

# Evolution Integrated Across All Islands of the Human Behavioral Archipelago: All Psychology as Evolutionary Psychology

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## ABSTRACT

Teaching evolutionary principles in higher education can provide an integrative theoretical foundation that can be used to incorporate vast amounts of interdisciplinary knowledge. Yet, paradoxes regarding evolutionary theory's place in academia are rampant—particularly when it comes to applying evolutionary principles to psychology. The EvoS Consortium is premised on the idea that evolutionary theory can shed light on phenomena across *all areas* of academia. Evolutionary principles have been an important aspect in the advancement of scientific research and knowledge since the modern synthesis in the late 1930's. In an effort to demonstrate the utility of the evolutionary perspective throughout psychology as a whole, this paper includes sections on several of the major areas of psychology. Specifically, we use this approach to address social, personality, developmental, cultural, biological and applied psychology. Very basically, this paper is designed to show how evolutionary approaches to behavior have not only helped to better understand various aspects of our psychology, but have changed the way we think and understand ourselves as humans.

## KEYWORDS

Evolution, Evolutionary Principles, Evolutionary Theory, Psychology, Evolutionary Psychology, Higher Education, Interdisciplinary Studies, EvoS Consortium, Evolutionary Studies

The current place of evolutionary psychology within the behavioral sciences is paradoxical. On one hand, a great deal of research in top journals related to the behavioral sciences features scholarship rooted in evolutionary principles such as adaptationist perspectives on why certain behaviors exist (such as work on the evolutionary underpinnings of human mating; see Geher & Kaufman, 2013). In fact,

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a recent analysis of articles published in the elite journal *Behavioral and Brain Sciences* found that nearly a third of articles in this journal (which addresses a broad array of psychological areas) connect directly with an evolutionary approach to behavior (see Glass, Wilson, & Geher, 2012).

But paradoxes regarding evolutionary psychology's place in academia abound. While emerging as a significant academic area within the halls of higher education (per Glass, Wilson, & Geher, 2012), evolutionary psychology tends to run into dramatic resistance from both ends of the political spectrum (see Geher, 2006). Similarly, while attention and interest on the part of the media and among the general population have shown conspicuous growth regarding evolutionary psychology (see Garcia, Kruger, & Fisher, 2011), universities have been slow to accommodate this interest in terms of offering sufficient curricula that train people in the theory and research that underlies human evolutionary psychology (Glass, Wilson, & Geher, 2012).

The EvoS Consortium is premised on the idea that evolutionary theory, the most powerful set of ideas within the life sciences, can shed light on phenomena across all areas of academic inquiry (see Chang, Geher, Waldo, & Wilson, 2011). Evolutionary principles have been an important aspect in the advancement of scientific research and knowledge since the modern synthesis in the late 1930's (i.e., when biological specialties accepted/ integrated evolutionary theory; Boyd & Silk, 2006) – and the EvoS Consortium represents the current instrument of progress along this front. In recent years, partly funded with an NSF grant, the Evolutionary Studies (EvoS) Consortium has worked to help integrate evolution across all areas of higher education (Chang et al., 2011). Concurrent with this trend, there has been a push to incorporate evolutionary theory into the social sciences—particularly within psychology (see Geher, Crosier, Dillon, & Chang, 2011). Interestingly, as with any shift in theoretical underpinnings, the idea of integrating evolutionary theory into psychology has been met with resistance (see Geher, 2006). Due to this unique academic history, the wedding of psychology and evolutionary theory is often reserved for a small subsection within psychology referred to simply as *evolutionary psychology* (EP). This paper is designed to show how evolutionary approaches to behavior have actually shed light on topics across the gamut of areas of psychology. Given the powerful nature of evolutionary theory in elucidating phenomena, changing the way we approach/ teach psychology has the potential to better connect various disciplines within higher education.

### **WHAT IS EP- AND HOW IT CAN HELP PSYCHOLOGY WRIT LARGE WITHIN HIGHER EDUCATION?**

While various definitions of EP can be found in the literature (see Geher, 2006), at its core, EP is an approach to understanding human behavior and psychological processes in terms of evolution – seeing behavior as the result of the clearly evolved human nervous system – ultimately designed to facilitate reproductive success. From this perspective, human nature is simply part of the natural world.

