The Multifaceted Effect of Motor Development on Cognition : An Ethological Perspective

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Something drastic occurs in the infant's life by the end of her first year: she moves from a crawling to a mostly walking creature. This change allows the young child to multiply behavioural innovations. It is noteworthy that the ability to stand and walk also seems to be accompanied by remarkable advances in cognitive functioning. A study by Verheyen, Lore Wyers and colleagues in this issue of *Developmental Medicine & Child Neurology* confirms this relation between independent walking and cognitive development and adds an interesting element: the age of independent walking might be an important indicator of the development of children with Dravet syndrome and could therefore provide useful information for the implementation of the therapeutic protocol.

Although the association between cognitive and motor development has been documented in several independent studies, the nature of the mechanisms underlying this association remain hypothetical. Based on the literature, one can identify two classes of mechanisms that can explain the effect of standing and walking on cognition.

First, locomotor development modifies the subject's point of view. It increases the scope and complexity of the visual environment, making it possible to detect and reach distant objects, thereby creating new opportunities for learning (Kretch, Franchak, and Adolph, 2014). It has been suggested that the ontogenetic development of the child thus recapitulate what happened when our hominid ancestors, confronted with the climated changes that occurred in East Africa 8 million years ago, adopted an essentially standing posture better adapted to a savannah rather than forested environment. This "east side story" theory is widely disputed today, based on archaeological evidence and the fact that bipedalism is not unique to primates living in open environments (Senut, 2006). The experiential argument, nevertheless, remains valid: the standing posture, among other consequences, frees the hands and thereby estab-

lishes a new dialogue between the hands and the brain capable of developing and enriching cognitive capacities.

Second, and not less importantly, the acquisition of standing and walking changes the way the child is perceived and interacts with his social environment (Walle, 2016). After reaching that milestone, the child engages in more and richer social interactions with caregivers which in turn enrich their verbal responses. As Walle points out, the fact that their child adopts a specifically human posture leads the parents to see her more and more ‘as an individual in his own right’. The richness and diversity of the language and vocabulary used during parent-child interactions can have positive consequences on the child's cognitive and language abilities, and in addition it is possible that her vocalisations are perceived as more ‘language-like’ given that she is seen as a more independent and intentional individual.

The exact way in which the relation between cognitive abilities and the acquisition of standing and walking unfolds during development requires further longitudinal studies. Whatever the exact nature of the mechanisms involved, it appears that the association between standing position and cognition is the result of a double movement involving, on the one hand, a change in the child's perception of her environment but also the modification of the perception of the child by her social environment. In this context, Verheyen et al's study constitutes an original and important addition to that literature as it reveals the potential influence of the age of walking on the future development of children with Dravet syndrome, a condition characterised by the added complexity of alternative individual neurodevelopmental trajectories and raising the question of the influence of seizure activity, which can potentially be modulated by pharmacological intervention.

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