Chapter 3
Child Development from the Perspective of Behavior Analysis

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If you are a behavior analyst working with children, you may have wondered how Behavior Analysis deals with the issue of child development. Child development may be considered a secondary issue for some, since much of the observed phenomena could be explained through the concept of learning. On the other hand, some point to the need to look at biological aspects and patterns that are repeated in most children. In any case, childcare settings are generally permeated by age norms, by expectations of skill acquisition related to different phases, and by conceptions based on maturation. Thus, it is important that the behavioral psychotherapist can understand and describe development, or the phenomena grouped under this label, in a way compatible with the radical behaviorist philosophy. This chapter was designed to meet, at least in part, this need. Therefore, in the following lines, we will present the analytic-behavioral concept of development, interpretations consistent with the approach on terms related to this label, and some questions that still exist in the area.

What Is Development for Behavior Analysis?

In the analytic-behavioral view, development can be understood as *progressive changes in the interactions between behavior and environment* (Bijou & Baer, 1961). The focus is not exclusively on organic or environmental variables but also on how the interaction between these variables occurs and changes over time. The

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interactions are always continuous, interdependent, and bidirectional – that is, in a cycle that begins in fertilization and only ends with the death of the individual, the actions of an organism impact the environment, and this impact has a feedback on the organism (Vasconcelos et al., 2010).

The "progressive" aspect indicates that each observed change in behavior occurs not only influenced by current environmental variables but also by interactions that preceded it (Rosales-Ruiz & Baer, 1996). Developmental analysis considers interactions that immediately preceded the change as well as any relevant historical variables (Rosales-Ruiz & Baer, 1996). What is observed, in general, is that previously acquired behavioral competences can become facilitating or hindering conditions for the construction of new competences. Moreover, the functions acquired by stimuli throughout history will influence how the environment will affect the organism and its actions at the moment analyzed, changing the present relations and facilitating or hindering new learning. Considering that historical aspects may even hinder new learning, it is important to highlight that the progressive character has no relation to the notion of progress, improvement, or single direction of development (Vasconcelos et al., 2010).

The study of development is diachronic, i.e., it analyzes the phenomenon over time. It does not, however, remove the need for a synchronic analysis, i.e., a functional assessment of the present conditions and processes that are relevant for an interaction to take place (Gehm, 2013).

The Issue of Age and Developmental Milestones

Although the study of development necessarily involves a temporal cutout – after all, to notice any change in a phenomenon, it is necessary to observe it in at least two moments – the mere passage of time should not be considered as the cause of the observed change (Harzem, 1996; Pelaez et al., 2008; Rosales-Ruiz & Baer, 1996). Often, changes are correlated to certain ages, and, therefore, confusion is often noted that leads people to interpret age as the cause. In the analytic-behavioral view of development, it is understood that changes always occur as a function of interactions, not as a function of the mere passage of time. For example, a child normally begins to walk between 11 and 18 months. This is the average time it takes to experience enough interactions with the environment to enable the acquisition of motor coordination, muscle strength, and balance, among other repertoires and physical conditions that usually make up the act of walking. If, instead of living these interactions, the child remains bedridden and immobile for the first 18 months of life, it will be difficult to learn to walk in this period, even though it has reached the age at which learning normally occurs. From this, we conclude that a child not walk because he/she is 18 months old, but because, over 18 months, interactions were made possible that culminated in learning to walk.

Once this is elucidated, it is worth asking, then, what would be the relevance in doing age or temporal analysis and/or categorization. Gewirtz and Peláez (1996)

suggest that temporal units can be used as descriptive, classificatory, or summary variables that indicate sets of responses more likely to be found in groups of people of the same age. In other words, it is a way to systematize which repertoires are expected at specific times in life. An analysis of the early years allows us to elucidate, in parts, how age regularities are constructed.

It is noteworthy that early life is marked by environmental regularities that favor the construction of similar developmental histories among the members of a species. From fertilization to birth, the environmental context (uterus) and the organic conditions of embryos/fetuses are relatively similar in different individuals with the same gestational age. This makes it highly likely that organism-environment/behavior-environment interactions are also similar across all, resulting in traits, repertoires, and learning tendencies common to most individuals at birth (Gehm, 2011, 2013, 2017). Although environmental influences present during intrauterine life (i.e., use of certain substances, maternal health conditions, and stress experienced by the mother during pregnancy, among others) may lead to interindividual differences, including at the epigenetic level, this is possibly the time of life of greatest environmental and organic similarity between members of the species.

