

"Bilingualism facilitates the monitoring of different cognitive control mechanisms"



Julia Morales¹, Carlos J. Gómez-Ariza², Teresa Bajo¹

¹ Research Center for Mind Brain, and Behavior, University of Granada; ² Department of Psychology, University of Jaén

0 ABSTRACT

- Background: Recent research shows that bilinguals excel monolinguals in coordinating different executive functions (e.g., Costa et al., 2009, Morales et al., 2015).
- Method: We further explored this idea by employing:
 - An adapted version of the flanker task:
 - Conflict condition: Ignore the flanking distractors and focus only on the direction of the target chevron to suppress interference.
 - Go/no-go condition: Pay attention to the flanking information to respond.
 - Mixed blocks (composed by intermixed trials of go/no-go and conflict blocks): increase of monitoring resources => to process the flanking information and use it or ignore it depending on the trial.
 - AX-Continuous performance task (AX-CPT): it requires participants to combine different control mechanisms in the critical AY condition (e.g., to withhold a prepotent response while maintaining context information).
- Results: bilingualism benefited the performance in most demanding conditions in the two tasks
- These data provide further support for the idea that bilingualism modulates the functioning of a whole cascade of processes engaged in cognitive control.

1 INTRODUCTION

- Multiple studies support that bilinguals experience less interference than monolinguals
- However these results are inconsistent: The bilingual advantage in inhibitory control is not always replicated (see Kroll & Bialystok, 2013 for a recent review).
- Recent theories suggest that bilingualism modulates the dynamic combination of monitoring and inhibitory processes to overcome interference from distractor information (e.g., Green & Abutalebi, 2013, Morales et al, 2015).

Do bilinguals exhibit better performance with high monitoring demands in different tasks?

2 METHOD & RESULTS

Participants: Young adults matched in age and IQ

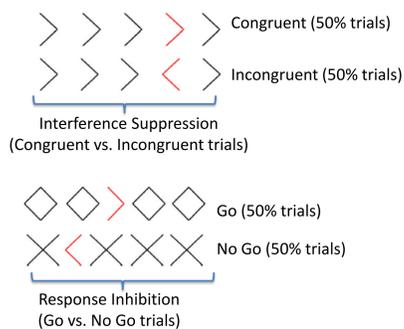
- 30 monolinguals
- 40 early balanced bilinguals (mixed languages combinations)

HYPOTHESIS

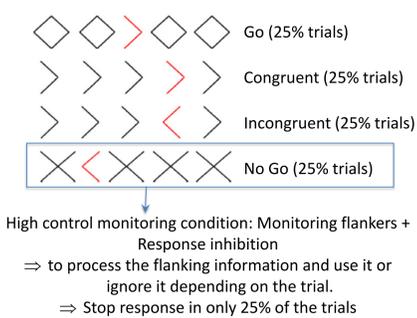
If bilingual cognitive advantages depends on monitoring resources, bilinguals would outperform monolinguals in the higher monitoring demanding condition (mixed block)

FLANKER TASK

A) Simple blocks (2 type of trials)

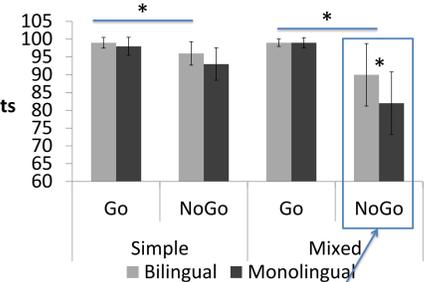


B) Mixed blocks (4 type of trials)



- Congruency effect (no interactions)
- Go vs. NoGo: Interaction Group*Block*Condition:
 - Both groups performed worst in the NoGo vs. Go condition
 - Bilinguals outperformed monolinguals only in the most demanding condition: NoGo trials in the mixed block

Response Inhibition (Go vs. NoGo)



Most demanding condition: Monitoring information + Response inhibition

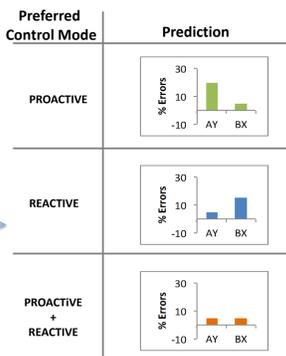
AX-CONTINUOUS PERFORMANCE TASK (AX-CPT)

INSTRUCTIONS:

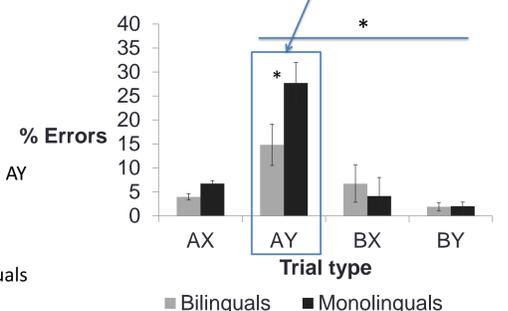
- Respond to all the probes
- Respond YES to X probes preceded by A cues
- In any other case, respond NO



CUE	PROBE	%	RESPONSE	CONDITION
A	X	70%	Yes	Target trials (=> it forces the engagement of proactive mechanisms)
A	Y	10%	No	Errors due to high engagement Proactive Control (cue induces «yes» responses)
B	X	10%	No	Errors due to low involvement of Proactive Control / failures in Reactive Control (probe induces «yes» responses)
B	Y	10%	No	Control trials



- Proactive effect (more errors in the AY condition than in the other conditions)
- Interaction Group*Condition:
 - Proactive effect (more errors in the AY condition than in the other conditions)
 - Bilinguals outperformed monolinguals only in the most demanding condition: AY trials



3 CONCLUSIONS

- In line with previous research, our results indicated that bilingualism benefited the performance in the most demanding conditions, where different cognitive control resources needed to work together to achieve the highest efficiency:
 - NoGo trials in the mixed condition of the flanker task (to withhold a prepotent response while monitoring the flanking information; Stop response in only 25% of the trials)
 - AY trials in the -AX-CPT (e.g., to withhold a prepotent response while maintaining context information).
- These data seem to support the idea that bilingualism modulates the functioning of the monitoring processes in charge of coordinating cognitive control.

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