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# When development matters: From evolutionary psychology to evolutionary developmental psychology

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*This article presents evolutionary developmental psychology (EDP) as an emerging field of evolutionary psychology (EP). In describing the core tenets of both approaches and the differences between them, we emphasize the important roles that evolution* and *development have in understanding human behaviour. We suggest that developmental psychologists should pay more attention to evolutionary issues and, conversely, evolutionary psychologists should take development seriously.*
Key words: *evolutionary developmental psychology, evolutionary psychology, developmental psychology, evolutionary theory.*

# Cuando el desarrollo importa: de la psicología evolucionista a la psicología evolucionista del desarrollo

*Este artículo presenta la psicología evolucionista del desarrollo (PED) como una perspectiva que emerge de la psicología evolucionista (PE). Al describir las asunciones principales de ambos enfoques, así como sus diferencias, se enfatiza la importancia que la evolución y el desarrollo tienen para la comprensión del comportamiento humano. Se sugiere que los psicólogos del desarrollo deberían prestar más atención a las cuestiones evolucionistas y, a la inversa, los psicólogos evolucionistas deberían tomar el desarrollo en serio.*
Palabras clave: *psicología evolucionista del desarrollo, psicología evolucionista, psicología del desarrollo, teoría de la evolución.*

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## Evolution, psychology and development

The founders of modern psychology considered their field a life science, and this is the approach that many psychologists still take today. Human behaviour and cognition may be understood in terms of the actions and reactions of individuals within the ecological or environmental conditions in which they live. Early psychologists and early developmental psychologists had a fascination with Darwin's theory of evolution and an interest in using an evolutionary perspective to better understand human behaviour and its development (e.g., Boring, 1950; Cairns, 1983). Their argument was quite simple: if evolution by natural selection applies equally to all living species and traits, it should be applicable to human behaviour as well.

Evolutionary ideas had been formulated and proposed before Darwin, but it was not until 1859, when he published *Origin of Species*, that they began to be taken seriously. It is important to note that evolution is a fact, and that natural selection, as formulated by Darwin, is its most tenable explanatory mechanism. The basic tenets of evolution by natural selection are not difficult to understand. The process depends on the following four factors: 1) there are more members of a species in each generation than can actually survive (superfecundity); 2) there are significant differences in physical and behavioural traits among individuals within species (variation); 3) this variation is heritable (through genetic mechanisms; although Mendelian genetics were still unknown during Darwin's time); and 4) those traits that best promote survival and reproduction increase in frequency within the population, while those that create opposition to these basic goals of life decrease (natural selection). Organisms act to maximize their *inclusive fitness*, which is a measure of reproductive success that includes their direct progeny as well as the offspring of relatives, with whom they share genes (Hamilton, 1964). Modern Darwinian theory, also known as the Modern Synthesis, was developed in the middle of the 20$^{th}$ century by prominent biologists including Dobzhansky (1937), Mayr (1942), and Simpson (1944). The Modern Synthesis combines Darwin's natural selection with Mendelian inheritance theory to describe the selection of characteristics inherited through genetic transmission.

The relationship between psychology and evolutionary biology has had only limited success for several reasons. First, mainstream psychological paradigms of the 1900s such as behaviorism and cognitivism widely ignored the role of biology in behaviour for epistemological reasons (Hernández Blasi, 2000). Second, some evolutionary ideas have been proven wrong, such as Ernst Hackel's "recapitulation theory", that individual ontogenesis is a recapitulation of a species' phylogenetic history ("ontogeny recapitulates phylogeny") (see Morss, 1990). Third, except in rare cases (e.g., Bowlby´s attachment theory), most behaviourally oriented evolutionary approaches (ethology, primatology, sociobiology, comparative psychology, animal psychology), despite their important insights on human behaviour and development, have not become widely accepted by mainstream psychology (Hernández Blasi & Bjorklund, 2003; Hernández Blasi, Bering, & Bjorklund, 2003).

The consequence of this contentious partnership between psychology and evolutionary thinking is that still, at the beginning of the 21st century, we know very little about the role of evolution in human psychology and development. It is in the context of this historical framework that evolutionary psychology (EP) and evolutionary developmental psychology (EDP) originated.

## Evolutionary psychology: A new science of the mind

Cosmides and Tooby (1997, pg. 1), two of the leaders of the EP movement, stated that "evolutionary psychology is an *approach* to psychology, in which knowledge and principles from evolutionary biology are put to use in research on the structure of the human mind. It is not an area of study, like vision, reasoning or social behaviour. It is a *way of thinking* about psychology that can be applied to any topic within it". The human mind is seen as *adapted*, equipped with a series of problem-solving devices (psychological and domain-specific in nature, often compared to the multiple devices of a Swiss Army knife), designed to overcome recurrent problems that ancestral humans faced as a hunter-gatherers, such as surviving, mating, parenting, cooperating, and competing. These devices, or modules, were shaped through natural selection during our evolutionary past, in the context of what is called the Environment of Evolutionary Adaptedness (EEA), and became relatively stable starting on approximately 2 million years ago (during the Pleistocene era of geologic time). Importantly, these devices are activated unconsciously when needed to guide our behaviour. Like the beating of our hearts or the movement of our lungs, we are not consciously aware of the underlying processes. In sum, these psychological devices are considered implicit, domain-specific information-processing mechanisms, physically situated within the brain.