During the first months of life after birth, a baby's needs are largely related to maintaining survival. Different infants have common needs, and so they select similar care responses from their environment. Although some environmental variability is allowed, it is still a time in life of great similarity, even across cultures. For example, it is possible to choose to feed the infant on demand or at specific times (variable component), but the vast majority of infants will nevertheless be fed milk through suckling responses (similar component). As in the prenatal period, despite some environmental variability, common aspects promote similar interaction histories and thus similar repertoires among infants, justifying the description of developmental milestones.

The increase in the child's history of interactions with the environment is accompanied by biological changes and by expansion of the repertoire of environmental control, which results in increased possibilities of choice on innumerous aspects. After a few months, the individuals, already less dependent on contingencies especially directed toward maintaining survival and with histories of increasingly individualized interactions, present greater variability of interests, experiences, and behaviors, and, consequently, there is a reduction in age classifications and in the stipulation of developmental milestones specific for each age.

Based on this, cultural contingencies are possibly the main responsible for the regularity of repertoire among individuals of the same age group, especially those provided by the school context. At school, relatively similar contingencies are established for learning specific behaviors at each age (Gewirtz & Peláez, 1996). Such contingencies are usually planned according to a standardized curriculum matrix among educational institutions, correlated to school years (Gehm, 2013). In Brazil, for example, there is the Common National Curriculum Base (BNCC), developed by the Ministry of Education (Base Nacional Comum Curricular, 2017, 2018), which aims to guide the pedagogical proposals of all public and private

schools, establishing what knowledge, skills, and abilities are expected throughout basic education.

Therefore, added to a similar genetic makeup among individuals, relatively standardized environments early in life and common cultural contingencies throughout ontogeny produce age similarities. But how important is it to know what is expected at each age? Knowing whether or not a child has reached a certain behavioral expectation at the expected time is useful when it opens up more relevant questions. Faced with frequent delays in different developmental milestones, the behavior analyst may ask: Why has that milestone not been reached? Are there organic conditions that are hindering learning? Is the child's environment adequate to develop that skill? How should the environment be changed so that certain skills can be established? Generally, questions like these lead to useful information, both for formulating a functional analysis and for planning and implementing appropriate interventions.

The description of what is expected in each age group, ideally, should be sought in the child's community (Bijou & Baer, 1961). If the child already attends school, for example, it would be interesting to visit the place and compare the child's repertoire to that of his/her peers of the same class and/or age. If it is not possible to compare the child's repertoire with peers, for the early years of life, we suggest consulting development guidelines or handbooks usually provided by health agencies.

In short, as described by Gehm (2013, p.19), "it can be said that the main role of time in the analytic-behavioral study of development is to characterize the dimension throughout a study is elaborated. Whereas age, as a temporal dimension, can act as a descriptive variable, with which certain changes are correlated, in order to summarize and systematize information. Still, it is critical to understand that age and time are not causal factors." The most important aspect is to understand what occurs during the passage of time. Once discrepancies are found between what is expected for a given age and a child's repertoire, further investigation should be conducted to seek functional relationships and/or physical conditions that may be contributing to that scenario.

Prerequisites and Behavioral Cusps

As mentioned earlier, development is *progressive*, and it is pertinent to analyze how historical and current conditions impact new learning. In this line, developmental psychology has described *prerequisites* for the acquisition of specific skills, that is, skills that, once learned throughout the history of the individual, become conditions for the acquisition of specific repertoires.

The adoption of the concept of "prerequisite," however, is not unanimous among behavior analysts who study development. In Baer and Rosales-Ruíz (1998) and in Rosales-Ruiz and Baer (1996), its use is criticized, and it is suggested that the term could bring the perspective that, for the learning of certain repertoires, there would

be a fixed sequence of development. That is, the learning of a prerequisite (behavior 1) would be a necessary, although not sufficient, condition for another specific learning to occur (behavior 2). Thus, there could not exist any situation in which behavior 2 would be learned before behavior 1. But how to prove that a given sequence is the only possible way for the acquisition of a repertoire? In the impossibility of proof, the aforementioned authors suggest that the use of the concept is unproductive.

