can lead to the avoidance of risky situations that, if confronted, could yield payoffs (e.g., public speaking anxiety or other forms of social anxiety). Hence, a central part of a functional analysis of any behavioral proclivity is an assessment of the perils and prospects associated with performing different behaviors within any particular ecological context. When the risk of physical damage is highly costly, threat-avoidance systems are likely to be set like smoke alarms, favoring false positive alarms rather than false negative complacency (Haselton & Nettle, 2006; Nesse, 2005; Rozin & Royzman, 2001); it is better to unnecessarily flee a misperceived potential threat than to mistakenly remain in a dangerous situation.

Affiliation and belongingness motives Maslow treated the needs for love, affection, and belongingness as a single category. These social motivations differ from physiological and safety needs in that they are not absolutely necessary for personal survival. Indeed, many other animals live more or less solitary lives outside the mating season. However, human beings are exquisitely sensitive to cues of social rejection, and they respond to such cues using some of the same neural circuits used to register physical pain (Eisenberger, Lieberman, & Williams, 2003; MacDonald & Leary, 2005). The adaptive functions of social affiliation have been extensively reviewed (Baumeister & Leary, 1995; Boyd & Richerson, 1985; Sedikides & Skowronski, 1997; Stevens & Fiske, 1995; Wisman & Koole, 2003), and there appear to be some general oxytocin-based neurophysiological systems associated with social attachment (Brown & Brown, 2006; Carter, 1992; Hazan & Zeifman, 1999; Taylor et al., 2000).

Modern humans' hunter-gatherer ancestors lived in groups, as did most of the primates from which they evolved (Lancaster, 1976). In terms of trade-offs, a solitary life avoids costs such as competition over local resources, socially transmitted diseases, and exploitation by fellow group members. However, there are also great benefits to social life, and human

groups involve extensive sharing of resources, knowledge, and parenting chores with other group members (e.g., Henrich & Boyd, 1998). Anthropological analyses of hunter-gatherer societies indicate that food sharing within such groups provides an essential insurance policy for survival through spotty times (K. Hill & Hurtado, 1989).

Although social affiliation appears to be a fundamental motive, as Maslow proposed, it is worth considering some important differences among the various forms of affiliation. There are functional and neurological differences between systems involved in romantic love, affiliation with family members, and affiliation with other group members—all of which Maslow lumped into one motivational category. For instance, relationships between romantic partners, friends, and family members tend to be governed by distinct affective states and cognitive decision biases (e.g., Ackerman, Kenrick, & Schaller, 2007; Diamond, 2004; Fiske, 1992; Kenrick, 2006). Sexual arousal and sexual jealousy are distinctly designed to deal with opportunities and threats arising in romantic relationships, but not in family relationships. Grossly uneven distributions of benefits and costs, taken for granted between parents and children, can trigger emotional reactions associated with injustice if occurring between friends and could be grounds for terminating the friendship. Because romantic love, friendship, and familial bonds are also likely to be associated with different developmental periods, we argue that it is worth clearly distinguishing them in a hierarchy of motives.

Status and esteem motives Maslow classified esteem needs into two related sets—one consisting of desires for strength, achievement, and mastery (which contributed to one's self-esteem) and the other consisting of desires for reputation, status, dominance, and glory (or the esteem of others).

Henrich and Gil-White (2001) note that status in humans can arise from physical dominance and threat in the same way that it typically does in other animals. They distinguish this from prestige, which is freely conferred deference toward individuals who possess special skills and information. Even among hunter-gatherers, many human activities depend on highly technical information (e.g., fishing, hunting, food preparation, building canoes or huts, and so on). It is much more efficient to learn by modeling the behaviors of successful others than by using trial and error (Boyd & Richerson, 1985; Henrich & Boyd, 1998), so people are willing to defer to, and perform favors for, others who have acquired skills. Unlike physical dominance, which leads subordinate individuals to avoid those with the potential to harm them, prestige leads subordinates to actively try to get close to higher status individuals.

As in other animals, higher status results in benefits for both men and women because it often translates into others performing favors for them. Status also has an additional benefit for human males in increasing their access to mates (Betzig, 1992; J. Hill, 1984; Li & Kenrick, 2006; Sadalla, Kenrick, & Vershure, 1987; Turke & Betzig, 1985). This helps explain why males are often more willing to take social and physical risks to attain status, a proclivity that is enhanced when mating motives are salient (Griskevicius, Goldstein, Mortensen,

Cialdini, & Kenrick, 2006; Griskevicius, Tybur, et al., 2009; Wilson & Daly, 1985). A functional analysis also addresses why people are motivated not only to attain status, but also to defer to others who are high in status. If those others are physically dominant, deference reduces the odds of physical conflict; if they have information-based prestige, deference increases the odds of learning from them (Henrich & Gil-White, 2001).

Related to the goal of status is the notion of mastery, which Maslow viewed as contributing to self-esteem and which also contributes to self-confidence and to prestige-generating skills. A motive to solve or master novel problems is likely to facilitate the attainment of status and others' esteem, with consequent implications for reproductive fitness. It is possible that mastery may have additional adaptive consequences that are not specific to status or esteem. Deci and Ryan (2000) posited a domain-general need to "to engage optimal challenges and experience mastery or effectance in the physical and social worlds" (p. 252). These authors link this need to curiosity and play, which they suggest can generate various adaptive consequences. They suggest that a general inclination to seek novel information and explore alternative solutions would be useful for solving problems across domains, including the satisfaction of physiological needs such as hunger and thirst, as well as problems involving safety and affiliation. To the extent that this is true, a general inclination to master problems would likely arise very early in development and should be clearly distinguished from status motivation, as well as from each of the other problem focused motives. Considerations of domain specificity and of the costs involved in acquiring skills caution that such a motivation will not be completely general, but will be directed to solving particular problems, and the problems deemed most worthy of mastery should vary depending on one's current opportunities and threats in interaction with current developmental phase.

Self-actualization In defining self-actualization, Maslow most commonly offered examples involving creative displays: "A musician must make music, an artist must paint, a poet must write, if he is to be ultimately at peace with himself" (Maslow, 1943, p. 382). Maslow believed that the desire to fulfill one's own unique potential was disconnected from biological needs. Although such higher needs may be separated from simple physiological imbalances, no human need can be meaningfully separated from biology. A modern functional analysis demands that one ask what adaptive (i.e., fitness-relevant) payoffs might be associated with a motive for self-actualization or, alternatively, whether the capacity to strive for self-actualization might be a nonadaptive consequence of other adaptive mechanisms.

That possibility that self-actualization is a by-product of other mechanisms is worth considering first. Many higher order human phenomena exist not because they serve specific fitness-relevant functions, but because they emerged as by-products or nonadaptive effects of psychological mechanisms that evolved for somewhat different reasons altogether (Park, 2007). Researchers have applied this perspective to understand

the origins of complex psychological phenomena such as religion and morality (e.g., Atran & Norenzayan, 2004; Boyer, 2003; Krebs, 2008). For example, the belief in supernatural beings may confer no functional benefits whatsoever. Instead, these beliefs emerge naturally as nonadaptive consequences of specific kinds of cognitive abilities (e.g., abilities to detect agency in other beings, to ascribe intentions to those beings, and to construct cognitive representations of things that aren't immediately perceptible). Those cognitive abilities might have evolved in response to fitness pressures that have nothing whatsoever to do with supernatural beliefs. It is possible that, just as transcendent religious beliefs serve no adaptive function, the transcendent strivings associated with self-actualization may also be essentially functionless—natural consequences, perhaps, of a basic capacity for goal construction coupled with the uniquely human capacities for self-reflection and the imagination of possible selves.

On the other hand, there may be specific fitness-relevant consequences associated with the striving for self-actualization. But these consequences may not be specific to self-actualization. The functional benefits associated with self-actualization may be no different from those associated with esteem/status or mating-related needs.

Although creative expression may often seem like mere self-entertainment, human displays of creative and intellectual capacities are directly linked to reproductive success. Talented artists, musicians, or writers frequently show off their creative outputs to others and may receive very high levels of fame, resources, and romantic interest as a result. Pablo Picasso, Diego Rivera, Duke Ellington, John Lennon, and Pablo Neruda all converted their considerably actualized talents with paintbrushes, musical notes, and words into fame, fortune, and reproductive opportunities. Miller (2000) reviews an extensive body of literature to make a case that creative displays in humans follow many of the same rules of sexually selected displays in other animals, such as peacocks' tails. For example, males are more likely to publicly draw attention to their creativity than are females, and females are likely to choose creative men as mates. As in competitions for status, males are more likely to display their creative talents when mating motives are activated (Griskevicius, Cialdini, & Kenrick, 2006).

From a modern perspective on functional adaptations, an explanation is not complete until a goal is connected to an external outcome. For instance, although feeling a sense of accomplishment, self-satisfaction, or philosophical insight is often a sign that progress has been made toward an adaptive goal, the good feeling is not a sufficient explanation in itself. One must ask what adaptive outcomes would have tended to follow from feeling good in one way as compared with another. For example, Maslow viewed esteem mostly in terms of self-evaluation, putting "opinions of others" at the end of a list of terms like self-esteem. This contrasts with the emphasis of more recent functional views—informed by evolutionary theorizing and supported by empirical research—that explicitly contemplate the relationship between self-esteem and external outcomes, such as one's standing in a social group (e.g.,

Kirkpatrick, Waugh, Valencia, & Webster, 2002; Leary, Tambor, Terdal, & Downs, 1995). This distinction is important from a functional perspective because any self-inflating tendencies that were not calibrated to others' respect could have maladaptive consequences for success in social groups (Kurzban & Aktipis, 2007). In a related vein, Maslow viewed self-actualization in very individualist terms, presuming that once one has attained the respect of others, one could move to a "higher" level by pursuing one's idiosyncratic goals. We suggest that, although the pursuit of one's unique talents may be experienced as distinct from the pursuit of esteem, these phenomenologically distinct pursuits are rooted in a common motivational system and produce functionally identical outcomes. Self-actualization, in this light, can provide an alternative pathway to esteem and to social status and, consequently, has indirect implications for successful mating and reproductive fitness.

This does not, of course, imply that whenever an individual strives to master a musical instrument or a mathematical proof, that individual does so with some conscious desire for status or mates. Nor does it imply that striving for a transcendent state of self-actualization involves any conscious desire to transform transcendence into tangible resources. The motives that govern behavioral strivings often lie outside of conscious awareness, as do the functional implications of those strivings. By removing self-actualization from our renovated pyramid of needs (Fig. 2), we in no way diminish the phenomenological or psychological importance of self-actualization itself. But neither phenomenological nor psychological importance is sufficient argument to accord self-actualization the status of a functionally distinct motive or need. By removing self-actualization from the pyramid, we simply recognize that its privileged position cannot be compelled nor justified by the functional logic of human evolutionary biology.

Summary of Functional Level of Analysis

A functional analysis of fundamental human motives suggests good support for many of Maslow's ideas, including the idea that humans have different motivation systems for physiological needs, safety (self-protection) needs, belongingness (affiliation) needs, and esteem (status) needs. However, a functional analysis also suggests several revisions to Maslow's model. First, whereas Maslow paid little attention to mating and included sexual motivation as a subset of physiological needs, mating needs are more sensibly identified as a separate category (as we discuss more fully in the next section). Second, what Maslow called belongingness is comprised of the different needs of romantic love, affiliation, and familial care, which ought to be considered separately. As we discuss below, a consideration of biological theories of life-history development suggests the addition of differentiated goal systems linked to mating, parenting, and kin care. Third, a functional analysis suggests that self-actualization cannot be considered a unique human need itself, but that it instead might sensibly be

subsumed within the broader sets of needs pertaining to status and mating.

Developmental Level of Analysis

Maslow's hierarchical theory of needs assumed that an individual's priorities shifted from lower to higher in the hierarchy as a person matured. In this section, we examine the notion of developmental priority in light of life-history theory. Several important points arise from this consideration: (a) there is broad biological support for the idea that motivational priorities change with development; (b) in species like humans, early developing life-history goals continue to operate alongside those that develop later in life; (c) life-history priorities involve necessary trade-offs in the allocation of effort to survival, growth, and reproduction; and (d) reproduction is the ultimate goal of such trade-offs, but successful reproduction involves multiple goals. These considerations suggest the addition of three sets of later-developing goals to the traditional hierarchy: mate acquisition, mate retention, and parental care. Life-history theory also suggests that there are likely to be important individual differences in motivational priorities—some linked to gender and others linked to within-sex variations in strategies emerging from interactions with the developmental environment.

Life-History Theory

Biological theorists have developed a powerful set of ideas called *life-history theory* that have profound implications for the developmental sequencing of human motivation (e.g., Kaplan & Gangestad, 2005; Kenrick & Keefe, 1992; Kenrick & Luce, 2000; Stearns et al., 2008). The field of life-history evolution explores how each animal's life cycle—from conception to death—is shaped by natural selection to facilitate reproductive success (Stearns et al., 2008). A life history is a genetically organized developmental plan—a set of general strategies and specific tactics by which an organism allocates energy to survival, growth, and reproduction (Crawford & Anderson, 1989; Partridge & Harvey, 1988; Stearns, 1976).

Life-history researchers ask questions such as “Why do some organisms have longer or shorter periods of bodily development preceding reproduction?”, “Once mature, does an organism devote all its resources to one short reproductive burst, or does it spread its reproductive efforts over several episodes spanning months or years?”, and “Does the organism allocate resources to caring for its offspring after they are born, and if so, how much care should be invested before leaving the offspring to fend for themselves?” Life-history models assume that resources are always limited and that development involves trade-offs in when and how to allocate those scarce resources. What constitutes a favorable or unfavorable trade-off depends on a dynamic interaction of environmental pressures (current threats and opportunities), inherited predispositions (useful traits and constraining traits the animal inherited), and the animal's current stage of development.

Life histories are commonly divided into two broad categories: *somatic effort* and *reproductive effort* (Alexander, 1987). Somatic effort is the energy expended to build the body. It is analogous to making investments to build a larger bank account. Reproductive effort is analogous to spending that bank account in ways that will replicate the individual's genes. Reproductive effort can be further divided into mating, parental care, and investment in other relatives (Alexander, 1987). Investment in other relatives is considered reproductive effort because grandchildren, siblings, nieces, nephews, or cousins share common genes.

The Life-History Developmental Hierarchy

The key life-history tasks can be arranged into a simple developmental hierarchy. Somatic efforts form the necessary developmental base required before mating efforts can unfold, and parenting efforts build on the base of earlier somatic and mating efforts. In any species reproducing more than once, these goal systems do not replace one another. For example, adult mammals divide current resources between somatic effort (eating, drinking, and protecting themselves), attracting and keeping mates, and caring for offspring. Given that resources are inherently finite, time and energy invested in one activity must be taken from others. For example, more mating effort means fewer resources available for parenting.

Animals show an amazing array of life-history patterns. One species of tenrec (a small mammal found in Madagascar) reaches sexual maturity 40 days after birth. Elephants, on the other hand, take 100 times that long to reach sexual maturity. Why don't all animals start reproducing as soon as possible and have as many offspring as possible? The answer is that the goal is the successful production of viable offspring, which may not follow from the production of as many offspring as possible as quickly as possible. The optimal investment of reproductive effort depends on the features of a particular species and the particular ecological constraints faced by that species. For large mammals like elephants, females are not physically able to produce and nurture offspring until they are several years old. And for elephants, as for any species providing parental care, having too many offspring too soon decreases the chances that any will survive (Lack, Gibb, & Owen, 1957).

Humans are closer to elephants than to tenrecs in our developmental life histories. Humans do not sexually mature for over a decade, during which individuals not only develop physically but also learn social skills that enable them to form networks of friends and establish social positions within those networks. After a variable period of mating effort, humans typically dedicate a great deal of energy to parenting, caring for slow-maturing large-brained offspring that in ancestral times did not thrive well without resources from both mothers and fathers (Geary, 1998). While human offspring mature, they, like elephants, often continue to receive care and resources from grandparents and other relatives (Laham et al., 2005; Sear, Steele, McGregor, & Mace, 2002). These life-history considerations are depicted by the addition of three separate

motivational systems to Maslow's hierarchy: mate acquisition, mate retention, and parenting (Fig. 2). Survival and social goals, on this view, provide the foundation for acquiring mates. Acquiring mates provides a foundation for forming a long-term bond, which in turn undergirds the goal of producing and successfully raising offspring.

Life History and Individual Differences

Biologists have noted three key sources of motivationally relevant individual differences across a wide range of animal species. First, across many species, it is common for males and females to differ in how they allocate resources to somatic development and reproductive effort. Second, not all members of one sex adopt the same strategy; there are often systematic individual differences within a sex linked to different mating strategies. Third, those differences in mating strategies are often systematically linked to ecological factors, and many of the same ecological factors (e.g., sex ratio, mortality levels, distribution of resources) are important across species.

