

The performances at Semantic Tasks can be affected by

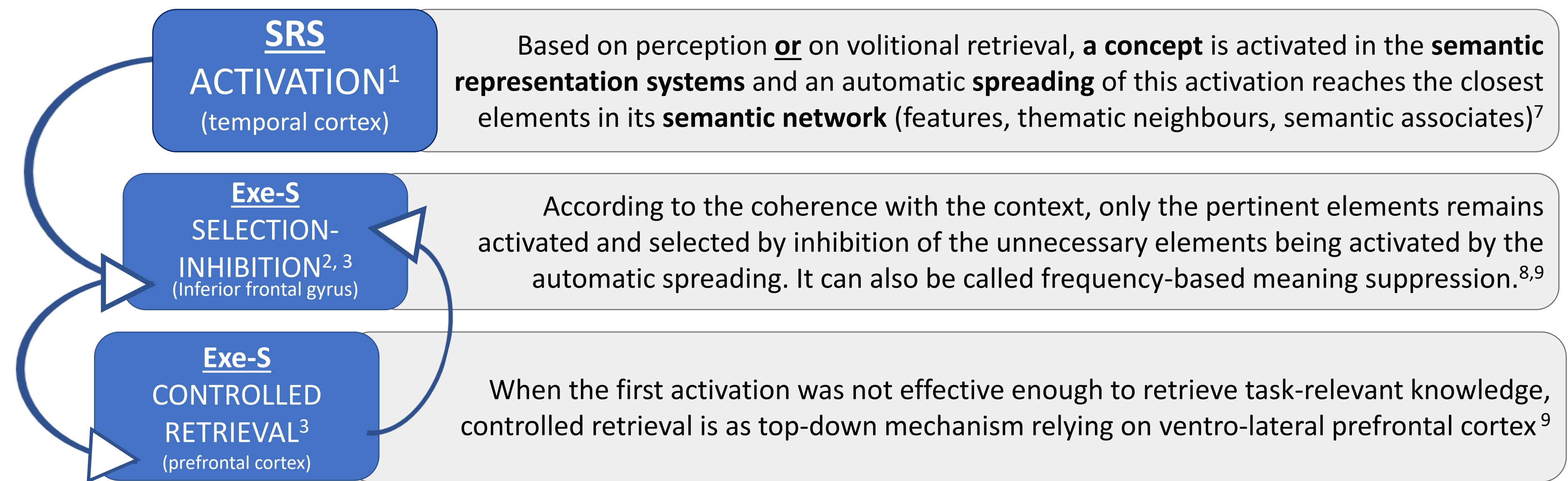
- Impaired access to the content of semantic memory relying on executive-semantic processes (Exe-S)³
- Impaired activation of semantic links and concepts in the semantic memory ⁴

Late-life depression (LLD) is not reported as affecting semantic cognition.

However, we recently published a meta-analysis^{4b} showing that this condition has a significant effect on performances at semantic tasks involving Exe-S (Phonemic and Semantic Fluencies, Naming)⁵, but not on other tasks relying on fewer executive resources (semantic choices, vocabulary descriptions,...).

Due to the dysexecutive nature of depression⁶, it is proposed that these results can be explained by LLD :

- Affecting Exe-S
- Not affecting semantic links and concepts in the semantic memory



EXPERIMENTAL TASKS

PARADIGMA AND HYPOTHESIS

Lexical decision task with priming

inspired by Copland et al. (2007)

In this task design to measure **activation of the semantic memory** and **selection-inhibition (Exe-S)**, participants face a screen where sequences of prime/blank/target are presented and have to judge for every target if it is a word or not. Four contbalanced versions of the task were created with 4 conditions of interest (blue lines of the Table 1).

