Towards a more complex, dynamic, and personalized perspective on development

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Towards a more Complex, Dynamic, and Personalized Perspective on Development

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Wigfield and Eccles' (2022) impressive and influential work focusses on understanding human development and performance attainment. In this commentary, we would like to focus on their articulated hope that *"…. more complex system-type perspectives …. will emerge over the next several years"* (p.31). Indeed, theoretical and practical progress in motivation science can be made by relying on complex and dynamic explanations for developmental processes and goal attainment at the individual level (e.g., Den Hartigh et al., 2022; Gernigon et al., 2015; Van Yperen, 2021).

While Wigfield and Eccles' (2022) findings provide important insights into group differences (e.g., between girls and boys) in achievement-related performance, group-level findings are often limited in understanding individual processes. This *ergodicity problem* has been demonstrated across a range of psychological phenomena (e.g., Fisher et al., 2018; Molenaar, 2004; Neumann et al., 2022). An example from our own achievement domain, sport psychology, is that group level statistics based on inter-individual variation of motivation and confidence collected from athletes several weeks, could not "generalize" to the statistics of the individual athletes, based on their intra-individual variation (Hill et al., 2021).

Furthermore, when proceeding from a complex systems-type perspective, the proposed focus on largely unidirectional causality of Wigfield and Eccles' (2022) predictions is questionable. More likely, goals, expectations, task values, and performances develop out of structures of dynamically interacting (personal and environmental) components, in the form of direct, indirect, reciprocal, and sometimes hierarchical loops of reinforcement or impairment (e.g., Den Hartigh et al., 2016; Gernigon et al., 2015; Hill et al., 2018; Van Yperen, 2022; Van Yperen & Renkema, 2008). Such processes of *circular causality* (Kelso, 1995) capture the ongoing interplay among key components that give rise to the (motivational) state of the individual.

Important to note is that working from a complex, dynamic, and personalized perspective on development, researchers need to overcome several challenges (Den Hartigh et al., 2022). For instance, core (higher order) factors must be identified that shape the developmental process researchers are interested in. To assess these key constructs, a measurement infrastructure needs to be established to obtain individual-level data at high frequency. In our own research on resilience, for example, we focus on factors such as motivation, self-efficacy, affect, performance, and their interactions. We collect these data on a daily basis across the sports season, and examine how these key variables change when transitions in the state of athletes arise (e.g., psychological or physical problems; Den Hartigh et al., 2022; cf. Fonseca et al., 2020). In order to deal with the high volumes of multimodal temporal measures, the rapid developing field of data science offers robust methods to integrate and analyze the data (e.g., De Leeuw et al., 2021). In addition, there is a toolbox of (nonlinear) time series analyses to study the intra-individual patterns of

participants under study. In our view, such a challenging, dynamic and personalized perspective is a possible answer on Wigfield and Eccles' (2022) call for more complex system-type perspectives to better understand complex individual processes in achievement-related performance.

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