Cosmides and Tooby (1997) propose that this approach consists of three complementary interrelated levels of analysis: adaptive problems, cognitive programs, and a neurophysiological basis (see Figure 1).

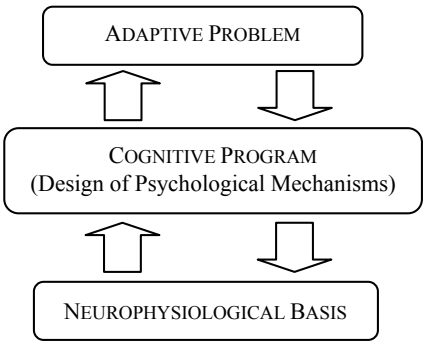


*Figure 1.* Complementary levels of analyses in evolutionary psychology (adapted from Cosmides & Tooby, 1997). Arrows represent the inferences that can be made from one level to another

EP has often been described in terms of a hybrid of cognitive science and evolutionary biology, even called *a new science of the mind* (Buss, 1999). Contrary to traditional interests of cognitive science, EP focuses on problem-solving strategies involved in survival and reproduction, the cornerstone of evolution, and, therefore, of any evolutionary approach.

Widely used by evolutionary psychologists to illustrate their perspective are the behavioural differences found in the classic Wason task (Wason, 1966) when presented in the context of a cognitive task versus when presented in the context of a social task. As you may know, in the Wason task four different cards are presented to the participants. On one side, each card has a letter (a vowel or a consonant); on the other side, each card has a number (even or odd). Participants are told, "If there is a vowel on one side, there must be an odd number on the other". Two of the cards initially show letters and the other two show numbers. Participants are then instructed, "Indicate only those card(s) you definitely need to turn over to see if the rule mentioned has or has not been accomplished". In the socially relevant context, participants are presented with a similar situation, but the contents of the cards are different. On one side of the cards, an alcoholic or non-alcoholic drink is pictured (e.g., beer; coke); on the other side, the card indicates the age of a person (e.g., 16 years old; 25 years old). The rule in this context states, "If a person is drinking beer, then he must be 21 years old", and participants are asked to indicate which cards should be turned to evaluate this rule.

Replications of this experiment in most of the countries studied (see e.g., Cosmides, 1989; Cosmides & Tooby, 1992) revealed the same pattern of results: while only about 25% of people succeeded at this task in the cognitive context, about 75% of people succeed in the social context, even though both tasks are based on the same logical if-then rules. One might argue that these findings are because of the abstract versus concrete nature of the situation, but this seems not to be the case. Variations on the procedure show clearly that success reaches the same high rate only when solving the task required individuals to detect the breaking of a social rule (i.e., detecting cheaters).

Cosmides and Tooby (1992) argue that while the social situation had activated an ancient and very specific cognitive mechanism for detecting cheaters who violate social rules, no such mechanism had evolved to address the problem encountered in the cognitive context; individuals are therefore unprepared for it, and this contributes to their low success rate. They conclude that cognition is not based on domain-general mechanisms (e.g., a "general problem solver"), but that it requires a series of domain-specific ones, activated unconsciously and targeted to the solution of "real" problems from our evolutionary history.

These and other basic tenets of EP, as well as updated summaries of typical research topics, can be found in various sources (e.g., Barkow, Cosmides & Tooby, 1992; Tooby & Cosmides, 1992, 2005; Buss, 2005, 2007).

While evolutionary psychologists take a functional perspective and provide explanations of why certain behaviours are adaptive, it is important to note that, from an EP perspective, not every psychological trait qualifies as an adaptation (i.e., a strategy designed through natural selection to address a specific problem) (Buss *et al.,* 1998). For example, the umbilical cord is an *adap-*

*tation* that solves the problem of feeding the fetus while in the mother's womb. However, the bellybutton has no adaptive function by itself and is therefore a *by-product* of the umbilical cord, in this case a remnant of its existence. Additionally, traits such as the shape of individual belly buttons are considered, in EP terms, *noise*, because they are entirely random characteristics.

Adaptations emerged to solve problems that were frequent to early humans, but traits that were adaptive during our evolution are not necessarily adaptive today because we no longer face all of the problems of ancestors. For example, the desire for sugary food, something extremely adaptive during a time in which scarcity of resources was the norm, nowadays is a mechanism that contributes to obesity in modern well-fed societies. Likewise, evolutionary thinking cannot always be successfully applied to relatively modern human behaviours, like reading or driving, because these behaviours were not subject to evolutionary pressures in the EEA.

