

Human development in an evolutionary perspective*

El desarrollo humano en una perspectiva evolucionista

MARIA LUCIA SEIDL-DE-MOURA**, ÂNGELA DONATO OLIVA
Universidade do Estado do Rio de Janeiro (Brazil)

and

MAURO LUIS VIEIRA
Universidade Federal de Santa Catarina (Brazil)

Abstract

This article presents an evolutionary perspective to the study of human development. Some general assumptions for the study of development are discussed and the principal building blocks of evolutionary psychology are presented. One of them is that there is a universal human nature (which is modulate also by particular conditions of each context) and the cognitive architecture of human beings is the resulted of interactions between genes and environment. Based on those, and other assumptions, directions for the study of child development in an evolutionary stance are discussed, along with the considerations of context and development. Thus, it is assumed there is a relationship between phylogenies and ontogenetic development (the ontogenesis needs to be understood also as a product of evolution), considering the inseparability of biological, socio-cultural, cognitive emotional aspects that constitute this development. It has been concluded that the evolutionary developmental psychology has scientific relevance because it broadens our vision on human development.

Key words: human development; evolutionary developmental psychology; biology and culture; phylogeny and ontogeny.

Resumen

Este artículo presenta una perspectiva evolucionista del estudio del desarrollo humano. Se discuten algunas suposiciones generales para el estudio del desarrollo y se presentan las principales bases de la psicología evolucionista. Uno de estos principios es que existe una naturaleza humana universal (la cual es también modulada por condiciones particulares de cada contexto) y que la arquitectura cognoscitiva de los seres humanos es el resultado de las interacciones entre genes y ambiente. Con base en éstas y otras suposiciones, se debaten las directrices para el estudio del desarrollo infantil desde un punto de vista evolucionista, junto con las consideraciones del contexto y el desarrollo. Así, se asume que hay una relación entre las filogenias y el desarrollo ontogenético (la ontogenia requiere ser entendida también como un producto de la evolución), considerando la inseparabilidad de los aspectos biológicos, socio-culturales, cognoscitivos y emocionales que constituyen este desarrollo. Se concluye que la psicología evolucionista del desarrollo tiene relevancia científica pues amplía nuestra visión del desarrollo humano.

Palabras clave: desarrollo humano; psicología evolucionista del desarrollo; biología y cultura; filogenia y ontogenia.

* Prof. Vieira would like to acknowledge the contributions of Alessandra Prado, Gabriela Martins, and Samira Macarini on previous drafts of this paper. Profs. Vieira and Seidl-de-Moura have grants from the Brazilian National Research Council, CNPq.

** Corresponding address: Maria Lucia Seidl-de-Moura. Fritz Feigl, 465, Rio de Janeiro, RJ, Brazil 22750-600. E-mail: mlseidl@gmail.com.

Introduction

Developmental psychology has had its origins in the biological thought, based in the Theory of Evolution (Bjorklund & Pellegrini, 2000). The authors who became classical in the area and brought great contribution to the study of human development such as J. Baldwin (1890-1968), A. Gesell (1880-1961), J. Piaget (1896-1980), L. S. Vygotsky (1896-1834), among others, were influenced by evolutionary ideas. Despite this beginning, after the first decades of the last century, we can observe a decline of this influence in the explanations of human ontogeny.

We assume that to understand human development it is necessary to consider the relation between biology and culture, and the inseparability of different planes of analysis: phylogenetic, ontogenetic, historical-cultural and microgenetic. With this assumption, to consider development in the ontogenesis is to think of a process that occurs in a historical time and in a context, and that in itself is a product of evolution by natural selection, along our constitution as a species. Humans have certain characteristics and they develop according to certain processes which translate in products with forms and functions. Thus, it is as a product of evolution that ontogenesis needs to be understood. This understanding should be incorporated to explanations of human mind and behavior in evolutionary perspectives.

Considering the level of analysis of the individuals of the species across the life span, it is important to take seriously the notion of development as a process and not a collection of products or results, or individual accomplishments or capacities. Studies in the area of developmental psychology often focus on *products* of development as relatively stable states. In doing so, they neglect the understanding of the interrelation of the determining factors and the complexity of the subjacent processes. Examples of this tendency are studies about early infant development. Although very relevant, many of them consider static capacities of newborns, for instance, without any evolutionary considerations about their function and how they fit in a human mind. Certainly it is important to follow

the development of mental processes. Nevertheless, although the studies of capacities of newborns bring light to essential aspects of initial development, the notion of initial state needs to be qualified. It can not be restricted to birth. It is necessary to analyze preparatory stages before that and, at the same time, to recognize other crucial moments in subsequent stages of development. It is not enough either to focus on performance in varied abilities at different age levels. What should be the aim of developmental psychology is to analyze behavioral and representational changes across the life span and to formulate hypotheses about the processes or mechanisms that produce those changes.