Between-sex variations Many sex differences are linked to the general biological principle of *differential parental investment*. Both within and between species, animals that invest more in their offspring tend to be more selective about choosing mates. Within mammals, there is a natural division in parental investment because females gestate the young within their bodies (for almost 2 years in the case of elephants, for the better part of a year in the case of humans), and then nurse them afterwards (often for several years). Thus, females have a higher minimal obligatory parental investment than do males. Males could, in theory, contribute little more than sperm to the offspring, which is the typical pattern for more than 90% of mammalian species. This difference in parental investment is linked in turn to differences in sexual selection, with female mammals tending to be more selective in choosing mates, generally picking males who have established their superiority by dominating other males or who exhibit traits suggesting relatively greater health and development.

Male investment varies across species. To the extent that male investment in offspring increases, the degree of sexual dimorphism is reduced (as in many bird species, in which both parents devote effort to nest-building and offspring care). In rare cases, a male actually invests more resources in the offspring than does the female, as in the case of bird species such as phalaropes—a type of sandpiper in which the female leaves the male to tend the eggs while she searches for another mating opportunity. Sex differences in morphology and behavior tend to reverse for such species, as would be expected, given the tenets of parental investment theory.

Because all the usual mammalian constraints on gestation and nursing apply to humans, several broad sex differences—regarding greater female mating selectivity and greater male intrasexual competition—apply to humans as to other mammals (e.g., Clark & Hatfield, 1989; Kenrick, Groth, Trost, & Sadalla, 1993; Wilson & Daly, 1985, 2004). One indirect

consequence of greater female selectivity is slower maturity for males (Geary, 1998). The reason for the maturational delay among males in dimorphic species is that it takes longer for males to reach a size when they are likely to successfully compete for females. In line with this general rule, human males typically reach sexual maturity much later than females and attain a somewhat larger size.

Similar differences in size and maturity rates are found in other species in which females exercise selection pressure by choosing more dominant males (Geary, 1998). Human males across societies are also more likely to engage in intrasexual competition in the form of male-to-male assaults and homicides as well as other risky behaviors (Daly & Wilson, 1988; Griskevicius, Tybur, et al., 2009; Wilson & Daly, 1985). The general mammalian pattern is somewhat (but not completely) qualified because human males frequently do contribute resources directly to the offspring (Geary, 1998; Kenrick et al., 1993; Kenrick, Sadalla, Groth, & Trust, 1990).

Within-sex variations Not all members of one sex within a species adopt the same mating strategy. Among several fish species, for example, there are different male mating strategies with different developmental trajectories. One common type of male grows very large and colorful and defends a territory to which he attracts females. Another type looks and acts more like a female but actually sneaks in to release sperm when a true female releases her eggs in response to the large male's courtship efforts (Gross, 1984; Warner, 1984). There are also within-sex variations in human mating strategies, with both men and women varying in their courtship strategies and degree of parental effort in ways that are linked to different developmental trajectories (Belsky, Steinberg, & Draper, 1991; Gangestad & Simpson, 2000). Men who adopt an unrestricted (nonmonogamous) mating strategy, for example, are larger, more physically attractive, and more competitive than those who adopt a restricted strategy characterized by high investment and greater monogamy.

Mating strategies are linked to attachment styles, suggesting that attachment takes different forms for males and females. Beginning at about 8 years old, females with insecure attachment styles move to an anxious/ambivalent style, whereas insecure males become avoidant. Del Giudice (2009) connects this developmental divergence to different life-history trade-offs between mating and parental effort for men and women (see also Kirkpatrick, 1998). Ecological and cultural factors also influence tendencies toward restricted or unrestricted mating, but men are universally more inclined toward unrestrictedness (Schmitt, 2006). This has implications for motivation and social cognition. For instance, an unrestricted mating orientation is associated with greater attention to attractive opposite-sex faces but, predictably, this effect is specific to male perceivers (e.g., Duncan et al., 2007).

As indicated by these findings on attentional differences, variations within and between sexes have implications for motivational priorities in responding to proximate environmental cues, an issue to which we will return.

Implications of Life-History Theory for a Revised Motivational Hierarchy

Life-history models have generally been developed from work with nonhuman animal species, but they have clear applicability to human beings (Del Giudice, 2009; Geary, 1998; Kaplan & Gangestad, 2005; Kenrick & Keefe, 1992; Kenrick & Luce, 2000). Many of these implications remain unexplored. As noted above, life-history theory includes an implicit assumption of a hierarchy of goals that can be broadly applied across the animal kingdom, with somatic effort at the base, reproductive effort in the middle, and parenting effort at the top. That simple hierarchy does capture some of human development, but it falls short in at least two important ways. First, although it encompasses broad goals that all animals must accomplish, the simple hierarchy is insufficiently specific to capture the separate problems involved in human survival and reproduction. Second, that simple hierarchy does not develop connections with the phenomenology of human goal-seeking, which is often concerned with more specific intermediate goals that contribute to reproductive success in important, but often indirect, ways. An integration of Maslow's approach to development with the biological life-history approach could provide a fuller understanding of the developmental psychology of human motives.

Do later developmental goals replace earlier ones? Do later developmental goals replace earlier ones, or do they simply add to one another? Maslow hedged a bit on this issue. On the one hand, he observed that starvation or social rejection later in life could certainly redirect attention from the so-called higher goals. On the other hand, he also argued that the relative emphasis shifted from the lower to the higher goals. If all was going very well, he presumed further that most of a person's effort could be directed toward higher goals, to the point that a person could ignore hunger and even the need for social contact (as in the case of Isaac Newton, who spent long periods in isolation and ate very little when he was working on scientific problems).

Some amount of developmental sequencing in human goals makes logical sense. Infants are concerned with getting food and liquids and unconcerned with making friends until they are beyond the toddler stage. Similarly, concerns about one's esteem in the eyes of others only make sense after there is a network of associates to impress. A life-history perspective on development certainly supports the basic idea that organisms must change the order of goal priorities as they develop: Some amount of somatic effort necessarily precedes mating effort, which necessarily precedes parenting effort. Our revised hierarchy adds the three reproductive goals following this developmental line of reasoning: Young children do not seek mates at all and, after puberty, maintaining a mating relationship or caring for offspring do not become issues until one has first attracted a mate.

A comparative life-history perspective adds another dimension to this issue, because animals vary in the extent to which mating effort replaces somatic effort. Biologists who have

studied the diverse life-history strategies in other living organisms sometimes make a distinction between two major patterns: *semelparity* and *iteroparity*. Semelparous animals mate only once, expending all their somatic energy in one burst, and then typically die (as in the case of salmon). For these single-burst reproducers, reproductive effort completely replaces somatic effort. Iteroparous animals, however, mate repeatedly over the life span. Those animals do not spend their whole bank account of resources in one effort, but conserve some for later mating efforts. Humans are clearly an iteroparous species, producing offspring over a period of up to three decades for females and potentially longer for males. Furthermore, unlike salmon, all mammals, including humans, must maintain their own bodies in order to nurture and care for their offspring. Hence, humans need to continue contributing to their personal bank account of physical and social resources even after they have begun mating. For a species like ours, physiological needs never disappear. Adults continue to require food and water, to avoid freezing and overheating, and so on.

On the one hand, it seems reasonable to assume that needs such as hunger might recede into the background among people living in modern industrialized societies. Even if this were the case, however, it is likely that, rather than disappearing, the satisfaction of those needs goes the route of well-learned motor skills, which become increasingly automatic (therefore requiring less central cognitive processing; e.g., Schneider & Shiffrin, 1977). Even so, physiological drives may not ever become completely automatic. Consider hunger: Human beings the world over dedicate a great deal of attention, conscious thought, and conversation to the selection, preparation, and presentation of food, and there is a great deal of cultural elaboration of these processes (Rozin, 2007a, 2007b). Indeed, the description of a culinary experience as pleasant or unpleasant may not be totally arbitrary, but linked to human's ability to detect subtle nutritive properties of foods (Katz, Hediger, & Valleroy, 1974). Recent evidence suggests that even "cultural" variations in food preference, such as the relative preference for spicy food in Central America versus Scandinavia, is actually linked to differential value of foods to people living in places with varying numbers of food-borne parasites (Sherman & Hash, 2001). Furthermore, there are interesting coevolutionary processes involved in food preparation. For example, corn is deficient in several nutrients, but it can be made much more valuable if prepared with alkali. Native American tribes whose corn preparation involves alkali eat substantially more corn than the other groups, although they are unaware of the underlying biochemistry—they simply regard corn prepared with alkali as better tasting (Katz et al., 1974). Finally, the hunger drive can be interlinked with other physiological developments in later life, most notably pregnancy (Flaxman & Sherman, 2008). Pregnant women's particular food preferences and aversions occur during the period when the fetus is developing its major organ systems and is highly sensitive to the influence of extrinsic toxins and infection. Women during this period are most likely to avoid foods that contain high levels of toxins (e.g., bitter vegetables) or which are likely to carry dangerous

bacteria (e.g., fish and meats). Rather than being a pathology, pregnancy illness is associated with better fetal health and lower rates of spontaneous abortion (Fessler et al., 2005; Profet, 1992).

This reasoning applies not only to hunger, but also to other simple physiological needs, including the desire to remain dry and warm. Mark Twain famously wondered why people bother talking so much about the weather but nobody does anything about it. But Twain's quip, however clever, may have been only half right. If our neighbors express some consensus about the upcoming weather, often we can do something about it—carrying an umbrella if we are told it is going to rain, or a coat if we are told it's cold outside—so that communication with others is potentially quite useful rather than idle chit-chat. In short, basic physiological needs probably never disappear from the motivational landscape, whether consciously or unconsciously.

Similar reasoning applies to later developing needs. Adults, even attractive and well-connected college students, remain exquisitely sensitive to social acceptance and social rejection, and they experience the latter using some of the same physiological mechanisms used to register pain (MacDonald & Leary, 2005). Indeed, individuals who are inattentive to affiliative goals as adults may be manifesting more pathology than self-realization. It thus seems that research since Maslow's time better supports a view that later developed motivations build upon earlier motivations rather than replace them (see also Krebs & Van Hesteren, 1994). Although earlier developed needs must necessarily share time with those that come later, and although their satisfaction may occur more automatically, they do not disappear in healthy, well-functioning adults but instead remain available to respond as relevant threats and opportunities arise. Thus, the overlapping triangles in Figure 2 are meant to explicitly reflect the assertion that later developmental needs and goals add to, rather than replace, existing ones.²

Summary of Developmental Level of Analysis

A developmental level of analysis and consideration of life-history theory suggest several important revisions to Maslow's original hierarchy. First, the revised hierarchy contains three later-developing reproduction-focused goals of mate acquisition, mate retention, and parental care. Second, this analysis suggests that the different motives in the hierarchy continue to operate alongside those that develop later in life—a point reflected visually by the overlapping triangles in the hierarchy. Third, this analysis suggests important individual differences in motivational priorities that result from interactions between development and current environment, which we discuss further below.

The Proximate Level of Analysis

Our review thus far suggests that adult humans always have multiple motivational systems at the ready and that (depending

on life-history considerations) some of these motives may be more ready than others. But potential activation does not equate to actual activation. At a proximate level of analysis, the key question is this: What determines which of the many potential motivational systems is actually active at any specific moment in time?

This question is not likely to be effectively addressed by a hierarchy of needs that is rigid or inflexible. A particular individual may, in general, prioritize affiliation goals over mating goals, but that prioritization may temporarily reverse when presented with a particularly salient mating opportunity. Indeed, one of the most potent conclusions to emerge from the enormous psychological literature on goal activation is that goal activation is highly sensitive to immediate contextual cues (e.g., Aarts & Hassin, 2005; Bargh & Morsella, 2008). To be applicable to a proximate level of analysis, a renovated pyramid of needs must incorporate this insight.

Motivational Priorities Vary With Immediate Ecological Context

The functional perspective offered by evolutionary theorizing in general, and life-history theory in particular, suggests that the motivation system active at any given time is likely to depend on some implicit evaluation of the trade-offs inherent in the ecological context. If you are having lunch with your boss, and you discover a scorpion crawling up your leg, self-protection goals are likely to trump whatever food- or status-related goals were salient a moment earlier. But if it is merely an ant on your leg, and your boss has just asked you to consider a promotion, the self-protection goal is not likely to be foremost in mind. In general, cues in the current situation are expected to dynamically interact with a person's developmental phase and recent deprivation or satisfaction of different needs, as well as the individual's cognitive, affective, or morphological traits that might make any particular threat or opportunity more threatening or potentially beneficial (Neuberg, Kenrick, & Schaller, 2010).

Although Maslow noted the dynamic interaction between a person's motives and his current environment, his general aversion to "situationism" led him to give short shrift to the proximate level of analysis: "It remains to caution the theorizer against too great a preoccupation with the exterior, with the culture, the environment, or the situation. Our central object of study here is, after all, the organism or the character structure" (Maslow, 1970, p. 28). Maslow justified this deemphasis of the situation by suggesting that fundamental needs are "relatively constant and more independent of the particular situation in which the organism finds itself," in part because a psychological need "organizes and even creates the external reality" (Maslow, 1970, p. 29). In contrast, an evolutionary perspective on human psychology implies that internal needs—and the extent to which those needs precipitate actual affective, cognitive, and behavioral responses—must be calibrated to specific threats and opportunities in the immediate ecological context.

Just as an evolutionary approach to human development (i.e., life-history theory) requires an assessment of fitness-relevant trade-offs, an evolutionary approach to behavior at the proximate level of analysis also requires an assessment of trade-offs. The activation of a particular motivational system may produce specific kinds of benefits (e.g., activation of a self-protective goal is likely to precipitate the strategic avoidance of potentially dangerous people), but it also may entail specific potential fitness costs as well (e.g., halting consumption of caloric resources, temporary cessation of behavior promoting reproduction). Consequently, these motivational systems are likely to have evolved in such a way as to be responsive to perceptual cues that indicate—even if imperfectly—the extent to which fitness-relevant benefits outweigh costs. When contextual cues indicate an unfavorable cost-benefit ratio associated with a particular motivational system, that motivational system is unlikely to be activated. But when contextual cues indicate a relatively favorable cost-benefit ratio, then that motivational system will be temporarily prioritized and is likely to exert substantial consequences on cognition and behavior (cf., Ackerman & Kenrick, 2008).

The temporary prioritization of any motivational system can be inferred from the observation of specific behaviors that are functionally predicted by that system. For instance, the acoustic startle reflex—the tendency for sudden loud noises to elicit a surprise response—indicates the temporary activation of a self-protective goal. In the realm of social cognition, specific kinds of stereotypical inferences also indicate the activation of a self-protective goal (e.g., the perception of male ethnic outgroup members as angry or aggressive; Ackerman et al., 2006; Maner et al., 2005). If implicit cost-benefit analyses set the priorities for momentary changes in motivational systems, then responses such as these should occur under conditions in which contextual cues imply that the benefits of a fearful, self-protective response are especially likely to outweigh the costs of such a response. If these cues imply that perceivers are especially vulnerable to harm, for instance, then those perceivers may show especially strong startle responses and may be especially likely to ascribe stereotypically dangerous traits to ethnic outgroups. Consider the psychological effects of ambient darkness. Humans depend substantially on visual perception to maneuver safely through the environment. When temporarily deprived of visual cues—when in the dark—we feel especially vulnerable to harm. Consequently, self-protective motives are prioritized. When people are in the dark, their acoustic startle responses are exaggerated (Grillon, Pellowski, Merikangas, & Davis, 1997). Similarly, people in the dark are especially likely to perceive ethnic outgroups as stereotypically aggressive and untrustworthy (Schaller, Park, & Faulkner, 2003).

Temporary activation of a single specific motive may influence a wide variety of cognitions and behaviors that, although superficially different, are linked in functionally relevant ways. Self-protection is frequently served not simply by fight or flight, but also by affiliative behavior, given that humans experience safety in numbers (Geary & Flinn, 2002; Kenrick & Johnson, 1979; Taylor et al., 2000). Consistently,

activation of a self-protective goal enhances conformity behavior among both men and women (Griskevicius, Goldstein, et al., 2006; Griskevicius, Goldstein, et al., 2009). In contrast, activation of a mating goal enhances conformity among women but actually leads to a reduction in conformity among men, who seek to stand out under these conditions. Mating goals also increase behaviors linked to the attainment of status, but they do so for males more than for females (Griskevicius, Cialdini, & Kenrick, 2006; Griskevicius, Goldstein, et al., 2006; Griskevicius et al., 2007). The nature of these sex differences fits with considerations derived from life-history theory discussed earlier, involving differential parental investment and sexual selection.