As any emerging field or approach, EP has been the target of criticism. We believe that, in some cases, these criticisms have been unfair. For example, as findings of evolutionary psychology can sometimes point out "inconvenient truths" concerning the human condition (at least according to contemporary societal values), some people feel uncomfortable about certain ideas proposed by EP and may even believe that evolutionary psychologists are trying to justify morally or politically unacceptable behaviour (e.g., that men and women have different psychological considerations because males and females filled different roles in ancient times). This attitude toward EP is reflective of the *naturalistic fallacy*, the assumption that what is natural is justifiable and appropriate. However, evolutionary researchers agree that understanding the past does not justify the present or the future; just because a behaviour or cognition has evolved does not make it acceptable. In fact, precisely because we prefer some behavioural outcomes to others, we put conscious social and cultural pressures on them. For instance, we value contemporarily relevant skills, such as reading and mathematics, and therefore expect children to attend school to become proficient in these domains.

Disdain for EP pervades certain academic groups within the social sciences, which feel particularly uncomfortable with any application of biological knowledge to psychology and social relations. Their attitude is reminiscent of the opinion of Lady Ashley, an English aristocrat who lived in the late 19$^{th}$ century. When told about Darwin's theory, Lady Ashley allegedly declared, "Let's hope it's not true; but if it is true, let's hope it does not become widely known". Since the inception of EP, some leading evolutionary psychologists have considered these groups as representatives of what they call the Standard Social Science Model (SSSM) (e.g., Tooby & Cosmides, 1992).

There is also fervent debate within the field itself. Evolutionary psychologists argue about whether all adaptations are domain-specific in nature or if there are domain-general mechanisms at work as well, whether all adaptations are preformed (or not), and about the roles that environment and development play in our evolved psychology (Bjorklund, 2003; Buss & Reeve, 2003; Lickliter & Honeycutt, 2003).

## Evolutionary developmental psychology: Development matters

Evolutionary Developmental Psychology (EDP) focuses on evolutionary analyses of infancy, childhood, and adolescent development, as well as parenting behaviour that has evolved to ensure the care of developing children. From an adaptationist perspective, the goals of EDP are the same as EP but focused on a specific part of the human lifespan. Evolutionary developmental psychologists aim to discover which behavioural and cognitive traits in the developing child are true adaptations designed to increase chances of survival to adulthood and which are by-products, as well as which traits in adults have been shaped to support successful maturation of offspring. Studying these issues will give us an understanding of the "whys" of human development that is more complete than what EP or developmental psychology alone can provide, and it will enhance our understanding of the "hows" of adult behaviour and development.

In this context, we can describe EDP as an approach that is interested in making an evolutionary analysis of development, as well as an epigenetic analysis of evolution. More specifically, EDP has been defined as "the application of the basic principles of Darwinian evolution, particularly, natural selection, to explain contemporary human development. It involves the study of the genetic and environmental mechanisms that underlie the universal development of social and cognitive competencies and the evolved epigenetic (gene-environment interactions) that adapt these competences to local conditions; it assumes that not only behaviours and cognitions that characterize adults are the product of selection pressures operating over the course of evolution, but so are characteristics of children's behaviours and minds" (Bjorklund & Pellegrini, 2002, p. 4).

EDP takes into account the interaction between organisms and their environments in the development of phenotypic characteristics. This interactionist approach reflects the perspective of dynamic systems theory, which describes development as a bidirectional interplay between genes and environment at all levels of the developmental system, from the genetic through the cultural (Gottlieb, 2002; Thelen & Smith, 2006). This model provides a dialectical view of human development, as traits emerge from the interaction of an individual and his or her environment. From this perspective development is no longer thought of in the classical framework of nature *versus* nurture, but instead is construed as nature *via* nurture.

Such an explanatory model provides important contributions to EP, which often fails to recognize the critical processes underlying the production of adult behaviour and cognition. While evolutionary psychologists typically acknowledge the importance of the environment in the development of evolved mechanisms, they often relegate the environment to the role of a mere "triggering mechanism" for genetically hardwired programs of behaviour (e.g. Cosmides & Tooby, 1992) rather than a creative force in the development of these programs (Lickliter & Honeycutt, 2003). EP acknowledges development, but views evolved cognitive mechanisms as reliably developing characteristics,

which assumes that development will produce the same results in all individuals. While a species-typical environment will produce species-typical individuals, not all individuals experience the same approximation of this environment. Instead of assuming that evolved mechanisms are innate and lie dormant until triggered into action during adulthood, EDP asks how these inherited mechanisms develop and come to be expressed in the phenotypes of adults through interaction between individuals and their environments. For example, social experiences during childhood affect hormone levels, which have lasting effects on brain development in relation to social interaction. Children who grow up with positive social experiences will be better prepared to navigate the social landscape as adults than children who grow up with negative social experiences (Flinn, 2006; Flinn & Ward, 2005). Individuals with fewer social skills may have more difficulty forming bonds and finding mates than individuals with greater aptitude for social interaction.

It may be unfair to criticize EP for neglecting development when they have chosen a level of analysis that initially does not require such an explanatory basis and is a valid and productive point of view (see Bjorklund, 2003). However, in ignoring development, we believe they may be overlooking a relevant perspective that will allow them to better understand their focus: the adaptations implemented in adulthood.

