

Abstract

Computational Phenotyping in Borderline Personality Using a Role-Based Social Hierarchy Probe

Iris Vilares¹, Tobias Nolte², Andreas Hula³, Zhuoya Cui⁴, Peter Fonagy⁵, Lusha Zhu⁶, Pearl Chiu⁷, Brooks King-Casas⁷, Terry Lohrenz⁷, Peter Dayan⁸, Read Montague⁹

¹ University of Minnesota

² University College London; Anna Freud National Centre for Children and Families

³ Austrian Institute of Technology

⁴ Virginia Tech Graduate Program in Translational Biology, Medicine, and Health

⁵ University College London

⁶ Peking University

⁷ Virginia Tech Carilion Research Institute

⁸ Max Planck Institute Tübingen

⁹ University College London; Virginia Tech Carilion Research Institute

Keywords: Computational Psychiatry, Borderline Personality Disorder, Neuroeconomics

Background: Dysfunction in social interactions is a hallmark of several psychiatric disorders. There has thus been a substantial recent interest in characterizing aberrant and normal social decision-making using games from experimental economics. However, these studies have so far covered only a small range of social interactions. One important omission

has been social dominance. A maladaptive reaction to social dominance may be particularly relevant for neuropsychiatric disorders such as borderline personality disorder (BPD) in which there is trouble sustaining social relations. Here, we examined how people with BPD behave in social interactions involving differences in social dominance.

Methods: Participants (169 controls and 313 BPDs) played a multi-round Social Hierarchy game where money could be used to increase (or maintain) social status. We then fit computational models to the recorded behavior. **Results:** We found no difference between patients with BPD and Controls in the amount spent to become or stay dominant, the challenge rate, or the number of rounds in the dominant position ($p > 0.05$). However, and contrary to expectations, we found that BPDs in the dominant position offered higher initial transfers to the other player compared to controls ($p = 0.03$). In the computational model, this was associated with a higher positive inequity aversion parameter. Furthermore, BPD patients challenged more when given an unfair transfer ($p = 0.02$).

Conclusions: Our results suggest that BPD patients and Controls value social dominance similarly but that BPD patients may be more inequity averse. We offer specific computational parameters that can be used to quantitatively characterize and phenotype each individual.

Supported By: Wellcome Trust Principal Research Fellowship (to PRM); PD was funded by the Max Planck Society.