	+	PRIME		TARGET
	200 ms	500 ms	500 ms	No limitation
Table 1. Metrics of pairs in the lexical decision task: mean (standard deviation)				
Prime – target relationship	N (task)	N (corpus)	Length	Book frequency
Homonym/Dominant e.g. Bank/money (HD)	8	32	6,09 (1,67)	42,74 (36,98)
Homonym – Subordinated e.g. Bank/river (HS)	8	32	6,06 (1,81)	34,19 (38,43)
Word – semantic associate e.g. Desk/screen (SA)	16	64	6,09 (1,87)	39,52 (39,82)
Word - non related word e.g. River/money (NR)	32	32	6,45 (1,91)	34,66 (33,56)
Fill-in unrelated pairs	20	20		
Word – Non-word	84	84		
TOTAL	168	264		

Note. There were no significant differences of metrics between conditions, except for LSA (strength of lexico-semantic association)

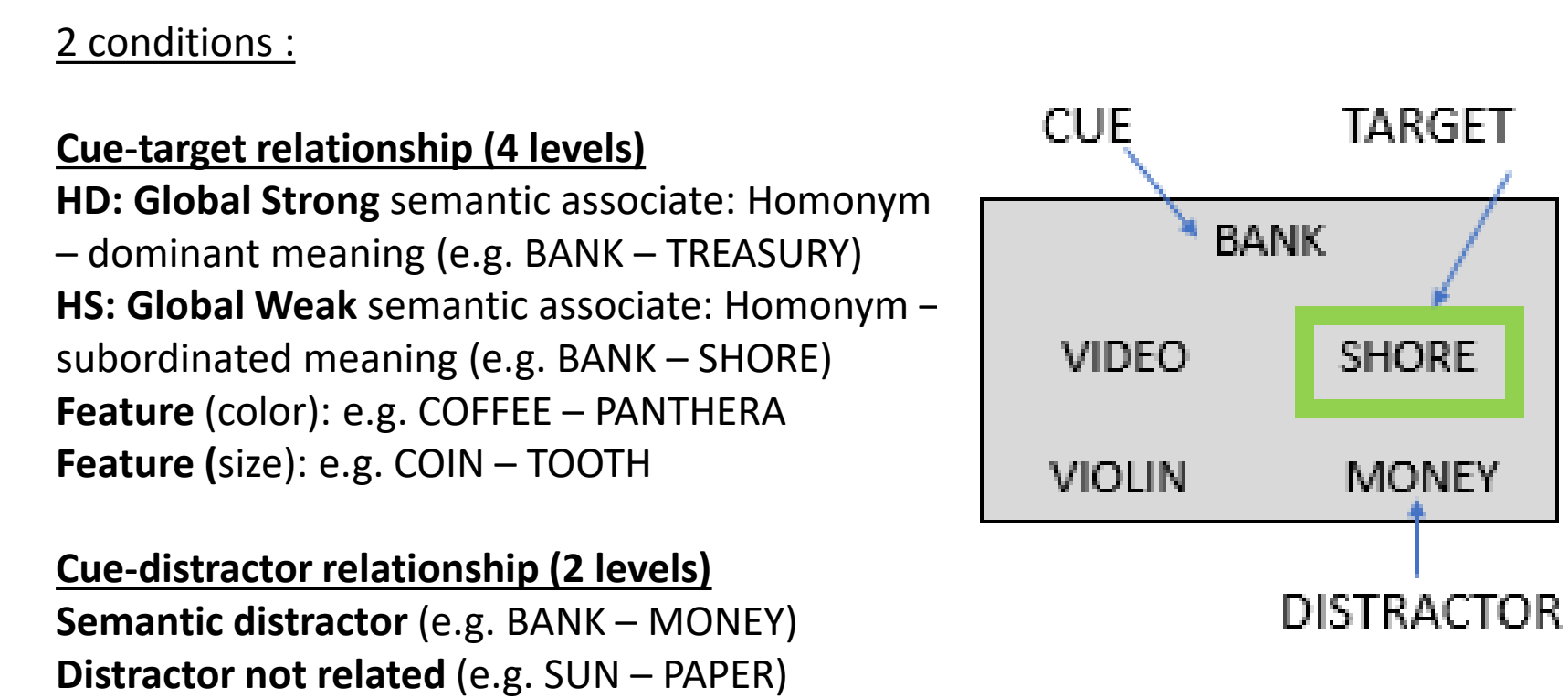
Cue to target association task

inspired by Badre et al. (2007) and Hoffman (2018)

In this task, the participant had to associate the word (cue) above with one (target) of the 4 propositions bellow according to an instruction. (or on the correspondence of the **global meaning**, or on a **shared feature**).

