



UNIVERSITÀ
DEGLI STUDI
DI PADOVA

CTRL-ALT-DEV - Information control processes: an alternative, cross-language and multidimensional approach to study their development

Vast research efforts have been made to understand how executive control (i.e., the domain-general processes needed to flexibly plan and monitor goal-oriented behavior) evolves in children to help them focus on a task (e.g., studying) while resisting interferences (e.g., phone notifications), ensuring an optimal cognitive development and future success in life. Still, no study has examined age related changes in (domain-specific) semantic control, namely the processes needed to focus on non-dominant aspects of knowledge based on the current goal and context demands, rather than automatically retrieving the dominant ones (e.g., during symbolic play, the non-dominant shape of a banana is used to make it a phone, ignoring its dominant edibility). Semantic control is intrinsically related to the development of memory for concepts meaning and, in turn, the typology of a given language, but these aspects are unexplored. Moreover, its development is naturally paralleled by cortical maturation, but their interplay remains a hot topic of debate. This project aims to address these issues by studying for the first time the development of executive and semantic control and their relation at three levels: behavior, models, and brain. I will build a battery of control tasks using a gamification method for online assessment of English and Italian children at different ages. High-density electroencephalography will also be recorded to assess their task-related brain activity and organization. I will use state-of-the-art analytical approaches to assess the development of control processes (O1), their relation (O2), and language-dependence (O3) and functional brain bases (O4). Results will provide a new brain behavior theoretical model of cognitive control acquisition embedding semantic control, opening new research agendas in cognitive neurosciences and education and paving the way to build trainings in control functions for children with typical and atypical development.

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