

Sébastien Destercke

CNRS Researcher

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Career

CNRS researcher

Oct. 2011 - **Joint research unit Heudiasyc (7053)**, *Université de technologie de Compiègne, France.*
Now

Interests Information modelling and treatment under severe uncertainty.

Team Decision et Image. Head: Yves Grandvalet, CNRS researcher

CIRAD research engineer

Feb. 2009 - Oct. **Joint research unit IATE**, *Montpellier SupAgro, France.*
2011

Interests Uncertainty modelling and aid-decision applied to agronomical production chains.

Team Knowledge Engineering group. Head: Patrice Buche, research engineer

Teaching and research assistant

Sept. 2008 - **Mathematic and computer science department**, *Université Toulouse le mirail, France.*
Feb. 2009

Interests Information modelling and treatment under severe uncertainty.

Team Raisonnements Plausibles, Décision et Méthodes de preuve. Head: Didier Dubois, CNRS researcher

Education

2005-2008 **PhD in Computer Science**, *Université Paul-Sabatier, Toulouse.*

Thesis prepared at Toulouse Institute of Computer Science Research and funded by the French Institute for Radiological Protection and Nuclear Safety.

Dissertation

Title Uncertainty representation and combination: new results with application to nuclear safety issues

Supervisor Didier Dubois, CNRS researcher, IRIT

Co-supervisor Eric Chojnacki, research engineer, IRSN

Reviewers Thierry Denooux, professor, Université technologique de Compiègne

Serafin Moral, professor, Universidad de Granada

Olivier Strauss, Lecturer, Université de science de Montpellier

Examiners Gert de Cooman, professor, Ghent University

Philippe Fortemps, professor, Faculté polytechnique de Mons

Monique Pontier, professor, Université Toulouse Paul Sabatier

1998-2004 **Engineer Degree**, *Faculté polytechnique, Mons (Belgium).*

Engineer degree in computer science and applied mathematics

Languages

French Mother tongue

English Fluent

Spanish Conversant

Dutch Basic knowledge

Awards, grants and fellowships

- 2012 3 month visit grant at Universidad de Oviedo, Statistic department
- 2009 Best Ph.D. (gold prize) awarded by the International Society for Imprecise Probabilities: Theories and Applications
- 2008 Best paper award, $\lambda\mu$ conference, category "new industrial challenges"

Projects

RECIF

- Details 3 years (2014-2017), member, ANR national grant (~150K Euros)
- Topic Uncertainty modelling by belief functions for railway systems reliability assessment
- Partners Heudiasyc/CNRS (France), LAMIH (France), CRAN (France)

ORUs

- Details 1 years (2013-2014), **PI**, Labex Grant (~8K Euros)
- Topic Optimisation under uncertainty of complex system reliability
- Partners Heudiasyc/CNRS (France)

EVEREST

- Details 3 years (2013-2016), member, ANR grant (~ 200K Euros)
- Topic Learning High Level Representations of Large Sparse Tensors
- Partners Heudiasyc/CNRS (France) & Xerox Research Center Europe (France).

ECOBIOCAP

- Details 4 years (2011-2015), member, FP7 European grant (~ 4M Euros)
- Topic Ecoefficient Biodegradable Composite Advanced Packagings
- Partners IVV (Germany), UCC (Ireland), SIK (Sweden), NBM (Spain), CSIC (Spain), INRA (France), FUERST-PLAST (France), FEDOU (France), ALTERBIO (France), UMINHO (Portugal), IBET (Portugal), UNIROMA (Italy), NOVAMONT (Italy), UNIBO (Italy), CBHU (Hungary)

Scientific activities

Reviewing

Journal **Editorial Board:** IJAR

Regular (min. 1 reviews/year): IJAR, FSS, INS, IEEE SMC, IJUFKS, SOCO

Occasional (less than 1 reviews/year): JSTP, AI, MSS, IJRS, ANOR, Hydrology and Earth System Sciences, CAD, JRR, AIJ, IEEE TFS, IEEE TKDE, Environmental Modelling & Software, CSDA, JSPI, TOMACS, MACHS, Ecography, IEEE TR, Pattern Recognition.