These and other lines of research (e.g., Ackerman et al., 2009; Neuberg, Kenrick, Maner, & Schaller, 2004; Van Vugt, De Cremer, & Janssen, 2007; Van Vugt & Spisak, 2008) support the general assumption that there is a continual interplay between motivational systems and the perception of affordances (fitness-relevant threats and opportunities) in the immediate environment. One important implication is that motivational systems include not just feelings, but also functionally specific cognitive problem-solving tools designed to facilitate the ongoing analysis of trade-offs involved in pursuing one goal as opposed to another (Kenrick, Li, & Butner, 2003). Table 1 provides a rough outline of the kinds of triggers likely to be functionally connected to each motivational system (for additional elaboration, see Kenrick, Maner, & Li, 2005; Kenrick & Shiota, 2008; Neuberg et al., 2010; Schaller, Park, & Kenrick, 2007). Many specific questions regarding the particular links between motives, threats, and opportunities—and the particular ways they are prioritized—remain to be empirically investigated.

Individual Differences Linked to Processing of Motivation-Relevant Cues

Motivational priorities may be extraordinarily sensitive to immediate contextual cues. This does not obviate the fact that different people may vary in the extent to which different motives are chronically prioritized (Funder, 2006). Both genetic and epigenetic (i.e., developmental) factors influence the extent to which an individual is chronically anxious, for instance, and therefore places a chronically high priority on self-protective goals. Similarly, the chronic activation of mating motives also varies considerably, not just between sexes but between individuals of any particular sex.

Regardless of the exact origins of these individual differences, they have important implications for cue-based activation of motivational systems. Generally speaking, we would expect that individual differences are likely to interact with situational inputs in functionally adaptive ways. Contextual cues connoting vulnerability to danger are likely to trigger self-protective motives most strongly among individuals who chronically perceive themselves to be vulnerable, but they are less likely to do so among individuals who, for whatever reason, perceive themselves to be invulnerable to harm. Empirical

evidence suggests that this is the case (Park & Buunk, in press). The impact of ambient darkness on prejudicial perceptions of ethnic outgroups occurs primarily among individuals who are chronically worried about interpersonal threats, not among individuals who feel chronically safe and secure (Schaller, Park, & Mueller, 2003). In a similar manner, cues connoting potential social exclusion appear to activate belongingness goals (as indicated by attempts to establish new social connections) among individuals who generally perceive social interactions in a optimistic way; but among those who suffer from social anxiety, on the other hand, the threat of social exclusion seems to more strongly activate a self-protective motivational system instead (Maner, DeWall, Baumeister, & Schaller, 2007).

Sex differences (and sex similarities) also have implications for processing motivation-relevant cues. The sex difference in intrasexual competition suggests that developmental issues surrounding esteem motivation are likely to differ somewhat for males and females. Women are more likely than men to regard social status as a necessity in a mate (Li, Bailey, Kenrick, & Linsenmeier, 2002). Hence, men are expected to be motivated by esteem needs to a somewhat greater degree than women and to have their sense of self-esteem more strongly linked to intrasexual competitive success. Indeed, when mating motives are activated, males are especially likely to show off in various ways—to become more creative, to conspicuously consume expensive goods, to desire higher paying jobs, and to opt for money now rather than later (e.g., Griskevicius, Goldstein, et al., 2006; Griskevicius et al., 2007; Roney, 2003; Wilson & Daly, 2004). Activating either mating or status motives leads men to report more inclination toward direct aggression in response to an insult in ways that seem tailored to impress other men and maintain their position in the social dominance hierarchy (Griskevicius, Tybur, et al., 2009).

Men are also selective about the characteristics they desire in long-term mates (in whom they will make potentially high investments), but men don't tend to select mates based on their mate's relative competitive success. Instead, men prefer mates who show physical cues associated with youth and fertility and who demonstrate traits (such as kindness and warmth) indicative of successful parenting ability (e.g., Griskevicius et al., 2007; Li & Kenrick, 2006; Singh, 1993; Zaadstra et al., 1993). Consistently, female esteem is more likely to be linked to physical appearance and to cues suggesting that they are cooperative and likeable (Ben-Hamida, Mineka, & Bailey, 1998; Gutierrez, Kenrick, & Partch, 1999).

Consistent with the sex difference in offspring care across societies and with the relatively lower advantages that females gain from acquiring multiple mates, women are generally expected to devote less time and energy to mating effort and more time and energy to parenting effort. Women are generally less interested in casual mating opportunities, whereas men generally have a lower threshold for initiating sexual interest (e.g., Buss & Schmitt, 1993; Clark & Hatfield, 1989; Haselton & Buss, 2000; Kenrick et al., 1990, 1993; Schmitt, 2003, 2006). And, as noted earlier, an enhanced mating motive leads men to

mistakenly perceive sexual arousal in the faces of attractive women, but no such reciprocal effect emerges among women (Maner et al., 2005).

The links between individual differences and proximate motivational cues is an area ripe for additional empirical exploration. Existing findings suggest the potential utility of thinking about goal-linked individual differences in a functional light (e.g., Tybur, Lieberman, & Griskevicius, 2009). However, much additional research is required to determine the specific ways in which individual differences link up with differential sensitivities to functionally relevant goal systems.

Different Motivational Priorities Depend on Developmental Sensitization to Ecological Features

Many motivational systems require developmental inputs to be fully activated (Lieberman, Tooby, & Cosmides, 2003). Mating motivation is unlikely to be triggered in a prepubescent child, for example. Sexual jealousy mechanisms are less strongly activated in young people who have not yet had a serious romantic relationship (Buss, Larsen, Westen, & Semmelroth, 1992). The motive to protect children is more strongly activated once a person becomes a parent, and women with children are acutely sensitive to the specific cries of their own children (Soltis, 2005). Parenting behavior itself seems to result from a cascade of hormonal and neurobiological responses to early experience with offspring, in interaction with the parents' own earlier experiences (Mayes, Swain, & Leckman, 2005).

This is another area where life-history theory can help put human motivational systems in broader comparative perspective. For instance, research with other animal species has indicated that mating strategies and correlated developmental changes are keyed to ecological inputs. In some species, the presence of local dominant males can suppress sexual maturation in nearby younger males (signaling that the metabolic costs of mating effort would not be worthwhile; e.g., Davis & Fernald, 1990; Sapolsky, 2005). As another example, in normally monogamous species, the availability of resource-rich territories may precipitate more polygynous arrangements (as females become more predisposed to share a single male mate who defends an especially rich territory; Orians, 1969).

These issues of developmental sensitization may also have implications for regional or cultural differences in motivational priorities. Some cultural variations seem to represent an interaction between a flexible evolved mechanism and particular triggers in the social or physical environment (Gangestad, Haselton, & Buss, 2006; Kenrick, Nieuweboer, & Buunk, 2010; Tooby & Cosmides, 1992). Specific motivational systems may be prioritized to a greater or lesser degree, depending on ecological variables that affect the functional implications of those systems. Ecological variables such as sex ratio and infant mortality predict worldwide variations in mating strategies (Schmitt, 2006). Ecological variations in the prevalence of disease-causing pathogens have been linked to

Table 1. How Different Motivational Systems Are Triggered by Proximate Cues and Individual Differences Linked to Fundamentally Important Threats and Opportunities

Motivational system	Proximate triggers	Moderating individual differences
Immediate physiological needs		
Opportunities: Nutrients, liquids, etc.	External incentives associated with past reductions of physiological needs (e.g., smell of food cooking)	Genetic variations in metabolic processes
Threats: Starvation, dehydration, overheating, etc.	Internal physiological imbalances	Developmental experiences with different cues for reinforcement (e.g., local cuisine)
Self-protection		
Opportunities: Safety provided by others	Presence of familiar, similar others; being in familiar surroundings	High dispositional trust in others; being large or male
Threats: Violence from other people; contagious diseases	Presence of unfamiliar, dissimilar, angry males; being in unfamiliar surroundings; darkness; unfamiliar smells; presence of others with morphological abnormalities	Past experience of being physically harmed; being of small stature or female; chronic belief in a dangerous world; chronic high disease concern.
Affiliation		
Opportunities: Share resources, receive material support, enhanced self-protection, access to mates	Familiarity; past acts of reciprocity, trustworthiness; others' adherence to group norms; facial characteristics signaling trustworthiness	Coalitional identity or investment; gender; "collectivistic" cultural context and proximity to kin networks; dispositional trust in others; need for belongingness and/or social approval
Threats: Exposure to disease, cheating/free-riding, incompetence, excessive demands	Subjective "foreignness" of others; unfamiliarity of other; other's acts of cheating or norm violation	Own inclinations to cheat; personal vulnerability to disease; location (central vs. peripheral) within group network
Esteem/status		
Opportunities: Status enhancing alliances, access to resources and (for males) mating opportunities	Nonverbal status-conferring displays (e.g., eye-contact, bodily orientation, etc.) by others; shifts in exchange rules; others willingness to invest in oneself	Current status level; presence of potential familial coalitional partners; presence of desirable (female) mates
Threats: Loss of status, social regard, status-linked resources and mates	Nonverbal dominance displays by others; shifts in exchange rules; lack of apparent respect from others	Current status level; public versus private nature of interactional context; optimism and self-efficacy
Mate acquisition		
Opportunities: Availability of desirable, opposite-sex others	Opposite-sex others' age, attractiveness, status, bodily symmetry, morphological abnormalities, scent, nonverbal flirting behaviors	Relative mate value and age; restricted or unrestricted sexual strategies; current ovulatory status or testosterone level; histocompatibility
Threats: Presence of desirable, same-sex others	Same-sex others' age, status, symmetry, masculinity/femininity, flirting behaviors	Relative mate value; male-female ratio of available mates; status-linked distribution of resources; unpredictability of resource availability
Mate retention		
Opportunities: Long-term parental alliances	Others' expressions of love, intimacy, commitment; others' and own age (i.e., postmenopausal females).	Shared children; own mate value; own resources; availability of desirable alternative mates
Threats: Sexual infidelity, mate poaching	Partner flirtation behaviors; presence of nearby, high mate-value, opposite-sex individuals	Relative mate value; own resources; availability of desirable alternative mates; ovulatory status
Parenting		
Opportunities: Enhanced reproductive fitness	Proximity of one's own children; nonverbal cues eliciting care (e.g., smiles)	Oxytocin levels; gender; number of other children of one's own, siblings, or nieces/nephews; age of child; availability of tangible resources
Threats: Especially high costs imposed by children, cuckoldry (for males)	Signs of distress in own children; apparent physical (dis)similarity of child	Degree of paternal uncertainty; step-parenthood; age of child; number of other children of one's own, siblings, or nieces/nephews

cross-cultural differences in behavioral traits (e.g., introversion vs. extraversion) and values systems (individualism vs. collectivism) that have functional implications for disease transmission (Fincher, Thornhill, Murray, & Schaller, 2008; Schaller & Murray, 2008). It seems likely that these and other cross-cultural differences may result, in part, from differences in the extent to which distinct motivational systems are sensitized to input from the environment within which individuals develop. Again, one sees many interesting empirical implications of this line of thinking.

Further Implications

We have reconsidered the idea of a hierarchy of fundamental motives in light of empirical and theoretical developments at the interface of evolutionary biology, anthropology, and psychology. We considered motivational hierarchies at three levels of analysis often used by behavioral biologists. Many—but not all—of Maslow's motives make sense at a functional evolutionary level. It is clear that behavioral systems involved in seeking safety, affiliation, and esteem serve adaptive goals. In contrast, however, goals relevant to self-actualization are perhaps more sensibly subsumed within other, more functionally defensible motivational categories.

At a developmental level, we considered the human motivational hierarchy in light of the broader biological theory of life-history strategies, which has revealed some general patterns in the energy trade-offs made by organisms as they develop. Both the life-history and functional levels of analysis suggest that Maslow's original hierarchy missed the importance of the ultimate goal of successful reproduction (represented by the specific fundamental motives of mate acquisition, mate retention, and parenting in the revised pyramid). The life-history perspective also suggests that later developing motivational systems are not likely to replace those that developed earlier. The continuing accessibility of earlier developing systems is represented in the revised pyramid by overlapping systems rather than stacked systems.

Finally, at a proximate level of analysis, we suggested that many interesting questions involve the ways in which motivational systems are triggered by events in the current environment in interaction with individual differences. Some individual differences in response to the environment depend upon developmental sensitization experiences. A key point of this revised perspective is the focus on the ongoing dynamic interaction between internal motives and their functional links to immediate environmental threats and opportunities.

There is some empirical support for the perspective we have presented here. And there appears to be considerable theoretical value in placing the motivational hierarchy in light of a broad interdisciplinary framework provided by evolutionary biology. However, much of what we have suggested remains in the realm of speculation. This perspective raises several important questions but is not presented as a final set of answers. In fact, we believe the utility of this reconsideration is that it generates a number of interesting, but as yet

unanswered, empirical questions. This perspective implies important individual differences in motivational hierarchies, linked to ecological factors, gender, mating strategy, and life-history phase. But exactly which ones remain to be determined. Does the pyramid look different for men than for women? How exactly do motivational priorities link up with particular ecological factors (such as sex ratios of available mates, conspecific density, mortality level, and resource scarcity)? How exactly does the order of priorities change as one becomes a parent or grandparent? Given that adults often have multiple motivational systems at the ready, what exactly are the situational triggers for the different systems, and which ones are likely to trump the others? How might life-history considerations, and the ecological variables bearing on them, be linked to specific cross-cultural differences in motivational systems? To the extent that these kinds of questions generate theories, hypotheses, and empirical discoveries, the fundamental motives framework outlined here can be extraordinarily generative.

Given the already broad aims of this article, we cannot review the immense research literature on motivation or the various theoretical views advanced in the decades since Maslow proposed his influential theory. We believe that the broad, integrative perspective suggested here has numerous implications for other theories and empirical findings on motivation, but developing those connections would go well beyond the scope of this article. We do, however, briefly consider three broad sets of issues: (a) the relationship between physiological needs, goals, and motivational systems; (b) the links between conscious and unconscious motivation; and (c) the links between evolutionary and humanistic approaches to psychology. Each of these issues also inspires a corresponding set of empirical questions.

Needs, Goals, and Motivational Systems

Throughout this article, we have used the terms *needs*, *motives*, and *goals* somewhat loosely. Our view of motivational systems follows that of evolutionary theorists such as Plutchik (1980) and Scott (1980), with connections to the views of the original evolutionary psychologists such as William James (1890) and McDougall (1908) and to Carver and Scheier's (1998) cybernetic view. On that view, any motivational system includes (a) a template for recognizing a particular class of relevant environmental threats or opportunities, (b) inner motivational/physiological states designed to mobilize relevant resources, (c) cognitive decision rules designed to analyze trade-offs inherent in various prepotent responses, and (d) a set of responses designed to respond to threats or opportunities represented by the environmental inputs (i.e., to achieve adaptive goals). Consider, for example, the self-protection management system. As noted in Table 1, this motivational system is triggered by various threats, such as the presence of unfamiliar, dissimilar angry males encountered in unfamiliar surroundings or the dark. The motivational states most likely to be activated by such stimuli are those linked to anxiety or fear, and the likely responses include flight, freezing, or fight (depending

on analysis of various trade-offs inherent in the particular threat and one's own characteristics and current surroundings).

Physiological needs and psychological deprivations As reviewed by Deci and Ryan (2000), the term "need" has been used in various ways, but it is most closely associated with physiological deficits such as low blood sugar, which triggers hunger, or high blood salt, which triggers thirst. Deci and Ryan argue that certain human needs may not be based in physiological deficits, including those for affiliation, mastery, and autonomy. Our perspective agrees with the view that there are innate biological underpinnings to motivational states other than physiological deficits such as hunger. If you do not drink when you are thirsty, you get thirstier and eventually die; if you do not have sex when you are feeling strong attraction, you will not die. Nonetheless, although higher or psychological needs are not typically deficit driven, they are likely to have important and revealing physiological correlates. For example, oxytocin, testosterone, progesterone, and estrogen have been linked to affiliation, parental care, status seeking, and mate choice in various ways (e.g., Brown & Brown, 2006; Durante et al., 2008; Gangestad, Garver-Apgar, Simpson, & Cousins, 2007; McIntyre et al., 2006). And although deprivation of such needs is not fatal, it can certainly become relevant to activation. For example, being in an environment where a particular motivational system is regularly triggered but the motivation is not satisfied may lead to a sense of deprivation, as when an individual lacking respect, affection, or romantic love is exposed to people high in status, with many warm friendships, or with attractive mates. There are a number of empirical questions remaining to be answered about exactly how higher needs are linked to physiological states and about the role of deprivation in triggering those states.