The primary focus of EDP is the development of individuals during childhood. All mammals pass through infancy and a juvenile period, but the youthful phase of development is particularly important for species that are born highly immature and require a long period of nurturing and adult care in order to survive and develop into adulthood. Especially in primates and most notably in humans, this period is significantly longer than in other species. For example, within primates, the more recently a species shared a common ancestor with *Homo sapiens*, the longer is its juvenile period: approximately 2 years in lemurs, 4 years in macaques, 8 years in chimpanzees, and about 15 years in humans (Poirier & Smith, 1974). It is our contention that natural selection has had a greater effect on the early phases of the lifespan than on the later phases. Childhood can have lasting effects on later life and is important in and of itself. Therefore, evolution has equipped children with adaptations to survive this essential but potentially dangerous time during their lives. Because juvenile development impacts later life, during which much of our evolved psychology is expressed, an evolutionary analysis of development is necessary to fully understand the origins of human nature.

Applying an evolutionary perspective to development requires the introduction of several basic tenets that integrate the two parent fields of EDP (see Table 1). As often happens in the process of articulating any hybrid discipline in science, there is a tendency among the practitioners of the mother disciplines (developmental psychology and evolutionary psychology, in this case) to think that there is relatively little that is actually novel in the "new" approach (just some basic evolutionary tenets in the case of developmental psychology; just some developmental considerations in the case of evolutionary psychology). What comes from one's own field is already known, and the

inclusion of the "new" field makes little difference to how one thinks. Although we understand such thinking, we believe that evolutionary developmental psychology is not simply the sum of evolutionary and developmental psychology, but a true integration of the two. We prefer to think that sometimes the whole is more than the sum of the parts, and that, in this particular case, the blend of some assumptions from both disciplines may produce an innovative and fruitful approach.

TABLE 1. SOME BASIC ASSUMPTIONS OF EVOLUTIONARY DEVELOPMENTAL PSYCHOLOGY

1. All evolved characteristics develop via continuous and bidirectional gene-environment interactions that emerge dynamically over time.
2. Natural selection works at all stages of development, not only during adulthood.
3. Some characteristics of infants and children were selected to serve an adaptive function at specific times in development and *not* as preparations for adulthood.
4. Children's adaptations show a certain degree of plasticity or flexibility, the ability to change in response to different ecological or environmental conditions.
5. An extended childhood is needed in which to learn the complexities of human social communities.
6. Both domain-specific and domain-general mechanisms have been shaped by natural selection.

As we mentioned earlier, central to EDP is the idea that all psychologically important characteristics emerge dynamically over time as a result of a continuous and bidirectional interaction between the organism and its environment. Perhaps equally central to an EDP perspective is that natural selection affects all stages of development, not only adulthood. EDP proposes that three distinct types of adaptations have been selected to operate during childhood.

*Ontogenetic adaptations* are specific to a certain period in development and serve an adaptive function during this time, but then disappear when they are no longer needed (Bjorklund, 1997; Oppenheim, 1981). The umbilical cord mentioned earlier is clearly an ontogenetic adaptation, providing prenatal nutrients during gestation but unnecessary after birth. A candidate for a behavioural ontogenetic adaptation is neonatal imitation of facial gestures, which appears shortly after birth but declines to chance levels after 2 months of age (Meltzoff & Moore, 1977; Nagy & Molnar, 2004). This behaviour may facilitate nursing (Jacobson, 1979) or function to foster interaction between the newborn and the mother (Bjorklund, 1987).

In contrast, *deferred adaptations* serve to prepare children in some way for adult life. For example, girls and boys have different play styles that, in ancient environments, may have provided practice for the different roles they would have as adults (and may still have today for many) (see Bjorklund & Hernández Blasi, 2005; Hernández Blasi & Bjorklund, 2003).

*Conditional adaptations* emerge when an individual responds to environmental conditions by adjusting behaviour in anticipation of later life (Boyce & Ellis, 2005). An example of a conditional adaptation is the "evolutionary theory of socialization" proposed by Belsky, Steinberg, and Draper (1991). According to this theory, the type of rearing environment during

childhood predicts the timing of pubertal development and the type of mating/reproductive strategy a person engages in as an adult, at least for females. Girls who grow up in father-absent, resource-scarce environments and establish insecure attachment relationships with their parents reach sexual maturity sooner and engage in sexual behaviour earlier than girls who experience more positive home environments. As adults, such girls are more likely to establish short-term mating relationships, have more offspring, and invest relatively little in those offspring compared to slower developing girls who experienced early home environments with adequate resources and secure and predictable relationships (see Ellis, 2004, 2005). Although it is tempting to view the former pattern of development as maladaptive and the latter as adaptive, that is true only from the perspective of contemporary culture. From a Darwinian perspective, girls whose early home environments are harsh and whose relationships are unpredictable can anticipate similar conditions as adults. Given the likely nature of their future environment, their inclusive fitness could best be served by accelerating sexual maturity, reproducing early and often, and investing relatively little in the offspring they have, similar to the *r* reproductive strategy of some species. In contrast, girls who experience supportive and predictable environments as children can anticipate similar environments as adults, and their inclusive fitness is best served by delaying sexual maturity, establishing long-term bonds with a mate, and investing substantially in the few offspring they have. In these cases, early experience entrains development in a direction that is apt to be adaptive, assuming ecological conditions remain constant. Children's developmental trajectory is not random, but directed toward an outcome that, assuming environmental stability, is likely to be adaptive (or would have been adaptive to our ancestors).