In the **global meaning** instruction, half of the trials are weak semantic associates to enhance the demand for **controlled retrieval (Exe-S)**. Association on a shared feature is designed to enhance the demand for **selection-inhibition (Exe-S)**.

In half of the trial, **one distractor is semantically associated** to the cue, which also enhanced the demand for **selection-inhibition (Exe-S)**.



Elderly participants with LLD (N=10) or without LLD (N=74)
Tested with :

- A lexical decision task with priming (experimental task)
- A cue to target association task (experimental task)
- The Camel and Cactus test (normed assessment of semantic association)
- The Geriatric depression scale (GDS 30)
- The Spielberger anxiety scale (STAI)

Hypothesis:

- According to the hypothesis of a preserved activation in semantic memory in LLD, in a **Lexical decision task with priming**, healthy control, with or without depressive symptoms and depression group will equally benefit of the priming effect of HD and SA conditions with significantly faster answers.
- In a **Cue to target association task**, depression group will show significantly slower answers in the HS condition, confirming that they experiment an impairment of the **controlled retrieval (Exe-S)**
- In a **Cue to target association task** « depression » group will respond significantly slower and make more mistakes than control in presence of a semantic distractor, showing that **selection-inhibition (Exe-S)** is impaired.

Exploratory question:
Are the results at the experimental tasks more specifically associated with one or several particular factors of depression (according to the classification of depressive symptoms proposed by Sheikh et al. (1991) ?

RESULTS

Table.1. Samples data, in mean (SD)	Control	depression	p
n (women)	74 (44)	10 (9)	
age	66.58 (4.27)	64.20 (7.19)	0.13
Education	12.19 (2.21)	11.60 (2.67)	0.07
Depression scale (GDS 30)			
General score	4.20 (4.26)	17.30 (4.60)	<0.001
Factor 1: sad mood and pessimistic outlook	1.30 (1.87)	5.20 (2.04)	<0.001
Factor 2: lack of mental and physical energy	1.08 (1.35)	4.60 (0.84)	<0.001
Factor 3: positive or happy mood	0.93 (1.36)	2.90 (1.73)	<0.001
Factor 4: agitation and restlessness	0.49 (0.67)	1.30 (1.25)	0.002
Factor 5: social withdrawal factor	0.09 (0.34)	1.10 (0.88)	<0.001
Anxiety scale (State)	28.27 (10.00)	46.40 (9.05)	<0.001
Anxiety scale (Trait)	33.86 (8.52)	48.00 (5.21)	<0.001
Camel and Cactus tree test	56.29 (3.36)	54.50 (6.62)	0.3

Note : GDS factors are determined according to the classification by Sheikh et al. (1991),