How many different motives are there? The answer to this question no doubt depends on whether one is asking about cognitively separable goals (in which case, there are lots of them) or motivational systems (in which case, there are fewer). In discussing the various physiological deficits, Maslow noted that there are many atomistic needs but that they could be arranged in a "hierarchy of specificity":

The true picture is not one of a great many sticks lying side by side, but rather of a nest of boxes in which one box contains three others, and in which each of these three contains ten others, and in which each of these ten contains fifty others, and so on. (Maslow, 1970, p. 25)

As a minimum, we have noted that each motivational system is connected to a set of different threats and opportunities. Moreover, the behaviors, feelings, and decision rules involved in making one's mate happy are different than those involved in defending against infidelity and those involved in making friends are different from those involved in catching cheaters on social contracts. Thus, it is perhaps more appropriate to think of motivational systems as somewhat akin to Martindale's (1980) notion of "subelves"—as sets of subprograms for dealing with general categories of adaptive problems, linked in

associative networks (Kenrick, 2006; Kenrick & Shiota, 2008; Kurzban & Aktipis, 2007). For example, seeing an attractive member of the opposite sex can prime a network of thoughts and feelings involving one's own partner and one's own mate value, activate strategies designed to increase or decrease commitment to the relationship, and so on (e.g., Gutierrez et al., 1999; Maner, Rouby, & Gonzaga, 2008; Roney, 2003).

This issue is linked to a set of interesting questions about the extent to which different psychological mechanisms are shared between different cognitive modules. On a strict modular view, mental mechanisms or systems (such as the motivational systems we have been discussing) are completely encapsulated and even physically distinct from one another. However, very few modern evolutionary theorists believe that these criteria apply to most psychological systems, instead preferring a view of functional modularity (Barrett & Kurzban, 2006; Kenrick, Sadalla, & Keefe, 1998). Thus, the demonstrations of domain-specific mechanisms do not obviate the possibility of various domain-general mechanisms as well. We suspect that different motivational systems can share access to information and to submechanisms useful in solving common problems (for example, contrast mechanisms operate in several different judgmental contexts). Even though there may be some degree of sharing of general mechanisms, the specifics of how they operate may change in important ways in different motivational systems governing the solution of different problems. The extent to which particular motivational systems invoke domain-general, domain-specific, and partly shared mechanisms raises a host of empirical questions.

Which motives come to the fore? We have argued that adults have a full range of motivational systems at the ready. What determines which motives come to the fore? Obviously, various particular threats and opportunities available in the immediate environment will be critical, as discussed in the section on the proximate level of analysis. We noted that whether a person is or is not sensitive to a particular stimulus may also depend on developmental sensitization experiences. It is also likely that individual learning experiences during development play an important role, with people stressing different goals as a function of past reinforcement history as well as local ecological factors (e.g., the availability of mates as well as one's own physical attributes alters whether one adopts a restricted or unrestricted mating strategy; Gangestad & Simpson, 2000). Socially shared experiences that result from one's particular culture will also be important (e.g., Japanese and Americans respond differently to opportunities to interact with someone at a different level of the social hierarchy; Nakao, 1987). As discussed earlier, it is becoming increasingly clear that those cultural experiences are not necessarily arbitrary from a biological perspective and that they are often linked to ecological factors.

Deci and Ryan (2000) argue that some needs do not require any form of external stimulation. Although we have stressed environmental triggers, it is totally consistent with our view that some people will sometimes (e.g., when no immediately pressing problems present themselves) go out of their way to seek opportunities not present in the immediate environment. We would speculate that the organism

may be relatively more internally motivated in seeking opportunities and more externally driven when it comes to avoiding threats.

Conscious, Unconscious, and Incidental Goals

Maslow believed that much of the operation of fundamental motives occurs at a nonconscious level, and we agree. On one level, this means that people are often not aware of the subtle influences on their behavior (e.g., Bargh & Williams, 2006; Cheng & Chartrand, 2003). At another level, fundamental motivational systems involve not only subtle and preconscious influences on behavior but also influences for which there is no awareness at any level. We earlier mentioned the example of birds migrating in response to changing day length and noted that those birds need make no connection between the migratory triggers and the ultimate purpose of traveling to obtain better food supplies and nesting sites. Human motives also likely respond to cues of which the person is neither consciously aware nor—even if those cues do penetrate conscious awareness—likely to understand the ultimate significance of (as in women's greater responsivity to symmetrical and masculine men during their fertile periods; e.g., Gangestad et al., 2007; Little, Jones, & DeBruine, 2008).

Besides having nonconscious triggers and consequences, motivated behaviors may also have incidental effects. This is because, as Maslow noted, a given behavior can serve more than one goal. For example, seeking companionship when feeling socially isolated after moving to a new city may result in the incidental, unintended consequences of finding a mate and improving one's chances of ascending the social hierarchy at work. This is connected to the issue of evolutionary by-products, which we discussed earlier and consider in more detail later in this article. Note that by-products of motivated behavior occur at the proximate and developmental levels as well.

Evolutionism, Humanism, and Positive Psychology

Besides his famous pyramid of needs, Maslow was influential as one of the founders of humanistic psychology. Maslow distinguished a humanistic approach from the two other perspectives influential in his time. The psychoanalytic approach was limited, Maslow argued, by its focus on the negative and pathological aspects of human behavior, viewing people as motivated by suppressed feelings of hostility and sexual desires, often directed at their parents. The behavioral approach was limited, in Maslow's view, by its assumption that general principles of behavior could be developed by studying rats. In contrast, the humanistic approach emphasized the positive side of behavior and its assumption that the traits that were most positive in humans (such as artistic creativity and scientific curiosity) were not to be found in rats. In this sense, Maslow presaged the modern movement toward examining positive aspects of human behavior (e.g., Diener, 2000; Diener & Biswas-Diener, 2008;

Lyubomirsky, 2008; Lyubomirsky, King, & Diener, 2005; Myers, 2000; Seligman & Csikszentmihalyi, 2000).

To what extent is an evolutionary perspective compatible with the distinguishing features of humanistic psychology? At first glance, it may appear that an evolutionary approach, à la Freud, adopts a view of humans as driven by base sexual and aggressive instincts and, à la Skinner, emphasizes the commonalities between humans and rats. First glances can be deceiving, however, and a more careful look reveals that a modern evolutionary approach is quite compatible with Maslow's dual emphases on the differences between humans and other animals, and on the importance of understanding positive as well as negative aspects of human behavior.

Positive aspects of human nature. Although an evolutionary perspective recognizes sexual and competitive motivations as undeniable aspects of human nature, it also emphasizes the roles of cooperation, love, and parental concern (e.g., Ackerman & Kenrick, 2009; Kameda & Tindale, 2006; Keltner, Haidt, & Shiota, 2006; Kenrick, 2006; Van Vugt & Van Lange, 2006). It is useful to keep in mind a point we made earlier: that sex is only a small part of human reproduction. Human beings devote great effort to lengthy courtship periods, which even for the sexiest among us usually involves more hours spent in platonic activities than copulation. Beyond initial courtship, humans, both males and females, devote a great deal of energy to maintaining their bond and to raising their children. And for the last few decades of their lives, they may devote great energy to helping their grandchildren. From this perspective, reproductive goals provide the ultimate driving force behind not only copulation but also much that is positive in human nature—creating music and poetry, devoting oneself to charitable endeavors, or working to improve the world for the next generation (Griskevicius, Cialdini, & Kenrick, 2006; Griskevicius et al., 2007). Our perspective is also compatible with a wide range of research and theory in developmental psychology suggesting that people move toward increasing concern for others' welfare with age (Krebs & Van Hesteren, 1994; Van Lange, Otten, DeBruin, & Joireman, 1997). Note that the top of our hierarchy is defined by taking care of others—not pursuing that which gives one idiosyncratic pleasure. Consistent with our analysis, Buss (2000) makes a good case that a full understanding of human nature and its links to the natural and social environment is essential to psychologists who desire to promote positive psychology.

Human uniqueness Although it is true that an evolutionary approach involves an attempt to search for broad principles that apply to all animals, the approach also involves careful attention to each species' unique adaptations. Evolutionists have dedicated much attention to the characteristics that separate humans from other primates (e.g., spoken language, bipedal gait, delayed reproduction, paternal investment in offspring), those that separate primates from other mammals (e.g., large brains, opposable thumbs), and those that separate mammals from other vertebrates (e.g., live birth, nursing, prolonged period of infant care). Animal behaviorists themselves have become increasingly evolutionary in their orientation, and this has led

to an exploration of how learning processes differ in rats, humans, and other animals (e.g., Wilcoxon et al., 1971). This is not to deny the search for broad general principles, but to appreciate that a full understanding of human behavior will come from exploring how those general principles apply specifically to our species. For example, paternal investment is not found in most other mammals (such as rats) but is found in some mammals (like gibbons and wolves) and is common in birds. Understanding the ecological and social factors that predispose paternal investment helps us understand that feature of humanity and how it links with other human features (Geary, 2000).

One of the defining features of our species is an unusually large cerebral cortex, and there are many theories about the specific fitness pressures that led to such a substantially increased brain size (e.g., Dunbar & Schultz, 2007). Whatever the evolutionary causes might have been, there are manifold consequences that transcend those adaptive origins, and those consequences are unique to human beings. For example, many different approaches to motivation suggest that people are characterized by a need to seek and maintain some sense of understanding, meaning, and purpose (e.g., Heine, Proulx, & Vohs, 2006; Koole, Greenberg, & Pyszczynski, 2006; Ryff, 1995; Stevens & Fiske, 1995). It is typically presumed that these needs are unique to humans, and this presumption is neither demanded nor denied by an evolutionary perspective on human motivation. Rather, an evolutionary perspective sharpens the discussion about the nature of these ostensibly unique needs. It does so by inviting specific kinds of questions: Are these cognitive needs simply nonadaptive consequences of underlying cognitive capacities (e.g., Boyer, 2003)? Or are they instead adaptive? If so, what exactly are their fitness-relevant consequences? And, regardless of whether they are adaptations or nonadaptive by-products, how might the expression of these needs, and their implications, change across the life span? An evolutionary perspective also suggests specific kinds of possible answers to those questions. For instance, in response to questions about developmental changes in the expression of cognitive strivings, an evolutionary life-history perspective suggests that what appear to be higher strivings in educated adults may stem from general motivational processes present much earlier in life (such as curiosity). This sort of suggestion resonates with—and substantiates—idiosyncratic speculations in Maslow's own work: "Acquiring knowledge and systematizing the universe have been considered as, in part, techniques for the achievement of basic safety in the world, or, for the intelligent man, expressions of self-actualization" (Maslow, 1943, p. 385).

Self-actualized people In an effort to redirect psychological research toward the positive side of humanity, Maslow (1970) studied a group of people he described as self-actualized. Besides manifesting the central feature of self-actualization motivation—striving to excel in their own unique area of expertise—these individuals also manifested a number of other characteristics Maslow viewed as highly desirable, including self-acceptance, independent thinking, a problem-solving orientation, an ability to form deep friendships, and a lack of prejudice. The individuals Maslow studied, such as

Albert Einstein, Eleanor Roosevelt, and Frederick Douglass, no doubt were highly accomplished and achieved very high levels of status as a function of their intellectual capacities and social intelligence. At one level, such individuals are manifesting the various aspects of "good genes" (Miller, 2000). Whether such highly functioning individuals reproduce more successfully than less self-actualized individuals is an empirical question, but it certainly seems likely that they would be attractive as mates. Their intellectual capacities and social skills would also be expected to translate into benefits for themselves and their relatives. Again, this is not to suggest that people who are striving to reach higher goals are consciously (or even unconsciously) intending to improve their fitness, only to suggest that any inclinations underlying such strivings are likely to be maintained within one's lifetime, and across generations, by adaptive consequences.

Conclusion

In light of developments at the interface of evolutionary biology, anthropology, and psychology, we have suggested some structural modifications to Maslow's classic hierarchy of human motives. A consideration of the ultimate functions of behaviors and of life-history development counsels the explicit inclusion of motivational levels linked to mating and reproduction. Reproduction for humans is not ultimately about self-gratification, but involves a considerable diversion of resources away from selfish goals and toward other human beings in our social networks. A consideration of life-history trade-offs also implies that later developing motive systems never fully replace earlier ones and that they continue to coexist, ready to be activated depending on current opportunities and threats in the environment, in interaction with individual differences. Thus, a key point of this revised perspective is the focus on the ongoing dynamic interaction between internal motives and their functional links to ongoing environmental threats and opportunities.

Notes

1. Evolutionary explanations can also examine the historical roots of a feature, trait, or behavior. For example, the human hand is quite similar to the hands of other great apes, and the differences between primates can be traced in the bones of now extinct species linking the current species. In this article, we focus on the functional, not the historical, aspect of evolutionary explanations.
2. Of course, there are transformations. Elderly people are less likely to devote attention to mating effort, and such effort in postmenopausal females would no longer have direct reproductive consequences.

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A Theory of Human Needs Should Be Human-Centered, Not Animal-Centered: Commentary on Kenrick et al. (2010)

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Abstract

Kenrick et al. (2010, this issue) make an important contribution by presenting a theory of human needs within an evolutionary framework. In our opinion, however, this framework bypasses the human uniqueness that Maslow intended to capture in his theory. We comment on the unique power of culture in shaping human motivation at the phylogenetic, ontogenetic, and proximate levels. We note that culture–gene coevolution may be a more promising lead to a theory of human motivation than a mammalcentric evolutionary perspective.

Keywords

human needs, hierarchy of needs, motivation, human evolution, culture–gene coevolution

Kenrick and colleagues' (2010, this issue) renovation of Maslow's (1943b) hierarchy of needs makes a great contribution by basing human needs on the strong theoretical and empirical foundation of evolutionary biology and psychology. In addition, Kenrick et al. consider human needs at three different levels: evolutionary function, ontogenetic development, and proximate inputs. Neither Maslow's hierarchy nor previous lists of human needs by Murray (1938) and instincts by McDougall (1908/1921) had such strong empirical justification and broad theoretical foundation.

However, because Kenrick et al. have based their analyses on an evolutionary perspective that is not attuned to unique aspects of human evolution, their theory of motivation is animalcentric rather than anthropocentric. Maslow (1943a) presented 13 propositions for a theory of human motivation, one of which was "motivation theory must be anthropocentric rather than animalcentric" (p. 89). Maslow intended to build a theory of human motivation, not a theory of animal motivation. The point of departure for his theory was that most psychological theories of motivation at that time were too heavily influenced by animal experiments on drives and instincts (see Seward, 1939, for an earlier review of motivation theories). Although these early theories were empirically sound, they focused on hunger and sex drives, leading Maslow to criticize them for capturing only part of human motivation.

Kenrick et al.'s theory is remarkable for its generalizability, but by removing the need for self-actualization and treating human uniqueness as an afterthought, they also dispensed with the human pillar of Maslow's pyramid. Their "new" theory feels strangely old to us, for it is reminiscent of the animal-centered theories of motivation popular in the 1930s and 1940s, albeit with much stronger foundations. In one sense, this new theory takes us back to McDougall's (1908/1921) very evolutionarily minded instinct theory. Although this is not a negative move in and of itself, the renovated pyramid is not true to the original architect's spirit, and we believe this to be a drawback.

The Case for a Higher Order Human Need

To address the limitations of earlier theories of motivation, Maslow (1943b) postulated the need for self-actualization as a uniquely human motivation. He described it as follows:

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Even if all these needs are satisfied, we may still often (if not always) expect that a new discontent and restlessness will soon develop, unless the individual is doing what he is fitted for. A musician must make music, an artist must paint, a poet must write, if he is to be ultimately happy. What a man can be, he must be. This need we may call self-actualization. (p. 382)

Maslow's description of self-actualization is reminiscent of Aristotle's (350 BCE/1985) concept of *eudaimonia*, which is often translated as happiness, a well-lived life, and flourishing. Aristotle proposed the concept of *eudaimonia* in an attempt to understand what is truly and uniquely human (Thomson, 1953). If the goal of theorizing and research on motivation is to gain insights into human nature, stripping off the very things that make humans uniquely human seems unadvised.

Both Maslow (1943b) and Murray (1938) based their need theories on the types of goals humans pursue, as opposed to animal drives and instincts. When Maslow created his hierarchy of needs, he intended the higher needs to capture higher order goals. According to Maslow, the ultimate goal was self-actualization. In Kenrick et al.'s revised hierarchy of needs, parenting is now at the top of the hierarchy. Some researchers have argued against the idea of parenting as an innate human need, in light of findings that some people voluntarily forgo parenthood and that couples without children are no less happy (and are possibly even happier) than couples with children at home (see Baumeister, 1991; Stevenson & Wolfers, in press; Veenhoven, 1974). Given the unreliability of birth control methods until very recently in human evolution, it is possible that the need for sex, not a need for parenting, ensured human procreation. Even if we leave the question of an innate parenting need aside, adopting Kenrick et al.'s developmental perspective in which parenting needs come after mating needs are met, it seems appropriate to us to go one step further. Erik Erikson postulated the life task of generativity (Erikson, Erikson, & Kivnick, 1986), which is strongly associated with parenting and caring for children and grandchildren, arising after the life tasks of identity formation and the establishment of intimacy. After the life task of generativity, however, he postulated the life task of achieving wisdom: Parenting was not the final need to be fulfilled in this anthropocentric theory of life span development. Erikson's theory was based on his clinical observations, but since his time, the prominent life span psychologist Paul Baltes and his colleagues have conducted numerous empirical studies on wisdom, demonstrating that wisdom is an integral part of optimal human development (for reviews, see Baltes & Smith, 2008; Baltes & Staudinger, 2000).