Gehm, on the other hand, proposes that the term be adopted without associating it with an immutable sequence. According to her, "in practical terms, if we know that the acquisition of one behavior increases the probability of issuing a second, […] we have useful knowledge. That is, the term prerequisite may be convenient to the behavior analyst if it is adopted *probabilistically*" (2013, p.33). Therefore, any repertoire that, when learned, increases the likelihood of learning another would be a prerequisite. An example can illustrate this point: Kuhl (2011) proposes that sensitivity to social reinforcement and sensitivity to language influence each other reciprocally during development. From a probabilistic definition, we can understand sensitivity to social reinforcement as a prerequisite for language learning, by significantly increasing the probability of its acquisition. Such a conception may help explain not only how typically developing children acquire language but also why children with autism spectrum disorder show deficits in both sensitivity to social stimuli and language. Yet, it is possible that for those children, language learning is established through reinforcers other than social stimuli. Therefore, it would not make sense to point to social learning as a condition that would need to be met for language development but rather as a condition that would increase the likelihood of its development.

Regarding language expression, another example can also be cited. The first words are usually uttered between 12 and 24 months of age, when the child is exposed to adequate stimulation. In turn, *self-control*, an ability related to the suppression of a preponderant response (i.e., the inhibition of a response with high probability of emission – which would be under control of immediate consequences – in favor of a response under the control of delayed consequences) begins to be observed between 3 and 5 years of age (Best & Miller, 2010). Would language be, a prerequisite for the development of self-control? According to Best and Miller (2010), 3-year-old children can already understand verbal rules, and understanding descriptions of contingencies or verbal rules may be important for the sensibility to delayed consequences. Language could then be a prerequisite – a condition that increases the likelihood – for the development of self-control.

Still based on the understanding of development as progressive, some behavior analysts have proposed the concept of *behavioral cusps* (Rosales-Ruiz & Baer, 1996, 1997; Bosch & Fuqua, 2001; Hixon, 2004; Oliveira et al., 2009). The term was first coined by Rosales-Ruiz and Baer, who defined behavioral cusps as an interaction or a complex of interactions "that allows access to new reinforcers, new contingencies, new reinforcement communities, and, as a consequence, new behavioural cusps, which are not always positive or desirable" (1996, p.219). This is therefore a crucial developmental change, which has effects beyond the change

itself. For example, when babies begin to crawl, access to varied environments and contingencies increases. Thus, they can reach toys and family members more easily; they can crawl after dogs and develop new interactions with them; they may have their muscles strengthened by exercise, facilitating the acquisition of walking; and they may begin to receive sanctions for accessing more dangerous objects, among other changes. Crawling would therefore be a behavioral cusp.

Such concept enables a type of reasoning that is interesting to applied behavior analysis: "what are the interactions that I, as an implementer, need to plan so that a boom of changes (i.e., access to new contingencies, learning, and reinforcers, among other aspects) occurs in the life of that patient?" For example, what would be the first intervention goal when faced with the case of a 10-year-old child who cannot read/write, has no friends at school, has a poor relationship with the teacher, and displays task-avoidance behavior? The answer to this should arise from a functional analysis. However, it would be plausible to assume that the researcher, based on the concept of behavioral cusp and a compatible functional analysis, would choose reading/writing as the first target of intervention, even if this aspect was not the one that produced most suffering to the child. Learning to read and write would possibly change all of the child's interactions in the classroom, possibly because of the following reasons: (1) make it more likely that the teacher would praise his/her behaviors, (2) make task-avoidance behaviors less likely, (3) allow for greater integration into everyday classroom activities; and thus (4) make it more likely that the child would develop good interactions in group activities and, perhaps, friendships with peers.

It is important to note that the concepts of behavioral cusp and prerequisites are complementary, so that both can serve for developmental analyses. Whereas a prerequisite is understood as a behavior that favors the acquisition of another specific behavior, a behavioral cusp is seen as a set of interactions that largely modify the individual's life. In other words, when behavior analysts question themselves about prerequisites, they are looking at specific learning, whereas when they question themselves about behavioral cusps, they are analyzing interactions that can generate global changes in the subject's relationships. It is worth noting that there is no impediment for the same behavior to be considered, at the same time, a prerequisite for specific learning and a behavioral cusp.

