

Introduction

- Open-Minded Cognition (OMC) refers to the extent to which an individual is willing to consider others' ideas and perspectives that may differ from their own. OMC has been shown to be highly correlated with Openness to Experience (Price et al., 2015), which Beaty et al. (2016) have found to be correlated with Default Mode Network (DMN) global efficiency.
- Previous research has also suggested that the right Dorsolateral Prefrontal Cortex (rDLPFC) is associated with partisan differences and biases, suggesting a theoretical association with OMC.
- The Earned Dogmatism Effect asserts that individuals are more likely to be closed-minded to others' ideas and information when they perceive themselves to have greater expertise on a topic relative to others (Ottati et al., 2018).
- In this study we investigate if 1) the DMN is important for OMC, 2) the rDLPFC is important for OMC, and 3) whether enhancing the probability of firing in the DMN or rDLPFC via High Density anodal transcranial Direct Current Stimulation (tDCS) could enhance OMC and thereby decrease the Earned Dogmatism Effect.

Methods

- 148 eligible Loyola undergraduate students participated in study approved by the Loyola University Chicago IRB.
- Participants were randomly assigned to one of three tDCS conditions. These included a 1) sham 30-min stimulation condition (20s of stimulation at beginning and end of the 30-min) or 2mA High Definition anodal tDCS using a 5-electrode montage (see Figure 1) on a Soterix Transcranial Electric Stimulation device targeting either 2) Posterior Cingulate Cortex (Default Mode Network), or 3) rDLPFC.
- During stimulation participants were asked to take a political quiz and were randomly assigned to either an easy (expert) or difficult (novice) quiz.
- Participants received false feedback and were asked to imagine talking to a person that scored about the same as they did (low expertise) or much lower than they did (high expertise).
- Participants then completed a measure of situation specific OMC (SOMC) for the imagined situation, ranging from 1 = "Strongly Disagree" to 7 = "Strongly Agree."
- We predicted a replication of the Earned Dogmatism effect such that individuals in the expert condition would show lower SOMC compared to those in the novice condition. Furthermore, participant's in both the DMN and rDLPFC stim conditions ought to report higher SOMC in the expert condition relative to sham such that there would be no difference between the expert and novice conditions for the stim conditions, thus eliminating the Earned Dogmatism effect.