Besides the need for wisdom, the need for meaning is another candidate for an ultimate human need (Baumeister, 1991). Meaning in life is a significant predictor of happiness (Emmons, 2003; Steger, Frazier, Oishi, & Kaler, 2006), and loss of meaning in life is related to depression and suicide (Wang, Lightsey, Pietruszka, Uruk, & Wells, 2007; Wong & Fry, 1998). The human need for meaning can't simply be reduced to needs for belonging, status, or mating. A person may have high status and a mate but still suffer from a lack of

meaning in life. Nor is the need for meaning tantamount to a need for belonging with other people. Meaning is derived from a sense of embeddedness, belonging, and relatedness (Nakamura & Csikszentmihalyi, 2002). People often find meaning in groups they belong to or their personal relationships, but people also derive meaning from being embedded in cultural meaning systems such as art, religion, or scholarly pursuits. These cultural webs of meaning consist of not only communities, but also valued ways of being, knowing, and doing. For these reasons, it seems reasonable to postulate the need for wisdom or meaning—if not the need for self-actualization, the cultural generalizability of which is suspect (Baumeister, 1986; Nevis, 1983)—at the top of the hierarchy of human needs.

Culture Should Be a Central Ingredient of a Theory of Human Needs

A major advantage of postulating a higher order need at the top of the needs hierarchy is that a need such as wisdom or meaning is broad enough to allow for individual and cultural variations in specific pathways and contents. Human reality is full of individual and cultural variations, and a theory of human needs should capture this complexity. The postulation of a broad, high-order need at the top of the hierarchy provides theoretical flexibility, which we consider a strength rather than a weakness, as it allows the leeway to accommodate the complexities of individual and cultural variation.

Both Maslow (1943b) and Kenrick et al. seem to assume that a universal theory of motivation would be more sound than a theory that allows for individual and cultural variations. This, we believe, is because both Maslow and Kenrick et al. underestimate the power of culture in their theorizing of human motivation. Culture is implicated in human needs in multiple ways, and its exclusion weakens a theory of human motivation. For instance, meaning is culturally constructed on innate human foundations. People derive meaning from their cultures (Bruner, 1991; Heine, Proulx, & Vohs, 2006). Connections to cultural systems such as art, science, religion, or one's nation give the lives of many people meaning and purpose. Both meaning and wisdom are closely connected to values, and although there is much commonality, different cultures also specialize in different human values (Schwartz, 1994; Shweder & Haidt, 1993). There are cross-cultural differences in the conceptualization of wisdom, too. For example Takahashi and Overton (2005) have noted that the Eastern mode of wisdom stresses the integration of affect with cognition and a reflective conscious experience whereas the Western approach stresses cognitive capabilities and doesn't much differentiate wisdom from knowledge. Culture, thus, is a critical aspect of higher level human needs (for review, see Heine, 2007; Morling & Kitayama, 2007).

But the influence of culture is not limited to higher order needs. All human needs are culturally malleable in their content, their strength, and in the ways they are satisfied. In other words, humans show very high levels of motivational

plasticity—a fact that the entire marketing industry depends upon. Even “basic” needs such as sleep, eating, and sex show variability in their expression, as is apparent in cross-cultural differences in where people sleep and with whom (Shweder, Balle-Jensen, & Goldstein, 1995), what and how much people eat (Rozin, 1996), and how sexual behavior is regulated (Baumeister & Twenge, 2002). Social needs such as affiliation and belonging show a similar variability across cultures. Different conceptualizations of the self across cultures seem to shape social-motivational systems, as is apparent in cross-culturally varying needs for self-enhancement (Heine & Hamamura, 2007), motivation for internal consistency (Heine & Lehman, 1997; Suh, 2002), need for personal control (Morling, Kitayama, & Miyamoto, 2002), and motivation to pursue personal versus relationally given goals (Iyengar & Lepper, 1999).

All that variability certainly doesn't mean that human needs are infinitely malleable. Cultures that don't address basic aspects of the human motivational system get modified or die out, as exemplified by the extinction of many utopian experiments (Sosis, 2000). Baumeister (2005) has noted that the stronger a biological need, the less modifiable it is by culture. Therefore, female sexuality and fatherhood show more variation across cultures than do male sexuality and motherhood (“erotic plasticity”; Baumeister, 2000), presumably because males have stronger sexual motivation and females a stronger motivation to take care of their children. Culture thus sculpts the human motivational landscape within the parameters set by the human material.

An Evolutionary Perspective Is Not Necessarily at Odds With Uniquely Human Needs

Our emphasis on culture and uniquely human needs shouldn't be read as a negation of an evolutionary perspective. We do not doubt that a hierarchy of human needs should be informed and constrained by evolutionary theory, and we fully agree that “no human need can be meaningfully separated from biology” (Kenrick et al., p. 297). But we also think that postulating uniquely human needs is not at odds with an evolutionary perspective, if one takes the particularities of human evolution into account. Humans differ from other species in that culture has played a major role in their evolution (Richerson & Boyd, 2005). Moreover, culture is critical in the formation of human phenotypes. These unique aspects of human evolution, we believe, offer great value in explaining the origins of higher level human needs.

Culture has profoundly shaped the evolution of human psychology by creating the environments that exert selection pressures on humans. Culture–gene coevolution refers to the process whereby cultural environments change fitness criteria for humans, leading to the selection of genes that are adapted better to those cultural environments, leading to further modification of the cultural environment and selection pressures,

and so on in a feedback loop (Durham, 1991; Lumsden & Wilson, 1981; Richerson & Boyd, 2005). This means that human needs have evolved in cultural environments. For example, the invention of fire may be responsible for the progressive reduction in the strength of human dentition, along with the availability of pounding, grinding, and milling tools (Brace, Rosenberg, & Hunt, 1987). These cultural inventions reduced the necessary amount of chewing, and relaxed selection pressures for larger teeth, presumably leading to a change in human physiology. Similarly, domestication of cows led to the evolution of lactose tolerance in some human cultures, and evidence suggests that this change happened independently in multiple populations in the last 7,000 years (Tishkoff et al., 2007). Culture, in other words, is a force of human evolution and culture-driven changes in the human genome that do not require millions of years, suggesting that many such changes may have become part of human biology in the last 20,000 years (also see Hawks, Wang, Cochran, Harpending, & Moyzis, 2007, on the recent acceleration of human adaptive evolution).

Given that cultural environments have changed human physiology, they may also have given shape to human psychology. There are indeed various accounts of how culture–gene coevolutionary processes may have changed aspects of human psychology (e.g., Boehm, 1999; Bowles, Choi, & Hopfensitz, 2003; Henrich, 2004; Wilson, 2002). The final word on the evolutionary origins of many human phenomena—such as language, culture, arts, religion, and morality—has not been written. We believe that a better understanding of the evolutionary origins of these human phenomena will give us a more solid basis for a theory of human motivation, and coevolutionary processes will be key to such an understanding. In the meantime, we don't see any good reason for dismissing higher order needs as by-products of adaptive processes or automatically subsuming them under one of the needs shared with some other mammals, such as status or belonging, as such a strategy would unnecessarily limit our vision.

Conclusion

Kenrick et al. make a compelling case for eliminating Maslow's self-actualization from the top of the pyramid and replacing it with three mating-related goals. This new hierarchy of needs has the added benefit of applying to most, if not all, mammals. The drawback, however, is that this hierarchy no longer uniquely captures human motivations, as well as the uniquely human malleability of the relative power of different needs at different times and places. We have tried to highlight this malleability by concentrating on the power of culture. An evolutionary perspective, we believe, is not at odds with a uniquely human theory of motivation, as humans are unique in the extent to which they are shaped by culture at the phylogenetic, ontogenetic, and the proximate levels. Culture–gene coevolution may be a more promising lead to a theory of human motivation, and to any other efforts to integrate evolutionary theorizing with social sciences, than an evolutionary

perspective that focuses on commonalities with other mammals (for a similar view, see Gintis, 2002; Laland & Brown, 2002).

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What Happened to Self-Actualization? Commentary on Kenrick et al. (2010)

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Abstract

Abraham Maslow's hierarchy of needs is one of psychology's genuinely good ideas and has had a sustained impact in and out of psychology. The revision of the hierarchy by Kenrick, Griskevicius, Neuberg, and Schaller (2010, this issue) is overdue and makes an important contribution by grounding the hierarchy in modern evolutionary thought. However, we suggest that it may be premature to remove self-actualization from the hierarchy by reducing it to other needs associated with status and reproduction.

Keywords

hierarchy of needs, self-actualization, positive psychology

Abraham Maslow's (1943) hierarchy of needs, which famously arranges people's motives in an order of precedence, is one of psychology's genuinely good ideas. To this day, the pyramid depiction of the hierarchy appears in all introductory psychology textbooks.

The basic idea has been taken up by other fields. For example, in political science, the hierarchy has been used to make sense of data from the World Values Survey. Using Maslow's hierarchy as the starting point, Inglehart (1990, 1993) distinguished between *survival values* (corresponding to needs at the bottom of the hierarchy) and *self-expressive values* (corresponding to needs at the top). Consistent with Maslow's basic premise, citizens of nations that become more affluent show a progression over time from survival to self-expressive values.

Maslow's hierarchy is among the theories taught to marketing students in MBA programs, and it provides a strategy for selling products to people for whom different needs are salient. As we all know, candy bars are placed right next to the checkout lines in grocery stores, where hungry shoppers will be tempted to buy them, whether or not candy was on the grocery lists they composed when other needs were operating. Those of us in the United States have surely noticed that advertisements for products promising safety and security have proliferated since the 9/11 terrorist attacks. More generally, Madison Avenue uses an approach known as *segmentation of the market*, which means that different consumers—with different needs—receive different ads (sometimes for the same product) in accordance with where they are assumed to reside in Maslow's hierarchy of needs.

The notion of a hierarchy of needs has even penetrated the common culture, as shown by our recent Google search that

yielded over 3,800,000 website hits for the phrase. We also located over 766,000 images of the pyramid on the Internet, a number that exceeds the number of images for the *Mona Lisa* or *The Last Supper*!

Why has the hierarchy of needs been so popular? The appeal of the pyramid image should not be underestimated, especially to those of us in the United States. We the people are fond of ranking everything, from cities to graduate programs to football teams to the jokes in David Letterman's lists. Maslow might have chosen a different icon (e.g., a Native American medicine wheel) but it would not have had the same iconic appeal.

However, we suspect that the major reason for the popularity of Maslow's hierarchy is that it corresponds to our common sense. We all know that different motives prevail at different times and that the order in which we attend to them has a predictable regularity. Immediate physiological needs typically trump social and intellectual needs. Anyone who has driven along an interstate highway with a full bladder knows that signs for "scenic views" do not grab attention as much as those promising "facilities."

So, the hierarchy in broad terms is accurate. The details are more controversial, but even a closer look at the hierarchy shows it to be usually true. Exceptions exist, but they are few enough to be interesting as opposed to theoretically damning.

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One of the subplots of the 2009 emergency landing of an airplane on the Hudson River entailed a passenger who insisted on retrieving her personal items, even as the plane was sinking. She blocked the exit until other passengers literally threw her out of the plane. When we read about this story, we shook our heads in amazement. We did not conclude that Maslow was wrong. Just the contrary, the behavior of this passenger dismayed us because Maslow was right.

Other exceptions to Maslow's hierarchy are inspiring. For example, parents will run into a burning building to rescue their children. Bone marrow donors will undergo a painful procedure on the behalf of strangers. People will blow whistles at work even if it means the loss of their livelihood and the esteem of their immediate colleagues. Again, these exceptions to the hierarchy attract our attention because the hierarchy describes the way most of us behave.

Maslow's hierarchy is an important reminder, rare in psychology, that people are more than a collection of independent parts (Park & Peterson, 2009). People's parts, as it were, are integrated, and the hierarchy provides a blueprint and operating manual for their integration at any point in time. Maslow's ideas foreshadowed the more modern psychological idea that people must be understood in terms of their context, internal and external.

Given the sustained popularity of Maslow's hierarchy, the update and revision by Kenrick, Griskevicius, Neuberg, and Schaller (2010, this issue) is overdue. We read their article with appreciation and offer some comments in an appreciative spirit. Only time will tell if their article will someday be regarded as another one of psychology's genuinely good ideas, but it has the potential.

As we see it, Kenrick et al.'s general contribution in their article is twofold. First, they articulated different levels of analysis—functional, developmental, and proximate—that are at best implicit in Maslow's writings and at worst conflated. Each level of analysis says something different about the order in which people attend to motives.

Second, they used modern evolutionary theory as a theoretical anchor. Perhaps because Maslow's original hierarchy is so congruent with common sense, previous scholars rarely took a step back and asked why this particular hierarchy holds for most people. Evolutionary theory seems to provide an answer to this question, in terms of inclusive fitness (success in passing on genes to the next generation). Kenrick et al. looked at Maslow's hierarchy in these terms and in light of recent empirical data. Much of the original hierarchy was preserved, but several changes were made.

Most notably, Kenrick et al. removed self-actualization from the top of the pyramid. Indeed, they disaggregated this motive altogether, and it appears nowhere in their updated pyramid. They assigned the components of self-actualization to different levels in their revised hierarchy, specifically to motives involving status and mating—the “chicks dig it” argument frequently invoked by evolutionary theorists.¹ We wonder, though, if this is a just-so story (Gould, 1977).

Table 1. Offspring of Famous People

Famous individual	Number of children
Cited by Maslow as self-actualized	
Jane Addams	0
Benedict Spinoza	0
Aldous Huxley	1
Albert Schweitzer	1
Albert Einstein	3
Abraham Lincoln	4
Frederick Douglas	5
William James	5
Eleanor Roosevelt	5
Thomas Jefferson	12
Cited by Kenrick et al. as highly creative	
Duke Ellington	1
Pablo Neruda	1
John Lennon	2
Pablo Picasso	4
Diego Rivera	4

Note. This information was gleaned from various Internet biographies, chiefly Wikipedia, and includes “legitimate” as well as “illegitimate” offspring. We checked multiple sources for each individual, but some errors may exist.

Although we do not want to confuse functional and proximate analyses, we refer to Table 1, which shows the number of children reportedly born to 10 well-known people Maslow (1954, 1971) cited as self-actualized and the several people mentioned by Kenrick et al. as highly creative. Except for Thomas Jefferson—and his is a story that may have little to do with self-actualization or creativity—the number of offspring of these remarkable people was thoroughly unremarkable given the eras in which they lived and the fact that most lived long enough to have children.

We are the first to acknowledge that our informal research into the offspring of self-actualized and highly creative people does not mean all that much. But if our results had shown that Thomas Jefferson was typical and not an outlier, evolutionary theorists might well have trumpeted the result. In any event, more systematic data would be helpful in evaluating the hypothesized association between self-actualization and mating.

We disagree with the assertion by Kenrick et al. that “Talented artists, musicians, or writers frequently show off their creative outputs to others, and may receive very high levels of fame, resources, and romantic interest as a result” (p. 298). Our reading of the literature on highly creative people shows their work to be intrinsically motivated. Nothing—literally—is in their minds when they are creating, and when they finish a painting, song, or poem, they lose interest in it and move on to another project (Csikszentmihalyi, 1990). Fame, fortune, and romance may well follow for some, but until we see the data, we are not convinced that these consequences are typical. They do not apply to posthumous recognition, and they certainly are not a self-conscious motive.²

The rejoinder to our objection is that people need not be conscious of what moves them, especially in the sexual arena.

And furthermore, motivational systems encouraged by evolution can be co-opted for other purposes. On the other hand, we have no trouble knowing when we are hungry or thirsty, or when we are afraid. We have no trouble knowing when we are showing off to a potential romantic interest, or when we are trying to ingratiate ourselves with a potential employer. Why is the “motive” to realize our creative potential different?

We agree with Kenrick et al. that the components of self-actualization are products of evolution, either directly or indirectly. We also agree that self-actualization and its components do not belong to the very few who have satisfied all of their other needs. For example, a study done some years ago asked homeless men to complete a self-actualization survey and found that their scores did not differ from those of other, less needy, samples (Sumerlin & Norman, 1992). And our own research showed that being highly engaged in what one does and having a sense of meaning and purpose in one’s life—features of self-actualization—are minimally associated with education or with occupation (e.g., Peterson, Park, & Seligman, 2005).

