Review

Intentional Self-Development—Genetically Framed: Reconciliation of Evolutionary and Action-Theoretical Perspectives on Human Development

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Is human ontogenesis a product of evolution or a result of individual decisions and actions? In the present paper we aim at solving this apparent conflict between a behavioral genetics approach and an action-theoretical perspective to human development. After a discussion of the idea of active and intentional self-development and the role of genes in development we argue for adequate conceptualizations of development, evolution, and self-determination that allow to understand human development as a joint product of evolution and intention. The paper concludes by proposing an evolutionary developmental psychology that integrates the two positions in that it "adapts" the concept of evolution to the development of the individual.

Keywords: Human evolution and ontogenesis, intentional self-development, role of genes in development, evolutionary developmental psychology

The debate about whether human development can be understood as a sequence of production processes of a predisposed adult form during childhood and adolescence or as a life-long process of adaptation and change has become less heated in the last two decades. Even though the question of what signifies development has not been answered yet, a discussion about the general concept is currently not taking place. Alternative approaches are either widely ignored or a polycentric pluralism is maintained, in which the 'Alice in Wonderland'-rule ("Anybody has won, everyone gets prices") constitutes the methodological principle. Conceptual questions are removed from the agenda while paradigmatic divergence represents an empirical discussion rather than a conceptual controversy. Particularly, the question to what extent human ontogenesis depends on genes, on the psychosocial environment, or on individual decisions—or on their interaction—is currently seen as an empirical rather than a theoretical problem.

In this paper we argue that this impression is misleading. We hold that the question of an adequate understanding of human development is not only an empirical but also a theoretical one by asking which change processes should be subsumed under the concept of 'development.' Specifically, we discuss to what extent human ontogenesis represents a product of evolution (and in that sense is genetically canalized) or a result of individual decisions and actions (and in this sense is self-determined). Our assumption is that these two positions are not contradictory but well compatible if adequate conceptualizations of development, evolution, and self-determination are taken into consideration. We start by discussing the idea of intentional self-development and the role of genes in human development. Then we outline a concept of (human) development that attempts to take recent theoretical considerations and empirical findings into account. Finally, we propose an integrative position in "adapting" the concept of evolution to the development of the individual.

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Human Development Between Evolution and Intention

Since Darwin (1859), the thesis has not disappeared that humans are animals—very special animals maybe, but nothing principally different. If our species, like all other species, has developed following evolutionary principles and has descended from simple prokaryotes then this also applies to all specifications of our species, including our consciousness, our personality, and our behavior—just everything that constitutes ourselves. The current discussion in science aims at an integration of these aspects: Human evolution, particularly the evolution of the human brain and the evolution of consciousness, are seen more and more as the key to a better understanding of functions and functioning of the psyche and of human behavior. Even the philosophy of the mind has paid increasing attention to materialist and specific evolutionary approaches (Dennett, 1995).

Despite early pioneers, it has taken some time for psychologists to seriously take up an evolutionary perspective. Integrating it into psychological thought and research (Barkow, Cosmides, & Tooby, 1992), finally resulted in one of the few cases of successful theoretical imperialism: The field, which was at first called 'sociobiology' prospers today almost generally under the name 'evolutionary psychology.' Today an evolutionary perspective applies to nearly all fields of psychology (Buss, 2005). There are not only several introductory textbooks on this perspective, but also introductory books to psychology from an evolutionary perspective.

Behavioral Genetics: Exploring the Substance of Evolution

Evidence supporting an evolutionary approach comes from several sources. A strong line of argument is based on findings from the behavioral genetics (Plomin, DeFries, McClearn, & McGuffin, 2001), that suggest that large parts of the variance of observable characteristics, in particular human behavior, but also personality traits, psychic diseases, and cognitive functions, are genetically (co-)determined. If this were true, it would be of theoretical significance as evolutionary processes depend on a highly reliable (biological) mechanism of heritage of attributes, and genes are currently seen as the system of informational transfer between generations. By means of favoring phenotypes that are able to reproduce more efficiently, "adaptive" attributes are "naturally selected." Evolutionary psychology holds that, as processes of natural selection take time to operate, many adaptations to our ancestor's environment may no longer be adaptive with respect to our modern environment, but can only be understood in the light of their evolutionary history. Obviously, this argument is strongly based on the

assumption of the heritability of the (determinants and development of the) phenotype including cognitive, affective, and behavioral processes.