Results

Figure 1. Stimulation sites for High Definition anodal tDCS

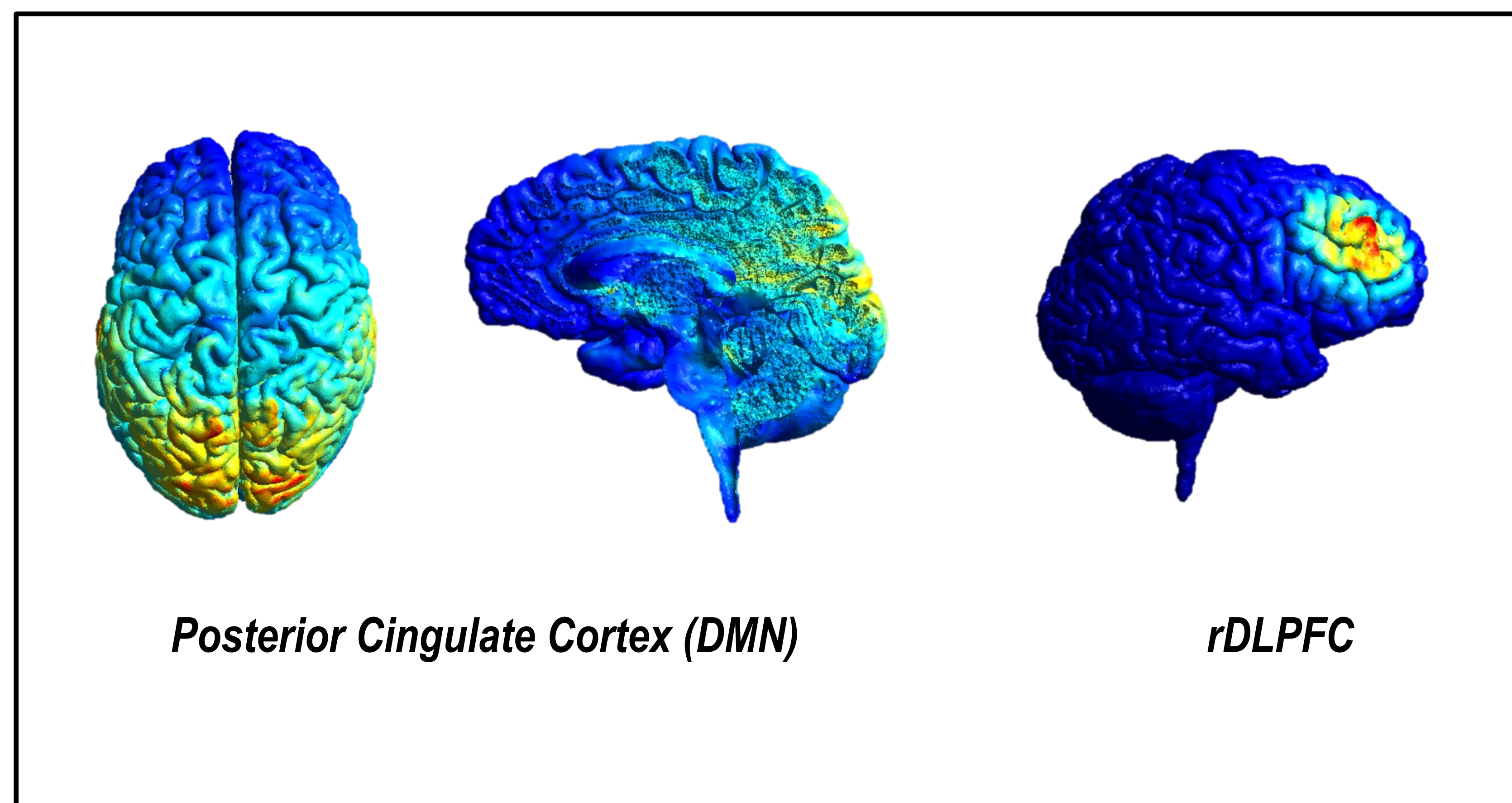
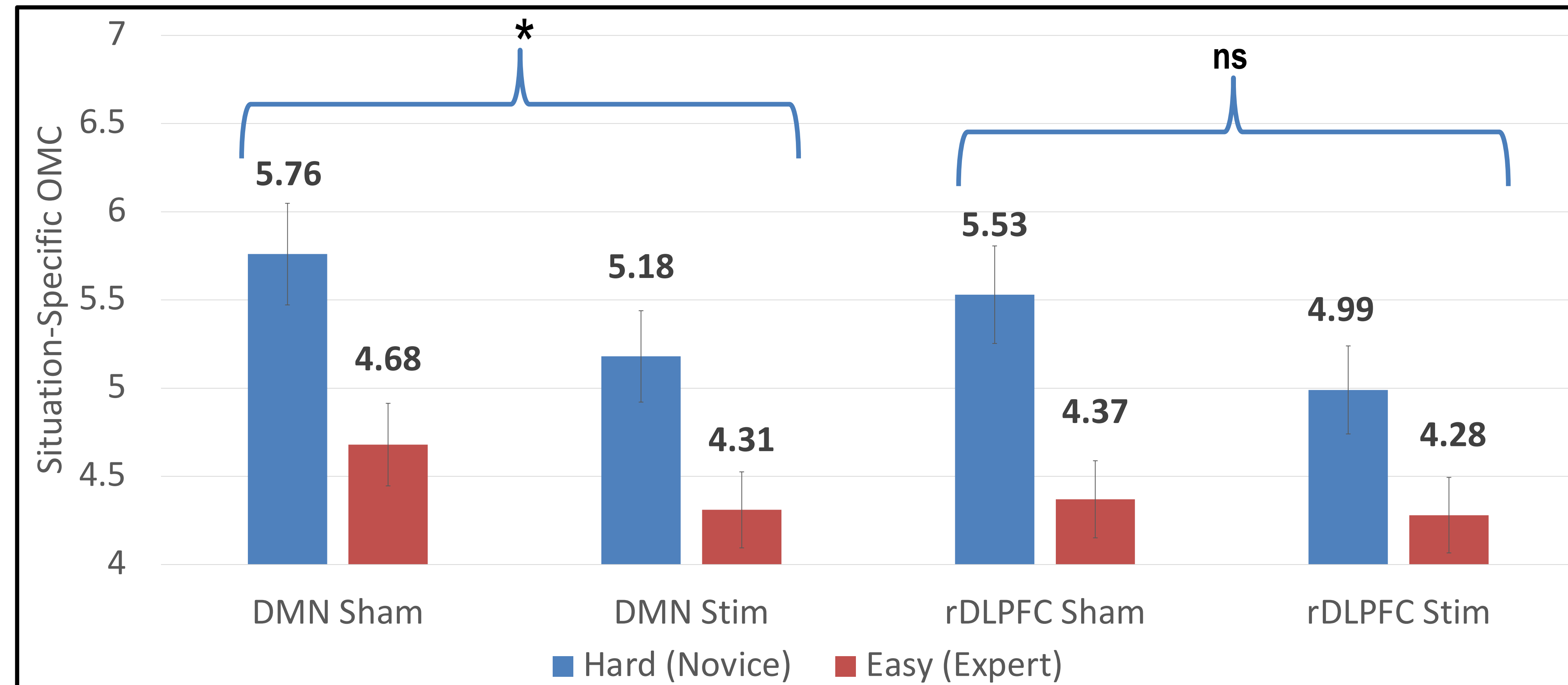