Conceptions of development are multiple, and are not going to be discussed here. What is important is to stress, among the ideas presented in the literature, some that are compatible with the perspective presented here. Van Geert (1998) considers that development involves transformations and a great number of influences. The transformations are produced by interactions of different levels. The systems approach to development emphasizes those interactions. The key notion is that of epigenesis. New relations are constructed across the development, reflecting bi-directional relations at all behavioral (including a complex interaction between environmental influences) and biological levels. (Bjorklund & Pellegrini, 2002). Structure and functioning levels (molecular, sub-cellular, cellular and of the organism) are considered. Functioning at each level influences and it is influenced by the others. Development represents a growth of complexity and organization at all levels as products of reciprocal actions between them. There is no separation of what is genetic and what is environment influence, because it is considered that genes-environment interaction occurs at all levels including the molecular one.

Individual development is probabilistic and unpredictable, resulting from the articulation of bi-directional influences between environment (physical, social and/or cultural), behavior, neural and genetic. Individual experiences begin before birth (for instance moving in the uterus or hearing mother's voice), are unique and enter in a non-linear equation. Bjorklund and Pellegrini (2000)

defend the idea of systems of development which include the genes and the multiple environments both internal and external in which the genes exist. What are transmitted are development resources which inter-act (genes, necessary apparatus for their functioning, and the broader context of development). Thus, individuals inherit not only a species specific genome, but, also, an environment typical of the specie. Some examples of characteristics of this environment are pregnancy, nursing, necessary parental care as consequence of the initial dependency, etc. (Keller, 2007). This environment is a system of contexts of several levels. Bronfenbrenner (1986) has described several levels of context that potentially influence development (i.e., the microsystem –for example, the child’s home, school, etc., the mesosystem– a group of microsystems, the, the government or economic system where the child lives, and the macrosystems -, for example, the child’s culture). Organisms and environments interact in a singular ways at different moments of the life cycle. There are specific tendencies, characteristic of the specie, for certain behaviors such as the one of attachment, for instance. However, the way those mechanisms, products of evolution, express themselves varies depending on the environmental conditions experienced at certain moments of development, that also vary. Those conditions can be described as developmental niches (Harkness & Super, 1996), which are interrelated sub-systems: the social and physical environment, the shared practices of care and the psychology of caregivers. This idea will be presented with more details in other part of this paper.

The conception of ontogenetic development presented here follows the perspective of a psychology oriented by the biology of evolution, which represents a recent tendency in the area, the perspective of the Evolutionary Psychology (EP), and specifically, the Evolutionary Developmental Psychology.

We believe that the *zeitgeist* has changed, and we are pleased to be part of a growing group of developmental psychologists who see the possibility of an evolutionary-based theory of ontogeny that will encompass all

who think seriously about development (Bjorklund & Pellegrini, 2000, p. 341).

It is important to consider the evolutionary perspective of development, but we emphasize that this does not exclude other contributions. The Evolutionary Developmental Psychology (EDP) should be integrated and understood under that perspective in a way that tries to incorporate the recommendations of both Vygotsky (about considering in development the inseparability of different planes of analyses) and Tinbergen (1963) (presented in next section, about providing the answer of the four basic questions) (Bjorklund & Pellegrini, 2002). Thus, this paper introduces an evolutionary proposal of a conception of ontogenetic development, considering the inseparability of biological, socio-cultural, cognitive emotional aspects that constitute this development.

Evolutionary psychology

When we formulate the question “Why are we the way we are?” the Theory of evolution offers some of the most inspiring answers from the scientific point of view. N. Tinbergen (1963) formulated the well known recommendation of the four categories of questions that should be answered related to behavior: 1) what are the stimuli that elicit the response, and how has it been modified by recent learning? How do behavior and psyche “function” on the molecular, physiological, neuro-ethological, cognitive and social level, and what do the relations between the levels look like? (Related to the proximate mechanisms –the immediate influences of behavior); 2) how does the behavior impact on the animal’s chances of survival and reproduction? What are the selective advantages? (Related to function of behavior or adaptation– the adaptive purpose); 3) how does the behavior change with age, and what early experiences are necessary for the behavior to be shown? Which developmental steps (the ontogenesis follows an “inner plan”) and which environmental factors play when / which role? (Related to the ontogeny –the developmental influences on behavior); 4) how does the behavior compare with similar behavior in related species

and how might it have arisen through the process of phylogeny? (Related to the phylogeny—the evolutionary or phylogenetic origins of behavior). This was very much considered in ethological studies, but more or less ignored in psychology.

