



Is optimal always optimal?

Chronotype, time-of-day, and children's cognitive performance in remote neuropsychological assessment

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Introduction:

- Chronotype and time-of-day (ToD) are important variables in multiple dimensions of human functioning, including cognitive performance.
- We investigated potential interactive effects of chronotype and ToD on children's cognitive performance (i.e., memory, language, and executive functions), hypothesizing that it may differ when comparing optimal vs. suboptimal ToD.

Materials and methods:

- Seventy-six morning-type (M-Type) or evening-type (E-Type) children (7 to 10 years old; M age = 8.05; SD age = .51; 3rd and 4th grades of elementary school), classified with the CCTQ¹.
- Two 30-minute remote neuropsychological assessment sessions via videoconference.
- Remote-friendly adapted versions of neuropsychological tests targeting memory, language, and attention/executive domains².
- Assessment sessions on the first or last hour of the school day (9:00 vs. 16:00, according to the Portuguese school schedules), depending on randomized allocation.

Table 1. Sample's distribution by chronotype, gender, and time of assessment.

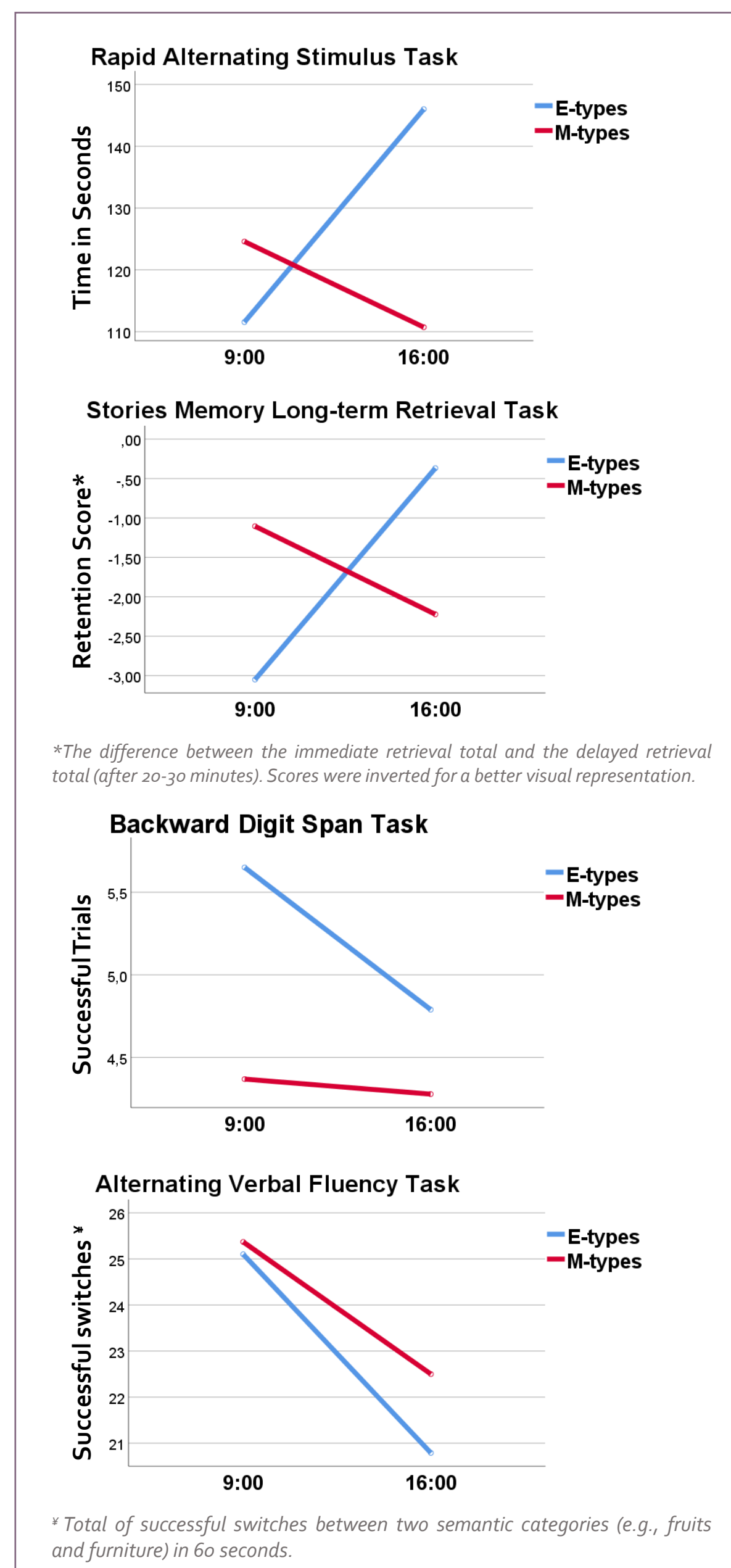
Chronotype	Total (n)	9:00 session (n)	16:00 session (n)
Evening-types	39	20	19
Females	20		
Males	19		
Morning-types	37	18	19
Females	17		
Males	20		

Results:

- Moderate interactive/asynchrony effect chronotype x ToD on a **Rapid Alternating Stimulus** task [$F(1,72) = 5.78, p = .019, \eta_p^2 = .07$]: M- and E-types were faster at their suboptimal ToD (i.e., morning for E-types, afternoon for M-types) than at their optimal ToD.
- Nearly statistically significant small interactive/synchrony effect chronotype x ToD on a **Stories Memory Long-term Retrieval** task [$F(1,72) = 3.79, p = .055, \eta_p^2 = .05$]: M- and E-types retrieved more story components at their optimal ToD when compared to a suboptimal ToD.
- Main effect of chronotype on a **Backward Digit Span** task: E-types outperformed M-types [$F(1,72) = 5.98, p = .017, \eta_p^2 = .08$].
- Main effect of ToD on an **Alternating Verbal Fluency** task: M- and E-types performed better in the morning than in the afternoon [$F(1,72) = 8.85, p = .004, \eta_p^2 = .11$].

Conclusions:

- Chronotype and ToD appear to be relevant variables in primary school children's cognitive performance, namely in verbal memory retrieval, working memory, processing speed, and verbal fluency.
- Children tested at their suboptimal ToD can perform better than at their optimal ToD depending on the cognitive area considered (i.e., more automatic processing).
- We are pursuing further studies to disentangle which cognitive processes are more susceptible to synchrony/asynchrony effects and which are more resistant to chronotype and/or ToD effects.



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2. Simões, M. R., Albuquerque, C. P., Pinho, M. S., Vilar, M., Pereira, M., Lopes, A. F., Santos, M. J. S., Alberto, I., Lopes, C., Martins, C., Moura, O. (2016). *Bateria de Avaliação Neuropsicológica de Coimbra (BANC): Manual de administração e cotação*. Cegoc.

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