Fig. 1 Lexical decision task with priming

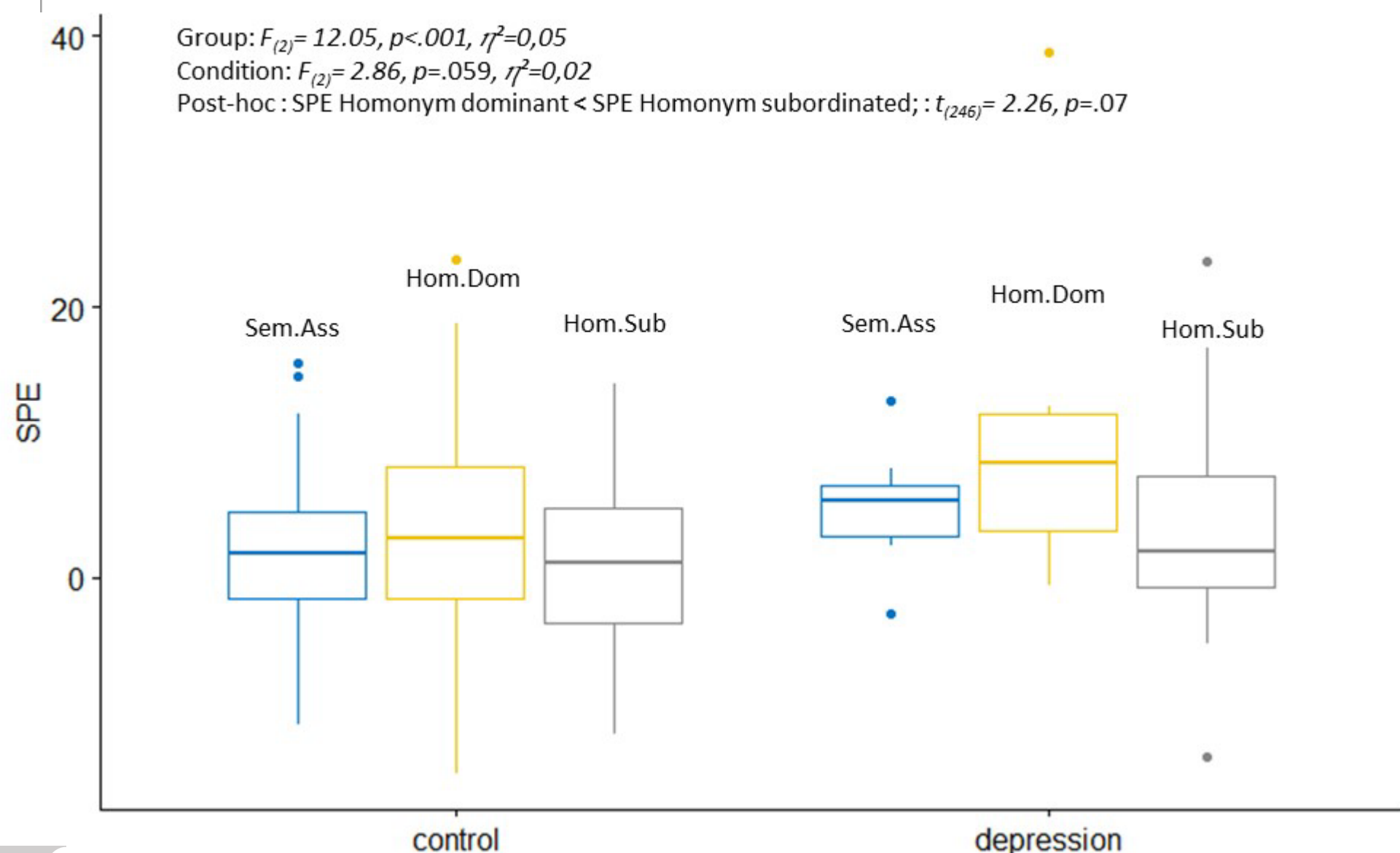
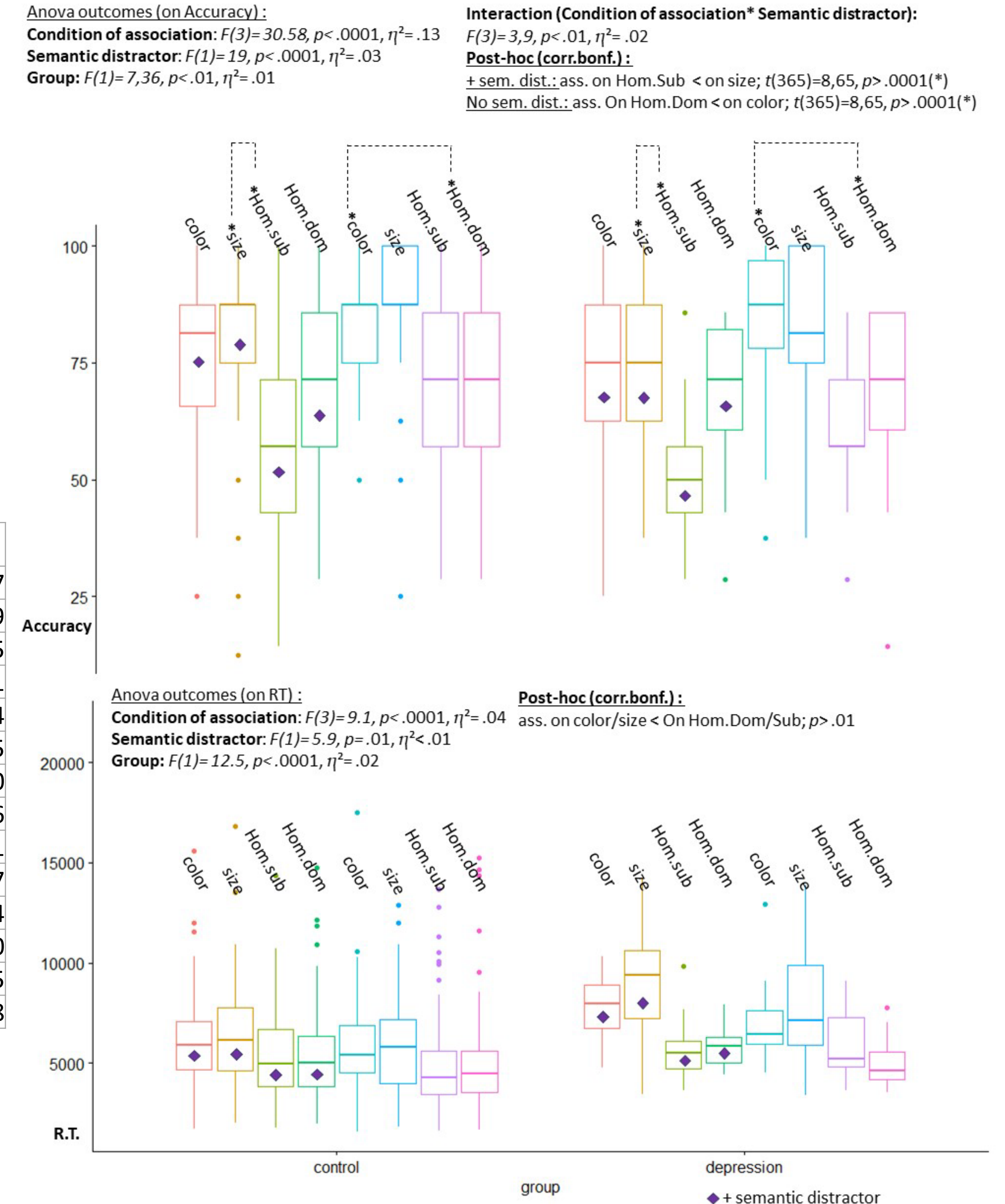


