

Inhibitory processing in the aging brain: Disentangling the effects of age, chronotype, time of day and executive control

ABSTRACT:

Background

Chronotype (Chr) and time-of-day (ToD) cause (a)synchrony effects, i.e., differences between off/on-peak (ToD (mis)/matching Chr) performance. Conditional automaticity (CA) reflects the enhancement of pathways linked, but not directly relevant, to the control structure of an ongoing task. Ageing, via hindered control efficiency, likely magnifies this enhancement and modulates its interaction with (a)synchrony.

Aims

To develop a CA-based processing model of the modulations of (a)synchrony by ageing, and test its predictions, viz.: 1. off-peak benefits are restricted to CA processes, and are coupled with off-peak impediment of the CA-linked control process 2. Ageing amplifies (a)synchrony effects 3. Specific ERP signatures index the processes in the model and their modulation by ageing.

Method

Young adults (YA) (21 evening-types (E-T); 19 morning-types (M-T)) and older adults (OA) (19 E-T; 21 M-T) performed, on- or off-peak, a spatial Stroop task probing controlled inhibition and CA. EEGs were recorded and ERPs extracted.

Results

Behavioral data supported predictions 1&2. As for 3: YA showed accrued onvs off-peak control (on-peak P200) whereas OA's CA was augmented onpeak and control lessened off-peak (on-peak P300); when all action-plans were predicted to be momentarily inhibited, this P300 was also present in YA; in YA a late positivity (LP) indexed conditions predicted to foster unduly suppression of the correct action-plan and its subsequent renewal; when all action-plans were momentarily inhibited, this LP was also present in OA.

Conclusions

The predictions derived from our processing model were largely borne out; further data should be collected to probe potentially important differences between E-T and M-T.

Keywords

Chronotype, Synchrony and asynchrony effects, Conditional automaticity, Spatial Stroop task, Event Related Potentials

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Published Work:

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