While some may see EP as a narrow section of psychology writ large, we argue that, in fact, the evolutionary perspective has potential to inform any and all

areas of psychology. Understanding human behavior as a product of evolution can shed light on such issues as developmental psychology (Bowlby, 1969), human emotional expression (Ekman & Friesen, 1986), personality traits (Nettle & Clegg, 2008), helping behavior (Wilson, O'Brien, & Sesma, 2009), and more (see table 1). Consistent with the work of Ketelaar and Ellis (2000), we see EP not as an area of psychology, but, rather, as a massive meta-theory based on the strongest set of ideas in the life sciences that can shed light on all questions of psychology. With this approach, we hope to provide a clear and useful framework regarding the high utility of an evolutionary perspective within the behavioral sciences and higher education (Garcia et al., 2011).

### ORGANIZATION OF THIS PAPER

In an effort to demonstrate the utility of the evolutionary perspective across various areas of psychology, this paper includes sections on several of the major areas of psychology— with examples of how new findings emerged in each sub-area as a result of applying an evolutionary approach. In an effort to represent psychology broadly, the areas we include represent a diverse set of the basic elements of the field. Specifically, we use this approach to address social, personality, developmental, cultural, biological and applied psychology.

#### Evolutionarily Informed Social Psychology

Some propose that the social nature of our species is a result of our evolutionary heritage (see Wilson, 2007). As such, it makes sense that social psychology should be an important target for the evolutionary perspective. In fact, social psychology has seen a great deal of evolutionary-based scholarship, addressing such issues of attraction (see Buss & Schmitt, 1993), aggression (see Bingham & Souza, 2009), altruism (see Wilson, 2007), emotions (see Ekman & Friesen, 1986), and more.

A particular example of evolutionarily informed social psychology is found in work on kin-selected altruism. Evolutionary theory strongly predicts – and helps us better understand – social behavior and seemingly altruistic prosocial behavior as observed in social psychology (for a full review of these examples see Neuberg, Kenrick, & Schaller, 2009). An evolutionary approach to prosocial behavior involves the concept of *kinship*, or the degree of genetic relatedness between any two individuals. Studies have demonstrated that individuals are more inclined to help genetically similar kin, especially when the reproductive success of those kin is threatened (Burnstein, Crandall, & Kitayama, 1994; Neyer & Lang, 2003; Stewart-Williams, 2008) (see table 1). Since genes are not conspicuously visible, people often rely on subconscious heuristics that otherwise might indicate possible kinship. For example, Neuberg, Kenrick & Schaller, (2009) note that superficial cues such as familiarity and similarity are often used to judge relatedness (Lieberman, Tooby, & Cosmides, 2007; Park, Schaller, & Van Vugt, 2008). Furthermore, the emotion of empathy is also believed to have primarily evolved as a proximate mechanism that prompts aiding distressed kin. As a result, people may feel obligated to assist other

individuals if empathy is elicited, even if the individuals in danger are genetic strangers (Hoffman, 1981; Krebs, 1975; Park, Schaller, & Van Vugt, 2008).

In fact, the evolutionary approach to prosocial behavior has actually led to a large body of literature on many facets of helping behavior beyond just kin selection (e.g., reciprocal exchange (Tooby & Cosmides, 1996), sexual selection (Miller, 2000), group-level selection (Wilson, 2007), and more). This fact clearly allows the evolutionary approach to help psychology's place within the broader area of higher education. When students have the ability to connect social theories with our evolutionary past, they are often able to form a novel view on the unique sociality of our species.

Altruism, or prosocial behavior, is a single area of social psychology that has been dramatically elucidated by evolutionary approaches within social psychology. Our next section turns to social psychology's first cousin, personality psychology.

### Evolutionarily Informed Personality Psychology

The evolutionary perspective is typically conceptualized in terms of human universals (see Buss, 1989). From this angle, psychological processes are considered products of natural selection (and other evolutionary forces), and they tend to play out similarly across individuals. Recently, an important push toward understanding variation in personality from an evolutionary perspective has helped shed light on such issues as: (a) the role of personality in mating psychology (e.g., *mating intelligence*; see Geher & Miller, 2008), (b) the ultimate reasons that personality traits tend to converge on the "Big Five" basic personality traits (see Nettle & Clegg, 2008), and (c) the bottom-line personality dimension of life history strategy, which seems to underlie personality variability in humans writ large – among others. In short, EP has dramatically transformed the area of personality psychology. Perhaps the highest-profile example of this work relates to our understanding of the "Big Five" (most basic) personality traits.

