# HUGO GILBERT


**Postdoc at Gran Sasso Science Institute, l'Aquila, Italy, since 01/10/2018**

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## RESEARCH INTERESTS

My work falls in the scopes of *combinatorial optimization*, *decision aiding*, *algorithmic game theory* and *computational social choice*. I enjoy designing *exact* and *approximation* algorithms, as well as studying the *complexity* and *parameterized* complexity of algorithmic problems. I am interested in a wide range of topics as *sequential decision making*, *voting*, *allocation procedures* and *robust optimization*. Recently, my work as particularly focused on two types of problems related to social networks: either problems that are related to *influence spreads*; or problems that are related to *interactive forms of voting procedures*. On this latter type of problems, I am currently co-supervizing Esmaiel Delfaraz, a PhD student at Gran Sasso Science institute, with Gianlorenzo D'Angelo.

## ACADEMIC POSITIONS

**Postdoc at Gran Sasso Science Institute** Since October 2018 GSSI, 67100, L'Aquila, Italy

**ATER at university Pierre and Marie Curie** From September 2017 to August 2018 UPMC, 75005, Paris, France

**PhD at LIP6, University Pierre and Marie Curie** From October 2014 to December 2017 UPMC, 75005, Paris, France

**Oracle-based Algorithms for Optimizing Sophisticated Decision Criteria in Sequential, Robust and Fair Decision Problems.**

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| **Jury:** | Wlodzimierz Ogryczak | Warsaw University of Technology | Rapporteur |
| | Régis Sabbadin | INRA Toulouse | Rapporteur |
| | Yann Chevaleyre | University Paris-Dauphine | Examine |
| | Bruno Escoffier | University Pierre and Marie Curie (Paris) | Examine |
| | Hélène Fargier | University Paul Sabatier (Toulouse) | Examine |

*Thesis director*: Olivier Spanjaard
*Co-advisors*: Paolo Viappiani, Paul Weng
*Place of defense*: UPMC, Paris, France.
*Date of defense*: 11 December 2017.

**Keywords**: decision theory, elicitation procedures, sequential decision making, robust optimization, computational social choice, algorithmic game theory.

- Design of exact methods to determine optimal solutions in optimization problems under *uncertainty*, *robust* combinatorial optimization problems and *fair* multi-agent optimization problems.
- Design of *elicitation* procedures dedicated to sophisticated decision criteria from decision theory.
- Determination of the *algorithmic complexity* of the induced optimization problems.

## PUBLICATIONS

### Journal Articles

- Gilbert, H. and Spanjaard, O. (2019). "Optimizing a Generalized Gini Index in Stable Marriage Problems: NP-Hardness, Approximation and a Polynomial Time Special Case". In: *Algorithmica* 81.7, pp. 2653–2681.
- – (2017a). "A double oracle approach to minmax regret optimization problems with interval data". In: *European Journal of Operational Research* 262.3, pp. 929–943.
- Lutton, E., Gilbert, H., Cancino, W., Bach, B., Pallamidessi, J., Parrend, P., and Collet, P. (2015). "Visual and Audio Monitoring of Island Based Parallel Evolutionary Algorithms". In: *Journal of Grid Computing* 13.3, pp. 309–327.

### International Conferences

- Becker, R., Coro, F., D'Angelo, G., and Gilbert, H. (2020). "Balancing Spreads of Influence in a Social Network". In: *Proceedings of the Thirty-Fourth AAAI conference on artificial intelligence, AAAI 2020, New York, USA, February 7-12,2020*.
- Escoffier, B., Gilbert, H., and Pass-Lanneau, A. (2020). "Iterative Delegations in Liquid Democracy with Restricted Preferences". In: *Proceedings of the Thirty-Fourth AAAI conference on artificial intelligence, AAAI 2020, New York, USA, February 7-12,2020*.
- Flammini, M. and Gilbert, H. (2020). "Parameterized Complexity of Manipulating Sequential Allocation". In: *Proceedings of the Twenty-Fourth European Conference on Artificial Intelligence, ECAI 2020, Santiago de Compostela, Spain, June 8-12, 2020*.

