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Evolution and Culture

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Abstract

The goal of cross-cultural psychology to identify and explain similarities and differences in the behavior of individuals in different cultures requires linking human behavior to its context (Cole, Meshcheryakov & Ponomariov, 2011). In order to specify this relation, the focus is usually on the sociocultural environment and how it interacts with behavior. Since cross-cultural psychology also deals with the evolutionary and biological bases of behavior, this focus on culture has regularly led to an unbalanced view (Berry, Poortinga, Breugelmans, Chasiotis & Sam, 2011). Too often, biology and culture are seen as opposites: what is labeled as cultural is not biological and what is labeled as biological is not cultural (Chasiotis, 2010, 2011a). This article will first introduce the central concepts of natural and sexual selection, adaptation, and the epigenetic (open) genetic processes in evolutionary biology, and indicate their psychological implications. It will then argue that biology and culture are intricately related. Finally, empirical evidence from diverse psychological research areas will be presented to illustrate why the study of the evolutionary basis is as essential as the analysis of the sociocultural context for the understanding of behavior. Due to space restrictions, cultural transmission will be the only research area which is addressed in more detail (more examples of evolutionary approaches in intelligence, personality, and behavior genetics and their implications for cross-cultural research can be found on the website accompanying Berry et al., 2011; see also further readings section).

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The goal of cross-cultural psychology to identify and explain similarities and differences in the behavior of individuals in different cultures requires linking human behavior to its context (Cole, Meshcheryakov & Ponomariov, 2011). In order to specify this relation, the focus is usually on the sociocultural environment and how it interacts with behavior. Since cross-cultural psychology also deals with the evolutionary and biological bases of behavior, this focus on culture has regularly led to an unbalanced view (Berry, Poortinga, Breugelmans, Chasiotis & Sam, 2011). Too often, biology and culture are seen as opposites: what is labeled as cultural is not biological and what is labeled as biological is not cultural (Chasiotis, 2010, 2011a). This article will first introduce the central concepts of natural and sexual selection, adaptation, and the epigenetic (open) genetic processes in evolutionary biology, and indicate their psychological implications. It will then argue that biology and culture are intricately related. Finally, empirical evidence from diverse psychological research areas will be presented to illustrate why the study of the evolutionary basis is as essential as the analysis of the sociocultural context for the understanding of behavior. Due to space restrictions, cultural transmission will be the only research area which is addressed in more detail (more examples of evolutionary approaches in intelligence, personality, and behavior genetics and their implications for cross-cultural research can be found on the website accompanying Berry et al., 2011; see also further readings section).

Basic concepts of evolutionary biology

Natural selection

The theory of natural selection, formulated originally by Charles Darwin in the nineteenth century (1859) and further developed in the course of over 150 years, is central to the biological sciences. For some scholars it is even the single most influential scientific theory of all (Dawkins, 1976, Dennett, 1995, Trivers, 1985). In short, the evolutionary process of natural selection can be described in three steps: reproduction, variance and selection (Dennett, 1995). These processes serve to achieve the ultimate goal of evolution, namely the dispersion of genes via a) reproduction, which leads to b) random genetic variations in the progeny; these new variants are then subject to c) selective environmental forces.

Darwin wanted to understand how new species occur; his view was that natural selection acted on the individual level: By gradually sorting out non-adaptive individual traits, individuals with less adaptive traits left less and less descendants until these traits were no longer part of the genetic repertoire of the species at all (Dennett, 1995; Mayr, 1984). However, his theory was interpreted as if individuals were trying to preserve their species by procreating. The most important landmark of modern evolutionary theorizing is the transformation of this idea of preservation of the species through individual reproduction (or Darwinian fitness) to the conception of inclusive fitness (Hamilton, 1964). Inclusive fitness is the sum of the individual fitness outcomes resulting from an individual's own procreation (Darwinian fitness) and the procreation of relatives with whom the individual shares genes. The focus on the concept of inclusive fitness implies that the unit