We have simplified the details of this theory (see e.g., Ellis, 2004, 2005, for a more updated and contrasted view on this topic), but the important point here is that a selected adaptive trait (reproductive behaviour) can become expressed in more than one way, depending on the ecological conditions experienced by individuals during early development. In other words, what finally becomes expressed in the adult phenotype is not just an automatic activation of adaptive cognitive mechanisms, but rather a conditional implementation that depends on experiences within the early ecological environment, which interacts bidirectionally with the individual at multiple levels of the organism-environment system. EDP proposes that traits do not become expressed by the direct reading of a genetic "blueprint", as espoused by many evolutionary psychologists. Individuals are not born with behavioural characteristics preformed (Bjorklund, 2003). Rather, the expression of evolutionarily selected traits takes place *within* a certain space (i.e., sociocultural and ecological conditions), and *throughout* a certain time (individual development).

Conditional adaptations such as Belsky and colleagues socialization theory reflect the high degree of plasticity of many human characteristics. While some traits are highly canalized and therefore develop with little deviation across individuals (except for those who experience extremely atypical environments), other traits can be highly flexible in response to environmental pertur-

bations. The lengthy duration of the human maturational period means a high possibility that developing individuals will experience dramatic environmental change during infancy, childhood, and adolescence. Juveniles must adjust to these changes to maximize their chances of survival and the development of adaptive adult reproductive strategies. Therefore, children have been evolutionarily prepared for unpredictable environments with a high degree of plasticity, or flexibility, that allows them to adapt, in constrained ways, to changing circumstances (Boyce & Ellis, 2005; Ellis, Jackson & Boyce, 2006).

This high degree of plasticity implies that domain-general mechanisms, in addition to domain-specific ones, have also undergone selection pressure. Examples of domain-general mechanisms that foster behavioural plasticity include speed of processing, working memory, and "g", or a general intelligence factor (Bjorklund & Pellegrini, 2002; Geary, 2005; Geary & Huffman, 2002). Such mechanisms are necessary for high levels of learning. For a long-lived and extremely social species such as humans, learning is of great importance because it allows us to develop the skills necessary to succeed in the complex social landscape of human groups. Our lengthy developmental period provides us with the time necessary to mature into socially competent adults. This prolonged period of maturation comes at a high cost to developing individuals, who are entirely dependent on others for their care and protection, without which they become vulnerable to predation and starvation. Basic evolutionary theory predicts that a trait that accrues such a high cost will provide an even larger benefit or it would not have been selected for. The extended juvenile period has great adaptive value because it provides developing children the time needed to learn the complexities of human social communities (see Bjorklund, 1997, 2007, for details).

In sum, although EP and EDP typically focus on different phases of the lifespan (EP in adulthood and EDP in childhood) and EDP places greater emphasis on an interactionist explanatory model of the development of cognitive mechanisms than EP, these perspectives share a common view that human behaviour and development should be approached from an evolutionary perspective.

## Three levels of analysis of human development

An EDP perspective relies on an interactionist view of development, that traits emerge from the bidirectional relationship between individuals and their environments. This perspective on the relationship between evolution and development requires analysis on three distinct levels. Every human psychological trait has a phylogenetic history (beginning approximately 2 million years ago, during the Pleistocene era, when human modern traits were shaped), a sociocultural history (beginning for modern humans 10.000 years ago, when agriculture made possible the birth of modern culture), and an ontogenetic history (the developmental path of each individual). Therefore, to properly understand the evolution of human psychology, it is necessary to analyze be-

haviour on each of these three levels (see Figure 2) (Bjorkund & Hernández Blasi, in preparation; Cole, 2006). An obvious implication of this approach is that development cannot be understood unless viewed from all levels of analysis. An ontogenetic perspective is only one piece of the explanatory puzzle; we must also take into account the information provided by phylogenetic and sociocultural perspectives, as well as the interactions between all three of these levels for a comprehensive explanation of development.

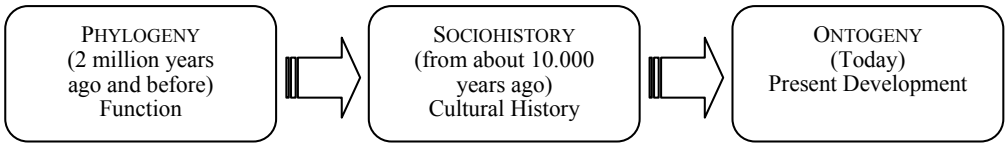


*Figure 2.* Levels of analyses of psychological development (adapted from Bjorklund & Hernández Blasi, in preparation). Any contemporary psychological trait can only be properly understood if its past phylogenetic and sociohistorical pressures (two distal levels of analysis), and its present ecological pressures (a proximal level of analysis) when the trait is expressed during ontogeny are taken into account. At every level, development progresses through bidirectional interactions between genes, brain/behaviour and the environment.