The Big Five personality traits (see Costa & McCrae, 1992) represent five fundamental dimensions of human personality that have been uncovered by psychometricians based on years of scientific work on the nature of human personality. These trait dimensions are extraversion, neuroticism (emotional instability), openness, conscientiousness, and agreeableness – trait dimensions that are normally distributed across varied populations and that seem to be stable within individuals across time (Costa & McCrae, 1992). While a psychometrician might ask, "How are these dimensions inter-related and structured?" an evolutionist is more likely to ask, "Why did these traits come to take on the form they have from time immemorial?" This is one example of how a researcher utilizing an evolutionary framework might look at a research question differently than those who do not – and how new findings that clearly inform the content of the field emerge.

Nettle and Clegg (2008) provide a compelling evolutionary case for helping us understand why these five dimensions have evolved as they have. Essentially, Nettle and Clegg (2008) appeal to the concept of balancing selection, which suggests that different alleles of a genetically based trait (in the case of personality, each end of a trait dimension) are evolutionarily adaptive for different reasons. As such, both ends of the trait would be selected and maintained within a population

across generations of selection (see table 1). Nettle and Clegg (2008) see the Big Five as excellent exemplars of this process – and explains them as follows: High levels of extraversion were selected because it led extraverts to build large social circles and to turn up mating opportunities. However, compared with introverts, extraverts are more likely to experience injury from risky behavior, while introverts are more likely to form close social bonds with a few consistent individuals. Given these correlates of extraversion, it makes sense that both high and low levels of extraversion would be maintained in human populations – they each have (discrete) adaptive benefits. Nettle and Clegg (2008) show how each of the Big Five personality traits, in fact, can be elucidated via an evolutionary approach.

Future work along these lines has strong potential to influence the understanding of personality as a whole—which, in turn, could lead to improved curricula on this topic in college classes. By integrating an evolutionary point of view, students are able to construct a theoretical backdrop to better understand various personality traits—including their own—and in doing so, form a more holistic understanding of personality variation.

In fact, evolutionary approaches to the nature of personality have shed light on a host of individual-difference variables that help us understand human nature. We next turn to the issue of psychological development over time – how can EP help us understand developmental psychology?

### Evolutionarily Informed Developmental Psychology

Evolutionary psychology and developmental psychology have had a somewhat rocky relationship. Evolutionary psychologists have been accused of neglecting or downplaying the role of developmental influences on behavior (Spencer et al., 2009), while developmental psychologists following the so-called *standard social science model* (Tooby & Cosmides, 1992), have been charged with advocating “blank slate” conceptions of the human mind and denying that our behavior is shaped by our evolutionary history (Pinker, 1997). In fact, viewed with a broad perspective, we can see that evolutionary and developmental approaches are actually highly consistent approaches to understanding human behavior. Without an appreciation of both an organism’s evolutionary and developmental history, it is difficult to make any claims about the contributing forces of each on the final product—in this case, behavior.

With this integrative model in mind, a great deal of research on developmental psychology has been conducted via an evolutionary perspective. Such areas that have been elucidated include attachment styles (Ainsworth & Bell, 1970), gender differences in early childhood (see Johnsen, Kruger, & Geher, 2011), life history strategy (Gladden, Figueredo, & Jacobs, 2008), risky behavioral patterns (Kruger & Nesse, 2007), and more.

Perhaps one of the best-known examples of evolutionarily informed approaches to developmental psychology is found in work on attachment theory (Bowlby, 1969). This theory describes the need for infants to form a stable relationship (or attachment bond) with a primary caregiver in order for development of social and emotional functioning to occur (Bowlby, 1969; see table 1). From this perspective, trusting early relationships between infants and caregivers provides a

template of security, leading to a pattern of trusting others in general – a key to success in a social species such as ours. Under ancestral conditions, being able to stay connected with individuals and being able to formulate trusting relationships would have clearly had adaptive benefits for one's ability to succeed in social domains. And the development of early attachment bonds, as predicted by Bowlby (1969), has been shown to help forge precisely these kinds of socially successful patterns across development (see Ainsworth & Bell, 1970).