of natural selection is the gene (Dawkins, 1976), although it is not the gene per se that is exposed to selective forces directly but the individual organism that lives or dies, breeds or helps the relatives (Daly & Wilson, 1983). This shift from the species to the individual level has substantial implications for the conception of human nature. It implies that altruism, the prosocial orientation and behavior, is not an unconditional human trait, but results from cost-benefit considerations, even if these are implicit and unconscious. There are two main concepts to describe the evolution of cooperative social behavior in self-interested organisms via natural selection: kin selection (Hamilton, 1964) and reciprocal altruism (Trivers, 1971).

Kin selection. According to this conception, individuals' social behaviors will vary according to the degree of genetic relatedness among group members. Individuals will be more cooperative with closely related others as compared to more distantly related or non-related others. The underlying assumption is that genetic closeness fosters cooperation and the reciprocation of investments. Cooperation and altruism based on the perception of reciprocity is considered as Hamilton's rule (Hamilton, 1964). Considerable empirical evidence has been presented in supporting this assumption. Dunbar and Spoons (1995) found that in Great Britain adults nominate a high proportion of kin relative to non-kin for help and support (see also Burnstein, Crandall, & Kitayama, 1994). In the same vein, Fijneman and colleagues (1996) reported that the family has been identified as the most salient ingroup in the lives of individuals (see also Neyer & Lang, 2003). As a final example, Georgas, Berry, van de Vijver, Kağitçibaşı and Poortinga (2006) concluded based on findings from an extensive cross-cultural research program, that relationships among family members are the most significant relationships in literally all parts of the world.

Reciprocal altruism. The concept of reciprocal altruism has been proposed by Trivers (1971) in order to capture social relations among genetically unrelated individuals. It predicts that individuals will cooperate with those with whom there is likely to be future social exchange and the expectation, implicit or explicit, that the costs of cooperative and altruistic behaviors that an individual invests are to be reciprocated in the future. It is assumed that these expectations are based on prior experiences of cooperative interactions. Cross-cultural field studies (Kaniasty & Norris, 1995) have found that a caring non-relative would be more likely to benefit from someone's altruism than a neglectful non-relative would be.

Sexual selection

About a decade after the publication of his theory of natural selection (1859), Darwin postulated a second selection process, namely sexual selection (Darwin, 1871). While natural selection deals with traits related to the struggle of survival and maintenance (e.g. food acquisition and hygiene), sexual selection acts upon all traits which are related to mating and sexual reproduction. Sexual selection is based on two processes, intrasexual competition and intersexual mate selection (Volland & Grammer, 2003). It took more than a century before Trivers (1972) recognized the implications of Darwin's theory to explain

animal and human behavior. Trivers (1972, p. 140) argued that in sexually reproducing species like humans

“...the sex whose typical parental investment is greater than that of the opposite sex will become the limiting resource for that sex. Individuals of the sex investing less will compete among themselves to breed with members of the sex investing more.”

In mammals, this limiting sex is the female and thus leads to higher intrasexual competition within the male sex (Daly & Wilson, 1983, 1988). This concept of sex differences in parental investment explains motivational differences and can help to answer the question why men and women often do not want to act in a similar way, although they are in principle able to do so (see Berry et al., 2011, pp. 45-49 for cross-cultural examples).

