BULGARIAN ACADEMY OF SCIENCES
INSTITUTE FOR POPULATION AND HUMAN STUDIES
Maria Atanassova-Trifonova

DEVELOPMENT OF MOTOR SKILLS AND DISCOVERY OF THE WORLD DURING INFANCY
(from birth to first year)

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The book explores the theoretical foundations of the developmental cascades approach and outlines its methodological parameters. This framework aims to enhance the understanding and explanation of mechanisms driving change in child development. At the empirical level, this approach emphasizes examining relationships between developmental processes across various domains. It also adopts the principles of variability and diversity in developmental pathways as a core scientific tenet.

In this context, the present study aims to offer a comprehensive theoretical rationale for the relationship between motor development and children's exploratory activity, while also empirically examining their concurrent interactions. Significant attention is given to the attachment system and the process of building emotional bonds in the child-parent dyad and its role in promoting the child's curiosity and initial exploratory attempts to understand the world. Additionally, the author has conducted two longitudinal studies of children in this age period, which serve as a guide for the future longitudinal research with more frequent observations (Atanasova-Trifonova, in press).

The development of new motor schemata is a crucial form of exploration, enabling children to discover the world, navigate space, and understand their body's capabilities. Each newly acquired motor skill significantly enhances a child's ability to perform more complex tasks and engage in a deeper exploration of their environment, objects, and the patterns that govern them.

This work examines the relationship between a child's motor skills and various forms of exploratory activities from birth through the first year of life. Key motor milestones serve as reference points—referred to as developmental "windows"—which metaphorically represent periods of heightened openness to new experiences and change.

The first developmental window covers the period from birth to three months of age. During this period, the child's movements are predominantly chaotic; however, they actively accumulate motor experience as their muscles strengthen and limb movements become more coordinated. Exploration of their own body and nearby objects—whether self-initiated or intentionally introduced by a parent—occurs through repeated visual fixations. This process is facilitated by the achievement of increasingly effective visual exploration, which is influenced by the infant's ability to hold firmly their head. The results of our study show that the development of gross motor skills in the first months is a predictor of higher levels of activity in visual stimuli' exploration. The infants' ability to turn their head from side to side and to keep it up during tummy time allows them to see a broader and more stable visual picture of the surrounding reality. At the same time, the role of the parent is important for a more active exploration of this reality, both in creating greater excitement and arousal of the infant's interest and in directing their attention towards the important aspects of their surroundings.

Although newborns differentiate the parent from other people, our research shows significant individual differences and allows us to conclude that the more distinguishable the figure of the parent for the child, the stronger he/she can attract and direct the child's attention to the surrounding objects and its properties. The effect of motor skills and parental involvement in stimulating the child's active visual exploration is complemented by his/her attention sustainability, even if short span.

During the second window – from the fourth to the sixth month – a new motor form appears: the ability to reach and grasp objects, which facilitates the transition from predominantly visual to manual exploration of objects. The child's attempts to reach for objects increase, many of which end with successful grasping, accompanied by a positive emotional reaction. This response is indicative of the motivating function of the achieved goal in initiating new

exploratory actions towards the objective world. During this period, about 44% of children demonstrate varying degrees of success in crawling, and the results of the empirical research reveal statistically significant differences in their level of activity in exploring objects. This activity is significantly higher (almost by about half a standard deviation) in children who master crawling compared to those who can only crawl for a short distance. During this period, dyadic interactions exhibit increasing synchrony, laying the foundation for the gradual development of more complex joint behavioral schemes. Temporal contingency in coordination of joint actions reinforces the child's learning of causal relationships.

Infants are more successful at grasping objects, adapting to their physical properties, and handling them once they master the sitting position as well as standing upright in one place. These motor achievements manifest themselves in the third developmental window, between seven to nine months. The results support the hypothesis of our study that the success of imitating actions is related to these motor skills, as well as the child's independent exploratory activity, and the higher qualitative degree of relatedness within the dyad with parent as illustrated by more active play interactions. This is a period of increasing independence for the child, both in choosing objects of interest and in their actions with them. Thanks to the ability to have free hands and the skill to move by crawling towards interesting objects, the child initiates increasingly diverse manipulations, performs more purposeful actions, and anticipates outcomes.

The results obtained in the present study support the idea shared by numerous scientists that the true nature of imitation lies in its social conditioning, which leads to the mastery of social norms and the strengthening of connections with other social subjects (Over & Carpenter 2012). Social motivation is particularly important for the execution of imitation, because by repeating an observed action, the child expresses the desire to participate in social interaction with their parent. The positive emotional tone and joy accompanying attempts to reproduce demonstrated actions reflect the child‘s desire to continue playing and interacting with the parent. Significant predictors of expressive communication are age, play interactions with the mother, and gross motor skills. The study of infants in the third window revealed the correlation between the child-parent dyad interactions and the success of the child's imitative behaviour related to the reproduction of a sequence of syllables.

After learning to walk, the child's attempts to explore the space and objects within it increase and become more successful. The infant discovers increasingly more physical principles governing the objects in their surroundings. One of the significant relationships revealed by the present study is between the skills required for self-care activities and the success of independent exploratory attempts. Although initially simple and not entirely successful, these attempts lead to the refinement of fine motor skills, the mastery of the functions of household objects, and most importantly, the build-up towards the concept of agency.

Communication during joint actions between children and parents becomes much more active, often involving naming both the objects they handle and the actions themselves. This interaction provides a rich environment for gaining experience and transferring knowledge, stimulating both receptive and expressive communication. The study conducted with children in the fourth window, from ten to twelve months old, found that motor achievements during this period have both direct and indirect effects on language achievements. In the latter case, the mediator of their relationship is the successful imitation of demonstrated actions. Our results complement the understanding of the mediating effect of children‘s exploratory activity, previously established only for spatial prepositions in a prior study (Oudgenoeg-Paz

et al. 2015). In contrast, the present study reveals its broader effect on both receptive and expressive language. In the context of social interactions, children master the referential function of language by receiving feedback on their pronunciation and vocalizations, as well as information from the people they engage with about the likely target referent.
Research on the complex interrelationships between different developmental domains during transitional periods of change reveals the potential for mutual influence among them. The asynchrony in their developmental trajectories suggests that some domains may naturally act as precursors for the development of others. The mechanisms through which this interdependence occurs remain to be explored in greater detail.

Chapter Three presents a summary of the theoretical principles of the developmental cascades approach, as well as the findings from empirical studies on the relationships between children's motor skills and their exploratory activity across each of the four age-related developmental windows. Additionally, it examines the processes underlying the formation of social connectedness. This chapter also addresses research approaches to atypical development and highlights the potential of the developmental cascades approach in shaping the direction and content of contemporary intervention programs.