Interestingly, there has been a growing body of work over the last decade and a half, which combines evolutionary and developmental perspectives. The integrated discipline of evolutionary developmental psychology (EDP) focuses on the interaction between genes and environment over ontogenetic time, and how this interplay governs psychological outcomes (Geary & Bjorklund, 2000). In EDP, the relationship between genetics and developmental context is considered to be bidirectional; genes can influence phenotype and thus the organism's environment, but environmental context also affects gene expression. The latter type of interaction is known as *epigenetics* and has sometimes been presented as a problem for EP (Lickliter & Honeycutt, 2003). However, epigenetics is fully consistent with the tenets of EP—and in fact—has been incorporated seamlessly into evolutionary paradigms by researchers across the academic spectrum (Cameron et al., 2005).

Evolutionary and developmental perspectives address two distinct facets of questions about why behavior exists. As such, a properly framed evolutionary perspective on a particular phenomenon does not undermine a developmental one. Developmental explanations that lack evolutionary foundations may be incomplete at best and misguided at worst, while evolutionary perspectives that do not allow for developmental flexibility may be overly simplistic if not completely erroneous. Evolutionary perspectives can be thought of as the “hardware,” while developmental perspectives are the “software”—both are needed for the system to operate. Developmental principles remind evolutionary psychologists that even the “universal” evolved adaptations within the human mind are malleable and highly contingent upon environmental contexts across the lifespan.

Curricula of higher education should strive to unify these two fields, which have been segregated by an accident of history; with evolution courses acknowledging the powerful influence of developmental influences on phenotype and developmental courses acknowledging evolutionary pressures, which may shape the mind. In this way, students will get a clear picture of the two disciplines as mutually compatible and complementary, rather than adversarial.

### Evolutionarily Informed Cultural Psychology

While cultural psychology and evolutionary psychology are sometimes framed as opposing sides of the nature/nurture issue, in reality, culture is ultimately a product of human behavior which is ultimately influenced by the human nervous system – biological adaptation *sine qua non*. In light of this perspective, evolutionary principles should hold important insights into the nature and origins of culture. And a great deal of research on behavioral patterns that vary across cultures – and that remain constant across cultures – have been informed by evolutionary

psychological research. EP has led to insights into such cultural psychological phenomena as variability in attachment style across cultures (see Schmitt, 2005), variability in aggression across cultures (see Chagnon, 1988), qualities valued in mates across cultures (see Buss, 1989), and the importance of group membership within a culture (see Bingham & Souza, 2009).

A particular area of cultural psychology that has been elucidated by evolutionary-based principles pertains to mating psychology. While human mating psychology includes research on lots of different phenomena, much has focused on sex differences (largely based on the dramatic parental investment differences that exist across the sexes). Parental investment theory (Trivers, 1972) applied to human behavioral sex differences essentially suggests that females, who bear higher parental costs than males, are predicted to be more likely to pursue long-term mating strategies than males. Cross-cultural research, as we will see, has been at the core of helping understand the important phenomena that comprise human mating psychology.

There is an enormous and growing body of research that has reported sex differences in behavioral patterns across many cultures – largely in the domain of mating (Buss & Schmitt, 1993). This body of research, demonstrating consistent sex differences that exist across varied cultures, sits at a major interface of cultural psychology – a point at which evolutionarily shaped psychological tendencies lead to consistency across varied cultures. In classic work in this field, David Buss and his colleagues (1989) found that across 37 different cultures, males consistently emphasize physical attractiveness in mates more than women do and women tend to emphasize traits associated with resource acquisition (such as ambitiousness) more than men do. These findings were obtained in support of hypotheses directly drawn from evolutionary reasoning. Basically, these findings regarding male psychology suggest that for males, a major evolutionary hurdle would be to be attracted to mates who are reproductively viable (not post-menopausal). As a result, a focus on features that signal relative adult youthfulness (features that characterize *attractiveness*, such as smooth skin and lustrous hair) would be adaptive in males seeking females. And for females under ancestral conditions, finding a male partner who was able to effectively support and care for her and her offspring would have been adaptive (given the high costs that females bear in childrearing) (see table 1). This work of David Buss and his colleagues demonstrates how an evolutionarily informed approach to cultural psychology can shed important light on human behavior.