Fig2. Cue to target association task



DISCUSSION & CONCLUSION

The results in Fig. 1 show that both depression and control groups had a larger SPE (Semantic priming effect) (close to sign P=.07) when the homonymous prime was followed by a word with a dominant meaning, in comparison with the subordinated meaning, confirming a preserved activation in semantic memory. In the association task (Fig. 2), both groups were more accurate but slower at associating items on a shared feature (color or size) than a global meaning, with no difference between dominant or subordinated meanings. These results do not support an effect of depression on controlled retrieval. In the presence of a semantic distractor, the depression group was slower to associate items on a common feature compared to any other condition. Although the interaction effect was not statistically significant, this result suggests that depression affects selection inhibition. The P.C.A. (Table.2.) applied to all the results shows a factor combining the RT on the association task and the global score on the depression scale, as well as the depression factor "lack of mental and physical energy" and the trait score on the anxiety scale. This result indicates that in the depression group, it is most likely the lack of energy trait that is related to the general slowing in performing the association task, but that this trait is not related to the performance at the priming task.

Table.2. P.C.A	Factor1 (25%)	Factor2 (16,7 %)
RT Ass. color / no dist. sem.	0,88	0,27
RT Ass. size / + dist. sem.	0,82	0,29
RT Ass. size / no dist. sem.	0,82	0,25
RT Ass. color / + dist. sem.	0,80	0,41
RT Ass. HS / no dist. sem.	0,77	0,44
RT Ass. HD / + dist. sem.	0,72	0,55
RT Ass. HS / + dist. sem.	0,71	0,00
RT Ass. HD / no dist. sem.	0,67	0,56
GDS30 - score	0,61	-0,71
GDS Factor 2	0,59	-0,57
Trait of anxiety (STAI)	0,56	-0,54
GDS Factor 3	0,47	-0,50
GDS Factor 5	0,43	-0,55
GDS Factor 1	0,41	-0,58