The handicap principle or the costly signaling theory. Costly signaling theory argues that many seemingly useless or harmful traits (handicaps), like the peacocks tail, evolved just because they signal their expensiveness and thus the high fitness quality of the bearer of this trait (Zahavi, 1975). For many decades, this handicap principle was criticized as being implausible: how can an apparently non-adaptive, costly trait still be beneficial for the bearer's fitness? After numerous empirical verifications in the animal kingdom, first mainly in birds (Zahavi & Zahavi, 1997), it has been rediscovered and finally also applied to humans. It also has been at the basis of evolutionary hypotheses on complex psychological domains like religion (Volland & Schiefenhövel, 2009), music, art, language, morality or altruism (Miller, 2000; Volland & Grammer, 2003). For example, from the perspective of the costly signaling theory, religious commitments might have been selected for the very reason that they are costly, (i. e., they are signals which are not easy to fake); through circumcision, through donations of large amounts of money, through observing rigid rules of dress or everyday behavior, adherents signal to the religious community that they are true and ardent believers. Thus, individuals profit from belonging to this special group, while the group profits by enhancing intragroup cooperation. Sosis and Bressler (2003), for example, using historical data on the constraints and ritual requirements of eighty-three nineteenth-century communes in the USA could show that communes that imposed costlier requirements survived longer than less demanding communities.

Let's take human cooperation as another example. The conceptualization of reciprocal altruism as proposed by Trivers (1971) was restricted to two-person interactions and is thus at most applicable to small and stable groups typical for hunter-gatherer societies (Kaplan, Hill, Lancaster, & Hurtado, 2000). Modern large scale societies are characterized by multiple and often anonymous interactions with unfamiliar and, consequently, unpredictable partners: If future benefits or reciprocity are uncertain, why should one behave altruistically in the first place? During the last decade, two theoretical concepts were introduced to enhance the understanding of human cooperation: altruistic

rewarding and altruistic punishment (Fehr & Fischbacher, 2003). Altruistic rewarding is the cross-culturally observed trustful exchange that has been widely documented in economic experiments based on game theoretical assumptions. Altruistic punishment, also a cross-culturally robust result, is the costly rejection of social imbalance, like for example unfair sharing (Henrich, 2001; Henrich et al., 2005). However, even the combination of altruistic rewarding and punishment is often not sufficient to explain social engagement in public or common goods' situations involving larger groups with potentially anonymous interactions. Human conditional cooperation is based on implicit assumptions whether all or most group members will cooperate or not. This assumption in turn is mainly determined by the possibility of punishment by third parties (Fischbacher, Gächter, & Fehr, 2001). So even more important than altruistic punishment in dyadic interactions is the altruistic propensity to punish norm violators by third parties who are not economically affected (Fehr & Fischbacher, 2004). This is regarded to be a key element of the enforcement of social norms in human societies (Hill, 2002). Reputation through indirect reciprocity or social reputation (Milinski, Semmann, & Krambeck, 2002) constitutes another powerful mechanism for the enforcement of cooperation. Reputation forming behavior can, for example, consist of tough bargaining with insisting on a fair exchange combined with the readiness to pay a costly price to punish deceivers (Fehr & Fischbacher, 2003).

From an evolutionary perspective, this kind of cooperation can be easily subsumed under the "costly signal" or "handicap principle" (Zahavi, 1975), because this mechanism explains why we show costly signals, i.e. behave altruistically, although we might not gain anything, even not indirectly. The underlying assumption is that individuals can afford to show off because they have as a consequence a higher reputation and thus a higher genetic fitness which lowers the costs of showing a particular behavior or trait (Volland & Grammer, 2003).

How and why questions:

Adaptation and the distinction of proximate and distal causes

The distinction of proximate and distal (or ultimate) causes helps to describe psychological phenomena like emotions, cognitions, and motivations which lead to a certain behavior (the proximate *how* question). But they also help to explain why these phenomena became the way they are (the ultimate *why* question). In cross-cultural psychology, their function usually refers to a psychological striving to obtain some kind of affective or cognitive state of equilibrium or well-being, thereby implying that the ultimate function of our psychological strivings is to survive and live a happy life. From an evolutionary perspective, this is only half of the story, explaining only the psychological, proximate causes of a behavior (e.g., by trying to show *how* we pursue a happy life). But *why* do we strive to obtain one certain state of mind and not another? Why do some things, like having children (and grandchildren, see Volland, Chasiotis & Schiefenhövel, 2005), make us happy while others do not? These are complementary questions dealing with the distal or ultimate cause of our psychological makeup. From an evolutionary perspective, a psychology based on the ultimate goal of survival or well-being is incomplete. Just by considering the fact that life is

finite, it becomes obvious that organisms did not evolve merely to survive and live a happy and carefree life, but ultimately, to reproduce.