Clearly, the evolutionary approach is importantly related to the nature of cultural psychology. Advancing such evolutionarily informed cross-cultural research in the future will surely have benefits across all areas of the academy. For instance, if students are taught the importance of both culture and evolution on human development, they already have the ability to integrate three major areas of psychology into their understanding of human nature, consequentially leading to more holistic research questions or counseling approaches.

### Evolutionarily Informed Biological Psychology

On the surface, it seems strange to even consider biological approaches to psychology as progressing separately from the principles of evolution. Interestingly, a great deal of biological psychology, which includes such subfields as behavior genetics, cognitive neuroscience, behavioral neuroscience, and physiological psychology, progresses separately from evolutionarily informed concepts (see Pinker, 2000). This said, clearly, evolutionary approaches to psychology have potential to positively influence our understanding of different areas of biological psychology – and recent research has shown how powerful evolutionary approaches are in this particular domain. Scholarship along this front has helped shed light on phenomena like language processing in the brain (Pinker, 2000), brain regions associated with deception detection (Malcolm & Keenan, 2005), attractiveness ratings of voice (Pipitone & Gallup, 2008), and effects of ovulation on social behaviors (see Miller, Tybur, & Jordan, 2007).

In a particularly strong example of evolutionarily informed approaches to biological psychology, Platek and Singh (2010) examined the neuronal patterns associated with males' visual response to female bodies that vary in waist-to-hip ratio (WHR). This research is based on the idea that, like many animals, humans exhibit sexually dimorphic body morphology. Males, on average have broad shoulders and narrow hips, while females, on average, have relatively small waists and wide hips. Singh (1993) showed that males prefer females with hourglass figures with a WHR around 0.7—even congenitally blind males show this preference (Karremans, Frankenhuys, & Arons, 2010) – and that this preference on the part of males makes adaptive sense as females with WHRs close to .7 are, in fact, more able to become pregnant and less likely to experience birth complications (see Singh, 1993; see table 1). With this in mind, Platek and Singh (2010) demonstrated that males display neuronal activation of reward centers when they see photos of females with optimal WHR.

In sum, our basic need for sexual reproduction is manifested within the intricate, subtle complexities of our everyday behaviors. Particularly, evolutionary theory illuminates the idea that our sexual desire has been an integral aspect of our evolutionary history. And clearly the work that has come out of this field has had positive impacts on the understanding of sexuality within the confines of academic circles – and beyond.

In combination, the work summarized above shows that EP has enormous potential to inform the curricula of biological psychology. We expect that this will be an important trajectory in the future of psychology.

### Evolutionarily Informed Applied Psychology

A final area addressed in this paper pertains to the broad area of *applied psychology*. Most scientific disciplines have both *basic* and *applied* branches – with the basic aspect of a discipline pertaining to research for the sake of advancing knowledge and the applied aspect bearing on using the basic knowledge to help solve specific problems or to address specific issues. Applied areas of psychology are those areas designed to help improve such psychological outcomes as mental

health (clinical and counseling psychology), academic achievement (educational psychology), physical health (health psychology), workplace productivity and climate (industrial/organizational psychology), and so forth. The recently formed Applied Evolutionary Psychology Society (AEPS; pronounced *apes*; [www.aepsociety.com](http://www.aepsociety.com)) was created to help further these important branches of the behavioral sciences.

Perhaps the best-known area of applied psychology pertains to clinical and counseling psychology. While mental illness was an interest of Darwin's (Walmsley, 1993), it has not been until the last several decades that modern evolutionary approaches have begun to enlighten the field (Kennair, 2003). This is lamentable because issues of mental illness or adjustment can be more fully understood (and thus, potentially more effectively treated) with an appreciation of why, from an ultimate perspective, they exist at all.