EP is a young scientific field, it was developed from the eighties, based in the assumptions of the Theory of species' evolution of Charles Darwin and the developments of neo-Darwinism and can be considered a synthesis of evolutionary biology and cognitive psychology (Barkow, Cosmides, & Tooby, 1992). Some important building blocks of evolutionary psychology are: modern developments in theoretical evolutionary biology; the cognitive movement; advances in paleoanthropology, hunter-gatherer studies and primatology; research in animal behavior, linguistics, developmental psychology and neuropsychology.

The first building block offered theories on how natural selection acts on altruism, kinship, mating, cooperation, reproduction, parenting, risk taking, aggression etc. Modern adaptationism with concerns with the functional design of mechanisms given a recurrently structured ancestral world clarified how natural selection works, what counts as an adaptive function, and what are the criteria for calling a trait an adaptation.

The rise of computational sciences, information theory, cognitive psychology and advances in neurosciences, called sometimes the “cognitive revolution”, provided a precise language for describing mental mechanisms as programs that process information (Barkow, Cosmides, & Tooby, 1992; Cosmides & Tooby, 2006; Seidl-de-Moura, 2005). Advances in paleoanthropology, hunter-gatherer studies and primatology provided data about the adaptive problems our ancestors had to solve to survive and reproduce and the environments in which they did so (Barkow, Cosmides, & Tooby, 1992; Cosmides & Tooby, 2006; Izar, in press).

Finally, a body of exciting research in animal behavior, linguistics, developmental psychology and neuropsychology showed that the mind is not a blank slate, passively recording the world. Human organisms come “equipped” with knowledge about the world, which allows them to learn some rela-

tionships easily and others only with great effort, if at all (Cosmides & Tooby, 2006).

The aim of EP is the mapping of our universal human nature, considered as the set of species specific information processing programs that have developed consistently in the human brain – the architecture of the human mind. As proposed by Cole,

[...] from a cultural-historical perspective, human nature is not the mechanical result of the interaction of two, independent forces, like two marbles bumping into each other. It is the bio-social-cultural product of a long evolutionary process (Cole, 1998, p. 336).

EP presupposes that there is a universal human nature, but this universality exists basically in the level of psychological mechanisms developed by natural selection, and not in the expression of cultural behaviors (Cosmides, Tooby & Barkow, 1992). Those psychological mechanisms are adaptations to the way of life of hunter-gatherer of the Pleistocene and not necessarily to our modern circumstances and they were designed to solve the adaptive problems of our ancestors in this Environment of Evolutionary Adaptedness (EEA). They consist of emotions, preferences and propensities selected because they helped our ancestors to survive and reproduce in the past.

With those assumptions, mind is conceived as organized in specialized modules. Specialization was necessary for fast, economic and efficient input processing and execution of sophisticated tasks. EP acknowledges the multipurpose flexibility of human thought and action, but considers that it is caused by a cognitive architecture that contains a large number of evolved ‘expert systems’.

An evolved psychological mechanism (EPM) is a set of inner processes that can solve specific problems of survival or reproduction during our evolutionary history. The evolved mechanism is designed by evolution to deal with a limited amount of information – it is highly sensitive to process input from a domain. This input tells an organism the type of adaptive problem it is facing and the evolved mechanisms transform it into output according to decisions rules. The output of an EPM can be a behavior, or information that you can use

and it is directed toward the solution to an adaptive problem. But it does not mean inflexibility of behavior. Evolutionary evolved mechanism is a theoretical construct to understand how the mind works. Evolutionary psychologists use the analogy with organs of the body (i.e. liver, lungs, heart, etc.) to illustrate that each one has a specific function. The heart is specialized for pumping blood and can not function for detoxifying poisons. The basic idea is that a similar principle could be used to understand how mind works. According to this, our minds consist of a large number of circuits that are functionally specialized.

Evolutionary evolved mechanism organize the way we interpret our experiences and provide universal frames of meaning that allow us to understand the actions and intentions of others. Human beings have some neural circuits whose design is specialized and the same mechanism is rarely capable of solving different adaptive problems. The function of the brain is to generate behavior that is sensitively contingent upon information from an organism's environment. It is, therefore, an information-processing device.

However, psychological mechanisms are not like rigid behaviors or instincts. They assume the form of decision rules, like "if something happens, then I can behave (or not) like that". Decision rules are grounded in specific contexts; they permit several possible response options and can adapt themselves as an answer to differences in the environment. Only narrowly defined aspects of organisms fit together into functional systems: most ways of describing the system will not capture its functional properties. Not all behavior of an organism is adaptive.