To understand how and why individual traits fit to environmental conditions, the Darwinian concept of adaptation is crucial. Adaptation usually refers to any process in which an organism reacts to demands of the environment in a way which enhances its well-being, survival, or its reproduction (for discussions, see Berry et al., 2011; Chasiotis, 2010). It is important to distinguish between the proximal, psychological adaptation and the evolutionary, distal adaptation. In evolutionary biology, the term refers to the adjustment of a population to an environment: Biological adaptations carry environmental information that has become represented in phenotypes during evolution because it helped organisms to (survive in order to) reproduce. Each species occupies an ecological niche in the environment. This niche is defined by the way of life of the individual organisms. It can be said that an organism contributes to establishing its own ecological niche through the way it interacts with the environment (Odling-Smee, Laland, & Feldman, 2003). From this perspective adaptation is the process of keeping up with the changing environment, which in turn is not organism-independent, because the organism defines the environmental features which can act upon it (Chasiotis, 2010).

With the Darwinian concept of adaptation, evolutionary theorizing integrates biological and cultural forces in a common framework and offers heuristically fruitful implications for evolutionary-based research in cross-cultural psychology (see Chasiotis, 2011a, 2011b). Because an evolutionary-oriented psychology hypothesizes human species-typical psychological adaptations, evolutionary approaches in cross-cultural psychology are concerned with universals in their broad sense: Universals, then, are psychological features (such as mechanisms, concepts, and processes) which are functionally organized to use cross-cultural regularities in the social and non-social environment and give rise to panhuman mental structures and contents. These mechanisms constitute the human metaculture (Tooby & Cosmides, 1992; see the impressive catalogue of these features of the Universal People by Brown, 1991). That is also the reason why it is not very surprising from an evolutionary point of view that findings from meta-analytic approaches in cross-cultural psychology show that human psychology is far more homogenous than some relativists might expect. Culture-comparative studies on such diverse psychological domains like emotions, personality, family relations (Van Hemert, 2003, 2011), generativity (Hofer, Busch, Chasiotis, Kaertner & Campos, 2008) or well-being (Hofer & Chasiotis, 2003; Hofer, Chasiotis & Campos, 2006) show that cross-cultural psychological differences are mostly smaller than they appear at face value once methodological artefacts and socioeconomic contextual factors are considered (see Berry et al., 2011 for a more thorough discussion of this shift from an interest in variations in the expression of behavior across cultures to the similarity in the underlying common psychological processes and capacities).

Development and the epigenetic view: The concept of open genetic programs

A telling example why a dichotomy between biology and culture does not apply is the epigenetic nature of human development (Bjorklund & Pellegrini, 2002; Gottlieb, 1998;). The epigenetic relationship of genes and environment can best be described by introducing the concept of open genetic programs. Genes exert their effects on behavior within two kinds of programs that can be differentiated with respect to the directness of the gene-behavior relationship. Fixed genetic programs are invariably coded in the DNA of the genotype and expressed in phenotypic characteristics without further transmission mechanisms. Besides the action of fixed behavioral programs, behavior and behavioral development of higher animals and especially humans is organized to a great extent by open genetic programs that are more susceptible to current environmental input (Mayr, 1997; Chasiotis, 2010). Contrary to the common misunderstanding of evolutionary biology as fully deterministic, the epigenetic view of development is bidirectional: if a gene is switched on, its genetic activity is a cause for the development of an organism, but the expression of the involved genes during ontogenesis is also influenced by the ontogenetic experiences of the individual (Gottlieb, 1998). Taking this perspective, the goals of cross-cultural psychology cannot be reached without examining development, because behavioral differences in the adult phenotype across cultures are the result of epigenetic processes during development (Keller, 2007, 2011).

