



HAL
open science

Inhibitory control and cardiac pre-ejection period in young and middle-aged adults

Cédric T. Albinet, C. de Faria, B. Valéry, M. Causse

► **To cite this version:**

Cédric T. Albinet, C. de Faria, B. Valéry, M. Causse. Inhibitory control and cardiac pre-ejection period in young and middle-aged adults. 21st World Congress of Psychophysiology, Jun 2023, Geneva, Switzerland. International Journal of Psychophysiology, 188, pp.108, 2023, 10.1016/j.ijpsycho.2023.05.277 . hal-04146942

HAL Id: hal-04146942

<https://hal.science/hal-04146942>

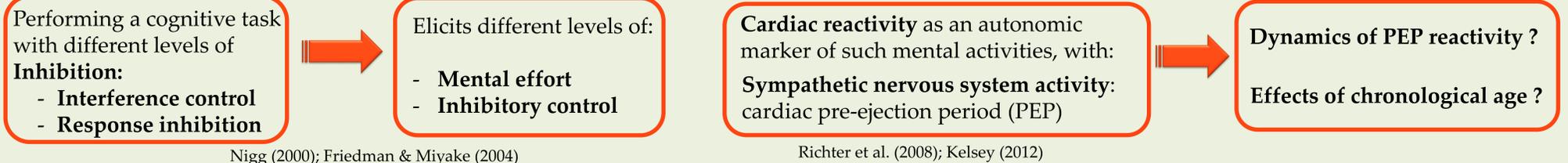
Submitted on 30 Jun 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

INTRODUCTION

Cognitive aging leads to declines in inhibition. Inhibition deficits can lead to decision-making errors in complex work contexts. Cardiac reactivity may be a relevant marker of inhibition control, but little is known on its dynamics and age-related effects.



Nigg (2000); Friedman & Miyake (2004)

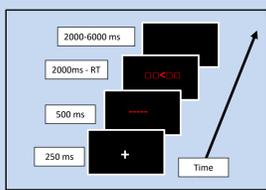
Richter et al. (2008); Kelsey (2012)

Objectives: To examine whether PEP reactivity dynamically adapts to different levels of inhibition control in young and middle-aged adults, using a mixed within-between-subjects experimental design.

Participants

29 students (14 males; 18-27 years)

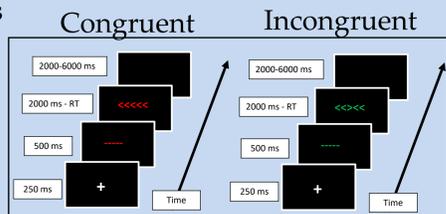
27 middle-aged adults (55-65 years)



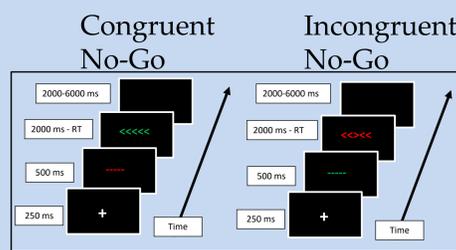
Neutral trials

Modified Flanker task

2 blocks of 40 trials per condition.



METHODS

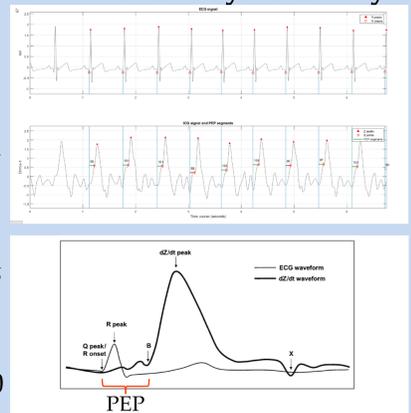


Cardiac activity/reactivity

ECG / ICG at rest and during cognitive activity

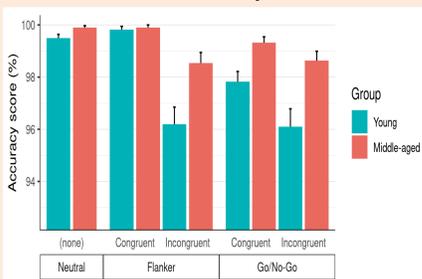
PEP reactivity = PEP_{task} - PEP_{resting} 1-min epoch

Rest period = 3'
Task period = 4'30"



Behavioral data

Accuracy

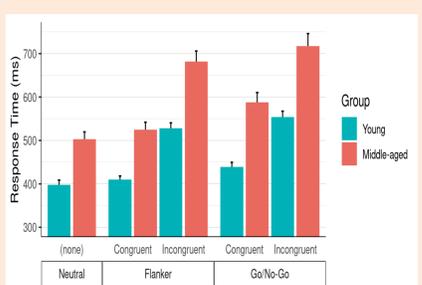


Accuracy was greater for Neutral block than Flanker block and Go/No-Go block ($p < .001$; $\eta^2_p = .33$).