The cognitive architecture is the joint product of genes and environment. The development of architecture of mind depends on a complex genetic and environmental interaction. It is a result of adaptations and must be considered as a process that will not stop. We continue to adapt to the different environments. In the theory of natural selection, as proposed by Darwin, there are three essential ingredients: variation, inheritance and selection. The adaptation, through natural selection, helps to solve problems of survival or reproduction and is based

on inherited and reliably developing characteristics. Beside this, there are some by-products that do not solve adaptive problems but they happen to be coupled with adaptations. Furthermore, we cannot forget the random effects produced by forces such as change mutations.

The evolutionary scientists do not agree completely what in evolution belong to each category mentioned above and this is not our point. Despite some disagreements, and generally speaking, the question is that what we are consisted of a large collection of adaptations, and it could be perceived through behaviors, ways of react and think in certain situations very early in our lives.

Evolutionary psychology and child development

The application of the basic principles of the Theory of Evolution to explain the contemporary human development is denominated Evolutionary Developmental Psychology. It is a relatively new approach that has as purpose to investigate in what way our evolutionary past has influence about the ontogenetic development of human beings (Bjorklund & Pellegrini, 2002; Ellis & Bjorklund, 2005; Seidl-de-Moura, 2004).

There are two main assumptions that have heuristic contributions to the Developmental Psychology and that are related to evolutionary perspectives (Charlesworth, 1992). One of them is related with the *individual differences* and it is concerned to the physical and social environments. In this way, there are differences of children in relation to mortality, abuse, neglect, malnutrition, quality in child care and education. This condition can be related with the immediate effects on health, life and development of children and that have repercussions in the long-term survival and reproduction in adult life.

Other contribution is the notion of *typical characteristics of the species*. In the case of the human being would be the behaviors or the motivations that usually appear in different cultural and historical contexts (universal predispositions). They would appear because they have high adaptive value; in other words, they are associated with the survival and perpetuation of our species. As a result

of the long period of relative immaturity of human beings, it can be registered the following examples: parental care which includes attachment and conflict between child and adult, interaction between brothers, moral development training, structure and function of groups with children of similar ages, which involves domination, submission, competition and cooperation, learning, among others.

Although all those interaction systems are important, to the purpose of this paper we are going to present and to comment more specifically on one of them that is the relationship between adult-child. It is remarkable the child physical and psychological dependence on the adult due to the immaturity in the initial period of development.

Relationship between parental care and child development

The Evolutionary Theory suggests that parental behavior and degree of development of the offspring developed simultaneously, in phylogenetic terms (Bjorklund & Pellegrini, 2000; Vieira & Prado, 2004). Thus, there is a balance between parental investment and initial state of development, as well as between the “effort in mating” (amount of time spent in seeking reproductive opportunities - mating) and “effort in the care of offspring” (all forms of care directed to progeny which carries an energetic cost to provide it – parental care). Parental investment subtracts energy available from another source, including a future pregnancy. In this way, such expenditure of energy in the development of young diminishes the effort in mating. Thus, how much is invested in mating versus parental care will vary between species and between females and males, depending on the characteristics of development of descents and ecological conditions present (Bjorklund & Yunger, 2002; Marlowe, 2000).

Among the mammals there is a wide variety of patterns of parental behavior, which can be classified according to the degree of development of the infant at birth (Rosenblatt, 1992). In some mammal species, the gestation period is short and offspring are born very premature. The thermo-regulatory and sensory systems are poorly developed and the infants are unable to feed themselves. Those species are called “altricials” and include rodents,

marsupials and primates. In those cases, parental care is of vital importance for the survival of offspring. On the other hand, there are species where the gestation period is long and the baby is born with vision, hearing, thermo-regulatory system and engine well developed (i.e. horses, cattle). These are called “precocial”. In those cases, parental care is an important factor to the infant, although less crucial when compared with the previous group. The “altricial” model may be related to a marginal, floating, unstable environment, where the animals are living best when producing the most possible descendants. The standard “precocial” adapts itself better to tropical stable environments (Gould, 1999).

