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## **Oculomotor control in DCD children with and without developmental dyslexia: What is the impact of co-occurrence between neurodevelopmental disorders?**

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### **Abstract :**

**Introduction.** In previous studies, we showed that the perceptual low-level pre-processing step that is responsible for landing position pattern in oculomotor control is not yet implemented in dyslexic children without developmental coordination disorder (DCD). This result has been interpreted with the idea that saccade computation (i.e. *where* and *when* the eyes land in a word) is not dysfunctional but rather a mirror of their less reading exposure (e.g. Bellocchi et al., 2013). In the same vein, some studies suggest a delay in the maturation of low-level oculomotor skills in children with DCD (e.g. pursuit system, Robert et al., 2014).

**Aim:** Considering that DCD and developmental dyslexia (DD) are often associated, the aim of the present study was to investigate the role of co-occurrence between these two disorders in saccade computation.

**Method:** We assessed the eye movements of four groups of children (12 DCD children with DD, 11 DCD children without DD, 20 DD children without DCD and 29 typical developing children – mean age: 117,3 months; SD: 10,2 months) using an oculomotor bisection task (participants were asked to move their eyes to a position they thought to be the middle of the stimulus). The type of stimulus - linguistic factor (words vs non-linguistic stimuli) and discreteness (lines vs strings of hashes) - in combination with the stimulus presentation side (left vs. right) were manipulated.

**Results:** Main results showed differences between groups with regard to saccade latency: “DCD + DD” and “DCD only” groups were slower compared to typical developing children in programming their first saccade. Moreover, in the LVF those two groups made shorter saccade size, suggesting that they struggled to reach the preferred viewing location (PVL) in this visual side. Furthermore, those two groups seem to suffer more for the absence of discreteness of the stimuli in order to compute their saccades and move their eyes in the middle of the stimulus. Finally, results seem to suggest differences between children with DCD (with or without DD) and children with DD only.

**Discussion:** Overall, it seems that no differences emerged between “DCD+DD” and “DCD only” groups, suggesting that co-occurrence in itself does not sharpen difficulties in saccade computation. However, the presence of a motor disorder seems to generate a dysfunction in saccade computation. These results strengthen the importance to take into account oculomotor control involved in visual word recognition for clinical assessment and intervention in children with DCD.

### **References:**

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Robert, M.P., Ingster-Moati, I., Albuisson, E., Cabrol, D., Golse, B., & Vaivre-Douret, L. (2014). Vertical and horizontal smooth pursuit eye movements in children with developmental coordination disorder. *Developmental Medicine & Child Neurology*, 56, 595–600.

**Keywords:** saccade computation; eye movements; developmental dyslexia; developmental coordination disorder; co-occurrence.