The Role of Representational and Computational Complexity in Belief Formation

By Cuimin Ba and J. Aislinn Bohren and Alex Imas

Supplemental Appendix

Proof of Prediction 1.

Denote the average overreaction ratio for Ω and Ω' by $r(s_j)$ and $r'(s_j)$, respectively. As shown in the proof of Prediction 10 in Ba, Bohren and Imas (2024),

$$\begin{aligned} r(s_2) &= \frac{1}{N} \sum_{\omega_i \in \Omega} \frac{(\hat{E}_i(\omega|s_j) - E_0(\omega)) - (E_B(\omega|s_2) - E_0(\omega))}{(E_B(\omega|s_2) - E_0(\omega))} \\ &= \lambda \frac{\frac{1}{N}\left(\sum_{\omega_l \in \Omega}(E_{R,l}(\omega|s_2) - E_0(\omega))\right) - (E_B(\omega|s_2) - E_0(\omega))}{(E_B(\omega|s_2) - E_0(\omega))} - (1-\lambda). \end{aligned}$$

If $\alpha > 1$, then $0 < \frac{1}{N}\left(\sum_{\omega_l \in \Omega}(E_{R,l}(\omega|s_2) - E_0(\omega))\right) < E_B(\omega|s_2) - E_0(\omega)$. A similar derivation holds for $r'(s_2)$. It follows that $r(s_2) \in (-1, 0)$ and $r'(s_2) \in (-1, 0)$ when $\alpha > 1$, $\lambda \in (0, 1]$, and $\lambda' \in (0, 1]$. Moreover, $r(s_2)$ and $r'(s_2)$ are increasing in λ and λ', respectively, approaching -1 as λ and λ' approach 0. Therefore, there exists an $\epsilon \in (0, \lambda)$ such that if $\lambda' < \lambda - \epsilon$, then $r'(s_2) > r(s_2)$. The argument is analogous for s_1.

*

REFERENCES

Ba, Cuimin, J Aislinn Bohren, and Alex Imas. 2024. "Over- and underreaction to information." *PIER Working Paper 24-030.*