If, as proposed by EDP, there is no automatic implementation of adaptive traits during adulthood but rather a progressive bidirectional interaction of genes and environment at the three levels of analysis described above, then evolutionary psychologists should pay more attention to the roles of development and culture than they currently do. Accordingly, we suggest that in order to become both a good (adult) psychologist and/or evolutionary psychologist, one may aspire to be a good developmentalist and/or EDP psychologist.

Just as EP provides an overarching perspective (i.e., a meta-theory) for psychology, EDP should be considered an approach or way of thinking about psychological development and evolution rather than a specific theory or area of study itself. Like any new perspective in science, it legitimately aspires to: "(1) help to reorganize old findings in a manner that generates new understandings; (2) generate new and testable hypotheses; and, as a result, (3) lead to new inquiry and new discoveries" (Belsky *et al.,* 1991, p. 664; see also Hernández Blasi & Bjorklund, 2003). We feel that, if evolutionary theory has successfully served as an umbrella or framework for the structure of modern biological science, this should also be the case for modern developmental psychology. However, we do not see EDP as an alternative to any other specific theoretical approaches in development, such as those focused on proximate developmental influences (Geary & Bjorklund, 2000). On the contrary, we see EDP as a potentially useful framework for developmental science that in conjunction with the necessary perspectives of proximal theories, can acquire a truly integrative understanding of psychological development.

## Evolutionary developmental psychology: The new science of development?

Although the introduction of EDP into the academic arena is relatively recent, the field has grown in many ways. Foremost, there has been much progress in establishing the conceptual and theoretical bases of EDP (e.g., Bjorklund & Hernández Blasi, 2005; Bjorklund & Pellegrini, 2000, 2002; Burgess & MacDonald, 2005; Geary, 1998; Geary & Bjorklund, 2000; Hernández Blasi *et al*., 2003). Additionally, specific methodological approaches have been established (Hernández Blasi & Bjorklund, 2003) and the EDP perspective has been applied to an increasing variety of fields, including language development (Locke, in press), education (Geary, 2007), family relationships (Gardiner & Bjorklund, 2007), and cognitive development (Bjorklund, 2007). Efforts are being made to introduce EDP to graduate and undergraduate students (Bjorklund & Hernández Blasi, in preparation; Ellis & Bjorklund, 2005), as well as to a more general audience (Bjorklund, 2007).

As EDP is considered an approach to development rather than a field of study in and of itself, we believe an EDP perspective should be expanded to encompass all areas of developmental psychology. However, this expansion should be more than just theoretical. While a passive empirical strategy may be a good starting point as an EDP approach is initially taken, a strong research agenda should also be formulated. There is currently an imbalance between the amount of theoretical and empirical works published, with theory significantly outweighing research. As developmentalists see how an EDP approach can enrich traditional perspectives, they must keep in mind how they can test their evolutionary hypotheses. Therefore, we encourage developmental psychologists to organize EDP Oriented Research Groups, focused on conducting developmental research using evolutionary tenets as a reference, as well as the establishment of Evolutionary Developmental Labs that investigate specific areas of development using an EDP approach.

Any new scientific perspective experiences a period in which it must show the scientific community that it presents a valid point of view and that it should be accepted and applied. EDP may be passing through this phase right now, and it is our challenge to convince developmentalists (and evolutionary psychologists) to take its tenets into account. Accordingly, if EDP is to become a "new science of development", as we provocatively ask in the title of this section, it is in our colleagues' hands. Obviously, as any scientific proposal, our approach is not without criticisms. And, as we have recognized elsewhere (Hernández Blasi & Bjorklund, 2003), there is always the possibility that, in the process of trying to integrate two well-developed scientific disciplines, where so many dynamic perspectives and contents may converge (ranging from genetics to anthropology, and from psychology to evolutionary biology), we may commit mistakes and/or need to introduce modifications in our current theorizing. We want yet to think that the effort is worthwhile.

We have outlined in this article many reasons that EDP provides an intriguing and valid perspective, and here would like to emphasize another: An

evolutionary developmental perspective permits scientists to view the children and development the way the earth is viewed from the window of a plane. We see few details of the ground below, but we get a look at the big picture, which can allow us to understand some issues more clearly and easily. That is, we may acquire a better understanding of the nature of many developmental phenomena. Also, an EDP perspective can be used to provide some practical applications to particular behaviours, including child abuse, aggression and violence during adolescence, parenting strategies, and reading and math disabilities (see Bjorklund & Bering, 2002; Bjorklund & Pellegrini, 2000; Geary, 2007).

The ultimate aim of any evolutionary perspective to psychology or developmental psychology is not surviving as an isolated field. Rather, the goal of an evolutionary perspective is to establish a core approach that becomes so fundamental to any psychological explanation that finally there is no distinction made between EDP and Developmental Psychology or EP and Psychology because an evolutionary view creates a metatheory that unites the field (Tooby & Cosmides, 1992; Geary, 2006).

