Philippe Colo

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Nationalities:	French, Italian, Brazilian

Research fields

Communication in Games, Decision Theory, Environmental Economics, Experimental Economics

Academic Positions

September 2016 - (current)	PhD candidate in economics, **Paris School of Economics** Thesis: "Essays on the foundation of expert-based knowledge" Advisors: Jean-Marc Tallon and Stéphane Zuber
January 2019 - December 2019	Associate Researcher, **Euro-Mediterranean Center on Climate Change (CMCC)**
September 2018 - February 2019	Visiting PhD candidate, **Bocconi University** Host: Massimo Marinacci and Valentina Bosetti

Education

June 2015	Engineer degree in statistics and economics, **ENSAE ParisTech** Major: Data Science Thesis: "A cooperative Game Theory approach to energy supply"
June 2016	Master's degree in Philosophy, **Université Paris I** Major: Epistemology Thesis: "Epistemology of decision under uncertainty in environmental economics models"

Teaching experience

2018 - 2020	T.A. Graduates at **Université Paris I** *Economics of information* for Pr. Stéphane Zuber
2016 - 2018	T.A. Graduates at **Paris School of Economics** *Game Theory* for Pr. Olivier Compte
2014 - 2016	Tutor Undergraduates at **Université Paris I** *First Year Mathematics*

Working papers

- **Expert-based scientific knowledge** (Job Market Paper)

  This paper studies the transmission of complex scientific knowledge. Scientific models are formalised as probability distributions over possible scenarios. An expert is assumed to know the most likely model and seeks to communicate it to a decision maker, but cannot certify it. As a result, communication of scientific knowledge is a cheap talk game over models. The decision maker is in a situation of model-uncertainty and is ambiguity sensitive. I show that information transmission depends on both the strategic misalignment of players and the degree of consensus among scientific models. When science

is divided, there is an asymmetry in information transmission when the receiver has maxmin expected utility preferences. Types below a certain threshold are necessarily pooled, regardless of the misalignment. All equilibria of the game are outcome equivalent to a partitional equilibria and, unlike similar models in the literature, the most informative one is interim Pareto dominant. These results bring new insights regarding the current COVID-19 and climate crises. They show why scientific recommendations calling for more efforts in the provision of a public good, such as social distancing or pollution reduction, may lack influence over the general public.

- **Planning the Aggregator's Strategy under Uncertain Behavior of the Agents** (with H. Le Cadre)

  We consider a two tiered wholesale electricity market made of a day-ahead and a real-time market. In the retail market, consumers can subscribe a contract with a conventional retailer or cooperate through an aggregator who directly participates in the wholesale electricity market by taking forward positions. These latter depend on the consumer aggregated demand as estimated in the day ahead. Consumers are then penalized in real time on the basis of their prediction errors. To plan the aggregator's pricing strategy, we model the consumers in a behavioral economics framework and take into account their possibility to churn. We characterize analytically the core of the game and give conditions for its non emptiness. Then we propose an algorithm based on Machine Learning methods (SVR, Neural Network, Regret) to optimize the aggregator's pricing strategy in a competitive framework. Our results are finally evaluated on a case study based on time series of the power consumptions of 370 Portuguese consumers.

Work in progress

- **Elicitation of imprecise probabilities** (with M. Abdellaoui and B. Hill) *In final writing stage*

  Despite the increasing relevance of multiple prior beliefs in various domains of economics and beyond and the significant theoretical work on them, little progress has been made on developing choice-based techniques for eliciting them. This paper proposes a new choice-based, incentive-compatible elicitation method for multiple prior beliefs, and implements it in two experiments on continuous sources of uncertainty to elicit the multiple prior equivalent of subjects' CDFs. The method is theoretically robust, insofar as it applies under a wide range of multiple prior decision models and with few assumptions about the nature of beliefs. In its implementation, we find a significant majority of subjects have non-degenerate sets of priors, with larger sets for more unpredictable events. Finally, we use our method to provide the first elicitation of the mixture parameter in the Hurwicz alpha-maxmin EU model that fully controls for beliefs.

