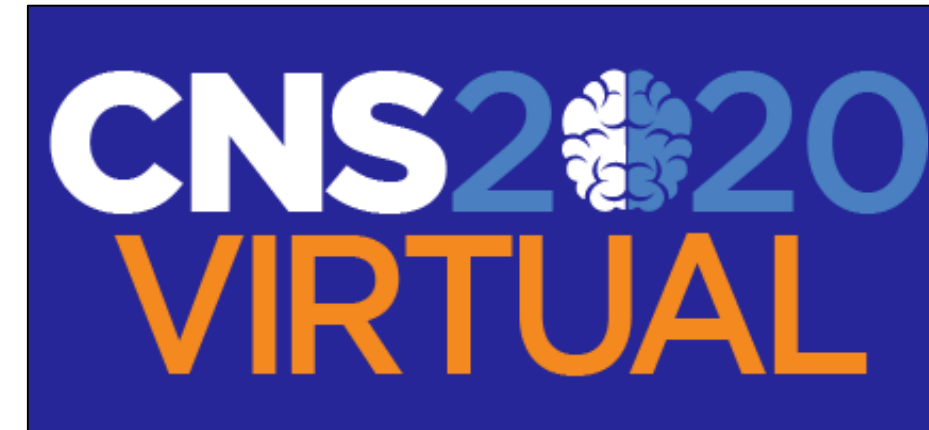


Social Context-Dependent Role of the Left Medial Prefrontal Cortex in Communicational Exchanges: rTMS Evidence: a rTMS study

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BACKGROUND

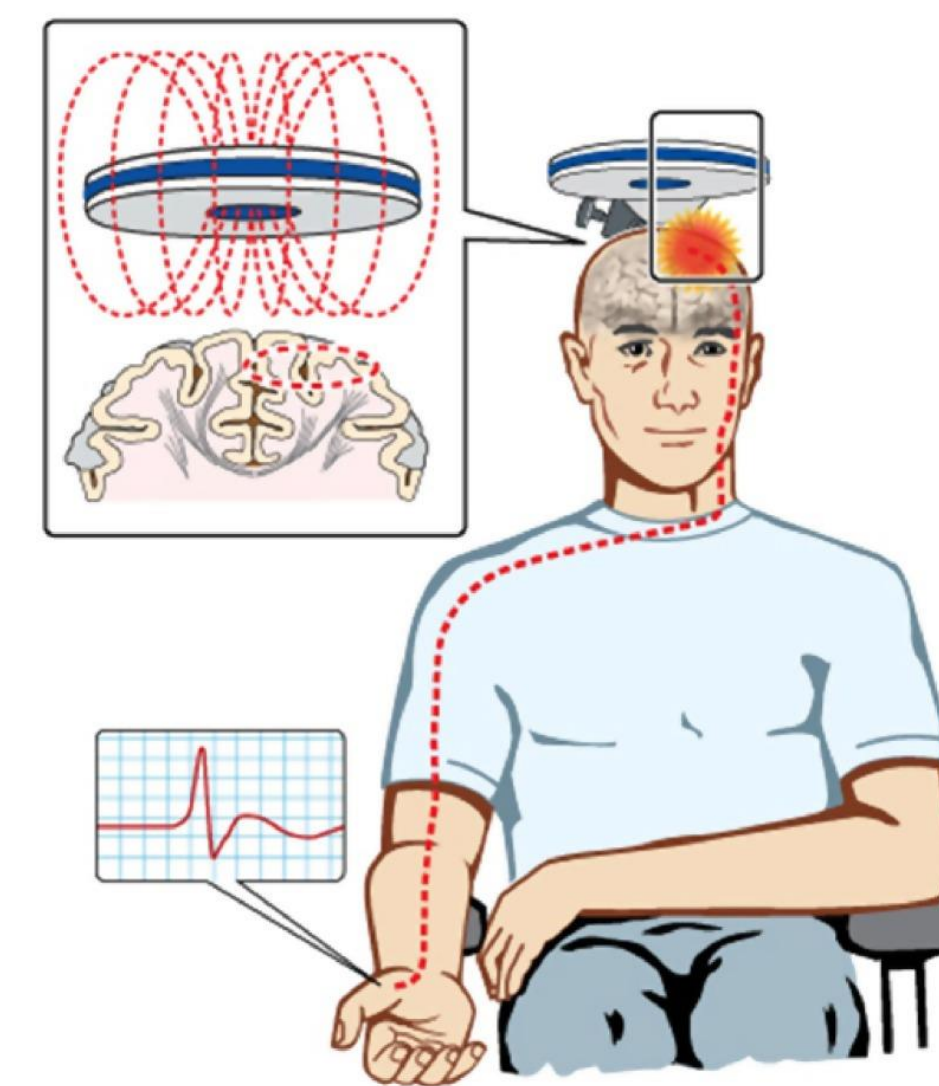
People change their communication strategies depending on the specific social context and their confidence in the information they communicate. We found (Martín-Luengo et al, 2018) that:

- In **informal contexts** (chatting with friends) under uncertainty, participants report their answers most of the times; i.e., being seen as more informative seems to be important to them.
- In **formal contexts** (job interview) under uncertainty, the proportions of withheld and report answers become equal. This strategy seems to be aimed at the highest possible accuracy while taking a more careful approach given the lack of confidence.

The **neurobiological underpinnings** of such contextual effects are **poorly understood**. Metcalfe and Schwartz (2016) pointed to the left **medial prefrontal cortex** (BA10), as the structure in charge of **self-referential characteristics in metacognitive processes**, such as considering ourselves as responsible for the output of the decision compared with only taking into account the final performance as such. Our **objective** here was scrutinize the causal role of this area in communicational exchanges using TMS.

Hypothesis: A transient inhibition of left BA10 implemented using repetitive TMS (rTMS) will affect the decision to report or withhold messages in the formal context; to keep accuracy high, participants will withhold more answers than report.

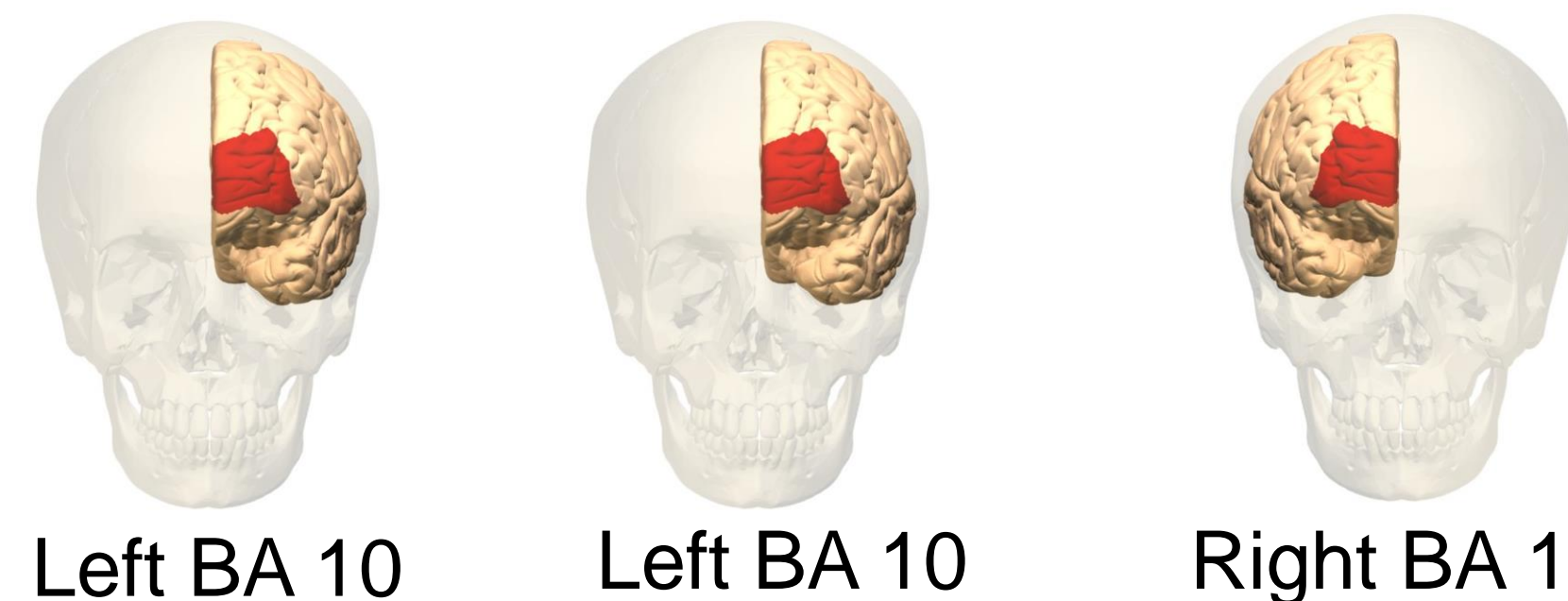
METHODOLOGY AND PROCEDURE



Resting motor threshold was measured in each participant to individualize the stimulation intensity

3 groups:

Target area Sham (placebo) Active control



20 different participants per group

Offline 1-Hz rTMS for 15 minutes

Behavioral task

Question 1: What is the former name of New York?

New Amsterdam

Please, indicate the confidence you have that your answers is correct:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Not sure at all Complete sure

Next

40 *difficult* general knowledge questions (previously normativized)

Participants had to write their answers, and rate the confidence on the correctness.

Indicate whether you will report or withhold your answer in these contexts:

