The state-of-the-art is healthy; time to take the next step with developmental coordination disorder

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King et al. have run an exemplar study investigating force control in children with developmental coordination disorder (DCD).[1] They measured fingertip force production and control in 36 children with DCD (plus 36 controls) ranging in age from 6 to 12 years. Unsurprisingly, they established that the children with DCD were worse at force control, but also that this difference did not change with age, suggesting that the problem is a constant developmental delay along a similar developmental trajectory rather than an emerging developmental deficit.

This study should be of great interest to the DCD community for several reasons. First, the data are from an important task with implications for activities of daily living. Fingertip force control is involved in every manual task we perform, and impairments have serious consequences. This focus on a controllable lab version of an ecologically relevant task has provided key insight that can be directly translated to the clinic. I'm all in favour of studying 'model' movement tasks in the lab in order to gain a level of experimental control, but if you can achieve both control and ecological relevance, especially when studying something like DCD, then this is all the better.

Second, the authors have taken the developmental aspect of DCD seriously, and examined children over a wide age range. They had a very specific developmental hypothesis and the means to test it in a specific functionally relevant task. This methodological approach will provide a useful framework for other researchers tackling performance in other tasks.

This study is therefore an excellent step. It is still, however, quite atheoretical, and the costs of this strictly behavioural approach are beginning to show themselves. DCD research has progressed in recent years to emphasize the use of quantitative kinematic data over more qualitative assessment methods, and this has been a productive change. But we need a theory in order to understand what variations in these kinematics mean. For example, King et al. use an interesting measure of force control irregularity, the approximate entropy.[2] They note that higher irregularity indexes are associated with better performance due to the person 'efficiently exploring the available control strategies to achieve the task goal.' This is all well and good; sensitive metrics are valuable. But the question remains, why is this the case, and what about the underlying mechanism does this metric reflect? The fact that kinematics and related measures have become commonplace in the DCD research literature suggests that it's time for the field to take the next step. It's time to move on from detailing the fact that children with DCD have worse motor performance, and even move on past examining how the children differ (as in King et al.), and onto why they differ. This means tackling mechanism, which requires a theoretical understanding of the system we are studying.

Skilled movements emerge from the dynamics of perception-action systems. There is now a wide-ranging literature identifying the affordances (and perceptual information about those affordances) used to coordinate and control various actions, from coordinated rhythmic movement[3] to prehension[4] to long-distance targeted throwing.[5] The methods and tasks used in these and other papers are providing rich insight into the perception-action mechanisms underlying performance and learning. A recent example of this tested the sensitivity of children with DCD to visual information for looming objects, information which is critical for controlling, for example, when to cross the road.[6] Applying the full range of perceptual judgment and perceptually guided action tasks and analyses to DCD can only help make our experimental findings even more immediately relevant to clinical practice, as they allow us to identify both how and where to target interventions for maximum effect.

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