## REFERENCES


Barkow, J.H., Cosmides, L., & Tooby, J. (Eds.) (1992). *The adapted mind: Evolutionary psychology and the generation of culture*. New York, NY: Oxford University Press.

Belsky, J., Steinberg, L., & Draper, P. (1991). Childhood experience, interpersonal development, and reproductive strategy: An evolutionary theory of socialization. *Child Development, 62*, 647-670.

Bjorklund, D.F. (1987). A note on neonatal imitation. *Developmental Review, 7*, 86–92.

Bjorklund, D.F. (1997). The role of immaturity in human development. *Psychological Bulletin, 122* (2), 153-169.

Bjorklund, D. F. (2003). Evolutionary psychology from a developmental systems perspective: Comment on Lickliter and Honeycutt. *Psychological Bulletin, 128* (6), 836-841.

Bjorklund, D.F. (2007). *Why youth is not wasted on the young: Immaturity in human development*. Malden, MA: Blackwell.

Bjorklund, D.F., & Bering, J.M. (2002). The evolved child: Applying evolutionary developmental psychology to modern schooling. *Learning and Individual Differences, 12,* 1-27.

Bjorklund, D.F., & Hernández Blasi, C. (2005). Evolutionary Developmental Psychology. In D. Buss (Ed.), *Handbook of evolutionary psychology* (pp. 828-850). New York: Wiley.

Bjorklund, D.., & Hernández Blasi, C. (in preparation). *Child and adolescent development: An integrative approach*. CA: Thomson.

Bjorklund, D. F., & Pellegrini, A. D. (2000). Child development and evolutionary psychology. *Child Development, 71,* 1687-1708.

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

Boring, E.G. (1950). A history of experimental psychology. New York: Century. (Original work published 1929)

Boyce, W.T., & Ellis, B.J. (2005). Biological sensitivity to context I. A developmental evolutionary theory of the origins and functions of stress reactivity. *Development and Psychopathology, 17*, 271-301.

Burgess, R.L., & MacDonald, K.B. (Eds.) (2005). *Evolutionary perspectives on human development (2nd ed.)*. Thousand Oaks, CA: Sage.

Buss, D.M. (1999). *Evolutionary Psychology: The new science of the mind (1st ed.)*. Boston, MA: Allyn & Bacon.

Buss, D.M. (2007). *Evolutionary Psychology: The new science of the mind (3rd ed.)*. Boston, MA: Allyn & Bacon.

Buss, D.M. (Ed.) (2005). *The handbook of evolutionary psychology*. Hoboken, NJ: Wiley.

Buss, D.M., & Reeve, H.K. (2003). Evolutionary psychology and developmental dynamics: Comment on Lickliter and Honeycutt (2003). *Psychological Bulletin, 128* (6), 848-853.

Buss, D.M., Haselton, M.G., Shackelford, T.K., Bleske, A., & Wakefield, J.C. (1998). Adaptations, exaptations and spandrels. *American Psychologist, 53,* 533-548.


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Cairns, R.B. (1983). The emergence of developmental psychology. In W. Kessen (Ed.), *History, theory, and methods* (pp. 41-102) Vol. 1 of P. H. Mussen (Gen. Ed.), *Handbook of child psychology (4th ed.)*. New York: Wiley.

Cole, M. (2006). Culture and cognitive development in phylogenetic, historical, and ontogenetic perspective. In W. Damon & R.M. Lerner (Gen. Eds.), *Handbook of child psychology (6th edition),* D. Kuhn & R.S. Siegler (Vol. Eds.), Vol. 2, *Cognition, perception, and language*, (pp. 636-683). New York: Wiley.

Cosmides, L. (1989). The logic of social exchange: Has natural selection shaped how humans reason? Studies with the Wason selection task. *Cognition, 31*, 187-276.

Cosmides, L., & Tooby, J. (1992). Cognitive adaptations for social exchange. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 163-228). New York: Oxford University Press.

Cosmides, L., & Tooby, J. (1997). Evolutionary Psychology: A primer [online]. Santa Barbara, CA: Center for Evolutionary Psychology at the University of California. Retrieved from http://www.psych.ucsb.edu/research/cep/primer.html

Darwin, C. (1859). *The origin of species*. New York: Modern Library.

Dobzhansky, T. (1937). *Genetics and the origins of species*. New York: Columbia University Press.

Ellis, B.J. (2004). Timing of pubertal maturation in girls: An integrated life history approach. *Psychological Bulletin, 130*, 920-958.

Ellis, B.J. (2005). Determinants of pubertal timing: An evolutionary developmental approach. In B.J., Ellis & D.F. Bjorklund (Eds.) (2005). *Origins of the social mind: Evolutionary psychology and child development* (pp. 164-188). New York: Guilford Press.

Ellis, B.J., & Bjorklund, D.F. (Eds.) (2005). *Origins of the social mind: Evolutionary psychology and child development*. New York: Guilford Press.

Ellis, B.J., Jackson, J.J., & Boyce, W.T. (2006). The stress response systems: Universality and adaptive individual differences. *Developmental Review, 26*, 175-212.