With truly unique vision, Darwin did devote an entire book to the evolutionary function of emotions (Darwin, 1872), which remains his most enduring contribution to the area of clinical psychology. By conceptualizing emotions as functional, Darwin set the groundwork for modern evolutionary perspectives of affective disorders (see Nesse & Ellsworth, 2009). Anger, for example, is an evolved motivational state, which attempts to obtain more favorable outcomes by coercing others to change their behavior (Fischer & Roseman, 2007). With this perspective in mind, clinicians (and counseling students) can conceptualize angry or aggressive behavior in a client as a normal adaptive response to an unfavorable situation. While this perspective may not seem especially profound, consider the perspective of a clinician without an adaptationist perspective of emotions. Such an individual may view anger as a purely negative and unproductive emotional response. If evolutionary perspectives do not seem to add much to the study of emotions, it is only because the functional Darwinian perspective has become so integrated into the research – even when evolution is not explicitly mentioned (e.g., Fredrickson, 2001), the notions of function and adaptation are often implicit. And, importantly, evolutionary approaches in the applied fields of psychology are clearly increasing – to the benefit of the field.

In fact, recent work on psychopathology and clinical psychology has shed light on such disparate topics as the evolutionary roots of depression (Keller & Nesse, 2006), schizophrenia (Shaner, Miller, & Mintz, 2008), and the full gamut of emotional responses (see Nesse & Ellsworth, 2009).

A particularly productive line of work in this applied area pertains to helping us understand phobias, which may be understood in terms of their adaptive significance. For example, specific phobias (in which a particular object or situation causes unreasonably high levels of anxiety) almost always tend to be of stimuli that existed in our evolutionary past, such as heights, snakes, or darkness. Rarely do patients exhibit phobias of dangerous stimuli that only appeared relatively recently, such as electrical outlets, cars, or guns (Merckelbach & de Jong, 1997; see table 1). Evolutionary perspectives view the common phobic stimuli as being *biologically prepared*, since our species (and our prehuman ancestors) had millennia or more to evolve to readily fear them (Öhman & Mineka, 2001).

Unlike other phobias, which lead to sympathetic nervous system arousal, blood-injury-injection type phobia results in lowered blood pressure and heart rate, and often fainting. If the sympathetic arousal of other phobias is conceptualized as

an (abnormally exaggerated) adaptive response to flee the phobic stimulus, the parasympathetic arousal of blood-injury phobia can be seen as an adaptive response to the loss of injury (Merckelbach & de Jong, 1997). In the environment in which we evolved, if an individual sees a large quantity of blood, there is a good chance that it is his or her own. Sympathetic arousal in the case of injury might only serve to increase blood loss; hence, humans may have evolved the tendency to become faint at the sight of blood, a trait which may simply be more pronounced or problematic in individuals who meet the phobic criteria (Merckelbach & de Jong, 1997). In regards to the phenomenon of phobias as a whole, as well as the atypical response that blood-injury phobia invokes, evolutionary perspectives provide the best available explanations.

Understanding the evolutionary roots of phobias, of course, is simply the tip of the iceberg in terms of how evolutionary principles can help us understand applied aspects of psychology. In fact, given the powerful and long reach of evolutionary theory, this perspective has clear potential to elucidate all areas of applied psychology – with potential benefits to humans in terms of improved mental health, physical health, educational outcomes, and more.

## DISCUSSION

In this paper, we demonstrate that an understanding of evolutionary principles has the capacity to provide new research insights into the many fields that comprise modern psychology (including social, personality, developmental, cultural, biological, and applied psychology). This cluster of areas of psychology is not designed to be exhaustive. Important areas of the field, such as cognitive psychology and sensation/perception, are not addressed – the reason simply being pragmatics. This paper is designed to be representative of how evolutionary principles can inform various areas of psychology – with an eye toward seeing how this approach can be adapted across courses found in a typical psychology curriculum.

To the extent that science is about helping best understand disparate phenomena, evolutionary theory clearly has demonstrated its ability to improve psychology as a science. In accord with the EvoS model, that has led to so many great curricular and research benefits across multiple schools (see Chang et al., 2011), evolutionary theory can be used as a foundational framework to integrate and shed light on all fields of inquiry (see Garcia et al., 2011). And psychology is no exception.

As with any significant academic area, applications for positive change for humanity should be considered – and we believe that the evolutionarily informed approach to psychology helps allow this field to better shed light on important issues. This trend has started in such fields as evolutionary clinical psychology (among others—see section on applied psychology).