Active and Intentional Self-Development

This approach seems to be in opposition to the action-theoretical perspective put forward by developmental psychology (Baltes, 1997; Brandtstädter, 1998). According to this approach, a central function of development is to enable humans to act. All changes that humans go through between birth and young adulthood can be understood as components of the constitution, the development, and the extension of their action capacities (Bandura, 1999). According to the actional-theoretical perspective on development, however, this is only half of the story. Theories of intentional self-development assume that not only does development produce action, but that individuals actively (co-)produce their development by selecting and pursuing goals and developmental tasks, particularly during the adult years. This implies not only that actions often have far-reaching consequences for the actors, but that the developmental regulatory effect of an action can be anticipated and intended by the actor. This can be understood as the action expressing the intention to *develop*.

Self-set discrepancies between the perceived actual developmental state of the person and an aspired ideal are usually coupled with the conviction that one is able to develop in the direction of the positive contrast. On the one hand, discrepancies from the ideal can be reduced by an active problem-oriented change of the present situation (Heckhausen & Schulz, 1995) and by selective optimization with compensation (Baltes & Baltes, 1990). On the other hand, they can be dissolved by adjusting goals to the current situation. Through these processes, goals gain central importance for human development, particularly so beyond childhood (Freund & Baltes, 2000). This, by no means, implies a unidirectional developmental path. Starting in middle-aged adulthood, the prominence and the necessity to stabilize and protect one's action capacities increase (Staudinger, Marsiske, & Baltes, 1995). Defending one's status quo and compensating losses in subjective and objective capacities become increasingly important for the protection of personal continuity and well-being (Ebner, Freund, & Baltes, 2006), even though preconditions and competencies for action can further develop until old age.

Intentional relations between the person and his or her actions and development, however, require that the individual has formed representations of his or her person and life as well as of possible directions of desirable developmental paths. In an action-theoretical perspective on development, the self therefore plays a role in two respects: On the one hand, it is the *product of development*; particularly during the formative years of development. On the other hand, it is the *co-producer of development* by setting standards, evaluating means, and initiating actions.

Since processes related to the self have been examined not only by introspective measures but also by more implicit and indirect methods (especially when it comes to processes underlying intentional planning that are not accessible to the person's awareness), an action-theoretical perspective on development is not restricted to a "personal" approach. Whereas most of this research so far has been done from a functionalistic perspective, behavioral genetics, complemented by the neurosciences, now attempt to better understand the physiological processes of the self. Genetic and neurological approaches agree—despite their differences in scope, method, and interest—that not the person as an entity decides about developmental trajectories. Rather genetic and physiological processes determine the range of ontogenesis (reaction norm) and concrete expressive behaviors, which then influences further development.

Phenotype and Genotype: The Misleading Stability of Persons

At first, there seems to be a conflict between the action-theoretical perspective and the biological approach. In particular, the well-replicated finding of a high stability of the adult personality (Pervin & John, 1999) appears to contradict the idea of a life-long development which is continuously flexible and (co-)produced by the individual. A stable adult personality (including a certain degree of behavioral flexibility at a micro-level) is perfectly compatible with a biological perspective and predictable from an evolutionary point of view. Natural selection of adaptive attributes of organisms imply that these attributes are reliably 'visible' for nature to be selected. Random behavior is probably not sufficiently advantageous for the organism and therefore not favored by systematic selection. Rather, stable behavioral tendencies (i.e., traits), which are flexible at the level of concrete behavior but at the same time reliable with respect to general functions, are prone to natural selection. Thus, the existence of stable traits is functional from an evolutionary perspective.

Despite some methodological and empirical limitations, the evidence that adult persons show stable and consistent behaviors across long periods of time and even increasing stability with advancing age cannot be dismissed (Roberts & Caspi, 2003). Does this, however, imply that there is no development of the adult personality? This is the position taken by the trait approach as prototypically represented by the five-factor model. This approach holds that no noteworthy ontogenetic development of personality traits takes place beyond the development of the adult phenotype (McCrae & Costa, 1996). It is, however, inadequate and risky to infer from phenotype to genotype. Stability of expressive behavior does not prove stability of its underlying mechanisms or traits. The existence of a trait that causally *explains* stability of the adult person has not been proven so far. There are, however, other ways to explain stable and consistent behaviors.