Figure 2. Earned Dogmatism Success vs. Failure Task by Stimulation Condition



- A significant main effect of the success vs. failure manipulation was found such that the easy (expert) condition ($M = 4.44$; $SD = 1.04$) differed from those in the difficult (novice) condition ($M = 5.46$; $SD = 1.01$) in terms of the SOMC; $t(152) = 6.14$, $p < 0.001$. That is, participants in the expert condition were more dogmatic than those in the novice condition.
- A significant main effect of stimulation condition was found on the SOMC such that participants in the stim DMN condition ($M = 4.76$; $SD = 1.04$) reported lower SOMC compared to participants in the sham condition ($M = 5.24$; $SD = 1.09$), that is, greater dogmatism, $F(1,77) = 4.32$, $p < .05$, $\eta_p^2 = 0.06$. No significant effect of rDLPFC condition was found on SOMC, $F(1,77) = 1.54$, $p = .22$, $\eta_p^2 = 0.02$
- No interaction effect was found between DMN vs. sham condition and expert vs. novice condition on SOMC, $F(1,77) = 0.172$, $p = .67$, $\eta_p^2 = 0.003$.
- No interaction effect was found between DMN vs. sham condition and expert vs. novice condition on SOMC, $F(1,77) = 0.751$, $p = .39$, $\eta_p^2 = 0.010$.

Conclusion

- The significant main effect of novice vs. expert condition on SOMC replicates past work from Ottati et al. (2018) regarding the Earned Dogmatism effect.
- DMN stim condition elicited greater dogmatism (i.e., lower SOMC) compared to sham. This may suggest that greater DMN activation may inversely related to the width of ideas one is willing to consider (i.e., OMC). This is opposite from what we expected based on prior neuroimaging results with Openness to Experience (Beaty et al., 2016).
- Interestingly no main effect of rDLPFC condition was found on SOMC. This may suggest that that rDLPFC plays a unique roll in open minded processing. For example, it could be that rDLPFC could be more associated with depth of processing (e.g., need for cognition; Cacioppo & Petty, 1982) rather than width of processing (e.g., OMC).
- Neither DMN nor rDLPFC conditions significantly interaction with novice vs. expert condition to elicit significant unique effects on SOMC. Though this may be due to possible floor effects.