Additionally, given the broad and powerful nature of evolutionary theory (see Wilson, Geher, & Waldo, 2009), evolutionary theory may be applied to the many areas that comprise the human condition (such as education, health, politics, and more). For instance, recent work from our team has shown that EP can lead to important insights in terms of parenting (see Geher, 2011). By using findings

obtained from EP, principles such as in-group harmony, altruism, and controlled expressions of emotions can all be taught to children with an eye toward how these processes are important elements of being human. For children to learn about these processes in terms of how they relate to basic aspects of being human, children can develop the abilities to articulate why these kinds of behaviors (e.g., helping others) make sense.

In addition to shedding new light on both basic and applied areas of psychology, the evolutionary approach has the capacity to lead to improved methods within psychology to better allow our findings to apply to broad human groups. EP has been so productive over the past several decades, that it may actually be useful to think of EP in terms of its impact on the actual research methods used by behavioral scientists. EP is a progressive field because of its use of various research methods. While many studies in psychology rely on undergraduate students to fill their sample, EP researchers look at a more diverse population by conducting cross-cultural studies. These studies may just look outside of Western cultures, but also can go as far as to examine the behavior of hunter-gatherer societies. In this respect, EP truly utilizes a broader sample than can be found in most other areas of psychology. Further, EP researchers also apply research from fields outside of psychology such as looking at anthropological and biological evidence. This interdisciplinary process aids in understanding the multiple aspects that may be contributing to the behaviors we see in humans today.

### Summary and Comments on the Future of an Evolutionarily Informed Psychology

The primary point of this article is to demonstrate that EP has potential to generate novel research questions and shed light on areas across the entirety of Psychology. In social psychology, the examination of prosocial behavior from an evolutionary perspective has led to a large body of literature on helping behavior beyond just kin selection (e.g., reciprocal exchange (Tooby & Cosmides, 1996)). In personality psychology an evolutionary approach has helped answer questions as to why particular personality traits may have been selected for in our ancestral past, resulting in the Big Five personality dimensions we see today (Nettle & Clegg, 2008). Further, widely supported theories in the field of developmental psychology, such as attachment theory (Bowlby, 1969), rely heavily on an evolutionary framework to explain the critical role a caregiver plays early on in life. In cultural psychology, research has found that across 37 different cultures, males consistently emphasize physical attractiveness in mates more than women do and women tend to emphasize traits associated with resource acquisition more than men do (Buss, 1989) —something that makes sense evolutionarily due to the parental investment theory (Trivers, 1972). In biological psychology, waist-to-hip ratio (WHR) has brought to light the idea that (even congenitally blind) males prefer females with a specific hourglass figure. This makes adaptive sense because females with WHR's close to .7 are, in fact, more likely to become pregnant and less likely to experience birth complications (Singh, 1993). In the applied clinical setting, mismatch-theory (i.e., something that was an adaptation in our ancestral environment is no longer

beneficial in our current environment; Gilbert, 1995) can be applied to understanding disorders within the general population.

All of these examples from different domains of psychology have one thing in common: the theory underlying the research relies on looking back at the challenges faced by our ancestors to explain why a certain behavior was effective enough in that environment to be stable enough to remain in modern generations. Without an evolutionary perspective, none of this research could have been conducted because nobody would have been asking the right questions. Evolution does just that, it encourages researchers to start asking different kinds of questions. Essentially, evolutionarily informed research has led to novel findings that have dramatically improved our understanding of what it means to be *human*.

### The Impact of Applying Evolutionary Theory in Higher Education

In academia, the more we learn, the more we understand how much we truly *do not know*. The only way to make sense of it all is by constantly asking new questions. Ketelaar and Ellis (2000) have argued that a good scientific paradigm is one that helps us ask and answer new questions (*progressivity*). We attempted to touch on the progressivity of EP by providing a gamut of research findings that extended across various content areas of psychology—blurring the lines between numerous fields.