An increasing stability in adulthood may be partly due to a cumulation of earlier experiences that render changes less likely. With advancing age, adults become increasingly reliable and stable in the way they think, feel, and act. This 'cumulative stability' (Roberts & Caspi, 2003) may in fact be intended by the individual (Greve, 2005). Beyond intended stability, human action can also appear stable for dynamic reasons such as when it is directed toward general goals that require long-term planning or toward insatiable goals

that do not have definite endpoints. Thus, unaltered intentions could be the explanation of observable behavioral consistency. From this point of view, traits do not offer an explanation but rather a description of consistent behavior, perhaps as a result of stable intentions. And the fact that environments are relatively stable may even add to the stability of adult personality: In a stable environment, reasons to change are relatively rare, particularly so when individuals take part in choosing and influencing their environment. From an evolutionary perspective, this interactive mutual stabilization has been recognized as 'niche construction' (Odling-Smee, Laland, & Feldman, 2003). Finally, motives or reasons of behavior can be extremely variable and heterogeneous, and they can change over time without resulting in "visible" behavioral variability. The very idea of compensation, for instance, implies replacement of competencies by functional equivalents in order to prevent changes in the "phenotypic" outcome (Baltes, 1997). Stability is thus sometimes the result of highly dynamic processes.

Taking these considerations into account, the question about a relative stability of self-perceptions and -projections and of general developmental goals becomes a research issue of crucial importance for developmental psychology. Apparently, they are not only the basis of individual self-presentation, but can also be part of the explanation of behavioral consistency of a person in different contexts and phases of life. Consequently, research on personality development in adulthood changes from a documentation of high behavioral stability to an investigation of developmental processes that ensure stability.

Explanatory Limits of Behavioral Genetics: Not Just Genes Alone

The behavioral genetics approach, however, avoids the circularity inherent to ad-hoc explanations of stability by referring to underlying traits which, in turn, are inferred from behavioral stability. It uses non-behavioral variables as predictors, in that it explains stability of personality by genetic constellations. Studies investigating various constellations of siblings, for instance, suggest that remarkable proportions of variance of personality can be explained by genetic variance (Plomin et al., 2001; but Joseph, 2004). The question, however, remains whether these studies prove that our genes direct our behavior, and that we are survival machines programmed by our "selfish genes" (Dawkins, 1976).

Adequate interpretation of the findings from behavioral genetics need to consider that genetic factors always interact (in different intermediate stages) with environmental conditions (Gottlieb, 1992). The term "environment", however, rather conceals than describes what these interactions include—viz., other genes, elements of the cell, interactions and states of the whole organism, to list just a few. Activation and expression of genes depend on the environment (Carey, 2003). The assumption of additive effects of genotype and environment—one precondition that typically underlies the argument for a heritability of personality—seems incorrect or at least abridging. The shaping of the phenotype depends as much on the context as on the genotype. The classical example of phenylketonuria illustrates this nicely (Plomin et al., 2001). Despite of an allel

which is malignant under normal conditions, the development of the phenotype can progress normally and undistinguishably from persons without this allel, given that a particular important aspect of the environment fits adaptively, or is adapted. This suggests that the question whether nature *or* nurture is responsible for development is misleading. The interaction of both results in the phenotype (Rutter, 2006). Due to a specific genetic setup, the expression of the phenotype depends on specific environmental conditions. This view does of course not deny the importance of genetic preconditions and vulnerabilities, but rather clarifies their way of effectiveness.

Nevertheless, the assumption that evolution functions only through genetic heritability still seems to speak against an action-theorectical, intentional perspective on development. Even if natural selection seems to select phenotypes, in fact the genotype is selected, since it has to be reliably reproduced. The common view on evolution agrees that only genes pass on the information into the next generation that is relevant for the phenotype. This heritage, given a stable environment, results in a phenotype which is similar to the phenotype of the former generation. Accordingly, what an individual acquires during his or her lifetime is lost for the next generation. Though there are different attempts that try to save a Lamarckian perspective, for instance via cultural traditions (Jablonka & Lamb, 2005), it is premature to rest a scientific position on these controversial approaches. Of course, individual plasticity, and in particular the ability to learn, can be the result of evolutionary adaptation. But the main pattern of development appears to have to be secured by more hard-wired, reliable processes.