- **The IPCC in Climate-Change Agreements** *Available upon request*

  I study a generalisation of the Crawford-Sobel (1982) model of cheap talk communication, where multiple receivers play in a game of contribution to a public bad under uncertainty. Because the receivers' game is inefficient, a welfare maximising sender is biased towards its outcome. I show that information transmission is always partial and divided in intervals. This result provides a strategic foundation for the Intergovernmental Panel on Climate Change's (IPCC) communication strategy over possible climate scenarios. When producing a report, the IPCC communicates climate knowledge to countries taking part in game of contribution to a public bad over green house gases (GHG), where there is uncertainty over damages. Because of climate science's complexity, I assume that that the IPCC cannot certify the likelihood of each scenario. The use of a subjective confidence scale as presented in Mastrandrea et al. (2010) consequently appears as an equilibrium behaviour, if the IPCC cares only about social welfare. In a parametric example, I further show that the amount of information conveyed and the social welfare decreases with the countries' dependence to GHG and their exposure to climate damages. Assuming that the set of emissions is bounded, I show that public communication when the receivers are heterogeneous is equivalent to direct communication with only one of the receivers.

- **Sequential foundation of knowledge** *Available upon request*

  This paper considers a game of sequential cheap-talk communication between a receiver and two senders who are imperfectly informed about the state. Senders and the receiver have singled-peaked utilities but with different optimal actions under certainty. As a result, full revelation is not possible, although it would lead to a Pareto dominant situation. I show that even if no sender learns the state

from nature, the receiver can end-up learning it from their successive messages. Unlike in similar models in the literature, this can happen when senders are biased in the same direction and even identical. Yet, a wider range of states can be revealed when senders are more heterogeneous. The quality of the first sender's expertise is decisive in the process. Those results show that sequential communication, even when senders are poorly informed and of similar motive, can account for a form of collective foundation of knowledge.

- **Selecting among causal theories**
  with A. Ghersengorin

  In this ongoing project we reflect on the positive drivers of selection among competing causal explanation. In order to explain a given phenomena, causal theories can involve more or less explanatory inputs, making their narrative more or less complex. Think of Einstein's theory of relativity, a more complex yet more accurate explanation of gravity than newtonian physics. Under limited data, complexifying a theory mechanically increases its accuracy to the cost of its insightfulness. We suggest an axiomatical representation of the preferences underlying this trade-off and we show that they can ultimately be seen as preferences over lotteries with an imprecise outcome. An imprecision averse individual will be aiming for the most accurate theory, whereas an imprecision loving one will favour insightfulness.

Academic presentations with committee

- **Expert-based scientific knowledge**, Econometric Society European Meetings (ESEM), Manchester 2019, Advances in Decision Analysis (ADA), Milan 2019, Foundation of Utility and Risk (FUR), York 2018
- **The IPCC in Climate-Change Agreements**, French Association of Environmental and Resource Economists (FAERE), Aix-en-Provence, 2018
- **Sequential foundation of knowledge**, Society for the Advancement of Economic Theory (SAET), Ischia 2019
- **Computing an Aggregator's Long Term Profit under Uncertain Behavior of the Agents**, 9-th EAI International Conference on Performance evaluation Methodologies and Tools (ValueTools 2015), Société Française de Recherche Opérationnelle et d'Aide à la Décision (ROADEF 2016)

Refereering Service

Social Choice and Welfare, Mathematical Social Sciences, Decisions in Economics and Finance

Grants

2019-2021	**Member of ANR (French national research agency) Ambiguity in Dynamic Environments**, P.I. Jean-Marc Tallon (PSE)
2019-2021	**Member of ANR Integrating Deep Uncertainty in Climate Change Modelling**, P.I. Loic Berger (IESEG)
2017-2020	**Member of ANR Coping with heterogeneous opinions**, P.I. Eric Danan (Université de Cergy)
2016-2019	**PhD Fellowship**, Univerisity Paris I
2016	**Member of ANR Decision-Making and Belief Change Under Severe Uncertainty: A Confidence-Based Approach**, P.I. Brian Hill (HEC)

Work Experience

December 2015-June 2016	Research engineer at HEC Paris, Jouy en Josas *Decision theory and statistics*
November 2015-May 2016	Consultant in Economics for EDF, Chatou *Industrial Micro-economics and Environmental economics*
June-October 2015	Assistant researcher in applied mathematics at Mines ParisTech, Sophia Antipolis
June-September 2014	Assistant researcher at Sofiprotéol, Paris *Microeconomics*

Languages

Native speaker:	French, Portuguese
Fluent:	English, Spanish, German
Good knowledge:	Italian

Computer Skills

Basic Knowledge:	Excel, Word, PowerPoint, SAS
Good Knowledge:	Python, R, Stata, LaTeX

Other

Sports:	National level triathlete at Paris Université Club (PUC)

References

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