However, there are animals that do not fit into either of the two groups cited previously (Gould, 1999). The gestation period is long, the newborn has some skills that allow independence to perform some tasks, but depend on adults to others activities which are vital to their survival. For example, an animal that can be born with eyes open and with the hearing working well, but has no ability to move by itself and to follow the group in its moving around. Among these animals we can cite some species of primates (such as chimpanzees), including human beings. The latter has “precocial” characteristics for development, such as long life, large brain and small offspring, but they are quite defenseless as compared to the standard “altricial”. The parental care of these animals is intense during the first moments of life, as they need to be fed and protected against predators and the climatic changes. The size of the brain is one of the characteristics that have made human babies to be born little developed, and in general, defenseless. The brain grows more slowly and during longer periods of time than in other primates. Furthermore, children characteristics during the early stages of development are attractive and act as triggers of parental responsiveness. For example, the vision of young babies is an activator of parental care. In addition, other features have evolved to this sense as the body size, orientation of the pelvis and the biped position and the position of the foramen magnum (the hole in the base of our skull from which starts the spine) that gives the orientation of the head and

enables look forward when we are standing. This series of events over evolutionary time was given the name *neotenia* that is a process through which occurs the “retention of youth” or the retention of juvenile characteristics embryonic or a delay in development (Bjorklund, 1997).

With those considerations, one of the most important aspects of human development is the prolonged period of immaturity and dependency to adults, which is focused not only on the physical characteristics of the newborn, but have important implications in the way as individuals live as a species. Compared with other primates, humans take a disproportionate amount of time to reach reproductive maturity. Moreover, human beings spend more time with children than any other animal and *Homo sapiens* is the only species that continues to take care and feed their children until adolescence or later, which involves a high energetic cost (Bjorklund, 1997). The benefit associated with the high cost of a long period of immaturity may be a necessary contrivance for the effective learning of the complexities of human social community.

The slow development and the consequent physical and psychological dependence at birth require the presence of an adult to provide the conditions necessary for survival during that period. This is generally provided by the family, which may have different configurations. The parental human care and family formation are traces of co-evolution of different human characteristics, including those already mentioned like a lengthy period of childhood and adolescence, the brain size, high level of parental investment, and others such as: the hidden ovulation, not reproductive sexual activity and menopause (Geary & Flinn, 2001).

As mentioned previously, the reproductive effort made to find a partner and the investment to care of descendants evolved simultaneously. Specifically in the human case, this situation is related with differences in reproductive behavior and in the parental care expressed by men and women, because they had encountered various problems during evolutionary period (time, effort and resources to develop and produce offspring, for example). This situation had repercussion in producing different

strategies to caring the descendants (Bjorklund & Pellegrini, 2000; Wittenberg & Tilson, 1980).

EP suggests that the expression of paternal investment is related, at least in some species, with the certainty of paternity to keep the proximity to the female (Geary, 2000). Furthermore, the lack of social support or father could increase the cost for mothers. The postpartum depression, according to Hagen (1999), would be an indicator of lack of social support, difficulties in providing the necessary resources to the baby during that period, or possible health problems related to the development of the newborn. Thus, the postpartum depression could be an adaptation that informs the mother that she is suffering or has suffered a cost which is too great, motivating her to reduce or eliminate the maternal investment in certain circumstances. This, on the other hand, provokes an increase of investment from other family members. However, is important to mention that these conditions can be an indicative of a situation of risk and not, necessarily, a determinant of the expression of the behavior of negligence in relation to the baby.

In sum, the central function of parental care and the human family, for authors who take the evolutionary perspective, is to promote an enabling environment for the development of complex social skills and, consequently, the child development and transformation of the child in an adult prepared to face the demands of adulthood life (Davis & Daly, 1997; Geary & Flinn, 2001). The context of human development –mainly provided by the family– involves many aspects which contribute to the development of various individual skills of the children.

Child development in cultural contexts

According to Blurton Jones (1993), parents in all cultures have three main purposes: 1) that their children survive, 2) that they become independent adults capable of supporting themselves and their family, 3) and that they become good members of society. However, ecological and socio-cultural conditions (context particularities) are important factors which modulate the form presented by the parental care system. One relevant concept to explain this variation is the “developmental niche”

(Harkness & Super, 1996), a system composed by three subsystems: social and physical environment (such as type of housing, type of social organization of the family); shared customs and practices of childcare which are culturally and historically established (for example, the concept of childhood, relations between generations), and the psychology of caregivers (i.e. beliefs and expectations of mothers for children). These three sub-systems influence each other reciprocally.

The Parental Ethnotheories (PEthno) are part of the third subsystem of this model. They are implicit, difficult to observe and intrinsically connected with the other two subsystems. The PEthno are part of cultural models, which are considered a set of ideas, organized and shared by members of a cultural group, generally implicit and related into practice (Harkness *et al.*, 2001; Suizzo, 2002).

In each culture people share values, ideas and beliefs about parenthood and child development, which include beliefs about how the children are and which are their needs, socialization goals and ideas on effective ways to raise children aiming those goals (Seidl-de-Moura *et al.*, 2004). Evidences from the literature suggest that there are some connections between cultural beliefs about the nature of the child and the practices of care (Meléndez, 2005).

