

INTRODUCTION

Cognitive ageing is associated to a decline of complex cognitive abilities such as reasoning, problem solving and decision-making.

These require being able to select between relevant and irrelevant pieces of knowledge. In cognitive psychology, these capacities translate into two critical working memory's control processes¹⁻⁴:

- **EXECUTIVE ATTENTION**: the focusing of processing resources on task relevant information
- **INHIBITION**: the suppression of irrelevant information

In cognitive neuroscience, several human and animal studies suggested a **primary role of the dopaminergic frontal-basal connections** in the inhibition of irrelevant information in working memory⁵⁻¹¹. Dopaminergic frontal-basal connections are impaired in Parkinson's disease.

AIM OF THE PRESENT RESEARCH:

STUDY IF, AND HOW, EXECUTIVE ATTENTION AND INHIBITION IN WORKING MEMORY DECLINE IN HEALTHY AGEING AND IN PARKINSON'S DISEASE

METHOD

Four groups were tested*:

1. Young adults (N=20; 18-40 years)
2. Older adults (N=23; 40-69 years)
3. Elderly subjects (N= 19; 70-80 years)

Inclusion criteria: a) normal or corrected to normal vision, and b) MMSE¹² score over or equal to the cut-off (24/30).
Exclusion criteria : a) the presence or history of any neurological disease or psychiatric disorder, b) the use of any psychotropic drug.

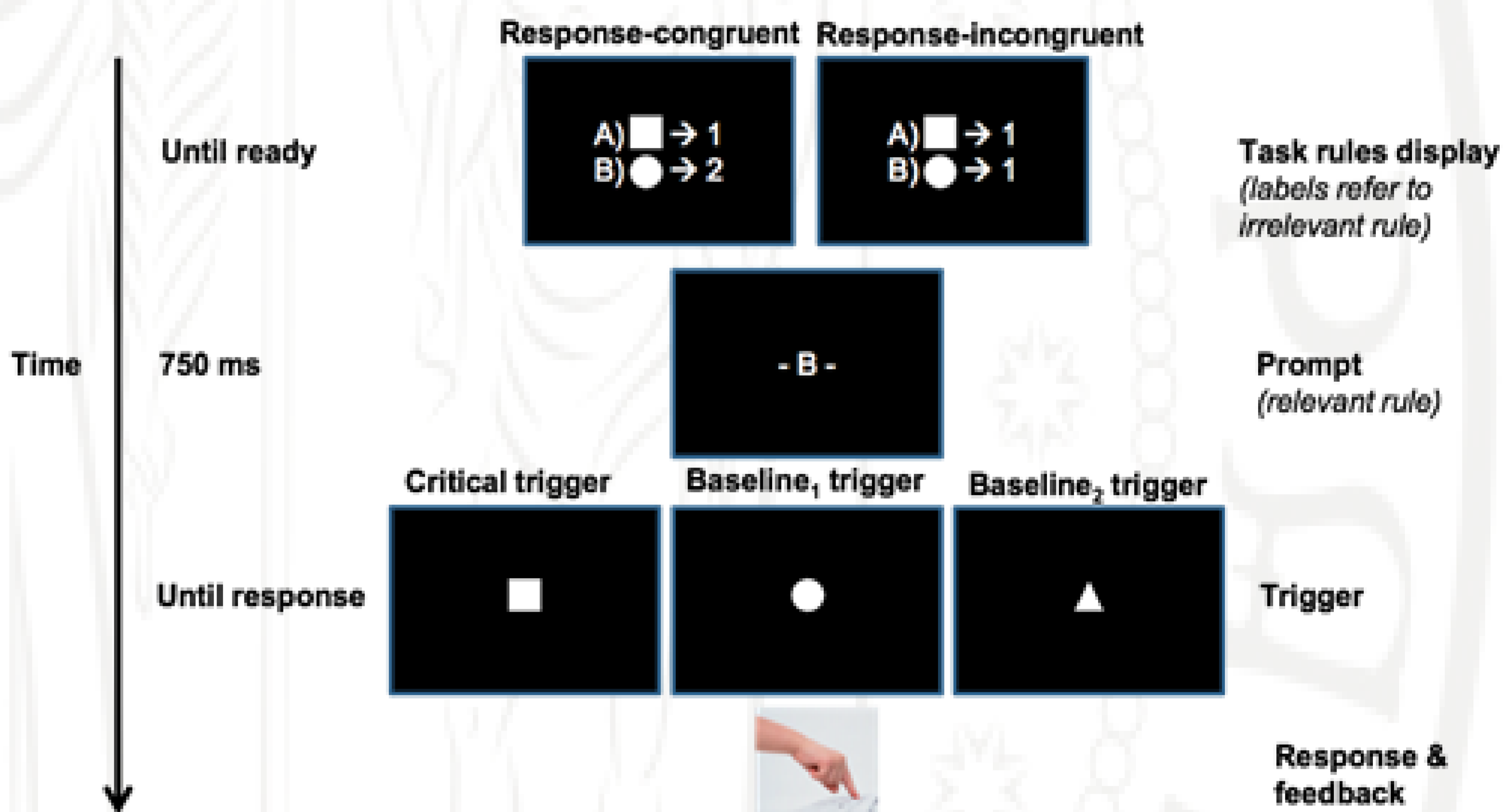
4. Parkinson's disease patients (N=20, 53-84 years)

PD patients were tested under the effect of the pharmacological treatment: 10 patients were on levodopa, 2 on dopamine agonists, 3 on a monoamine oxidase inhibitor and 5 on a combination of levodopa and dopamine agonists.