We suggest that it is premature to jettison self-actualization from this revised version of Maslow’s hierarchy. We write from the perspective of positive psychology, which regards what is good in life to be as genuine as what is bad (Peterson & Park, 2003). What is good is not secondary, derivative, illusory, epiphenomenal, or otherwise suspect—at least until the data show otherwise. In their revision of Maslow’s hierarchy and their dismissal of self-actualization as a motive in its own right, Kenrick et al. seemed to reflect business-as-usual psychology by reducing what is good to something more mundane and perhaps not so good.

However, Kenrick et al. mentioned positive psychology in their article and concluded that their evolutionary perspective is consistent with the view that human nature indeed has positive aspects. So, their revised pyramid may well accommodate the various emphases of positive psychology. And someday, if we take the pyramid metaphor literally, psychologists may follow the earlier examples of Egypt and Mexico and build several, including one that reflects Maslow’s (1971) deficiency needs and another one that reflects his growth needs.

Notes

1. Kenrick et al. cited an interesting series of laboratory studies showing that both men and women, when primed with mating cues, performed more creatively at various laboratory tasks (Griskevicius, Cialdini, & Kenrick, 2006). More telling in the present context would be a different sort of experiment, one that primed participants with creativity cues and then assessed the effect on romantic interest and appeal.
2. Gauging the number of sexual partners that someone has had in a lifetime is notoriously difficult, and one of the consistent findings is that heterosexual men report many more partners than do heterosexual women. This cannot be if these reports are valid. Still, one of the other consistent survey findings is that young men in their 20s are more sexually active than other demographic groups. Are these young men the most creative, talented, and self-actualized among us? That seems unlikely. And some surveys show no differences in sexual activity—including in particular number of partners—as a function of a man’s educational attainment, which presumably bears some relationship to his talent and creativity and perhaps his self-actualization (e.g., Leigh, Temple, & Trocki, 1993).

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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The Purpose-Driven Life: Commentary on Kenrick et al. (2010)

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Abstract

The resurgence of motivation in social psychology has been a welcome addition to the cognitive revolution, though a theory-based approach to motivational content has remained conspicuously absent. Kenrick, Griskevicius, Neuberg, and Schaller (2010, this issue) dust off Maslow's hierarchy of needs and find this content in the form of evolutionarily inspired, fundamental motives. Their new framework unites functional, developmental, and proximal levels of analysis by showing how these levels complement rather than compete with each other. We highlight what we see as the especially valuable features of this framework and discuss its relevance for research on goal conflict, multigoal priming, and recent studies of goal scaffolding. We also suggest one main tweak to the theoretical foundation presented here that may bear greater empirical fruit. In sum, Kenrick and colleagues have reinvigorated a classic theory by integrating it with a modern understanding of human behavior's evolutionary roots.

Keywords

motivation, evolutionary psychology, goal pursuit, hierarchy, scaffolding

The way to a man's heart is through his stomach.

—Fanny Fern

The cognitive revolution in psychology was not kind to motivational concepts and models. Soon after Maslow's hierarchy of needs was published, empirical research on motivation was neglected for many years, as nonmotivational approaches were pushed as hard and as far as possible. Eventually, however, the field of social psychology came to appreciate that motivational concepts needed to be reintroduced for further progress to be made (Gollwitzer & Bargh, 1996; Kunda, 1990; Sorrentino & Higgins, 1986; Wyer & Srull, 1986). This new focus emphasized the structural properties of goals and their action at varying levels of consciousness (e.g., Bargh, 1990; Kruglanski, 1996). However, a theory-based analysis of the content of these goals, à la Maslow, remained conspicuously absent. Kenrick, Griskevicius, Neuberg, and Schaller's (2010, this issue) reanimation of Maslow's (1943) theory of motivation neatly provides this content in the form of evolutionarily inspired, fundamental motives. These motives act at multiple levels of analysis and fit a hierarchical framework that, as Fanny might affirm, starts with the stomach and ends with love and parenting.

In this commentary, we highlight what we see as the most critical features of this revised framework and comment on a few open questions and implications raised by the article.

Why This Framework Matters

In the interest of full disclosure, we're well-fed, rested, and writing from the relative safety of our offices, and so our current motivational state might predispose our comments in this section toward feel-good, affiliation-motivated observations. Maslow's original theory included a number of valuable insights, but perhaps the most important was the attempt to delineate a set of universal human motivations in hierarchical form. This approach predated the rise of evolutionary psychology, but its basic tenets would be familiar to many evolutionary researchers. (It is interesting to note that Maslow studied primate dominance and sexual behavior in graduate school, though he later explicitly disavowed the need to connect human and animal motives.) Kenrick and colleagues have preserved and expanded this approach, drawing on more modern ideas about function and adaptation.

One of the most relevant of these ideas concerns domain specificity. Current perspectives on the distinct but flexible forms of information processing and behavior common to different domains of human life do suggest that "Maslow

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sometimes lumped together functionally (and psychologically) distinct needs into single, overly broad categories” (p. 296). The current article nicely summarizes research on domain-specific mechanisms and presents a more functionally tuned set of domains. It also, perhaps, puts self-actualization in its proper place as a consequence of goal pursuit in other domains, and not itself a fundamental motive. The self-actualizing quest for expertise is a worthy one, but as a basic drive, it is rather untenable from an evolutionary perspective (“just good enough” and “just soon enough” will typically be the selected strategies, what Clark, 1996, referred to as the principles of least effort and opportunistic closure). Thus, this quest probably rests in the realm of prescriptive and not descriptive motives.

A second significant contribution involves the coherent focus on multiple levels of analysis in Kenrick and colleagues’ framework. It would certainly make for an easier write-up if the influence of proximate cues could be shrugged aside as Maslow seemed to do (Kenrick et al., 2010), and if fundamental motives emerged through ontogenetic development in order of their evolutionary importance. Unfortunately, this isn’t the case (e.g., infants do not seem to care much about the functionally supreme goal of baby making). A real problem that researchers must tackle is that different hierarchies can be generated depending on the perspective with which one approaches the issue. We therefore greatly value the authors’ integration of developmental- and proximal-level perspectives (which describe pressures on the activation of motives) with a functional perspective (which describes the fundamental motives themselves). In the broader literature, too little attention is paid to influences at multiple levels of analysis, which, as the authors point out, has led to misunderstandings such as the notion that developmental and proximate models represent meaningful alternatives to evolutionary accounts. If nothing else (and we think there is a lot else), the current article elaborates a coherent way to combine both the contents and processes of key motivations across multiple explanatory levels.

Kenrick and colleagues’ overall approach is also valuable in that it emphasizes the potential trade-offs that people might make between motives. Oddly, there have been few direct tests of this implication of Maslow’s original hierarchy (for examples, see Graham & Balloun, 1973; Strong & Fiebert, 1987). Modern theorizing has promoted the notion that more primary motives trump less primary ones, as demonstrated in the actions of early-stage cognitive processing as well as in later behaviors (e.g., Neuberg, Kenrick, Maner, & Schaller, 2005). According to Kenrick and colleagues, “if you are having lunch with your boss, and you discover a scorpion crawling up your leg, self-protection goals are likely to trump whatever food- or status-related goals were salient a moment earlier” (p. 302). These trade-offs should follow derivable rules based on the strength of the relevant domain, people’s current state of goal satisfaction, etc. (Ackerman & Kenrick, 2008). For instance, all people typically retreat from imminent physical harm, but romantically committed people (who have met their mate acquisition goals) are more likely than uncommitted people to spurn the flirtatious advances of attractive strangers. Of

course, counterexamples can also be generated: Soldiers may throw themselves on grenades to save their comrades and people in bars may fight to the death over mates. However, instead of refuting the broader model, these examples appear to represent unique instances in which people (nonconsciously) perceive little opportunity to fulfill active motives outside the proximate environment. Soldiers may have few other ways to powerfully demonstrate fidelity to their coalition. Barflies may have few future mating opportunities available. Thus the cost-benefit ratios of their actions are profitable at a functional level.

Despite the intriguing hypotheses that can be generated about such trade-offs, the research contrasting domain-specific motives is sparse at best. This remains one of the frontiers for work on goal conflict and multigoal priming. The functional, developmental, and proximate weights given to each motive should in theory predict the speed, intensity, and order to which they are responded. The question now is whether they do in practice.

Did the Authors Succeed?

Given the variety of domain-style models of human motivation and social life (e.g., Bugental, 2000; Fiske, 1992; Kenrick et al., 2010), we suspect that the debate on which framework is more well-supported will continue for some time. For instance, one might ask whether Kenrick and colleagues have identified the full suite of motives at the proper level of resolution? Maslow himself thought that “Such a theory should stress and center itself upon ultimate or basic goals rather than partial or superficial ones, upon ends rather than means to these ends” (1943, p. 370). In fact, there are a number of regularities between existing domain-style models, providing strong support for the current motive selections. Further, we agree with Maslow (and Kenrick et al.) that a stress on fundamental motives “would imply a more central place for unconscious than for conscious motivations” (1943, p. 370). This accords with research demonstrating a continuum of such motives across human and other social primate species. In these respects, we feel that the authors have succeeded admirably in detailing a comprehensive and contemporary framework of motivation. However, we were also left wondering whether a slightly different focus on the motivational hierarchy would bear greater theoretical and empirical fruit.

The hierarchy presented in Kenrick et al.’s article mixes motives described at a functional level of analysis and motives described at a developmental level (see Fig. 2 in Kenrick et al.). This makes sense in the context of the article’s focus on integration, but it might also leave the reader wondering as to what elevation in the hierarchy represents. Is it functional weight, developmental order, or some other metric? Likely, the pyramid symbolizes a combination of weight and order at a broad enough level of generalization to represent the prototypical human (Maslow’s original hierarchy similarly merged proximate and developmental levels). Kenrick and colleagues do state that it is “worthwhile to explicitly separate” issues of proximate, developmental and functional analysis (p. 294), making the case for a single hierarchy that much more complicated.

We suggest that in order for a single hierarchy to maximize both predictive power and generalizability, it should be skewed toward a functional weighting scheme. Though motives do typically emerge in a fixed developmental sequence (e.g., mating motives tend to proceed from acquisition to retention to parenting), this does not tell us much about the relative action of older and younger motives. Again consider the hierarchy presented in Kenrick et al.'s Figure 2. Self-protection concerns likely are weighted more heavily than affiliation concerns under most circumstances. However, we suspect that some of the upper, developmentally placed motives would exhibit functional and proximate priority over lower motives. For example, mate retention goals often conflict with affiliation goals (e.g., does one choose to spend the night out with a significant other or with friends?), and we would assert (perhaps based on personal experience) that the former option frequently trumps the latter. Indeed, from an evolutionary perspective, differential reproduction is the most important goal that organisms pursue, and thus mating motives are liable to attain functional primacy once they emerge over the course of development. Of course, this weighting scheme is relatively sensitive to the individual-level fluctuations described by Kenrick and colleagues, including variations in the local environment, individual differences, and past experiences. A functionally based scheme would also generate clear empirical predictions. At some level, the ordering of motivational domains is a matter of personal preference, as many different but compelling arguments can be made (e.g., a worthwhile system might entail several functionally based hierarchies, each corresponding to a separate developmental period). We suspect, though, that the most traction will be gained by focusing primarily on function.

Implications of This Framework

For our part, one of the most interesting components of Kenrick and colleagues' framework involves the explicit overlap between motivational domains. The notion that "later developed motivations build upon rather than replace earlier ones" (p. 302) is consistent with the general thinking in evolutionary biology that adaptations often do not arise *ex nihilo* but that they instead co-opt and extend preexisting structures. Many stage models of human development also support this notion (e.g., Krebs & Van Hesteren, 1994; Levine, 1979). Evolutionary psychologists have traditionally considered mental modules as relatively discrete entities that use unique sorts of cognitive processing to respond to unique sorts of problems. Certainly, selection pressures make this true in some respects. However, if later arising modules co-opt a foundation built by earlier modules, then some degree of commonality or flexibility will likely emerge (e.g., Ackerman, Kenrick, & Schaller, 2007; Barrett & Kurzban, 2006).

Applying this notion to the realm of goal pursuit, we can say that "younger" goals are scaffolded onto "older" goals (Williams, Huang, & Bargh, 2009). *Scaffolding* here refers to an implicit process and not the effortful teaching-learning that is sometimes named *scaffolding*. This process produces a mental association between the older and younger goals (or

motives). Thus, various aspects of one goal (e.g., relevant means, affective reactions, completion criteria) are shared with those of a second goal upon which the first is scaffolded. Two empirical examples help to make this point. First, consider the mental association between physical cleanliness and moral cleanliness. Physical disease avoidance goals represent a subset of Kenrick et al.'s self-protection motive and involve a clearly evolved set of avoidance behaviors and emotions (e.g., Ackerman et al., 2009; Rozin & Fallon, 1987; Schaller & Duncan, 2007). Moral cleanliness goals should instead fit within the levels of affiliation or status/esteem motives, as these goals act to preserve one's standing in a group. If moral purity is in fact scaffolded on physical purity goal structures, then we should observe actual overlap of goal pursuit elements when people attempt to "wash away their sins." A number of researchers have found just this (see Williams et al., 2009). For example, Zhong and Liljenquist (2006) have shown that people primed with moral impurity were more likely to think of physical cleaning words and to favor cleaning products than people not primed with this experience. Further, those morally impure individuals who washed their hands in a study were actually less likely to reaffirm their moral standing by helping another person, suggesting that behavior at one level of motivation satisfied an active motivation at another, younger level. Evidence also exists for a similar overlap between the processing of physical and social pain (e.g., DeWall & Baumeister, 2006).

An intriguing possibility is that younger motives can be satisfied through actions relevant to older levels of motivation, whereas actions that fulfill younger motives may not as effectively complete the operation of older motives. That is, scaffolding may produce relatively unidirectional effects. For instance, a mental association between sensations of physical warmth and social warmth (Williams & Bargh, 2008) may allow an active affiliation goal to be completed through experiences with heat (e.g., drinking hot coffee or tea), whereas making a new friend would not necessarily eliminate an active need for physical warmth. Likewise, protecting the physical self might stop a drive to affirm the psychological self (e.g., by emphasizing one's status or group membership), but self-affirmation is unlikely to equally preclude the desire to pursue a goal of physical protection. The Fanny Fern quote at the beginning of this commentary might support a similar claim for hunger and love motives. In fact, in his novel *Don Quixote*, Cervantes presaged the concept of unidirectional scaffolding, cleverly stating, "The stomach carries the heart, and not the heart the stomach." Whether goal scaffolding proves to be unidirectional or bidirectional, Kenrick et al. have provided a strong theoretical means of predicting specific motivational overlap, and we believe their framework could stimulate a wealth of future investigations in this arena.

Conclusions

The multilevel framework developed by Kenrick and colleagues presents a solid foundation for empirical work on the topics of fundamental motives and interacting motivational states. This framework has significant implications for many

of the important “second-generation” questions in the goal pursuit and priming literatures (Bargh, 2006). Namely, what happens when cues to multiple motives are present? And which one “wins” if conflicting responses are activated? We might quibble with certain features of the framework, but we recognize its utility as a theory that has elegantly merged findings from evolutionary biology, cognitive development, and basic social and personality psychology to reinvigorate one of the really good ideas in behavioral science. We hope that, in the spirit of Cervantes and Fanny Fern, this article has provided the theoretical sustenance that will motivate a great deal of exciting future work.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Human Motives, Happiness, and the Puzzle of Parenthood: Commentary on Kenrick et al. (2010)

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Abstract

It is presumed that happiness, and its associated positive emotions, signal to the individual that an adaptive problem has been solved, thus allowing her to shift attention to other concerns, perhaps those “higher” on the revised motivational hierarchy proposed by Kenrick et al (2010, this issue). In this commentary, we present a sampling of longitudinal and experimental evidence supporting two predictions: (a) that people will feel happy after realizing fundamental human motives, and (b) that in turn, the experience of happiness will galvanize people to fulfill these very motives. However, one conspicuous exception to our argument that happiness is both a consequence and a stimulus of human motives is parenthood, which paradoxically is associated with decrements in well-being. Two broad sets of explanations to account for this puzzle are discussed. The first involves evolutionary accounts: that children interfere with lower level needs, that short-term costs of having children are outweighed by long-term benefits, and that the modern-day context of raising children is at odds with our ancestors’ environments. The second possibility involves measurement: namely, problems with study designs and the difficulty of capturing on paper or computer screen what is precisely so wonderful and elusive that children grant their parents.