Maturation

Developmental psychology generally addresses not only analyses of the impact of past behavioral interactions on new learning and relationships but also how biological components play a role in determining change. The fact is that there is no development without a biological body, which is in constant transformation. In developmental psychology, the term "maturation" is used broadly to refer to these biological transformations that an organism undergoes during life. Importantly, while maturational aspects influence and integrate changes observed at the

behavioral level, behavior-environment interactions to which an organism is exposed throughout life also impact its biological components.

According to this conception, it would be salutary to consider maturational aspects in the behavior analysis' perspective of development. The problem, however, lies in the way maturational explanations are sometimes employed. The term maturation has already been criticized (Gewirtz & Peláez, 1996; Schlinger, 1995; Skinner, 1974) for being frequently associated with *genetically determined developmental plans*, which would define which transformations individuals should undergo during life, despite their lived experiences. Explanations like these generally ignore the influence of the environment in determining behavior, assuming an invariable sequence of changes, which would not be compatible with the analytic-behavioral view of development.

Another problem with some maturational explanations lies in the lack of biological evidences (Gewirtz & Peláez, 1996). That is, many times, such explanations are not based on research or direct observations of the biological phenomenon but rather on assumptions derived exclusively from the observation of behavioral changes (Gewirtz & Peláez, 1996; Rosales-Ruiz & Baer, 1996). Efforts to seek biological bases for behavioral changes have been observed (Tau & Peterson, 2010), but, not infrequently, it is noted that the attribution to biological factors is made recklessly, without the necessary substantiation, attributing, generically, to biology everything that cannot be explained with existing psychological concepts. For example, there are behaviors and sensitivities that are often understood, in our area, as exclusively determined by biological components, when, in fact, they also depend on the history of interactions between the behavior and the environment to occur (Gottlieb, 1997; Held & Hein, 1963; Kuo, 1967). The study by Held and Hein (1963) can illustrate this issue by demonstrating how the emergence of reflex behavior is influenced by previous behavioral interactions.

Held and Hein (1963) investigated some determinantes of a paw-placement response in cats, which is considered an unconditioned response similar to the parachute reflex in humans. In this research, cats were reared, from birth, in the dark (visual deprivation) and, from the eighth week of life, were exposed to visual stimulation (stripes) only for a few hours a day. Half of the subjects had their movements enabled during stimulation ("active"), so that the stripes changed as they walked. The others ("passive") were tethered to a box, being passively transported during stimulation – so for them, the visual change was not contingent on walking. After that, the paw-placement responde was tested, and it was found that only the "active" animals presented the expected response. Their visuomotor experience, understood as the change in visual field as a function of walking, was apparently crucial for the development of the response. That is, specific histories of interaction between behavior and environment were necessary for the development of a reflex repertoire, so that the cause cannot be attributed exclusively to biological factors.

Another example refers to how some "unconditioned" sensitivities are established throughout ontogenesis. Research by Gottlieb (1997) found that the sensitivity of ducks to the call of their own species is established through prenatal exposure to vocalizations emitted by the embryo itself within the egg and/or to vocalizations

emitted by other members of the species, whose sound penetrates the intra-ovine environment and reaches the embryo. In the absence of such sound stimulations, the "unconditioned" sensitivity to the species call is not established. Similarly, in the human case, the reinforcing value of some stimuli is established while still inside the womb. More specifically, research suggests that frequent exposure to a stimulus during the prenatal or neonatal period may result in increasing its reinforcing value or decreasing its aversive value – a process known as *learning by exposure or familiarity* (Gehm, 2011; James, 2010). This concept allows us to understand, for example, how sensitivity to the human voice, considered an unconditioned reinforcer, is established through the prenatal ontogenetic history of exposure to this stimulus and not only by maturational aspects.

Within the discussion on maturation, there is a tendency to give excessive or unfounded weight to biological factors. Although, it is undeniable that changes in the organism impact behavior, as well as changes in behavior alter the organism. Considering this, behavior analysis perspective highlights the importance of considering maturational aspects in a judicious manner, based on scientifically grounded biological factors and their interaction with behavior.