Parental knowledge about development encompasses beliefs about the basic needs and abilities of children, the most likely periods for acquisition of motor skills, cognitive and perceptual abilities; beliefs about factors that may influence on the development; beliefs about care of hygiene and safety that interfere with the health of children, among others (Ribas, Seidl-de-Moura & Bornstein, 2003; Seidl-de-Moura *et al.*, 2004). Such systems beliefs about the development can guide parents' practices of caring for their children. For example, if they believe that the baby does not recognize human faces at birth, it is not likely that they will create many opportunities for face-to-face interaction. It has been reported differences in social and cultural beliefs about parental human development, relating to issues such as the socioeconomic status of caregivers (Ribas *et al.*, 2003; Seidl-de-Moura *et al.*, 2004).

The second important components of the PEthno are the socialization goals, or what the caregivers want and value for the future of their children. Those, as well as the knowledge of parents about the child development, also influence the practices of caregivers and vary in each cultural group. In general, studies carried out in contexts of more independent cultural orientation have found that mothers emphasized goals related to self-improvement and self-control of the child. In contrast, studies in more interdependent settings have noted the emphasis on proper demeanor of the child and his/her adaptation to social expectations (Keller, Borke, Yovsi, Lohaus & Jensen, 2005; Leyendecker, Harwood, Lamb & Schölmerich, 2002).

Beliefs about parenting practices of care are another dimension of parental cognition. Several studies are designed to specifically investigate that practices are more and less valued by parents of different cultures, social class, and education level, among others variables. There is evidence in the literature that the parental beliefs on practices of care vary with the cultural context (Keller, 2007; Keller *et al.*, 2004; Keller *et al.*, 2005; Keller *et al.*, 2006; Suizzo, 2001).

Brazilian studies have been developed in different contexts in order to identify the importance attributed to different belief dimensions (Kobarg, 2006; Piovanotti, 2007; Ruela, 2006). The set of those studies have indicated the existence of diverse systems of beliefs between different Brazilians contexts, the influence of socio-demographic characteristics of the sample and, moreover, indicates possible changes in beliefs about parental practices of care over the years.

In another study conducted with 350 mothers of the all the five geographical regions of Brazil, it has been found that the size of the city and the educational level of mothers had influence on the mothers' socialization goals (Seidl-of-Moura, *et al.*, in press). Complementing those results, a different analysis with the same group of mothers have indicated that there are shared beliefs about practices of care and that the mothers studied value most practices of proper presentation of their children and in second place their stimulation (Vieira *et al.*, Submitted).

Final considerations

This paper aims to presenting the basis and some assumptions of EDP and to discuss some contributions of this theoretical perspective to the explanation child development. In light of current knowledge about development, and based on epistemological assumption that there should be links between biological factors, psychological and the external environment—including here the ecological context, social and cultural—it is considered that the EDP has scientific and social relevance because it broadens our vision on human development. However, as any other theoretical perspective, EDP has advantages and limitations. In the first case, contemporary perspectives in Psychology emphasize that the human baby is not a *Tabula Rasa* when born, but he/she is someone who has capacities, propensities for behavior that are characteristics of the species, motivation and needs. Human beings are also born with specific predispositions that may (or not) be confirmed by their ontogenetic history. Moreover, although there are different forms of physical organization, social and cultural environment in which children live, it is important to emphasize the need to know about our evolutionary past. This knowledge can help us not only to understand development, but also to create more adequate daily settings for child development. For example, although today there are different family configurations, it is necessary to understand that children at the early stages of their development need someone who could be an attachment figure. Depending on the roles they play in this context, father and mother, for example, among other primary caregivers, may develop different skills in caring for children. During our evolutionary history, mothers have specialized in caring for their descents by physical characteristics (pregnancy and childbirth, among others) and social and cultural traditions. However, the past does not determine the future, but may influence it and nowadays, the role of the father is increasingly valued. Knowing the evolutionary history does not mean that it determines our contemporary behavior and practices. The father can and should participate in the care of children. For this, it is necessary to create conditions in which this activity occurs, for example, to intensify the contact between fathers

and their sons or daughters. Some activities may be more pleasant or easy to the father to do than others, such as playing with the child and taking it for walks. Others may require more learning, for example, direct care (nutrition and hygiene). In this way, is necessary also to know the ideas and values which are established by the cultural group (parental ethnotheories). The cognitive dimensions also are important components which have strong influence on the child development. The great challenge to Development Psychology is to integrate the different dimension related to the psychological development (behavior, culture, psychology, social context and biology).