Job interview Chatting with friends

New Amsterdam New Amsterdam

Report Withheld Report Withheld

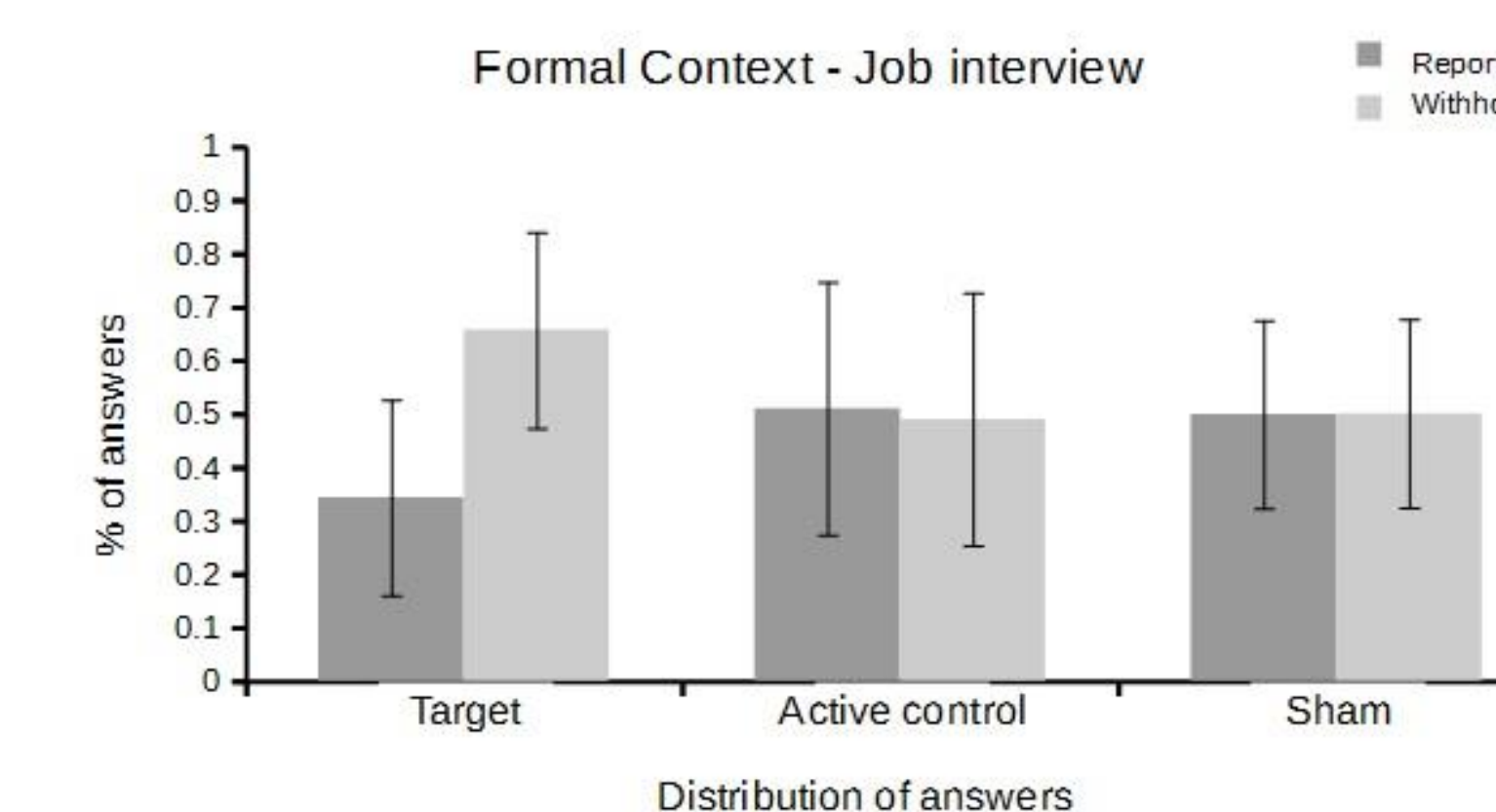
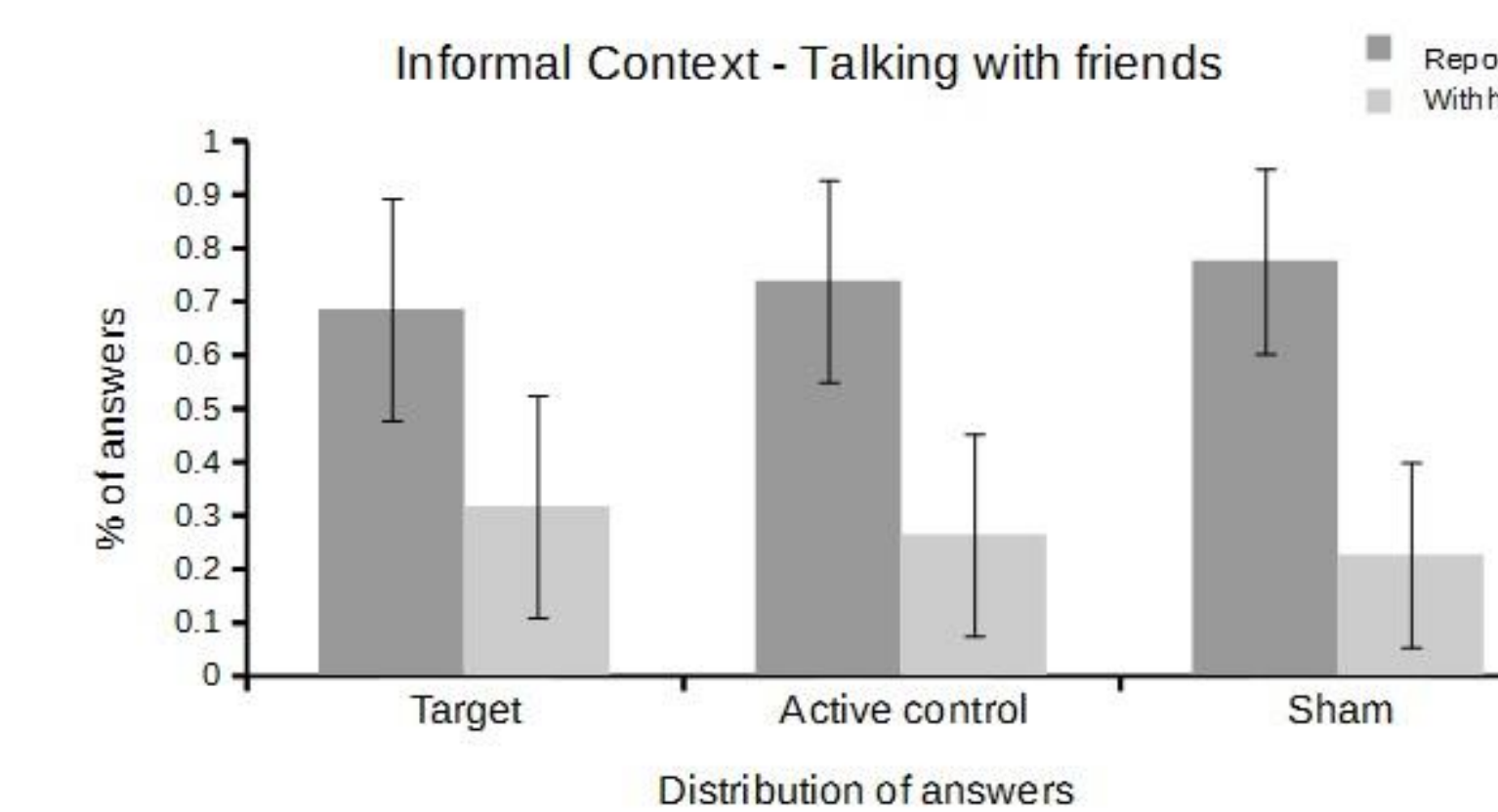
Next

