

The role for context in motor development in autism

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Autism is a pervasive developmental disorder with qualitative impairments in reciprocal social interaction and communication as well as a restricted range of interests and repetitive and stereotyped behaviors. Though specific motor impairments are not part of the diagnostic criteria, the displays of stereotyped motor behaviors are, such as hand or finger flapping and complex whole-body movements. Further, persons with autism show a different pattern of body postures and use of gestures for communication and in social interaction. Motor disturbances among persons with autism are an important clinical feature, though these, in light of the cognitive impairments, seldom are seen as primary.

Disorders of coordination are seen in children with autism and Asperger syndrome (AS) as well as in those with pervasive developmental disorders not otherwise specified, with the children with AS having the least difficulties. Much work on motor impairment in the autism spectrum has focused on the clumsiness seen in persons with Asperger syndrome, in an attempt to differentiate between autism and AS. Persons with autism, however, have also been shown to have neuromotor deficits.

It is important to understand motor impairments in autism, though not considered to be among the core deficits, as these are among the early signs in infants later diagnosed with autism.

A characteristic motor impairment in autism and AS is the deficient sequencing of movement as the infant rotates from lying on its back to its stomach (Teitelbaum et al, 2004). Normally the infant develops a movement pattern from head to feet, in a corkscrew fashion. In infants later diagnosed with AS, the asymmetrical tonic neck reflex was displayed long past the time when it should have been inhibited. This means that the child rolls, or rather falls over with the whole body, not sequentially.

We have earlier argued that the ability to correctly identify and maintain an appropriate context may be the cause of some of the attentional deficits in autism (Balkenius & Björne, 2005). Here, we want to suggest a possible role of context in the development of sequential motor actions. Although well trained motor sequences can be seen as actions that are activated in rigid sequence, this may not be how such

sequences are initially learned. An alternative view is that actions are selected as the result of a two stage selection process. In the first stage the target stimulus for the action is selected, and in the second stage, the actions possible for the selected target are chosen depending on the current task context. According to this view, the initial sequentiation of actions is the result of a context based mechanisms that inhibits inappropriate or impossible actions until they can be successfully executed (Björne & Balkenius, 2005).

Learning the sequence of actions that is necessary for an infant to efficiently turn around could thus be the result of a mechanism that detects when an action is not successful and gradually sorts out the order (Balkenius & Winberg, 2004). The context in each step is here the position of the body and possibly also the memory of the previous actions.

If the autistic infant lacks the ability to maintain a context, they will not be able to inhibit actions that should not yet be executed, which will lead to an inability to learn sequential behaviors in the normal way. Instead, they would be expected to use monolithic actions that are able to obtain the desired end state, even if they are less efficient. This is exactly what is observed in the case of the rotation of the autistic infant. Furthermore, an inability to take contextual factors into account. when for example walking, would leave the modulation of movements to slower feedback systems which will result in clumsy movements. Although speculative, we believe that this view of sequence learning can contribute to the understanding of some aspects of the autistic individual.

References

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