What Does 'Development' Mean?

Thus, the question still remains how the seeming contradiction between the theoretical view of evolutionary psychology and the empirical arguments of behavioral genetics, on the one hand, and an action-theoretical perspective on human development, on the other, can be solved. Is this question an empirical one, and, if so, is it already answered by findings from behavioral genetics? To respond to these questions, it is useful to take a closer look at what 'development' actually means.

Human development, from its very beginning, depends on necessary and beneficial conditions provided for by the physical and social environment. Some of these conditions are very basic and are the same for all individuals such as oxygen and water. Others are more complex such as linguistic education and essential to different degrees (e.g., culture-specific competences such as driving a car). In addition, human beings differ in their requirements and in their needs: Innate and acquired vulnerabilities and deficiencies require special support and interventions or preventive actions. A minimum of fit between the person and the environment, however, is a necessary precondition for any development to take place. This basic requirement as well as general potentials and limits for development can be viewed as the genetic developmental frame. Within this "norm of reaction", human development can unfold a considerable

variability: It is by no means set how a person will develop, even if all necessary conditions for development are fulfilled. The individual and human-specific nature interacts with an unpredictably broad variety of environmental factors. According to lifespan theory these interactions persist throughout the entire lifespan, resulting in a life-long, complex relation between gains and losses (Baltes, 1997).

The notion that ontogenetic development can be understood as a life-long process is, however, not an empirically testable thesis. It is rather a theoretical proposal to understand certain processes of change and adaptation beyond adolescence as developmental dynamics, that are equivalent to structural and functional adaptations during childhood. Lifespan theory thus constitutes a normative and empirically fertile alternative to theories that argue from a more biological standpoint. These "classical" theories do not deny the existence of changes in old age, but they do not classify them as developmental processes. In contrast to lifespan theory, they assume that the building-up of central functions is completed at the end of childhood. After adolescence, at the latest, man is "fully-grown." They understand development as a process of "unpacking" a predetermined adult form and as a process that passes more or less distinct stages which can differ tremendously from the final form (as for example in the butterfly). This view implies that development is directed, usually irreversible, and determined to a relatively high degree.

This perspective is in line with the evolutionary approach. How can an adult phenotype be selected through evolution, without a developmental trajectory to ensure that a certain genotype regularly results in this phenotype? This does not imply inflexibility, but the general course of individual development has to be genetically "canalized" (Waddington, 1959), otherwise evolution could not have selected it.

Classical, biological ("embryological," Wolpert et al., 2002) concepts of development argue that with the development of the adult form all essential aspects, all traits and attributes, of the person are on hand; individual variations are explained by specific influences during sensitive phases in early stages of ontogenesis (given that they do not go back directly to variations of genetic reaction norms). Changes in middle-aged and late adulthood are either regarded as learning or explained by non-normative influences, and in later phases also by age-related decline of cognitive and physical functions. They are not regarded as 'development.' This view is in line with dispositional models of personality, as both approaches propose that individual behavior of an adult person is substantially determined by developed traits of the person.

We now propose that a revision of the traditional understanding of development is necessary to better understand the stability of the phenotype of a person as a result of a permanent and dynamic developmental process. Complementing considerations brought forward most prominently by Baltes (1987, 1997), we argue that a biological and evolutionary perspective speaks in favor of such a conceptual renewal. One specific argument stems from findings that mental and organic structures are and remain astonishingly malleable. Note, however, that the concepts of 'life-long development' and 'plasticity' do not entail each other logically. Plasticity of organisms and developmental trajectories are compatible with a concept of development that limits the formation of organismic complexity to certain phases. There is, for instance, indication that the development of cerebral structures goes through sensitive and malleable phases in the first months of life which can hardly be made up for at later stages. There is, however, also increasing evidence that suggests that the development of the brain is changeable until late in life (Huttenlocher, 2002). Taking these recent findings into account, a narrow conception of development that is limited to qualitatively distinguishable phases beyond which development does not take place (but only learning), becomes implausible.