- Gilbert, H., Portoleau, T., and Spanjaard, O. (2020). “Beyond Pairwise Comparisons in Social Choice: A Setwise Kemeny Aggregation Problem”. In: *Proceedings of the Thirty-Fourth AAAI conference on artificial intelligence, AAAI 2020, New York, USA, February 7-12,2020*.
- Escoffier, B., Gilbert, H., and Pass-Lanneau, A. (2019). “The Convergence of Iterative Delegations in Liquid Democracy in a Social Network”. In: *Algorithmic Game Theory - 12th International Symposium, SAGT 2019, Athens, Greece, September 30 - October 3, 2019, Proceedings*, pp. 284–297.
- Gilbert, H. (2017). “Fair Proportional Representation Problems with Mixture Operators”. In: *Algorithmic Decision Theory - 5th International Conference, ADT 2017, Luxembourg, Luxembourg, October 25-27, 2017, Proceedings*, pp. 108–123.
- Gilbert, H., Benabbou, N., Perny, P., Spanjaard, O., and Viappiani, P. (2017). “Incremental Decision Making Under Risk with the Weighted Expected Utility Model”. In: *Proceedings of the Twenty-Sixth International Joint Conference on Artificial Intelligence, IJCAI 2017, Melbourne, Australia, August 19-25, 2017*, pp. 4588–4594.
- Gilbert, H. and Spanjaard, O. (2017b). “Complexity of Solving Decision Trees with Skew-Symmetric Bilinear Utility”. In: *Proceedings of the Thirty-Third Conference on Uncertainty in Artificial Intelligence, UAI 2017, Sydney, Australia, August 11-15, 2017*.
- Gilbert, H., Weng, P., and Yan, X. (2017). “Optimizing Quantiles in Preference-Based Markov Decision Processes”. In: *Proceedings of the Thirty-First AAAI Conference on Artificial Intelligence, February 4-9, 2017, San Francisco, California, USA*, pp. 3569–3575.
- Gilbert, H., Zanuttini, B., Viappiani, P., Weng, P., and Nicart, E. (2016). “Model-Free Reinforcement Learning with Skew-Symmetric Bilinear Utilities”. In: *Proceedings of the Thirty-Second Conference on Uncertainty in Artificial Intelligence, UAI 2016, June 25-29, 2016, New York City, NY, USA*.
- Nicart, E., Zanuttini, B., Gilbert, H., Grilhères, B., and Praca, F. (2016). “Building Document Treatment Chains Using Reinforcement Learning and Intuitive Feedback”. In: *28th IEEE International Conference on Tools with Artificial Intelligence, ICTAI 2016, San Jose, CA, USA, November 6-8, 2016*, pp. 635–639.
- Gilbert, H., Spanjaard, O., Viappiani, P., and Weng, P. (2015a). “Reducing the Number of Queries in Interactive Value Iteration”. In: *Algorithmic Decision Theory - 4th International Conference, ADT 2015, Lexington, KY, USA, September 27-30, 2015, Proceedings*, pp. 139–152.
- – (2015b). “Solving MDPs with Skew Symmetric Bilinear Utility Functions”. In: *Proceedings of the Twenty-Fourth International Joint Conference on Artificial Intelligence, IJCAI 2015, Buenos Aires, Argentina, July 25-31, 2015*, pp. 1989–1995.
- Lutton, E., Gilbert, H., Cancino, W., Bach, B., and Collet, P. (2014). “GridVis: Visualisation of Island-Based Parallel Genetic Algorithms”. In: *Applications of Evolutionary Computation - 17th European Conference, EvoApplications 2014, Granada, Spain, April 23-25, 2014, Revised Selected Papers*, pp. 702–713.


## TEACHING POSITIONS

### Parameterized Complexity - Algorithmic and Formal-Methods Viewpoints. Lecturer (∼20h)

**PhD course** April 2020 GSSI

I am currently developing with Clemens Grabmayer a lecture on parameterized complexity for the 1st-year PhD students of GSSI. This lecture aims at giving a broad overview of parameterized complexity: its main concepts, the main methods to design fixed-parameter tractable algorithms as well as algorithmic lower bounds.

### Advanced programming in C. Teaching Assistant (∼20h)

**2nd-year of Bachelor Degree in Computer Science** 2015 – 2018 UPMC

This course aims to improve the knowledge students have about the C language. The standard library and the open-source GCC compiler are used. During the course, we see how to handle the memory with all the consequences this may have: pointers, tables, dynamic memory allocation, et caetera.

### Introduction to Python. Teaching Assistant (∼60h)

**1st-year of Bachelor Degree in Computer Science** 2017 – 2018 UPMC

A gentle introduction to programming using the Python 3 language. The first part of the course introduces the basics of programming (e.g., what are programs? variables? functions? types?...). In the second part of the course, different data structures are explored as lists, sets or dictionaries.

### Algorithmic Theory and Data Structures. Teaching Assistant (∼20h (2016) and ∼40h (2017))

**2st-year of Bachelor Degree in Computer Science** 2016 – 2018 UPMC

This course aims at giving the basics of complexity theory and data structures. This course introduces graphs, binary research trees, heaps as well as hash tables. These data structures are presented and used extensively in many exercises and projects realized using the C language and their algorithmic properties are analyzed.

### Algorithmic Theory and Programming in C. Teaching Assistant (∼24h)

**3rd-year of Bachelor Degree in Computer Science** 2015 – 2018 Polytech Paris, UPMC

This course aims at giving the basics of complexity theory. Many examples are used from graph theory. The main types of algorithms (brute force, greedy, divide and conquer, dynamic programming, et caetera) are presented and used extensively in many exercises and projects realized using the C language.

### Machine Representation. Teaching Assistant (∼20h)

**2nd-year of Bachelor Degree in Computer Science** 2015 – 2017 UPMC

The aim of this course is to explain the architecture and the operation of a sequential computer. It also highlights the representation of different categories of data needed to run a program (instruction, data, stack, et caetera), and shows how a C program is represented in the MIPS assembler language.

### Decision Theory and Game Theory. Teaching Assistant (∼20h)

**1st-year of Master of Science** 2017 – 2018 UPMC

The aim of this course is to introduce decision models formalizing the behavior of strategic agents acting alone or in a group. We then discuss how these models can be embedded in decision aiding tools.

## ACADEMIC DUTIES

I am or have been a PC for the following conferences: RJCIA2020, IJCAI-PRICAI2020, AAMAS2020, AAAI2020, RJCIA2019, IJCAI2019, IJCAI2018.