Participants had to decide for each context what they would do: to provide or to withheld their answer in 2 different contexts

Job interview → **Formal context**
 Chatting with friends → **Informal context**

RESULTS

Answers rated with 100% of confidence were excluded of the analyses



Proportion of reported and withheld answers in each stimulation group (Target, Active Control, Sham) splitted by social context (informal, formal) and report option (report, withheld). Error bars indicate standard deviation.

Univariate ANOVA analysis on the proportions of the reported answers in the formal context with Stimulation factor manipulated between subjects.

- Differences between the groups, $F(2, 57) = 4.130, p = .021, \eta p^2 = .021$.
- Student t-test showed that the proportion of reported answers in the Target group ($M = .34, SE = .18$) was lower than for Active Control ($M = .51, SE = .05, t(36) = -2.43, p = .02, \text{Cohen's } d = 0.79$), and also lower than in the Sham condition ($M = .49; SE = .04, t(36) = -2.68, p = .011, \text{Cohen's } d = 0.87$).
- Between Active Control and Sham conditions there were no significant differences, $t(36) = .161, p = .873$.

DISCUSSION

➤ These results support the involvement of the left BA10 in self-referential processes during exchanges of information in formal contexts: **selective social context-dependent influence on the decisions to report or withhold information in communication.**

➤ Prefrontal cortex may be one of the key brain regions that differentiate humans from other animals; it has developed in humans to be a neuroanatomically rich and complex structure which supports a range of higher cognitive processes. However, the detailed inventory of these cognitive processes remains unclear.



References:

Martin-Luengo, B., Shtyrov, Y., Luna, K., & Myachykov, A. (2018). Different answers to different audiences: The effects of pragmatics on the regulation of accuracy-informativeness trade-off when answering questions. *Memory*.
 Metcalfe, J. & Schwartz, B. (2016). The ghost in the machine: Self-reflective consciousness and the neuroscience of metacognition. In J. Dunlosky and S. (Uma) Tauber (Eds.), *The Oxford Handbook of Metacognition*. Oxford, GB, Oxford University Press.

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