Applying an evolutionary approach across the spectrum of a psychology curriculum will surely lead to a more integrated and powerful learning experience for future students of the behavioral sciences. This approach to a college curriculum reflects the basic ideas of Evolutionary Studies in higher education (see Chang et al., 2011): it takes a few basic and logically consistent core ideas of evolutionary theory (such as natural and sexual selection) and from there, provides a fully coherent framework that interconnects parts of psychology that are traditionally conceptualized as "different content areas."

The ability of the evolutionary approach to synthesize and integrate seemingly disparate phenomena within psychology allows for enhanced teaching and the development of critical thinking skills by encouraging students to understand a basic set of principles and apply them to a variety of intellectual problems. The meta-theoretical approach that is modern evolutionary psychology (see Ketelaar & Ellis, 2000) is, bit by bit, helping make psychology the kind of integrated and progressive science that it should be. Working in tandem, the field of EP along with its big sibling, EvoS, have potential to realize this not-yet-fulfilled component of Darwin's vision.

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as Evolutionary Psychology

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**TABLES**

Table 1: Examples of Specific Concepts across Areas of Psychology that Demonstrate the Utility of an Evolutionarily Informed Approach

<b>Psychological Area</b>	<b>Specific Concept</b>	<b>Theory/Research findings</b>	<b>Evolutionary Relevance</b>	<b>Implications</b>	<b>References</b>
Social Psychology	Kin selected altruism.	Studies have demonstrated that individuals are more inclined to help genetically similar kin, especially when the reproductive success of those kin is threatened.	Prosocial behavior, or helping others, can be explained by the evolutionary principal of inclusive fitness.	Without our understanding of inclusive fitness, this major aspect of human helping behavior would not be understood.	Burnstein, Crandall, & Kitayama, (1994).

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Personality Psychology	The Big Five personality traits.	Nettle and Clegg (2008) propose that, as a result of frequency-dependent selection, high or low levels of personality traits may be adaptive for different (environmental) reasons.	<i>Balancing selection</i> suggests that different alleles of a genetically based trait (in the case of personality, each end of the trait dimension) are adaptive for different reasons.	All dimensions of personality are relatively stable across generations of selection. Evolutionary theory has informed the idea that these five dimensions have been selected and maintained within a population because of various environmental factors.	Nettle, & Clegg, (2008).
Developmental Psychology	Attachment theory.	Bowlby (1969) describes the need for infants to form a stable relationship (or attachment bond) with a primary caregiver in order for normal development of social and emotional functioning to occur.	Caregivers play a critical role in shaping a child's attachment. This is attachment starts with their parents, but can carry on for a lifetime, leading to attachment styles with future partners.	A child's attachment style can be indicative of the type of attachment one has with their romantic partner, which can either increase or decrease the likelihood of offspring (i.e., genetic flow).	Bowlby, J. (1969).

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Cultural Psychology	Universals in Human Mating Preferenes.	Buss et al. (1989) found that many features of human mating preferences, such as seeking a kind mate (across sexes) or focusing on markers of physical health, are cross-cultural universals.	Human mating is a major target of selection, and understanding universals in human mating behaviors across cultures is an area that is strongly guided by an evolutionary lens.	The features that people seek in potential mates are not random – and features that are documented as attractive across cultures are best explained by evolutionary principles	Buss, (1989).
Biological Psychology	Body Morphology.	Singh (1993) proposes that there is an optimal Waist-to-hip ratio (0.7), and that this ratio is indicative of mother and offspring vitality.	Females with high WHRs are more susceptible to early death, leading to the cessation of genetic flow throughout the generations.	Body morphology (phenotype) can be indicative of underlying genetics (genotype) that can either facilitate or impede genetic flow.	Singh, (1993).

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Applied Psychology	Phobias.	Öhman and Mineka (2001) use an evolutionary approach to understand common phobias. Their approach has found that people are relatively prepared to be more phobic of natural phenomena such as spiders, snakes, and heights, compared with human-made phenomena such as guns.	The evolutionary approach to phobias suggests that anxiety in response to specific stimuli that would have been dangerous under ancestral conditions would have been naturally selected.	This approach to phobias shows that adverse psychological responses can be seen as adaptive responses to stimuli that provided real threats to survival or reproduction under ancestral conditions.	Öhman, & Mineka, (2001).
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\*\*Received 6/8/12; First Revision 11/30/12, Second Revision 3/5/13, Accepted 3/14/13\*\*