

## EXPLORING THE SWARMING EFFECT IN CHILDREN'S FOOTBALL

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### **Introduction**

In social neurobiological systems, such as colonies of animals or traffic networks, there are countless examples of spontaneous pattern formation on the basis of local inter-individual interactions. Likewise, coherent sub-units within sports teams often emerge in games demonstrating a shared capacity between players to make important decisions about how and when to attack or defend (Goldstone & Gureckis, 2009). We explored whether collective self-organisation behaviours exist both within and between teams in children's football.

### **Methods**

10 inexperienced football players (age = 6 years old) were allocated into two teams of five. The children played against each other in two games for 20 minutes. The indoor pitch size was changed prior to each half (Game 1: 1<sup>st</sup> half 10 x 20m, 2<sup>nd</sup> half 15 x 30m; Game 2: 1<sup>st</sup> half 15 x 30m, 2<sup>nd</sup> half 10 x 20m). Over-head video footage recorded from a high definition, digital camera fixed to the ceiling of the sports hall was used to automatically track and calculate the position and velocity profiles of players.

### **Results & Discussion**

Interpersonal distances and speeds between system agents (team mates and opponents) exemplify local interaction rules that define to some extent how much space and time can be exploited in games. Larger pitch size and lack of fatigue influenced the relative strength of the swarming effect. The collective variables that define system behavioural patterns change in a nonlinear fashion over time and obviously at different skill levels (e.g., observe the tendency to swarm around the ball shown here in children's football with the more complex inter-team symmetrical spacing typical in elite performance).

### **Conclusion**

Constraints such as pitch size, technical ability and physical capacity influence the extent to which inexperienced players 'swarm' around the ball.

### **References**

1. Goldstone, R.L. & Gureckis, T.M. (2009). *Top in Cog Sci.* 1(3):412-38.