Greater for Congruent trials than for Incongruent trials ($p < .001$; $\eta^2_p = .34$).

Greater for Middle-aged than Young ($p < .001$; $\eta^2_p = .35$).

Reaction Time



RT increased from Neutral to Flanker to Go/No-Go block ($p < .001$; $\eta^2_p = .72$).

Shorter for Congruent trials than Incongruent trials ($p < .001$; $\eta^2_p = .72$).

Longer for Middle-aged than Young ($p < .001$; $\eta^2_p = .42$).

Inhibition cost of Composite Score (Accuracy/RT*100)

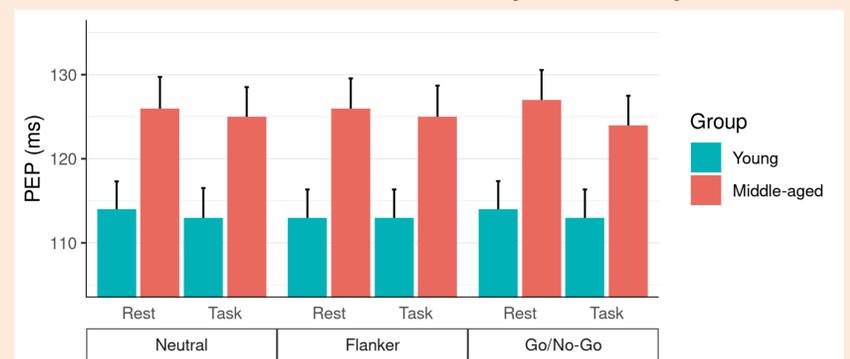
Block	Young	Middle-aged
Inhibition cost Flanker	24.8 % (4.8)	23.7% (6.9)
Inhibition cost Flanker Go/No-Go	21.9% (6.4)	17.9% (8.9)

Relative inhibition cost decreased from Flanker to Go/No-Go block ($p < .001$; $\eta^2_p = .45$).

No difference between the 2 groups.

RESULTS

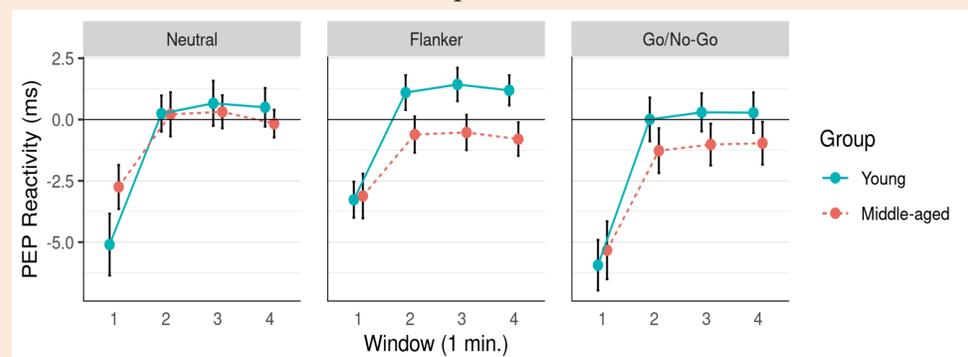
Cardiac activity/reactivity



Globally, PEP_{task} was slightly shorter than PEP_{rest} ($p = .02$; $\eta^2_p = .09$).

PEP was longer for Middle-aged than Young ($p = .01$; $\eta^2_p = .10$).

PEP was stable across rest periods.



PEP reactivity was significant only for the first 1-min window (w1). PEP reactivity was greater for Go/No-Go block than Neutral block and Flanker block ($p = .002$; $\eta^2_p = .11$). No difference between the 2 groups.

DISCUSSION

Overall, participants were **less accurate and slower** during the **most challenging** task involving **interference control and response inhibition**. Middle-aged were more accurate but slower and their inhibition cost was comparable to the one of the younger participants.

Absolute PEP values were **higher** for the **middle-aged** but **PEP reactivity** was **comparable** between the **2 groups**. These results add to the current very limited but contradictory literature on this topic (Cybulski, 1996; Gurel et al., 2019).

Importantly, for both groups, **PEP reactivity** was significantly **lower than 0** only during the **first minute** of each experimental task, going back to baseline level afterward. Similar dynamics were recently reported but during a recovery period by Czarnek et al., (2021). **PEP reactivity** was also **more important** during the **flanker Go/No-Go** task comparatively to the flanker task and the neutral task.

PEP reactivity appears to be **sensitive to different levels of inhibitory control** requirement, but **does not increase linearly as a function of task demands**. It also appears to be a **short lasting phenomenon**, demonstrating a possible rapid dynamic adaptation of the cardiac activity to task constraints or a form of habituation. Additional within-subjects design studies are required to replicate these findings.

REFERENCES