

Call for a 2-years Post-Doctoral position

Title: The role of cognitive biases on the dynamics of opinion formation and diffusion at large scale.

Framework of the call:

This position is open in the framework of the ANR project ***From individual cognitive biases to collective drifts on on-line social networks, (COBCOD)*** <https://iscpif.fr/cobcod/> devoted to understand how cognitive biases are amplified and potentially altered through repeated online interactions. Specifically, we seek to identify the mechanisms driving the emergence of dynamic patterns unique to online environments and explore how these collective dynamics, in turn, influence individuals. Moreover, we aim to find strategies for mitigating these effects and test them through models and experiments.

To achieve these objectives, the synergy of multiple approaches is essential, including individual-based modeling, complex computer simulations using both standard and *generative agent-based models* (ABM and G-ABM) to study the effects of biased agents in online networks, theoretical analysis of emergent phenomena, large-scale social network data analysis, online experiments with volunteer users, and fully controlled laboratory experiments.

Scientific objectives

Nowadays, online social media are widely used as primary information channels and tools for social interaction. With their unprecedented speed of communication and sheer volume of exchanged data, they define a vast public arena with evolving rules of virtual interaction. These rules emerge from complex dynamics, blending individual characteristics and motivations with rapidly advancing –often undisclosed– technology and economic constraints.

Decades of research in cognitive, social, and behavioral sciences have uncovered fundamental processes behind information processing and attitude formation, in particular the existence of *cognitive biases* that constrain the way in which an opinion forms and diffuses. For example, the *confirmation bias* describes the propensity of social actors to pay more attention to opinions that are already near to their own, while they disregard those which are very different, the *negativity bias*, describes an enhancement of attention towards information with negative content or tone and the *in-group bias* refers to the fact that social actors give more credit to information issued from members of their own group. While there is extensive empirical evidence for the effect of cognitive biases on the formation of the opinion of the individual, understanding their broader systemic impact in a networked society remains an open challenge.

On the other hand, a vast literature exists on opinion dynamics models, ranging from theoretical models explaining general properties of social opinion formation, to data-driven ones aimed at predicting or controlling specific systems. Theoretical models, based on complex dynamical systems, have successfully shown how simplified versions of common human interaction traits can lead to large-scale outcomes observed in real systems, such as consensus, polarization, or fragmentation^[1,2]. However, as these models are extremely stylized, it is urgent to understand the effect of important widespread characteristics of real systems on the known results, so as to allow for comparison with empirical observations.

A systematic work has been done in the recent years to incorporate some of these widespread characteristics to a particular class of opinion dynamics models, called *bounded confidence models*^[3,4], which already integrate the notion of confirmation bias, by including heterogeneity in the agents' properties and in their interactions, correlations between the agent's intrinsic properties and its local connectivity, fuzziness in the agents' decisions, etc.^[5-8].

The **COBCOD** team is at present addressing the role of each of the three considered cognitive bias, specifically in networked systems, both theoretically and by analyzing large empirical data bases. The recruited candidate is expected to contribute to these studies by designing and studying models that incorporate the different cognitive bias that jointly rule the agents' behavior. A second task will be to investigate whether and how the introduction of intelligent evolving agents via G-ABMs modify the results known from ABMs, for example by comparing the large-scale patterns observed in an artificial society of G-ABMs with those obtained for an equivalent traditional ABM model with controlled dynamical rules. Finally, the selected candidate will participate in the study of large-scale impact of the intervention strategies tested on individuals in laboratory experiments, by developing models that could simulate the role of super-spreaders in mitigation strategies.

The recruited candidate will be a full member of the Laboratoire de Physique Théorique et Modélisation, (LPTM) a research unit jointly ruled by the CNRS and the CY Cergy-Paris University, situated in the north-west side of the Parisian region. She/he will be fully integrated to the COBCOD team and will benefit of the multidisciplinary background of the

project. The candidate will participate in the monthly meetings of the group, and the yearly conferences organized by the team. In addition, she/he will be eligible to attend conferences, workshops and schools related with the project.

Practical information:

Requirements: The candidate should have a PhD in Physics, Applied Mathematics or Cognitive Science, with strong interest in interdisciplinary studies, extensive numerical simulations and data analysis, and a very good programming skills. Good knowledge of Dynamical Systems, Statistical Physics, Phase Transitions and Network theory, and LLMs will be strong asset for the application.

Working conditions: A 2 years research contract under the French law, including health care and unemployment insurance benefits. The working place will be the Laboratoire de Physique Théorique et Modélisation (LPTM) UMR CNRS-CY Cergy-Paris University. 2 Av Adolphe Chauvin 95430, Cergy-Pontoise.

Starting date: October 2026 (flexible).

Application process: the applicants must send to the contact email below the following documents: CV, copy of the PhD degree along with the reports of the reviewers. Two reference letters should be sent directly by the researchers signing them, to the email address below.

Application deadline: September 1st 2026.

Contact : Laura.Hernandez@cyu.fr

Plus d'informations : <https://iscpif.fr/cobcod/>

References

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- [4] Hegselmann, R. & Krause, U. *Opinion dynamics and bounded confidence models, analysis, and simulation*. Journal of Artificial Societies and Social Simulation 5 (2002).
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