Humans constantly have to deal with new situations and adapt to new requirements. These are partly normative and expectable and partly culturally set or highly idiosyncratic. From an evolutionary perspective many of these challenges are too "young" to make a genetic predisposition of responses seem plausible. The occurrence of constantly new challenges, whose successful coping is the necessary precondition for all that follows, is not new but a central element of evolution. This is in line with the idea that evolution of flexibility, that is short-term intraindividual adaptability, constitutes the key to an evolutionary understanding of humans ('phenotype plasticity', West-Eberhard, 2003). According to this perspective, life-long development can be described as the expression of a permanent person–environment interaction—as life-long adaptation process. Since the concept of evolution encloses exactly this dynamic, we propose to transfer the concept of evolution to the ontogenesis.

Indeed, evolutionary (adaptive) interaction processes do also exist beyond the individual organism. In his concept of "neural Darwinism", Edelman (1992) explains the development of the nervous system using evolutionary principles.Transactional dynamics apply to the expression of the genetic code: Without an adequate environment in the cell, DNA-sequences cannot be translated into RNA-sequences which, again only under certain conditions, encode the respective amino acids (McClearn, 2003). If the surroundings change the results do so, too. Preformation is therefore relative, even genetic preformation. In a very similar fashion, the individual life course, from its very beginning as a fertilized egg, consists of interactive processes between what is already there (i.e., the result of earlier interactions) and the present environment. Humans—like all other animals—can be regarded as systems of structures and of processes operating in these structures. And these systems always have to integrate themselves transactionally and adaptively in their interactions with other systems (the environment and other people; Ford & Lerner, 1992).

The discussion in evolutionary theory about the unit of selection, however, is still open today (Jablonka & Lamb, 2005). It can be assumed that there is not only a single unit of selection, but that evolution takes place at various levels. Why then should it not also take place at an ontogenetic level? What we phenotypically regard as development is the expression of constant and partly actively influenced interactions and adaptations in the context of numerous surrounding conditions that are influenced by genes, physical, chemical, and social environments.

An evolutionary perspective suggests a "undirectedness," since evolution is itself undirected. There is no absolute "better" or "higher", but only a relative more adaptive state of development or evolution, that is, a state that fits relatively better to current circumstances. This is fully in line with lifespan theory: If life-long development encloses gains and losses at all times, then a conception is untenable that marks development with a certain direction, with a universal developmental goal. As outlined above, a concept of an inherently flexible and plastic development seems incompatible with the notion of natural selection. Even modern attempts of evolutionary developmental biology ('evo-devo', Carroll, 2005) stick to an embryological concept of development with a relatively restrictive reaction norm. Such approaches cannot explain the concrete processes of ontogenetic regulation without limiting or canalizing preformation. At best, they can explain that there is ontogenetic plasticity by arguing that it may produce individual adaptability to new circumstances and challenges and, hence, is an adaptation. As its consequence, humans can survive in very different and partly extremely divergent environments (from snowy mountains to the desert). This seems to suggest that it is advantageous to be malleable. However, plasticity is very costly: It requires a highly complex system which, in turn, is extremely vulnerable during its development.

From this point of view, evolution looks rather "systemic." The different pleadings for a theory of "developmental systems", which were brought forward in reaction to Oyama's approach (1985), also in developmental psychology (Thelen & Smith, 1998), however, hold that a unidirectional perspective does not adequately fit to the phenomena. A developmental systems view incorporates genetic arguments but, at the same time, allows for individual regulatory processes which are influenced by the developing system itself. The resulting flexibility and ability to fill, and even to construe, heterogeneous ecological niches is its evolutionary benefit. Thus, intentional self-development makes sense from an evolutionary perspective. Even if there is no absolute free and immortal soul, that is independent from the physical laws and determines actions, the systemic and dynamic interactions of the ontogenetic and phylogenetic development are so complex, that one cannot assume a unidirectional determination; especially not in a genetic sense. Increasing evidence for a plasticity of neural structures rather suggests that the putative hardware is relatively soft. This is not astonishing, as learning can take place across the entire lifespan. Therefore at least parts of our neural system need to be adaptable and flexible (Edelman, 1992).

In sum, to understand intentional self-development in the sense that humans are active producers of their development, in that they have images and representations about themselves and their development, and can evaluate them and operate according to them, does not contradict a biological understanding of development. And this is the case, although it incorporates development in adulthood and at later ages and, hence, does not fit into an embryological conceptualization. Therefore, we suggest to take the evolutionary idea of development seriously and to transfer it to the individual ontogenesis. An evolutionary developmental psychology takes serious our "adapted mind" (Barkow et al., 1992) and also our "adaptive self" (Greve, 2005). It offers an evolutionary explanation of the "developmental gap" of evolutionary theories of the phylogenesis (Bjorklund & Pellegrini, 2002).