Keywords

happiness, positive emotions, hierarchy of needs, motives, parenting paradox, evolutionary psychology

What do most individuals hope to achieve during their lifetimes? Not surprisingly, a happy, healthy life populated with friends, family, and success tops people’s lists of desires (e.g., King & Broyles, 1997). Notably, with the exception of “happiness,” all of these wishes correspond with Kenrick, Griskevicius, Neuberg, and Schaller’s (2010, this issue) revision of Maslow’s (1943) hierarchy of needs. In this commentary, we argue that although happiness does not attain the formal status of a fundamental human need, it is intrinsically and bidirectionally associated with all the human motives specified by the revised hierarchy, with one intriguing exception.

From an evolutionary perspective, the experience of happiness and the positive emotions that are its hallmark (e.g., joy, satisfaction, enthusiasm, serenity, interest, pride) indicate to the individual that adaptive problems like nourishing one’s hunger, locating a safe shelter, or maintaining relationships will be or have been solved (Buss, 2000; Hill & Buss, 2008); presumably, the individual is then able to redirect resources and attention to a “higher” step of the motivational ladder. By contrast, negative affect signals that an immediate response is needed to unpleasantness or danger in the environment (Clore, 1994). Accordingly, both well-being and ill-being

likely play a critical role in evolutionary accounts of human motivation and behavior. Our aim here is to begin to explore precisely how each of the fundamental human motives is linked to feelings of well-being. Notably, we believe the relationship can be characterized as representing two causal directions. First, fulfilling each of the motives in Kenrick et al.’s hierarchy is expected to promote enhanced well-being. Second, being a happy person and experiencing a preponderance of positive emotions is expected to bolster the likelihood that a motive is successfully achieved.

To this end, we offer a necessarily cursory review of primarily longitudinal and experimental evidence in support of these two causal pathways.¹ Readers cannot fail to notice, however, that the one conspicuous exception to our contention that happiness is both a consequence and a stimulus of human motives is the parenting motive. Indeed, becoming a parent has

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been found to be associated with decrements in happiness (Baumeister, 1991). Several promising explanations to account for this anomaly are discussed at the end of this article, after a description of the bidirectional relationship of happiness with the other human motives in Kenrick et al.'s renovated hierarchy.

Satisfying Fundamental Human Motives Makes People Happy

Starting at the base of the hierarchy, to nobody's surprise, satisfying one's physiological needs puts people into a happy mood.² In the case of hunger, participants in one study who ate a cooked breakfast reported feeling more content than those who did not eat breakfast (Smith, Kendrick, Maben, & Salmon, 1994). Another investigation confirming the obvious revealed that women who ate an apple or a piece of chocolate felt more joyous than women who ate nothing (Macht & Dettmer, 2006). Indeed, eating a variety of food samples and recalling previous food experiences is associated with pleasant emotions more so than unpleasant emotions (Desmet & Schifferstein, 2008). Similarly, fulfilling the physiological need of a restful night's sleep is also linked to happiness. Better quality of sleep and an earlier bedtime predicted cheerfulness the following day (Totterdell, Reynolds, Parkinson, & Briner, 1994), as did shorter times to the first period of REM sleep (Berry & Webb, 1985). In addition, people who slept normally reported greater positive affect the next day than did those who experienced a night of sleep deprivation (Franzen, Siegle, & Buysse, 2008). Although this area may represent one instance when anecdotal evidence is entirely sufficient, taken together, the experimental evidence suggests that fulfilling immediate physiological needs like hunger and sleep yield an abundance of positive emotions.

For the next human motive—self-protection—the research again shows that enhancing safety and diminishing threats impacts subsequent well-being. For example, families who were originally living in high-poverty areas (characterized by social disorder and violence) were randomly assigned to either receive housing assistance and relocate to low-poverty areas, receive housing assistance, or receive no housing assistance. Those families who were given assistance and moved to neighborhoods low in poverty (which are presumably safer) showed improvements in family well-being relative to families in the other two conditions (Rosenbaum & Harris, 2001). Another study also suggested that relocating from substandard housing to quality housing was associated with enhanced mental health (Evans, Wells, Chan, & Saltzman, 2000). In sum, feeling safe directly impacts a person's sense of well-being. As Diener, Arora, and Diener (2009) showed so persuasively, a sense of safety—assessed by whether individuals have had money or property stolen from them during the past year—strongly correlated with life satisfaction across several hundred thousand respondents in 145 nations.

A wealth of research further shows that social affiliation affects feelings of happiness. In one study, highly affiliative adolescent females reported better moods than their less

affiliative counterparts (Wong & Csikszentmihalyi, 1991). Similarly, a daily diary study demonstrated that people who felt more understood during their daily social interactions showed greater happiness (Lun, Kesebir, & Oishi, 2008). Social affiliation seems to provide a buffer against negativity—for example, participants who had been initially rejected reported increases in well-being when they were reminded of their group membership (Knowles & Gardner, 2008). Indeed, social support has been found to be a highly effective coping strategy in times of strain, distress, or trauma. For example, women who actively sought social support to help cope with cancer after surgery showed greater natural killer cell activity (Levy et al., 1990), and people who experienced the sudden death of their spouse showed better adjustment if they confided in others close to them (Pennebaker & O'Heeron, 1984). Finally, students hypnotized to feel loneliness reported reduced positive affect relative to students hypnotized to feel a sense of belongingness (Cacioppo et al., 2006). Connections with others—whether in person or even just as a cue—enhance feelings of well-being (cf. Brown & Harris, 1978).

Happiness has also been shown to be strongly correlated with (but distinct from) a sense of high status and self-esteem (e.g., Diener & Diener, 1995; Furnham & Cheng, 2000). Establishing the causal relationship, however, has been more difficult. In one experiment, feelings of self-esteem were manipulated by asking participants to repeat either positive or negative self-evaluative statements (e.g., "I am a likeable person" or "I can't seem to do anything right"). Those individuals who repeated positive self-evaluations reported more elation and less depression relative to those who repeated negative ones (Coleman, 1975). However, this benefit appears to hold only for people with relatively high self-esteem (Wood, Perunovic, & Lee, 2009).

Furthermore, relatively low-status members of society report reduced well-being. For example, people with low socioeconomic status indicated greater anxiety following a stressful medical examination (A.E. Simon, Steptoe, & Wardle, 2005), and females living in low-status, poverty-stricken areas reported diminished well-being (Ross, 2000).³ Although experimental evidence is scarce, studies that have boosted people's status in the laboratory have shown a variety of benefits. For example, in an artificially created corporate office setting, participants assigned to play the role of "managers" were rated more positively on multiple dimensions than those assigned to take on the role of "clerks" (Humphrey, 1985). All together, the evidence suggests that greater self-esteem and status may promote well-being.

An entire research literature addresses the relevance of happiness to the mate acquisition and mate retention motives described by Kenrick et al. Beyond just having close friends or family members with whom to affiliate, establishing a romantic relationship and maintaining that relationship have both been consistently found to be related to enhanced well-being. Numerous survey studies report significant correlations between marital status and well-being (e.g., Kozma & Stones, 1983; Mastekaasa, 1994a), but interpreting these data is

problematic. Somewhat more persuasive are large-scale, prospective investigations, which have shown that, on average, people experience a short-term but significant boost to their well-being after marrying (Lucas, Clark, Georgellis, & Diener, 2003). Moreover, being unhappily married predicts reduced well-being (i.e., depressive symptoms) many months later, even when initial levels of well-being are controlled (Beach & O'Leary, 1993). Finally, an innovative study showed that, in a threatening situation, holding hands with a spouse reduces the unpleasantness more than holding hands with a stranger or not holding another person's hand at all, especially when the marital relationship is strong (Coan, Schaefer, & Davidson, 2006). This combined evidence suggests that both acquiring and preserving an intimate relationship yield boosts to one's well-being.

Being Happy Increases the Likelihood of Successfully Realizing Human Motives

According to our simple thesis, not only should satisfying a fundamental human need make one happy, but that happiness in the first place should bring about the successful fulfillment of each need and propel a person through the hierarchy. Beginning with physiological needs, studies show that individuals induced into a joyous mood are more motivated to eat (Macht, Roth, & Ellgring, 2002), consume more food (Patel & Schlundt, 2001), report eating for enjoyment (Macht, 1999), rate food samples as more sweet and pleasant (Greimel, Macht, Krumhuber, & Ellgring, 2006), and sleep more hours each night (Emmons & McCullough, 2003) than those who are induced into a negative mood. Being happy also impacts the likelihood of illness and the experience of pain. For example, participants with a positive emotional disposition were less susceptible to the common cold than those without such a disposition (Cohen, Alper, Doyle, Treanor, & Turner, 2006; Cohen, Doyle, Turner, Alper, & Skoner, 2003), and the experience of positive affect led to a higher tolerance for pain (Alden, Dale, & DeGood, 2001; Cogan, Cogan, Waltz, & McCue, 1987; Tang et al., 2008). In sum, positive feelings may encourage people to more effectively meet their most basic needs.

Positive feelings may also prompt individuals to more accurately judge potential hazards in their environments. Although "good judgment" is always debatable, sometimes it calls for not overreacting to threats. For example, participants in happy moods interpreted fewer homophones as threatening (e.g., *die* vs. *dye*) relative to those in angry or anxious moods (Barazzone & Davey, 2008). In addition, in comparison with dysphoric individuals, nondysphoric individuals looked away from images of threatening faces more so than neutral faces (Bradley et al., 1997). And another study showed that people reading about a happy event subsequently report less risk from potential natural disasters, illnesses, and traumas (Johnson & Tversky, 1983). This evidence suggests that happy feelings help people avoid overestimating threats to their safety and well-being in potentially ambiguous situations. However, other research indicates that happier people do not necessarily deny threats

when they are real. For example, participants with more positive and optimistic beliefs were more, not less, likely to attend to and recall self-relevant threatening health information about vitamin use (Aspinwall & Brunhart, 1996).

Research relevant to the affiliation step of Kenrick et al.'s motivational ladder shows that positive affect undoubtedly plays a role in the drive to develop social bonds. For example, positive affect stemming from a success triggers more attentiveness to the social environment, more efforts to initiate conversation with a stranger, and greater helpfulness toward others (Isen, 1970; McMillen, Sanders, & Solomon, 1977). Furthermore, people in an experimentally induced positive mood were relatively more attracted to another person (Gouaux, 1971; May & Hamilton, 1980), showed increases in communication with a confederate, offered more intimate disclosures (Cunningham, 1988), and felt more connected to others (Emmons & McCullough, 2003). Similarly, participants who shared a humorous situation together—a context in which positive emotions are evoked—subsequently felt closer to one another (Fraley & Aron, 2004). Even judges who evaluated the yearbook photos of college students viewed women displaying sincere positive emotion as more sociable; in addition, those same judges were more inclined to approach the women who appeared the happiest and had higher expectations for a pleasant interaction (Harker & Keltner, 2001). In sum, being in a good mood facilitates the development of relationships by encouraging interaction, approach-oriented behavior, and enjoyable exchanges with others (cf. Lyubomirsky, King, & Diener, 2005).

With respect to the middle of the motive hierarchy, a number of experimental studies have shown that individuals put into a happy mood feel more efficacious (e.g., Baron, 1990) and describe themselves more favorably (e.g., Barsade, 2002; Sarason, Potter, & Sarason, 1986; Wright & Mischel, 1982). Furthermore, people who display happiness in their facial expressions are rated as more confident (Harker & Keltner, 2001) and dominant (Hareli, Shomrat, & Hess, 2009) than those displaying fear or sadness. These findings suggest that positive emotions encourage feelings of esteem that are recognized not only by the self, but also by others.

With respect to mate acquisition and retention, increasing evidence suggests that individuals characterized by high well-being many years prior to marriage are more likely to get married (Lucas, 2007; Lucas et al., 2003; Marks & Fleming, 1999; Mastekaasa, 1992), to have satisfying relationships (Headey, Veenhoven, & Wearing, 1991), and to stay married (Booth & Amato, 1991; Mastekaasa, 1994b). In a striking finding, relative to their less happy counterparts, women displaying positive emotions in their college yearbook portraits were more likely to be married several years later, more likely to express satisfaction with their marriages three decades later, and less likely to have experienced marital discord or to have been divorced (Harker & Keltner, 2001). It is interesting to note that people who eventually get divorced or separated tend to be less happy prior to marriage (Doherty, Su, & Needle, 1989; Kim & McKenry, 2002; Lucas, 2005,

2007). Collectively, this evidence suggests that being a happy person makes it more likely that one will ultimately get married and that one will enjoy relatively stronger, longer lasting relationships in the future.

The Puzzle of Parenthood

The central tenet undergirding our review is that happiness and its associated positive emotions signal to the individual that one or more adaptive problems have been solved (Hill & Buss, 2008) and essentially give him or her permission to shift attention to other problems—perhaps those that are higher on the motivational hierarchy. Accordingly, we have thus far presented evidence supporting the prediction that people will feel happy after realizing fundamental human motives. Next, we extended this reasoning to argue and provide evidence that, in turn, the experience of happiness should galvanize people to fulfill these very same motives. Taken together, this evidence suggests that the adaptive value of happiness lies not only in its role as a psychological reward for the fulfillment of fundamental human needs described by Kenrick and his colleagues, but also as a stimulus, catalyst, or motivator.

However, a glaring gap in the literature—and the resulting fissure in our arguments—raises an interesting puzzle. That is, research suggests that despite the palpable and widely reported desire of most people to have children, parenthood is not associated with increased happiness but, on the contrary, is most frequently linked to decreased well-being (e.g., Campbell, Converse, & Rodgers, 1976; Evenson & Simon, 2005; Glenn & McLanahan, 1982; Glenn & Weaver, 1979)—a phenomenon Baumeister (1991) coined as “the parenthood paradox.” As just one oft-cited example, in a retrospective time use rating study, working women judged taking care of their children slightly more positively than the unpleasant tasks of commuting and housework (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). To try to understand why this is so, we consider below two broad sets of explanations: the first involving evolutionary accounts, and the second involving issues of measurement.

Evolutionary Perspectives

Several explanations that could account for the lack of a relationship between parenthood and enhanced well-being are rooted in evolutionary psychology: the first is that children interfere with lower level needs, the second is that the short-term costs of having children are outweighed by the long-term benefits, and the third is that the modern-day context of raising children is at odds with our ancestors’ environments.

To begin, the birth of a child is likely to interfere with parents’ physiological needs. Sleep deprivation and fatigue characterize most new moms and dads, along with physical discomfort as a woman’s body recovers from pregnancy and prepares to feed an infant (Fleming, Ruble, Flett, & Van Wagner, 1990; see also Blackburn, 2007). Self-protection and safety become even more salient concerns as parents are no longer concerned with merely their own safety, but also the

safety of their (initially very vulnerable) offspring. Moreover, the birth of a child may interfere with previous social relationships—both because of lack of leisure time and because the interests and activities of childless friends may no longer complement those of new parents.⁴

Status, particularly that experienced in the context of the workplace, may be diminished after children are born. For example, parents may have to contend with daycare issues or afterschool activities that conflict with employment responsibilities. Tellingly, working women with children (but not men) earn less than their childless counterparts (Mason & Ekman, 2008). Furthermore, children may foster feelings of inadequacy in parents, which ultimately diminish self-esteem (e.g., “The baby is still crying, the first-grader still can’t read, the teenager says he hates me . . . I must be doing something wrong”; e.g., Fleming et al., 1990). Finally, successful maintenance of a romantic partnership involves an ongoing commitment to an emotional and physical relationship with one’s partner. However, parenting responsibilities may interfere with the resources and attention that one can dedicate to a partner—a phenomenon supported by several studies showing reduced marital satisfaction in couples with small or teenage children (e.g., Gorchoff, John, & Helson, 2008; Rollins & Cannon, 1974; VanLaningham, Johnson, & Amato, 2001). Taken together, the challenges that parents encounter when fulfilling needs beyond those of raising children are likely to be related to their reduced well-being.

Second, the relatively short-term costs of raising a child—which are arguably greatest when the child is young—may be compensated by the long-term advantages. For example, as parents age and become frail, financial assistance comes from grown-up children (Chesley & Poppie, 2009), and caregivers are most often adult daughters (Dwyer & Coward, 1991; Stone, Cafferata, & Sangl, 1987). In addition, companionship for the elderly (by means of telephone calls, visits, and other means of help) tends to come from adult daughters (Spitze & Logan, 1990). And, of course, the long-term advantage of offspring is the survival of one’s genes into future generations. In sum, despite the apparent drawbacks to a parent’s well-being in the short term, children may provide substantial benefits in the long term.