*Elderly participants and PD patients were also invited to attend a neuropsychological assessment session to exclude cognitive decline.

A new task was administered:

good performance requires focusing on one of 2 task rules encoded and transiently stored in working memory, without being distracted by the other rule



Two effects are expected in the participant performance:

1. **BENEFIT**: if a response-congruent irrelevant information is not effectively inhibited, it interferes with processing, resulting in decreased RT and decreased error rates
2. **COST**: if a response-incongruent irrelevant information is not effectively inhibited, it interferes producing increased RT and increased error rates

If a rule that will be irrelevant for a soon incoming task has just been communicated to us, does our ability to ignore it- and thus to avoid that our behavior is captured by it- decline with age?

MAIN PREDICTIONS:

- The degree of interference (both costs and benefits) should increase with age
- Dopaminergic deficit may cause different degrees or patterns of interference in PD patients

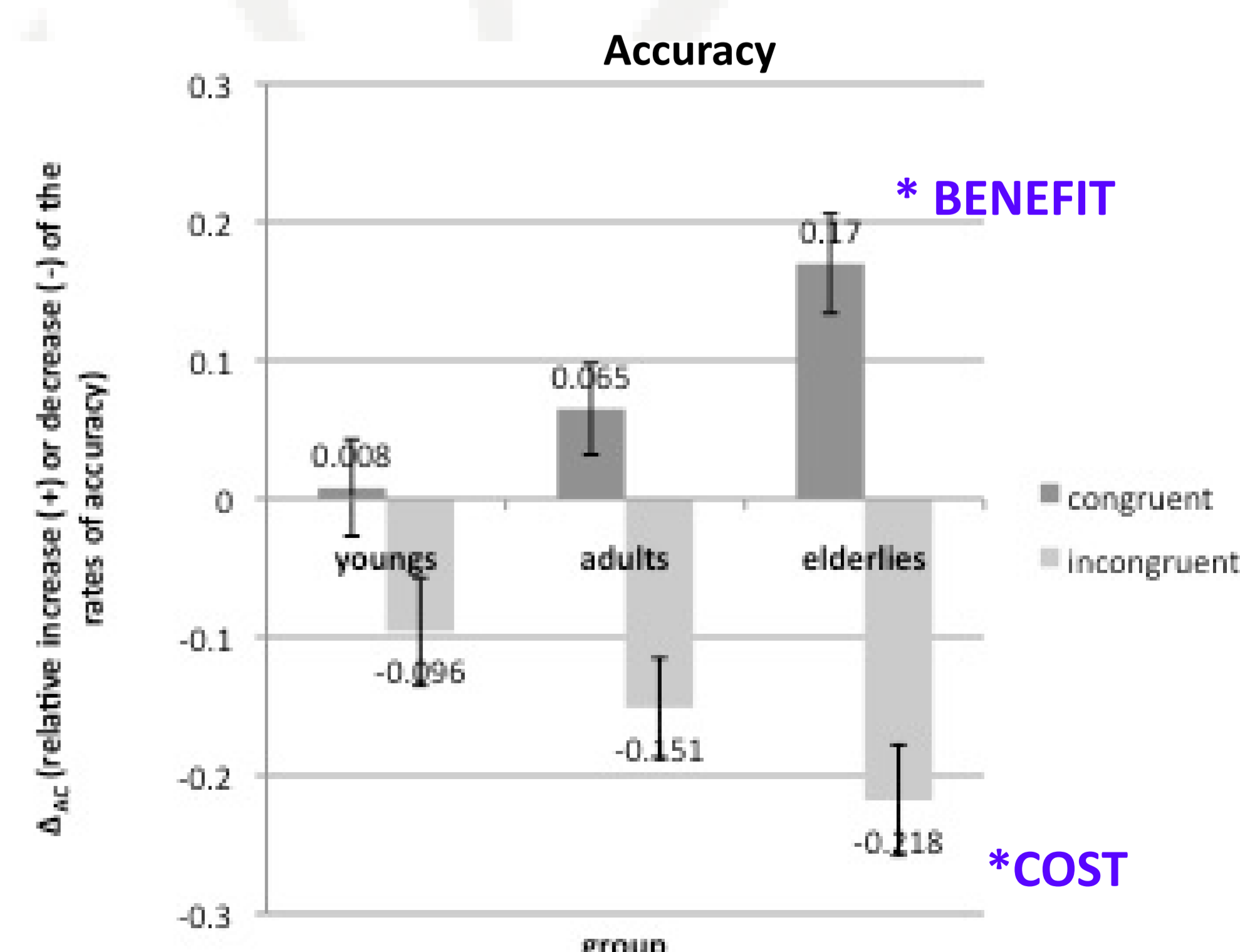
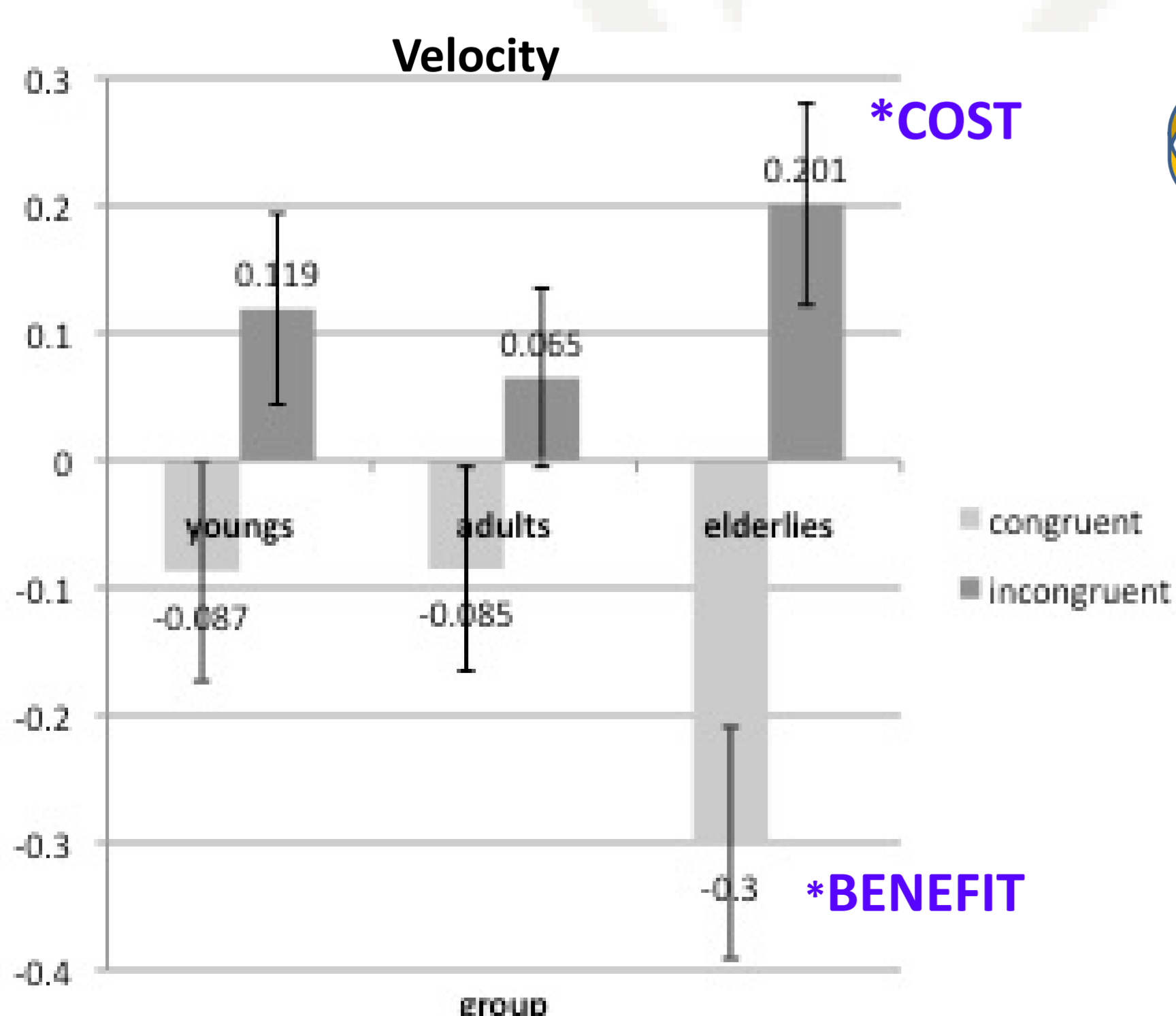
RESULTS AND DISCUSSION

Interference by an irrelevant task-rule in working memory rises significantly only in the elderly group (over 70):

This suggests a non-linear relation between age and the decline of executive attention and inhibition in working memory.

Interestingly, while the total interference experienced by the healthy elderly individuals correlated positively and significantly with their age, this did not happen in the group of PD patients, who performed like the matched group of healthy participants.

The pharmacological treatment might have contrasted the dopaminergic deficit effect on working memory



REFERENCES

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