Evolutionary Developmental Psychology: Attempt of a Conclusion

At present, the proposal to apply an evolutionary perspective as well as evolutionary concepts to (human) development may seem to be just another descriptive metaphor. Admittedly, its theoretical value remains to be shown. However, some use and benefit of this perspective seem immediately obvious. One possible consequence for empirical research could be computer simulations of developmental trajectories, similar to attempts in the context of evolutionary research in the 70s and 80s or of robotics. The assumption that psychological functions compete with each other within a person, such as in response to stressful life, events could lead to testable empirical predictions and could result in specific quasi-experimental studies in the field of developmental interventions.

A use of quite a different kind would be an increasing participation of developmental psychologists in current public debates on genetic engineering or stem cell research; not necessarily to evaluate but to further differentiate controversial topics. From the perspective of developmental psychology, visions of personality profiles according to catalogues, that are increasingly evoked in the age of genetic technology, could in principle be unmasked as deficient. To date, it is not only unclear whether genes are the only replicators of evolutionary processes (in the Dawkinsian sense, 1976; Dawkins himself suggested the "meme" as an alternative, Jablonca & Lamb, 2005), but it is also unclear what genes really are. The DNS-string has a certain "meaning" only in a certain context (by itself it cannot even copy itself a single time), and this "meaning" changes with the context. The omnipresent topic of embryonal (and adult) stem cells, which are assumed to be toti- or at least pluripotent, already points out that it is not determined what cell biography will result from further development. Since the genetic code of each nucleus is identical, it all depends on environmental conditions which can, at least partially, be directed, influenced, and changed. Metaphorically speaking, the developing system "educates" such stem cells to the body cells that are needed by allocating suitable developmental surroundings. And sometimes this fails, as the cell does not "play along" for reasons that we still hardly understand. Of course, this is an airy way to talk. However, it satisfies the complexity of the relations much better than any deterministic scenario.

So at the end of our considerations, we hope, and to some degree even ask, that especially developmental psychologists should take part in the hot and virulent debates. The unbelievable width of human ontogenesis is apparently not evolutionarily explicable in a deterministic way. Rather ontogenesis substantially determines the conditions of our actions which, in turn, shape our ontogenesis. Thus, ontogenetic development seems to be evolutionary and self-determined at the same time. Therefore, we have sound scientific reasons to defend an action-theoretical idea of man. Especially, if we want to further adopt a biological perspective.

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Call for Papers

"European Journal of Developmental Science"

The *European Journal of Developmental Science* (EJDS) is dedicated to interdisciplinary research in Developmental Science. Despite the focus on human ontogenesis, we, the Editors, want to include a broad system theoretical perspective in order to fully acknowledge the various complexities of human ontogenesis. One of the basic assumptions of Developmental Sciences is that biological (such as genetic and neurophysiological), individual psychological, social, and cultural systems have to be taken into account simultaneously in order to arrive at a deeper and broader understanding of the various changes that humans experience during the course of their life-long development. Furthermore, Developmental Science does not only focus on the area of normative human development, but also covers research dealing with abnormal, pathological development. As well, the application of research findings is yet another area of interest. Thus, Developmental Science offers a transdisciplinary framework for questions related to human development.

The *European Journal of Developmental Science* provides an interdisciplinary and international forum for basic research and clinical applications in the field of Developmental Science. The aim of the journal is to bring together work by researchers across different subdisciplines within Psychology, as well as across other disciplines, such as Psychology, Anthropology, Biology, Communication Science, Neuroscience, Linguistics, Medical Science, Ethology, History, Philosophy, and Sociology, to discuss questions relevant to human development.

The editors are sending this Call for Papers requesting original contributions, that is, those that have not been previously published or have not been submitted to another journal. All submitted articles will undergo a multiple peer-review procedure. Authors may choose either a double-blind or an open review procedure.

What kinds of contributions can be submitted?

All contributions should be written in English. They may be original empirical research papers, short empirical research reports, or theoretical contributions pertaining to questions and problems of Developmental Science. Reviews providing a systematic overview or presenting an evaluation of the state of the art of a certain field of research, as well as methodological contributions, such as modelling of change and / or developmental systems, are welcome.

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