1-K-44 Modulation of social conformity and confirmation bias with transcranial direct current stimulation: a preliminary study

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When people are facing opinions different from their own, they often change their behaviors to conform to group norms, which is known as social conformity. In addition, when individuals are dealing with social information, especially emotionally-consequential negative information, they have a tendency to search or utilize evidence which is congruent with one's existing belief, which is known as confirmation bias. There is increasing evidence suggesting that social influences affect our behavior via the medial frontal cortex (MFC) (Izuma, 2013; Stallen & Sanfey, 2015). In the current study, we implement an experimental setup in which participants underwent a non-invasive Transcranial Direct Current Stimulation (tDCS), followed by charitable decision-making tasks designed to induce social conformity. We further investigate how the tDCS simulation over the MFC would modulate confirmation bias. In a double-blinded randomization between-group design, 82 participants received anodal, cathodal and sham tDCS followed by a two-session donation task. For the first session, at the beginning of each trial, participants were presented a logo and a mission statement of each organization. They were asked to indicate how much they would like to donate to the organization on a scale ranging from 1 ($0.5) to 8 ($4) within 4 s. Finally, they were informed the average donation by 200 other university students obtained from a previous study (peer-group rating). In an unexpected second session, participants were asked to go through the same procedure once again, in a new randomized order, but without the feedback about the group rating. We demonstrated that compared with cathodal tDCS stimulation, anodal tDCS over the MFC tended to increase overall conformity. Moreover, "stingy" individuals, as compared to "generous" individuals, exhibit a bias in behavioral adjustment towards feedback that was congruent with their prior self- definitions while discounting counterevidence and anodal tDCS enhanced this confirmation bias. Our findings provide evidence for the role of MFC in social conformity and confirmation bias, and the modulatory function of anodal tDCS in increasing such behaviors. Reference Izuma, K. (2013). The neural basis of social influence and attitude change. Current Opinion in Neurobiology, 23(3), 456-462. doi:10.1016/j.conb.2013.03.009 Stallen, M., & Sanfey, A. G. (2015). The neuroscience of social conformity: implications for fundamental and applied research. Frontiers in Neuroscience, 9, 337. doi:10.3389/fnins.2015.00337

1-K-46 Behaviour and neural correlates in an implicit confidence task

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Objective Methods for measuring the confidence with which people make decisions, have traditionally relied on post-decision self-reports. These studies of confidence have found neural correlates of confidence in several areas including rostrolateral prefrontal cortex (De Martino et al., 2013), dorsal and anterior medial prefrontal cortex, bilateral orbitofrontal gyrus, and bilateral striatum (Molenberghs et al., 2016). However, it is not clear if the knowledge of an upcoming confidence report influences the decisions, and/or the neural representation of confidence. In a previous study we have presented a task that can measure implicit decision confidence, and shown that this measure is strongly correlated with an explicitly measured decision confidence. In the present study, participants performed the same task while undergoing functional magnetic resonance imaging (fMRI) scanning to investigate if the neural correlates of implicit confidence differs from those of explicitly measured confidence as identified in previous studies. Methods Thirty-nine participants performed the deceit-free task where they have to move a cursor around a circle to catch particles that move from the centre to the edge of the circle. The

direction of the particles is block-wise determined by a mean and a standard deviation from that mean. The participants can change the size of the cursor, and the amount of points rewarded for each catch is inversely proportional to the size of the cursor. After performing the task in the scanner, participants performed a control task and a Balloon Analogue Risk Task outside the scanner. Results The fMRI analysis showed activation in the expected decision-making areas (including the striatum, thalamus, anterior insula and ventromedial prefrontal cortex) as well as in areas associated with spatial tracking. The analysis also revealed correlation with confidence signals in anterior cingulate cortex and correlation with changes in confidence in anterior premotor cortex as well as both sides of posterior parietal cortex. Conclusion We believe that there is a case for developing methods for measuring confidence implicitly, and our results show that not only could such a task work successfully, but also that the neural correlates might be different from the correlates found in a task measuring confidence explicitly.

1-K-47 Social norms, self-enhancement, and genes; the role of dopaminergic, serotonergic, and oxytocinergic genes in self-construal

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Variation along independent and interdependent self-construal is well documented both within- and across-cultures. Rice theory proposes that, for individuals in Chinese agricultural regions, Northern, wheat-growing regions, are more independent than Southern, rice-growing regions, which are relatively interdependent. In the present study, we investigate neurochemical genetic differences between independence and interdependence. We adopt a novel perspective from social genomics, which conceptualizes cultural acquisition as occurring via coevolution of culture and genes, and conduct an exploratory study to investigate whether genetic pathway genes (e.g., receptor or synthesis genes) coding for neurochemicals involved in three well-defined social reward processing pathways, the dopaminergic, serotonergic, and oxytocinergic pathways, are associated with standard measures of self-construal for Chinese individuals from varying agricultural regions. Five hundred and twelve current students and graduates from universities in Beijing, China were recruited for participation in the study (mean age = 24.22). Of these, 210 were from southern China (109 females) and 302 were from northern China (160 females). Eligible students, who had previously been genotyped as part of a research panel, were contacted via email and completed a one-hour online survey. All participants were of Chinese origin and Chinese was their native language. Each participant was compensated with 100 Chinese Yuan (approx. $15 USD). Principal components analysis was conducted on all independence and interdependence self-construal survey outcomes, and the top 5 components were regressed on eigenSNPs from social reward pathway genes using a minor allele dosage model. Separate regressions for each gene were run using the equation, (1) $\gamma_i = \mu + \beta_j \chi_{ij} + \varepsilon_i$, where γ_i denotes the survey response of individual i, μ is the mean survey response in the population, χ_{ij} denotes the minor allele frequency of eigenSNP j for individual i, and ε_i is the residual or effect of exogenous factors on γ_i. The slope coefficient for χ_{ij}, β_j, is the unique effect of eigenSNP j on γ_i. To control for multiple testing, only genes that remain significant at $\alpha = .05$ after a 1000 permutation test are considered significant. Preliminary empirical results indicate that genes involved in social reward pathways are associated with various self-construal outcome measures. Given that self-construal is an important, fundamental determinant of human behavior, understanding the biological components that influence self-construal may provide tangible insights for advancing our understanding of social and economic behavior.

1-K-48 The effect of financial and social incentives on cooperation and its underlying neural mechanisms

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