Open genetic programs influence and direct behavior in manifold ways. They are products of evolutionary fixed programs but constitute “facultative” or “open” developmental processes (Odling-Smee et al., 2003). For language acquisition, for example, a different interplay between genetic preparedness and learning might be operating than for motor development or social competencies. Learning based on these open genetic programs therefore has to be understood as a highly specialized mechanism for the acquisition of specific environmental information at certain phases of development (Trivers, 1985; see also the concepts of “epigenetic rules”, Wilson, 1975; “central tendencies”, MacDonald, 1988; “Darwinian algorithms”, Cosmides & Tooby, 1987; and “informed hypotheses”, Chisholm, 1999). The expression of the genetic information in behavior can also occur during different stages of the human life span and can even become stronger with development (see for example the onset and offset of reproductive capability, Volland et al., 2005). The open or closed nature of these predispositions varies according to the required specificity of the environmental information (see e.g., the ethological concept of a sensitive period for imprinting, Lorenz, 1965).

One of the most obvious manifestations of the interplay between open and fixed genetic programs is the evolution of life spans (Chasiotis, 2010, 2011a; Keller, 2011). Because ontogenetic plasticity is also genetically based, the question is not “Which ontogenetic processes are genetically determined and which are not?” Rather, the evolutionarily significant question is “Why is there an ontogenesis based on epigenetic processes and not an adult phenotype right away?” This view implies that different developmental stages are not transitory phases toward adulthood but evolutionary end-products per se (Alexander, 1987; Bjorklund, 1997).

There are two kinds of evolutionary functions for developmental stages: Firstly, they can be ontogenetic adaptations, i.e. that many features of childhood are either only functional during particular phases in development (e.g. Meltzoff & Moore, 1977), or they can be seen as a sort of adaptive immaturity (see e. g. the overestimation of competences during the preschool period as an adaptive function for persisting in young children, Bjorklund, 1997).

The second function is that some other features of childhood can be considered preparations for adulthood. If environmental change is slow compared to an individual lifespan, the optimal mode of adaptation is to establish sensitive learning situations early in life as preparations for adulthood that guide later development (Chasiotis, 2011a; Draper & Harpending, 1988). This evolutionary perspective fits with empirical evidence in the psychological literature and in mainstream developmental psychology, in which the first six years of childhood are considered as psychologically the most important (“functional”) for individual development (Lamb & Sutton-Smith, 1982). Every child is reared in a unique environment characterized by contextual variables like number of siblings, specific birth order position (Sulloway, 1996; Tolman, 1971), and socioeconomic conditions. Evidence for the importance of socioeconomic factors for developmental conditions comes also from extensive value surveys in sociology (Inglehart, 1997) and cross-cultural psychology (Allen et al., 2007): The financial situation during childhood has been found to be a better predictor of the endorsement of values in adulthood than the current economic situation of the adult respondent. Recent empirical evidence for these two building blocks of childhood context, birth order and socioeconomic status during childhood, demonstrate their explanatory power for cultural variance in such highly diverse areas as pubertal timing (Chasiotis, Keller & Scheffer, 2003), parenting motivation (Chasiotis, Hofer & Campos, 2006; Chasiotis, Bender & Hofer, 2011), social values, and autobiographical memory (Bender & Chasiotis, 2010).

These results imply that the family context during childhood can be a powerful tool to explain cross-cultural differences in developmental outcomes. Therefore, context variables like socioeconomic status during childhood, birth order or number of siblings can be expected to exert similar influences on somatic, psychological, and reproductive developmental trajectories across different cultural contexts. On the basis of the explanatory power of these childhood context variables for cultural differences, it can be suggested that many psychological characteristics that are typically attributed to cultural differences may reflect systematic variations in family constellations across cultural contexts (for further implications, see Chasiotis, 2011a).