Flinn, M.V. (2006). Evolution and ontogeny of stress response to social challenges in the human child. *Developmental Review, 26*, 138-174.

Flinn, M., & Ward, C. (2005). Evolution of the human child. In B. J. Ellis & D. F. Bjorklund (Eds.), *Origins of the social mind: Evolutionary psychology and child development* (pp. 19-44). New York: Guilford.

Gardiner, A., & Bjorklund, D.F. (2007). All in the family: An evolutionary developmental perspective. In C.A. Salmon & T.K. Shackelford (Eds.), *Family relationships: An evolutionary perspective* (pp. 337-358). New York: Oxford University Press.

Geary, D.C. (1998). *Male, Female: The evolution of human sex differences*. Washington, DC: American Psychological Association.

Geary, D.C. (2005). *The origin of mind: Evolution of brain, cognition, and general intelligence*. Washington, DC: American Psychological Association.

Geary, D.C. (2006). Evolutionary developmental psychology: Current status and future directions. *Developmental Review, 26*, 113-119.

Geary, D.C. (2007). Educating the evolved mind: Conceptual foundations for an evolutionary educational psychology. In J.S. Carlson & J.R. Levin (Eds.), *Educating the evolved mind: Conceptual foundations for an evolutionary educational psychology* (pp. 1-99). Charlotte, NC: Information Age Publishing.

Geary, D.C., & Bjorklund, D.F. (2000). Evolutionary developmental psychology. *Child Development, 71*, 57-65.

Geary, D.C., & Huffman, K.J. (2002). Brain and cognitive evolution: Forms of modularity and functions of mind. *Psychological Bulletin*, *128*, 667-698.

Gottlieb, G. (2002). Developmental-behavioral initiation of evolutionary change. *Psychological Review, 109,* 211-218.

Hamilton, W.D. (1964). The genetical theory of social behavior. *Journal of Theoretical Biology, 7*, 1-52.

Hernández Blasi, C. (2000). Dossier documental: Neurociencia cognitiva evolutiva: Mentes, cerebros y desarrollo (Documental dossier: Cognitive development neuroscience: Minds, brains and development). *Infancia y Aprendizaje, 91*, 111-127.

Hernández Blasi, C., & Bjorklund, D.F. (2003). Evolutionary Developmental Psychology: A new tool for better understanding human ontogeny. *Human Development, 46*, 259-281.

Hernández Blasi, C., Bering, J.M., & Bjorklund, D.F. (2003). Psicología Evolucionista del Desarrollo: Contemplando la ontogénesis humana desde los ojos del evolucionismo (Evolutionary Developmental Psychology: Viewing human ontogeny through the eyes of evolutionary theory). *Infancia y Aprendizaje, 26* (3), 267-285.

Jacobson, S.W. (1979). Matching behavior in the young infant. *Child Development, 50*, 425-430.

Lickliter, R., & Honeycutt, H. (2003). Developmental Dynamics: Toward a biologically plausible Evolutionary Psychology. *Psychological Bulletin, 128* (6), 819-835.

Locke, J.L. (in press). Evolutionary developmental linguistics: Naturalization of the faculty of language. *Language Sciences.*

Mayr, E. (1942). *Systematics and the origins of species from the viewpoint of a zoologist*. New York: Columbia University Press.
Meltzoff, A.N., & Moore, M.K. (1992). Early imitation within a functional framework: The importance of person identity, movement, and development. *Infant Behavior and Development, 15*, 479–505.
Morss, J. R. (1990). *The biologising of childhood: Developmental psychology and the Darwinian myth*. Hillsdale, NJ: Erlbaum.
Nagy, E., & Molnar, P. (2004). Homo imitans or homo provocans? Human imprinting modelof neonatal imitation. *Infant Behavior and Development, 27*, 54–63.
Oppenheim, R.W. (1981). Ontogenetic adaptations and retrogressive processes in the development of the nervous system and behavior. In K. J. Connolly & H. F. R. Prechtl (Eds.), *Maturation and development: Biological and psychological perspectives* (pp. 73-108). Philadelphia: International Medical Publications.
Poirier, F.E., & Smith, E.O. (1974). Socializing functions of primate play. *American Zoologist,14*, 275-287.
Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford.
Thelen, E., & Smith, L.B. (2006). Dynamic systems theories. In W. Damon & R.M. Lerner (Gen. Eds.), *Handbook of child psychology (6th edition),* R.M. Lerner (Vol. Ed.), Vol. 1, *Theoretical models of human development*, (pp. 258-312). New York: Wiley.
Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J.H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 19-139). New York: Oxford University Press.
Tooby, J. & Cosmides, L. (2005). Conceptual foundations of Evolutionary Psychology. In D.M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 5-67). Hoboken, NJ: Wiley.
Wason, P. (1966). Reasoning. In B.M. Foss (Ed.), *New horizons in psychology*. Harmondsworth: Penguin.

*Anuario de Psicología,* vol. 39, nº 2, septiembre 2008, pp. 177-191