Another implication of EDP is the knowledge that the research can bring about children and their development, recognizing the specific nature of ontogenetic adaptation, and expanding the consideration of the variables that interfere in the contexts of child development. In this sense, EDP can help to improve the assessment of risk and protection factors, making it possible to create or modify conditions in order to provide children with a better environment for their integral development.

Specifically in the case of the limitations of EDP, we can think of the difficulty in working with individual differences, because one of the purposes is to work with *typical characteristics of the species*. However, it is important to emphasize that the assumption adopted by EDP that there is a universal human nature does not cancel individual differences. As highlighted by Keller (2007) there are universal tasks of development, such as self development, which is modulated by the physical environment, social and cultural of the child.

The evolutionary perspective does not reduce human beings to its evolutionary history, but allows us to see our species through a broader perspective and have a better understanding of what it means to be human. Furthermore, although one of purposes of human beings is the survival and reproduction, with the consequence of species' perpetuation (product), it is necessary to understand the way to reach the maturity (process). In this way, one of the privileged areas in this context is the study of human development, which involves different level of analysis, such as biological, psychological, cultural and social context ones.

References

- Barkow, J. H., Cosmides, L. & Tooby, J. (Eds.) (1992). *The adapted mind*. Oxford: Oxford University Press.
- 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.
- Bjorklund, D. F. & Yunger, J. L. (2002). The Evolution of parenting and evolutionary approaches to childrearing. In: M. Bornstein (Ed.), *Handbook of parenting*, 2^a edition, Mahwah, NJ: Erlbaum,
- Bjorklund, D.F. (1997). The role of immaturity in human development. *Psychology Bulletin*, 122, 153-169.
- Bjorklund, D.F. & Pellegrini, A.D. (2002). Evolutionary perspectives on social development. In: P.K. Smith & C.H. Hart (Eds.). *Handbook of childhood social development* (pp. 44-59). Oxford & Malden, MA: Blackwell Publishers.
- Blurton Jones, N.G. (1993). The lives of hunter - gatherer children. In M. Perreira & L. Fairbanks (Eds.), *Juvenile Primates* (309-326). Oxford and New York: Oxford University Press.
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, 22 (6), 723-742.
- Charlesworth, W.R. (1992). Darwin and the development psychology: Past and present. *Development Psychology*, 28, 5-16.
- Cole, M. (1998). *Cultural psychology: a once and future discipline*. Cambridge, Mass.: The Belknap Press of Harvard University Press.
- Cosmides, L. & Tooby, J. (2006). Evolutionary psychology, moral heuristics, and the law. In: G. Gigerenzer & C. Engel (Eds.). *Heuristics and the Law*. (pp. 181-212). MIT Press, Cambridge, MA.
- Davis, J. N., Daly, M. (1997). Evolutionary theory and the human family. *The Quarterly Review of Biology*, 72, 407-435.
- Ellis, B.J. & Bjorklund, D.F. (2005). *Origins of the social mind: Evolutionary psychology and child development*. The Guilford Press: New York.
- Geary, D.C. (2000). Evolution and proximate expression of human paternal investment. *Psychological Bulletin*, 126, 55-77.
- Geary, D. C. & Flinn, M. V. (2001). Evolution of human parental behavior and human family. *Parenting: Science and Practice*, 1, (1/2), 5-61.
- Gould, S. J. (1999). Evolução Humana. In: *Darwin e os Grandes Enigmas da Vida*. 2^a Edição: São Paulo: Martins Fontes.
- Hagen, E.H. (1999). The functions of postpartum depression. *Evolution and Human Behavior* 20, 325-359.
- Harkness, S. & Super, C. M. (1996). Introduction. In: S. Harkness & C. M. Super (Eds.), *Parents' cultural belief systems: their origins, expressions, and consequences* (pp. 27-55). New York & London: The Guilford Press.
- Harkness, S., Super, C. M., Vanna Axia, A. E., Palacios, J. & Welles-Nyström, B. (2001). Cultural pathways to successful parenting. *International Society for the Study of Behavior Development Newsletter*, 38, 9-11.
- Keller, H. (2007). *Cultures of infancy*. Mahwah, N.J.: Lawrence Erlbaum Associates.
- Keller, H., Borke, J., Yovsi, R., Lohaus, A. & Jensen, H. (2005). Cultural orientations and historical changes as predictions of parenting behavior. *International Journal of Behavioral Development*, 29(3), 229-237.
- Keller, H., Hentschel, E., Yovsi, R. D., Lamm, B., Abels, M. & Haas, V. (2004). The psycho-linguistic embodiment of parental ethnotheories: A new avenue to understanding cultural processes in parental reasoning. *Culture and Psychology*, 10 (3), 293-330.
- Keller, H., Lamm, B., Abels, M., Yovsi, R., Borke, J. & Jensen, H. (2006) Cultural models, socialization goals, and parenting ethnotheories: A multicultural analysis. *Journal of Cross-Cultural Psychology*, 37(2), 155-172.