Cultural Transmission

Genetic information is transmitted from generation to generation. However, the psychological transmission of information between members of a cultural group in the course of ontogenetic development does not necessarily require a genetic relationship. One of the most important tasks in Human Behavioral Sciences is explaining how social or cultural information is transmitted, both inter- (e.g., via parents) and intragenerationally

(e.g., via peers). In the Social Sciences, more traditional concepts describing this transmission process (like socialization and internalization, Berry et al., 2011) seem to have been replaced in the meantime by more modern ones like enculturation, cultural learning, and cultural transmission (Berry et al., 2011; Schönplflug, 2009). Still, there is an ongoing and fruitful debate about why (function) what (content) is sent in which way (mode) by whom (sender) during cultural transmission. When following the classical definition of Cavalli-Sforza, Feldman, Chen, and Dornbusch (1982) that “cultural transmission is the process of acquisition of behaviors, attitudes or technologies through imprinting, conditioning, imitation, active teaching, and learning or a combination of these” (p. 19), cultural transmission can then be regarded as either opposed to, or complementary to, genetic or biological transmission. However, the relationship between biological and cultural transmission is still not very clear. There are at least three different ways to describe their relationship: First, there is the classical, but outdated notion in the Social Sciences of cultural transmission as being opposed to genetic transmission (nature-nurture antinomy; see Chasiotis, 2011 for discussion). Second, Dawkins’ conceptualized the “meme” (1976) as a basic information unit that is an analogous, but independent counterpart to the biological notion of a gene. The meme may be a somewhat hapless concept, because it was not intended to be regarded as such a counterpart to the genetic process of transmission (Dawkins, 1982) while at the same time being hard to tackle empirically. Finally, and arguably the most plausible way, cultural and biological transmission can be described as parallel and functionally related (e.g., via epigenetic learning, Chasiotis, 2011).

From an evolutionary perspective, the adaptivity of cultural transmission is signified by a higher reproductive success of those individuals who successfully obtain information from their cultural environment that helps them (or their kin) to reproduce. An alternative view to such an adaptive value of cultural transmission can be found in theories of self-organization. According to these theories many behavioral patterns, including cultural transmission on the group or societal level, do not have to be functional. A similar view can be found in the addition of a historical perspective as a function of cultural transmission (Cole, 1996). There are also attempts to reconcile both views, in which a synergistic relationship between natural selection and self-organizing complexity is favored (e.g., Wilson, 2005). Furthermore, the causality of this transmission process on levels higher than the individual level is still not clear: Are we dealing with a process executed by the individuals themselves and can its outcome therefore be regarded as a dependent variable? Or is cultural transmission a phenomenon taking place outside the individual?

Biologists have developed formal models in which the transmission of both genetic and cultural information is dealt with. One well-known example is the dual inheritance model of Boyd and Richerson (1985, 2005). They postulate a cultural inheritance system that is based on social learning, which is distinguished from individual learning. The latter is based on trial-and-error or conditioning principles, which are processes that are regarded to be too uneconomic to account for the acquisition of a large cultural repertoire (Henrich & McElreath, 2007). Social learning by observation and imitation leads to cultural

stability of behavior patterns. Individual learning, shaped by specific environmental conditions, leads to change.