As suggested by Rosales-Ruiz and Baer, "[w]e do not deny that biology is implicated in development, that is beyond doubt, but for us the important thing is to discover biology, not to invent it" (1996, p. 229). To illustrate the importance of exploring the physiological factors correlated to behavioral traits, let us take as an example the *stress hyporesponsive period* (SHRP) – a typically observed developmental phenomenon that occurs over the first 14 days of life in rats and over the first 12 months in humans. During SHRP, the endocrine axis known as the hypothalamic-pituitary-adrenal (HPA) axis is shown to be relatively inactive, and circulating corticosterone/cortisol levels are low, even though some stressors are present (Callaghan & Richardson, 2013; Gunnar & Donzella, 2002; Levine, 2001; Sapolsky & Meaney, 1986). At the same time, in behavioral terms, lower responsiveness of organisms to aversive stimulation is noted (Callaghan & Richardson, 2013; Gunnar & Donzella, 2002; Levine, 2001; Opendak & Sullivan, 2016; Sapolsky & Meaney, 1986).

Studies with rats indicate that, in this phase, a neutral stimulus paired with an unconditioned aversive stimulus ends up acquiring reinforcing rather than aversive properties (Moriceau et al., 2010). Such functioning allows greater adaptation to the environmental context experienced by the puppy. More specifically, the duration of the SHRP coincides with a period in which the pup is more dependent on maternal care – a period in which biting, stepping, and the imposition of painful stimulation by the mother on the pups are also observed (Moriceau et al., 2010). If aversive pairings were formed in the same way as observed in adults, the mother could acquire aversive properties, being avoided by the pup – which would clearly bring disadvantages for its survival. The end of the SHRP is close to the period when rats and humans begin to move independently, and therefore it is necessary to protect themselves from potentially aversive stimuli present in the environment.

The organic characteristics of SHRP (inactivity of the HPA axis and low corticosterone/cortisol levels) seem to help explain why pups learn to approach rather than avoid stimuli associated with pain (for a more detailed explanation, see

Opendak & Sullivan, 2016). Delving into SHRP is beyond the scope of this chapter, but it is worth mentioning that the biological features described can be considerably altered under atypical environmental conditions, such as in the absence of the mother, in both humans and mice (see Gunnar & Donzella, 2002). Thus, it seems that (1) there is an agreement between biological development and behavioral predispositions of each phase and (2) this biological development depends on the environment in which the individual is inserted, occurring in different ways in typical and atypical environmental conditions.

Through the discussion on SHRP and its effects on behavior, it is clear that there is an important interaction between physiological and environmental conditions, determining how the course of individual development will unfold. It is of great importance that the behavior analyst also seeks to know the physiological changes and sensitivities of the organism to the environment that are specific to each moment of development, to guide his intervention and to better guide parents on how to conduct certain situations. To unveil the harmony between the changes observed at the biological level and those observed at the behavioral level, it would be important to have more initiatives to integrate the data already produced from the different sciences involved.

Sensitive Periods of Development

As illustrated by the SHRP, there are organic and environmental characteristics that are more common in certain periods of ontogenesis. In these cases, it is not the age that determines the emergence of such features, but age descriptions become useful by allowing the systematization of phenomena common to most individuals at specific moments of ontogenesis. Among these phenomena, it is observed that certain periods of ontogeny are more favorable for the acquisition of specific repertoires, so that learning is highly likely in the face of appropriate stimulation. On the other hand, once this period has passed without the repertoire having been acquired, its learning may be hindered. Developmental psychology has called these moments sensitive, critical, or privileged periods.

Oral language can be used as an example to illustrate this issue. There is an accumulation of evidence to suggest that exposure to appropriate stimulation during early childhood differentially favors oral language learning (Kuhl, 2011). Evidence from cases of extreme environmental deprivation, child neglect, congenital deafness, acquired brain injury, or learning a second language suggests that the lack of such stimulation in this age group, for most individuals, may result in greater difficulty in acquiring oral language. Undoubtedly, for each of these conditions, there are intervening variables that should be considered in the analysis, but in general, compiled data indicate that when acquisition occurs later in life, learning may be deficient in some aspects, especially regarding phonetic and syntactic aspects (Kuhl, 2011; Morgan, 2014). Therefore, it has been suggested that early childhood is a sensitive period for learning this repertoire.