Finally, as Kanazawa (2008) has persuasively argued, in many ways, the demands of rearing children in the modern-day environment are completely at odds with how our ancestors raised their children. For example, current research suggests that children have their most negative impact on parental well-being when they are adolescents or very young (i.e., infant or toddler stage; cf. Compton, 2004). In ancestral environments, adolescents would not have resided at home; instead, they would have lived independently after reaching puberty. Thus, the characteristically rebellious and independence-seeking behavior of teenagers today is constrained by laws that render parents responsible for children until they are 18 years old (Kanazawa, 2008). Moreover, raising children has historically been a collective responsibility, illustrated by the well-known adage, “it takes a village” (cf. Clinton, 1996). Our

ancestors brought up very young children in the context of a larger village, clan, or tribe, which allowed childcare responsibilities to be shared across many individuals—both family members and neighbors. By contrast, the level of distress for modern-day parents is magnified when only one or two individuals are available to respond to a child's cries and needs. Thus, evolutionary explanations for why parenthood is not associated with increased happiness can be traced to the obstacles parenthood poses to other motivational needs, the long-term benefits stemming from having children, and the conflict between ancestral and modern-day environments.

Measurement Issues

Another set of explanations for the apparent inverse relationship between parenting and well-being involves consideration of measurement issues. The more mundane problem is that all of the relevant studies are necessarily correlational and lacking appropriate control groups—a situation that renders the possibility of multiple interpretations and unknown third variables. The more substantively rich problem concerns the difficulty of capturing via paper and pencil what it is precisely so wonderful and elusive that children grant their parents.

For example, perhaps the momentary occasions of joy and meaning that parents derive from their children are not captured by the measures of happiness and positive emotions typically used by researchers (Inglehart, Foa, Peterson, & Welzel, 2008; Loewenstein & Ubel, 2006). In Inglehart and colleagues' (2008) words, the "one minute when your child comes running to greet you with a smile and a hug may be worth a hundred minutes of cleaning up after them" (p. 279). In other words, because happiness is not merely the sum of positive experiences, evidence suggesting that caring for a child is just slightly more enjoyable than commuting and cleaning (Kahneman et al., 2004) does not mean that parents are not happier than nonparents in a more profound, deeper, more substantial way. Indeed, Baumeister (1991) argued that although parenting may not promote well-being, it fosters a sense of meaning and purpose that may be as important to happiness as are fleeting positive moods (see also Rubin, 2009; R.W. Simon, 2008; White & Dolan, 2009). The fact that the loss of a child is considered to be the worst tragedy that can befall an individual across almost all cultures lends further support that extant measures that only ask people how satisfied they are and how often they experience joy, interest, and enthusiasm are somehow failing to tap these essential elements of a happy life and a good life.

Besides promoting a greater and more intensely felt sense of meaning, having children can provide individuals with many other valuable and important resources that contribute to happiness and a life well lived, all of which may be difficult to assess with standard measures of well-being (see Loewenstein & Ubel, 2006). For example, children bestow parents with a legacy—that is, a contribution to society that will persist beyond their own lifetimes. Becoming a parent is also closely tied to an individual's identity. Indeed, most people expect, desire, and actually do have children (Baumeister, 1991).

Regardless of how much happiness is actually derived from children, being a parent is strongly aligned with the culturally prescribed goals and dreams that people envision for their lives. Moreover, the experience of raising children adds to the story that people tell about their lives. Seldom do life stories recount pleasure after pleasure; instead, people incorporate both their trials and triumphs (McAdams, Diamond, de St. Aubin, & Mansfield, 1997). As such, life stories that involve children can contribute to purpose in life and cultivate a sense of flourishing and fulfillment.

Finally, being a parent (and, indeed, the sense of being alive) involves encountering a wide range of emotions and experiences (Loewenstein & Ubel, 2006)—not just the high highs but also the low lows. Parents are likely to experience extremely positive emotions (e.g., pride at watching a toddler's first steps) along with extremely negative ones (e.g., anguish at a child's pain). People value having a breadth of emotional experiences, even if that includes negativity and even suffering. Consider, for example, the adage that "'tis better to have loved and lost, than never to have loved at all" (Tennyson, 1850). The potential for passionate love (or, in the case of parenting, for joy and contentment) outweighs the potential for disappointment or a broken heart. In sum, despite the apparent disparity in well-being between parents and nonparents, current measures of happiness may be unable to gauge the more powerful and profound—and literally immeasurable—ways that children enhance an individual's life.

Concluding Remarks

All told, we have argued here and provided initial evidence that the fundamental human motives identified by Kenrick and his colleagues share a bidirectional relationship with happiness—namely, we've argued that achieving each motive is rewarded by feelings of happiness and, in turn, that being happy increases the likelihood of satisfying motives. The singular human motive that presents a conundrum and a challenge to our thesis is parenting. Although a variety of explanations—involving evolutionary considerations as well as measurement issues—can account for this exception, the puzzle of parenthood and happiness is an important question that remains to be addressed by future researchers and thinkers. However, setting the parenthood paradox aside, we contend that happiness and positive emotions play a vital role in an upward spiral that ultimately fosters a fulfilling and successful life. In other words, happiness propels a person through the hierarchy of motives both by fostering success and by acting as a reinforcing trigger and incentive.

Notes

1. Where longitudinal and experimental studies are scarce, we also report some correlational findings. Of course, both correlational and longitudinal evidence may be subject to unexplained third variables; nevertheless, we believe that such evidence is better than no evidence at all.

2. This point may seem obvious, but we explore it for the sake of consistency across all of the human motives.
3. It is interesting to note that this effect appears to be accounted in large part by the social disorder (i.e., lack of safety) that characterizes low-income neighborhoods.
4. Other evidence, however, suggests that all groups of new parents (e.g., married vs. unmarried) experience an increase in social affiliation with the birth of a new child (Nomaguchi & Milkie, 2003).

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The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Pyramid Power: A Reply to Commentaries

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Abstract

Four thoughtful commentaries identify important issues and insights pertaining to the pyramid of needs presented by Kenrick, Griskevicius, Neuberg, and Schaller (2010, this issue). Here, we offer additional thoughts on some of these issues and insights, with an emphasis on the logical implications that result from an evolutionary analysis of fundamental human needs.

Keywords

evolution, meaning, motivation, parenting, pyramid of needs

People love a pyramid. Collectively, the four very thoughtful commentaries on our renovation of Maslow's famous pyramid of needs (Kenrick, Griskevicius, Neuberg, & Schaller, 2010, this issue) concur with our impression that his pyramid is more than just an iconic artifact of humanistic psychology. The pyramid can still have a prominent place in the psychological sciences for a very simple reason: By identifying a hierarchy of fundamental human needs, we can more fully understand human nature.

The commentaries echo our belief that any scientifically sensible pyramid of needs must be built on an evolutionary foundation. This is not to say that the commentaries are simply nodding their heads, slapping us on the back, and congratulating us on a job well done—far from it. These commentaries identify a variety of issues, questions, and thoughtful disagreements. But these issues and questions and disagreements pertain primarily to the finer details of our analysis; there is no disagreement about the fundamental value of a serious evolutionary analysis of human motivation. The commentaries show how an evolutionary analysis can probe even more deeply into the connections between different kinds of goal states (e.g., how the renovated hierarchy provides insights into how goal conflicts are resolved, and how the hierarchy, when integrated with the concept of “scaffolding,” generates specific and novel predictions about how related goals are likely to influence the operation and consequences of one another; Ackerman & Bargh, 2010, this issue). The commentaries reveal how an evolutionary analysis can be used to address additional scientific questions that arise from our revised pyramid (e.g., the “parent-hood paradox”; Lyubomirsky & Boehm, 2010, this issue). And so on. We are especially heartened by the fact that one of the sharpest criticisms of our revised pyramid—the complaint that

it is mammal-centric rather than human-centric (Kesebir, Graham, & Oishi, 2010, this issue)—results not from any disavowal of the role of evolution in human affairs, but instead from the assertion that our analysis is actually insufficiently attentive to the most recent epoch of human evolution. If these commentaries accurately represent the perspectives of contemporary psychological scientists, it would appear the field is moving away from dispiriting rhetorical battles about whether evolution is relevant to human psychology and moving toward the more progressive and productive pursuit of figuring out exactly how. This is wonderful.

So exactly how might a Maslovian pyramid be most sensibly reconstructed in light of what we know about human evolution? There is no simple answer to that question. Therefore, it is no surprise that our article—and the reformulated pyramid that appears in it—stimulated such a variety of thoughtful quibbles and questions. We will offer a few additional thoughts on several of these issues.

Pyramid Plasticity and Constraint

Maslow created a single pyramid and allowed it to represent many things. We do not have that luxury. Logically, the hierarchical organization of fundamental human needs may differ depending on whether the pyramid represents a functional hierarchy, a developmental trajectory, or a cognitive prioritization. The evolutionary logic that informs our analysis suggests that

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these hierarchies are also likely to differ somewhat as a result of other fitness-relevant variables too, including sex, age, and immediate ecological context (including culture). From an evolutionary perspective, the specific contents of the pyramid must be applicable to all people everywhere, but the specific prioritization of those contents (their actual position in the pyramid) is expected to vary in predictable ways across both persons and situations. This implied plasticity poses a graphic design problem (see Ackerman & Bargh). But it also highlights the fact that an evolutionary approach to human motivation—even though it necessarily emphasizes those elements of motivational systems that are universal across all peoples in all places—is entirely compatible with alternative metatheoretical approaches that emphasize motivational variability across persons, situations, and cultures.

At the same time, however, evolutionary logic imposes strict constraints on that plasticity. The human genotype produces individual persons who are infinitely variable at the surface level, but every normally developing human being still conforms to a single prototypical template for basic phenotypic design. Analogously, an evolutionary approach to motivation produces a pyramid defined by some plasticity in the prioritization of needs, but one that is also defined by a strictly limited, and logically constrained, set of fundamental fitness-relevant needs. It also implies a default prioritization of those needs. (The satisfaction of immediate physiological needs must typically take priority over other needs, for example, and mate acquisition must typically be satisfied prior to parenting.)

The Vanishing Self, the Selfish Gene, and the Purpose of Parenting

By employing an evolutionary analysis to construct a pyramid of needs, we cannot just add something to the pyramid because it conforms to common sense, or because it pleases us to see it there. The structure must be consistent with the logical implications of an evolutionary analysis. Among those logical implications are these: (a) Any fundamental need represented in the pyramid must have been clearly linked to reproductive fitness throughout some substantial chunk of human evolutionary history, and (b) a strong case must exist for its universal relevance to all human beings. Judged against these criteria, some of our favorite desires and aspirations have no place in the pyramid. Most notably, despite its iconic appeal (see Peterson & Park, 2010, this issue), self-actualization just does not make the cut.

Although self-actualization may have a lot going for it, a clean conceptual definition is not one of those things. There is nothing in its fuzzy conceptualization that links in any obvious way to reproductive fitness. Nor is there any strong case to be made that a need for self-actualization is universal across all human populations (see Kesebir et al.). To the contrary, the concept of self-actualization (like self-esteem, self-enhancement, and many other self-ish goals) may well have a peculiar intellectual appeal only within modern Westernized individualistic societies. Hence, self-actualization has no logical place in a pyramid of fundamental human motives.

Although many self-gratifying aspirations (such as self-actualization) are logically excluded from our hierarchy of fundamental needs, the pinnacle of our pyramid is occupied by something that often is experienced as both self-gratifying and something closer to its opposite: parenting. The fact that parenting is at the pinnacle highlights a fundamental distinction between a pyramid informed by a highly personal perspective on human health and happiness (as Maslow's was), and a pyramid informed by the rigorous logic of genetic evolution (as ours is). From an evolutionary perspective, people do not matter, *per se*. Rather, people are essentially vehicles for genes, and they are designed by genes to do the kinds of things that facilitate the replication of those genes. This gene-centric objective is not satisfied simply by the production of viable offspring; it is satisfied more fully when those offspring are sufficiently mature and capable of producing viable offspring themselves. The satisfaction of a fundamental need does not operate in the service of self-gratification, but in the service of the replication of our genes into our children's children.

Fulfillment of these needs may still be psychologically pleasing, of course. A reward system—the production of positive affective experiences—is an integral part of the suite of psychological adaptations that promote behaviors facilitating genetic replication. So it is perfectly sensible that the satisfaction of a fundamental need is associated with happiness (see Lyubomirsky & Boehm).

However, this does not mean that people will actually feel happy when attempting to satisfy that need. It is not a lot of fun to peel a pile of potatoes, or to anxiously primp in preparation for a blind date, even though those actions can promote the satisfaction of fundamental physiological and mate acquisition needs. The same principle applies to parenthood, even though the actual satisfaction of the parenting need (successfully raising one's offspring to an age at which they are capable of producing offspring themselves) requires a considerably greater commitment over a necessarily longer stretch of time. Therefore, it is perfectly sensible (and not a paradox at all) that people are not always so happy when they are doing the sorts of things that parents have to do. Instead, the affective reward comes as we make progress toward the underlying evolutionary objective—when the peeled potatoes temporarily sate the need for nutrition, when the primped appearance impresses a potential mate, or when the child scampers off the school bus and proudly produces a remarkable report card.

Human Evolution, Human Uniqueness, and the Meaning of Life

The parenting need is not unique to human beings, but there are many uniquely human aspects to the manner in which that parenting need is fulfilled. In comparison with other animals (including the other primates most closely related to *Homo sapiens*), humans devote a more substantial chunk of their adult lives to protecting and nurturing their offspring. This is necessary because, from a developmental perspective, human babies are exceptionally immature at birth. This immaturity is a

product of recent events in human evolution, including the spectacular increase in adult brain size that has evolved over the last several hundred thousand years. The exact circumstances that precipitated the evolution of big brains are uniquely human and pertain to the kinds of things that are integral to human culture (an emerging capacity for language, complex organization of large social groups, etc.). The emergence of culture (and big brains) in our species is further associated with the emergence of cognitive capacities that are also unique to humans, and they exert a pervasive influence on everything we do.

There are, therefore, many uniquely human goals that reflect unique aspects of human cognition and human culture. Chimpanzees do not aspire to buy fancy cars, marry neurosurgeons, or publish more articles than their colleagues down the hall. People do. There is no evidence that chimpanzees concern themselves with self-actualization. People (at least some of them) sometimes do. Nor is there any evidence that chimpanzees have the capacity to reflect deeply on their own mortality. People do, and this existential self-reflection stimulates a uniquely human form of goal-directed behavior. The list goes on and on. There are an enormous number of goal states experienced by an enormous number of human beings—powerful desires for a variety of outcomes both mundane and transcendent (the desire for a jewel-encrusted iPhone, for the feeling of self-actualization, or for everlasting happiness in the sweet hereafter). At a phenomenological level of analysis, these goal states may be experienced much more powerfully than, say, the need for status or mate retention or parenting.

But that does not mean that these goal states are evolutionarily fundamental. An evolutionarily sensible pyramid cannot be a mere list of phenomenologically salient motivational states. Rather, it must offer a logically deduced (and biologically principled) hierarchical mapping of the small set of truly fundamental needs that actually are served by the vast variety of human motivational states.

Still, as suggested by our commentators (e.g., Kesebir et al.; Peterson & Park), perhaps it is worth thinking a bit more deeply about motivations associated with meaning and wisdom. There is no doubt that, as a result of relatively recent historical circumstances within which human culture and human cognition coevolved, people uniquely attach symbolic meaning to a dazzling array of ideas and artifacts. There is also no doubt that people seek meaning and wisdom. But in these regards, people are probably not unique. Chimpanzees (and many other mammals too) surely attach meaning to lots of things and are also motivated to perceive their world in a way that makes sense. The bigger question, then, is whether the needs for meaning and wisdom have unique implications for reproductive fitness and thus qualify for a place in our pyramid.

We suggest that the needs for meaning and wisdom do not have conceptually unique implications for reproductive fitness but that they rather operate in service to each of the other fundamental human needs. To identify and then satisfy any fundamental need, an individual must be able to make sense of his or her world. To the extent that an individual's perceptual or ecological context appears inconsistent, incoherent, or senseless—to the extent it appears meaningless or unknown—the satisfaction of any fundamental need is that much more difficult. Young children are no less motivated than philosophers are to understand their worlds—to comprehend the connections between colors and shapes and textures, to grasp the meanings of spoken words and logical arguments, and to figure out exactly when and why mommy gives a cookie at certain times and not at others. Teenagers ponder many of the great mysteries of social psychology as they attempt to negotiate friendships, status hierarchies, and dating relationships. Meaning and wisdom matter, but they have no particular place in the pyramid; rather, they are implicated throughout.

And, of course, from an evolutionary perspective, meaning and wisdom matter not because people aspire for meaning or for wisdom, but because these psychological desires for meaning and wisdom, as with so many other human aspirations and goals, offer a means to facilitate our survival and reproductive fitness, and thus the reproduction of our genes in our children, and in our children's children, too. Thus, our pyramid.

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The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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