- Kobarg, A. P. (2006). Crenças e práticas de mães sobre o desenvolvimento infantil nos contextos rural e urbano. [Mother's beliefs about child development and maternal practices in the rural and urban contexts] Unpublished Master's thesis. Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brazil.
- Leyendecker, B., Harwood, R. L., Lamb, M. E. & Sholmerich, A. (2002). Mothers' socialisation goals and evaluations of desirable and undesirable everyday situations in two diverse cultural groups. *International Journal of Behavioral Development*, 26(3), 248-258.
- Marlowe, F. (2000). Parental investment and the human mating system. *Behavioural Processes*, 51, 45-61.
- Meléndez, L. (2005). Parental beliefs and practices around early self-regulation: the impact of culture and immigration. *Infants & Young Children*, 18 (2), 136-146.
- Piovanotti, M. R. (2007). Metas de socialização infantil e crenças sobre práticas de cuidado parental na perspectiva de mães primíparas. [Child socialization goals and childrearing beliefs in the primiparous mothers' perspective]. Unpublished Master's thesis, Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brazil.
- Ribas, R. C. Jr., Seidl de Moura, M. L. & Bornstein, M. C. (2003). Socioeconomic status in Brazilian psychological research: II. Socioeconomic status and parenting knowledge. *Estudos de Psicologia*, 8(3), 385-392.
- Rosenblatt, J.S. (1992). Hormone-behavior relations in the regulation of parental behavior. In: J.B. Becker; S. M. Breedlove & D. Crews (Eds.), *Behavioral endocrinology*. (pp.219-229), Massachusetts: MIT Press.
- Ruela, S.F. (2006). Um estudo intergeracional de crenças valorizadas por mães em uma comunidade rural do estado do Rio de Janeiro [An intergenerational study about mothers' valued beliefs in a rural community in Rio de Janeiro]. Unpublished Master's thesis, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil.
- Seidl-de-Moura, M.L. (Ed.) (2004). *O bebê do século XXI e Psicologia em Desenvolvimento*. [The XXI century baby and the developing psychology], São Paulo: Casa do Psicólogo.
- Seidl-de-Moura, M. L. (2005). Dentro e fora da caixa preta: a mente sob um olhar evolucionista [In and out the black box: The mind in an evolutionary perspective]. *Psicologia: Teoria e Pesquisa*, 21(2), 141-147.
- Seidl-de-Moura, M. L., Ribas, R. C. Jr., Piccinini, C. A., Bastos, A. C. S, Magalhães, C. M. C, Vieira, M. L., Salomão, N. M. R., Silva, A. M. P. M. & Silva, A. K. (2004). Conhecimento sobre desenvolvimento infantil em mães primíparas de diferentes centros urbanos do Brasil [Primiparous mothers of different Brazilian urban centers' knowledge about child development]. *Estudos de Psicologia*, 9 (3), 421-429.
- Suizzo, M. A. (2002). French parents' cultural models and childrearing beliefs. *International Journal of Behavioral Development*, 26, 297-307.
- Tinbergen, N. (1963). On aims and methods in Ethology. *Zeitschrift für Tierpsychologie*, 20: 410-433.
- Van Geert, P. (1998). A dynamic systems model of basic developmental mechanisms: Piaget, Vygotsky and beyond. *Psychological Review*, 105, 634-677.
- Vieira, M.L. & Prado, A.B. (2004). Abordagem evolucionista sobre a relação entre filogênese e ontogênese no desenvolvimento infantil. [Evolutionary approach about the relationship between phylogeny and ontogenesis in the child development]. In: M. L. Seidl-de-Moura, (Ed.). *O bebê do século XXI e a psicologia em Desenvolvimento* [The XXI century baby and the developing psychology] (pp. 155-20). São Paulo: Casa do Psicólogo.
- Vieira, M. L.; Seidl-de-Moura, M. L.; Rimoli, A.; Magalhães, C. M. C.; Piccinnini, C. A.; Lordelo, E.; Salomão, N. M. R.; Martins, G. D. F.; Macarini, S. M. & Moncorvo, M. C. Mother's beliefs about childrearing practices in seven Brazilian cities. *Journal of Cross-Cultural Psychology*, Submitted.
- Wittenberg, J. F. & Tilson, R. L. (1980). The evolution of monogamy: Hypotheses and evidence. *Annual Review of Ecology Systems*, 11, 197-232.

Fecha de recepción: 21 de noviembre de 2008
Fecha de aceptación: 8 de noviembre de 2009