But what makes certain periods of time be more favorable for the acquisition of certain skills? Some authors have suggested that as life interactions occur, organic plasticity and behavioral potentialities become more limited – a phenomenon known as "canalization" (Kuo, 1967; Gottlieb, 1991). Once canalization occurs, contingencies that could return the organism to its initial potentialities are unknown (Gehm, 2017). Therefore, early life would be a time of lower accumulation of interactions, of less channeling, and, therefore, of greater potentiality for different learning. In addition, as already pointed out, some age groups correlate with specific environments (uterine environment for fetuses and intense maternal care environment for newborns, for example). Such environments are unlikely to be repeated in the same way later on. Thus, some stimuli are restricted to certain periods of ontogenesis. Finally, it is important to note that culture has norms based on age groups, in order to deal differently with individuals of different ages – for example, people use simpler commands, articulate more phonemes, and play sonorous games with words with a 1-year-old baby who doesn't speak, which would not happen with a 13-year-old teenager who couldn't speak. In other words, the verbal community is prepared to teach specific skills in certain age groups and not in others.

Based on this, it is considered that sensitive periods are multidetermined by maturational and environmental variables. This is possibly a time in life when there is an optimal match between organic characteristics and environmental stimuli relevant to the acquisition of a given skill. What should be emphasized here is that the behavior analyst should program teaching contingencies that are compatible with the individual's development. One should take into consideration the existence of optimal moments for teaching certain skills, when organic characteristics and natural contingencies can be taken advantage of without further environmental arrangements. On the other hand, once such settings are no longer available, it is up to the behavior analyst to think about how to arrange the environmental contingencies for teaching the specific skill, considering the history of that organism and its biological characteristics at the time of the intervention.

Risk Factors in Early Childhood

The first years of life are usually considered critical for children's development, with studies showing that early childhood experiences may have more significant influences on how the individual develops at molecular, brain, and behavioral levels than those observed in other moments of life (Meaney & Szyf, 2005; Pisani et al., 2018; Szyf et al., 2008). Some conditions, when present early in life, seem to make individuals more vulnerable to the development of emotional, social, cognitive, and motor skills and competencies that deviate from what is desirable or expected in our culture. Such conditions or variables, named here as *risk factors*, may include biological and genetic attributes of the child and/or the family, as well as community factors that influence both the child's environment and his/her respective family (Maia & Williams, 2005).

Exposure to extreme stressful situations (e.g., early separation from caregivers; sexual, physical, and/or psychological abuse; maltreatment; childhood neglect or social deprivation) is considered to be one such risk factor for child development and, in conjunction with other factors, can negatively impact on the acquisition of language, cognitive skills, and on the ability to attach affectively and to regulate oneself emotionally (Carpenter & Stacks, 2009; Kreppner et al., 2007). A historical example that also illustrates how negative early experiences can be risk factors for development is the case of orphans in Romania. From 1966 to 1989, political maneuvers instituted by the then Romanian political head, Nicolae Ceausescu, put strong pressure on birth rates to rise in Romania. Births increased sharply, but families could not afford to raise the children, who were then sent to shelters. Conditions in the shelters were extremely hostile, with poor hygiene, malnutrition, and a severe lack of emotional or verbal interaction. A year after the deposition of the Romanian leader, the case of the Romanian orphans gained international repercussion, and many families from other countries adopted the abandoned children. Several researchers approached the subject, and studies followed the development of these children, who were then adopted and placed in much more favorable living conditions.

Data obtained through longitudinal studies identified that children who were adopted, i.e., placed in favorable environments when they were still young, showed greater gains, in relation to several parameters assessed, than children who remained in institutions. Children adopted before 24 months, for example, tended to have more secure attachments with their caregivers than those adopted after this period (Smyke et al., 2010). Children adopted before 24 to 26 months also showed better stress response, better mental health, and better language development than children adopted later (Black et al., 2017). Still comparing different environmental conditions to which Romanian children were exposed to and their implications, Wade et al. (2018) assessed indicators of psychopathology among Romanian orphans aged 8 to 16 years. Data obtained through assessment conducted when all participants were 16 years old showed that those who remained institutionalized showed higher indicators of psychopathology when compared to those who were adopted at age 8. In addition, the group that was adopted at age 8 showed lower rates of externalizing problems.

But how do risk factors impact on development? To answer this question, it is important to look both at the conditions that resulted in the risk factor and at the cascade of events that occurred between the specific factor and the observed developmental outcome. It is worth asking, for example, what happened between the maltreatment experienced at the age of 2 (risk factor) and the difficulty in becoming affectively attached at the age of 20 (observed outcome). It is unlikely that something that happened in the first 2 years can, in isolation, explain an outcome observed in adulthood. It is necessary to look at a complex and individualized network of interactions to understand this relationship. For example, maltreatment may have continued throughout the individual's history in all relationships experienced by the person, so that he or she may never have had the opportunity to be in a secure caregiving relationship and thus learn to attach more adequately.