Finally, there are approaches based on the new branch of costly signaling theory which tries to explain the evolution of culture. The interpretation of cooperative or altruistic acts as costly signaling can explain why we contribute to public goods, but it cannot explain why we should "show off" in social contexts through being altruistic and not, for example, by trying to appear genetically fit by impressing others how particularly brave, powerful, or healthy we are (Volland & Grammer, 2003). In the first section we have mentioned evidence of human subjective evaluations of fairness and inequity aversion, i.e. the disapproval of unequal transactions. Such behavior goes against the principle of economic rationality which would imply self-interested free-riding without any considerations of fairness (Fehr & Fischbacher, 2003). However, cooperative behavior is likely to be imitated when everybody cooperates. Thus, in special contextual circumstances, like in the human case of cultural transmission through accumulative cultural evolution, norms and institutions may have been maintained through altruistic punishment by third parties (Bowles, Choi, & Hopfensitz, 2003; Boyd, Gintis, Bowles, & Richerson, 2003). This line of reasoning basically conceives of humans as being uniquely prone and able to act altruistically. Some authors even start to postulate a species-specific "altruistic drive" (Fehr & Fischbacher, 2003; Warneken, Chen & Tomasello, 2006) facilitating within-group cooperation in humans. This view has been challenged by a fair number of studies showing similar prosocial behaviors in non-primate species (Brosnan, Newton-Fischer & van Vugt, 2009). Bshary and colleagues could show in pairwise cooperating cleaner fish that they are also able to detect and punish defectors (Bshary, Gruter, Willener, & Leimar, 2008; Raihani, Grutter, & Bshary, 2010). This punishment promotes cooperation and thereby yields direct foraging benefits to the punisher. The authors concluded that third-party punishment can evolve via self-serving tendencies in a nonhuman species, and this finding may also shed light on the evolutionary dynamics of more complex behavior in other animal species, including humans (Bshary & Bergmüller, 2008; see Berry et al., 2011 and Chasiotis, 2010, 2011b for further discussion).

Conclusion

The available evidence leads to the conclusion that evolutionary approaches can be very fruitful for cross-cultural psychology. Such a position means that the pursuit of a universalist perspective is more appropriate than a relativist perspective in which typically human functions are seen as inherently (and only) cultural (see Berry et al., 2011). It is still a common tendency in much cross-cultural psychology to consider "culture" as the explanans and not as the explanandum. Evolutionary biology can help to identify variables that can explain the emergence of cultural differences by disentangling the oftentimes fuzzy conception of culture that dominates many cross-cultural comparisons (for critical discussions see van de Vijver, Chasiotis & Breugelmans, 2011).

Further Readings

Berry, J., Poortinga, Y., Breugelmans, S., Chasiotis, A. & Sam, D. (3rd ed., 2011). *Cross-cultural psychology: Research and applications*. Cambridge, UK: Cambridge University Press.

The third edition of this leading textbook includes also research and recent developments of evolutionary approaches in cross-cultural psychology.

Bjorklund, D. F., & Pellegrini, A. D. (2002). *The origins of human nature: Evolutionary developmental psychology*. Washington, DC: American Psychological Association.

This textbook on evolutionary developmental psychology gives a readable synopsis of this emerging field with explicit implications for the study of culture.

Boyd, R., & Richerson, P. J. (2005). *The origin and evolution of cultures*. New York: Oxford University Press.

This book describes the further development of the dual inheritance model of genetic and cultural transmission.

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

This book is an excellent treatise on how and why the Darwinian idea of evolution by natural selection permeates virtually all areas of modern science.

Dunbar, R. I. M., & Barrett, L. (2007). *Oxford handbook of evolutionary psychology*. Oxford, UK: Oxford University Press.

This book gives an excellent overview of the international "state of the art" in evolutionary psychology with special attention to the interplay of biology and culture.

Mayr, E. (1997). *This is biology*. Cambridge, MA: Harvard University Press.

This is an impressively readable introduction to the basic concepts of modern evolutionary biology by probably the single most influential evolutionary biologist after Darwin.

Odling-Smee, F. J., Laland, K. N., & Feldman, M. W. (2003). *Niche construction: The neglected process in evolution*. Princeton, NJ: Princeton University Press.

This book provides an illustration of the models that emerge when the role of the ecological and sociocultural environment is emphasized more than in traditional evolutionary approaches.

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