The research on risk factors brings correlations between the events "risk factor" and "developmental outcome," not committing to inform directly about causes. In other words, it is not possible to state that the risk factor caused a particular outcome. However, correlational data allows the behavior analyst to be aware of some events that have a greater probability of influencing the establishment of certain conditions and to look at this in intervention planning. For example, when faced with the fact that maltreatment is a risk factor for attachment difficulties in adulthood, some aspects should be considered: (1) when faced with a child who suffers or has suffered abuse, the behavior analyst should ask himself how to organize the environment in such a way as to promote an adequate and secure attachment history from then on, since there is an increased probability that this child will become an individual with attachment difficulty; (2) when faced with an adult with attachment difficulties, it would be interesting to investigate the existence of a history of maltreatment, given that in the general population there is an association between the two; and (3) when faced with a community that presents child maltreatment, one should ask about the impact of preventing maltreatment in the family context on the later development of social bonds and, based on this, evaluate the relevance of preventive strategies.

Knowing risk factors has, therefore, practical relevance, allowing, among other things, a collection of data oriented toward their identification in the individual's history, the elaboration of preventive strategies that prevent risk factors from becoming established in the individual's life and the elaboration of interventional strategies in case prevention is no longer possible. In addition, one can encourage the creation of conditions that favor the development of *protective factors*. Protective factors can be defined as those factors that modify or change the individual's response to some environmental condition that predisposes to an undesired outcome, such as repertoires that improve or change the response of individuals to hostile environments, for example, problem-solving skills (Maia & Williams, 2005). In this sense, studies show that early interventions designed to remove or mitigate the effects of exposure to unfavorable conditions during specific periods of development can prevent negative sequelae (Tarabulsy et al., 2008; Welsh et al., 2007), opening an important space for the behavior analyst.

Final Considerations

In summary, development, understood as progressive changes in the interactions between behavior and environment, should be the object of attention of behavior analysts, especially those interested in the behavior of infants, children, and adolescents. It is noteworthy that, in behavior analysis, most studies with humans have been carried out with individuals in adulthood, with little emphasis on the organic and environmental specificities of other age groups. Such knowledge could be directly transposed to children only if children were considered as mini-adults, rejecting the existence of particularities peculiar to this period. On the other hand,

the study of child development may allow the development of more adequate functional analyses that consider the characteristics of individuals at different moments of ontogenesis, as well as more effective prevention and intervention strategies.

If, on the one hand, the study of development can be useful to the behavior analyst, on the other hand, the behavior analysis' perspective can be useful to the developmental sciences. The history of developmental psychology is marked by age categorization and expectations about child behavior, often defining developmental milestones without clarifying how the environment should be arranged for such milestones to be reached. Perhaps one of the greatest contributions of behavior analysis is to denaturalize such standardization, elucidating the interactions that underlie the regularities observed among different individuals with regard to development, as well as assisting the planning of effective contingencies for the development of new skills.

In this sense, as mentioned earlier, changes observed throughout ontogenesis are often attributed exclusively organic causes, ignoring behavior-environment interactions that may, in a complementary way, help explain the phenomenon. In this respect, it is also possible to see contributions of behavior analysis, by fostering explanations that consider the role of the environment in determining change. Such a proposal does not mean to diminish the value of organic variables in the analyses but to include them as long as they are scientifically grounded, also expanding the view to other variables that may influence the phenomenon. The limits, possibilities, and paths of development for different repertoires should, in an ideal world, be defined from scientific evidence coming, preferably, from different fields of knowledge (such as biology, psychology, anthropology, and pedagogy, among others).

Finally, we highlight the importance of building new research that will allow, perhaps in the future, the construction of a compilation on the most important prerequisites for specific repertoires, on the behavioral cusps most relevant for healthy development in given contexts, on sensitive periods of development and their causes, as well as on the integration between maturational, cultural, and behavioral aspects in determining the regularities observed in the development of most individuals of a species. With this knowledge, the behavior analyst can assume a very important role in planning contingencies that ensure favorable conditions for child development, both at the individual level, for example, in the therapeutic context, and at the collective level, in educational institutions or in the construction of public policies.

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