Conferences **Program committee:** UAI (2010-2013), BELIEF (2012), ECSQARU (2011,2013), IHMSC (2011), ISIPTA (2009,2011,2013-chair), SMPS (2012), SOCPAR (2010), LFA (2012,2013), KSE (2013), EUROFUSE (2013), IPMU (2014), ECAI (2014)

Reviewer: LFA (2009), SMPS (2008, 2010), EUSFLAT (2009), IPMU (2010, 2012)

Organization

Committee LFA (2006, 2012), SMPS (2008), ISIPTA (2013)

Special Sessions ERCIM (2011,2012), SMPS (2012), IPMU (2014)

Responsibilities

SIPTA Society for Imprecise Probability: Theories and Applications (Executive Editor 2011-2013, Secretary 2013-2015)

BFAS Secretary for the Belief Functions and Applications Society (2011-2013)

Invited talks

SUM 2012 Invited tutorial: "Uncertainty handling and modelling: an introduction"

ECSQARU 2013 Invited tutorial: "Uncertainty handling and modelling: an introduction"

PhD supervision

2012-2015 Gen Yang, co-supervisor: Mylène Masson)

"Machine learning problems with severe uncertainty and structured data"

2010-2014 Nicolas-Sutton Charani, co-supervisor: Thierry Denoeux

"Learning from uncertain data: application to rubber quality prediction"

Publications

Edited journals, proceedings, books

- [1] F. Cozman, T. Denœux, S. Destercke, and T. Seidenfeld, editors. *ISIPTA'13: Proceedings of the Seventh International Symposium on Imprecise Probability: Theories and Applications*, Compiègne, 2013. SIPTA.
- [2] Sébastien Destercke, Mylène Masson, and Benjamin Quost. Belief 2012 conference special issue. *Int. J. of Approximate Reasoning*, 55, 2014.
- [3] Cozman Fabio, Sébastien Destercke, and Seidenfeld Teddy. Isipta 2013 conference special issue. *Int. J. of Approximate Reasoning*, 56, 2015.

Books and book chapters

- [4] Sébastien Destercke and Didier Dubois. *An introduction to Imprecise Probabilities*, chapter Special cases. Wiley, 2014.
- [5] Sébastien Destercke and Didier Dubois. *An introduction to Imprecise Probabilities*, chapter Other uncertainty theories based on capacities. Wiley, 2014.
- [6] Patrice Buche, Sébastien Destercke, Valérie Guillard, Ollivier Haemmerlé, Rallou Thomopoulos, et al. Springer series 'studies in computational intelligence. 497, 2014.

Journal papers

- [7] Enrique Miranda, Matthias CM Troffaes, and Sébastien Destercke. A geometric and game-theoretic study of the conjunction of possibility measures. *Information Sciences*, 298:373–389, 2015.
- [8] Marie-Hélène Masson, Sébastien Destercke, and Thierry Denoeux. Modelling and predicting partial orders from pairwise belief functions. *Soft Computing*, 2015, in press.
- [9] Frédéric Pichon, Sébastien Destercke, and Thomas Burger. A consistency-specificity trade-off to select source behavior in information fusion. *IEEE Trans. on Syst., Men and Cyb.*, 2015, in press.
- [10] Sébastien Destercke and Inés Couso. Ranking of fuzzy intervals seen through the imprecise probabilistic lens. *Fuzzy Sets and Systems*, 2015, in press.
- [11] Enrique Miranda and Sébastien Destercke. Extreme points of the credal sets generated by comparative probabilities. *Journal of Mathematical Psychology*, 64:44–57, 2015.
- [12] F. Aguirre, S. Destercke, D. Dubois, M. Sallak, and C. Jacob. Inclusion-exclusion principle for belief functions. *International Journal of Approximate Reasoning*, 55(8):1708 – 1727, 2014.

- [13] S. Destercke. Comments on "learning from imprecise and fuzzy observations: Data disambiguation through generalized loss minimization" by eyke hüllermeier. *International Journal of Approximate Reasoning*, 55(7):1588 – 1590, 2014.
- [14] S. Destercke. Comments on "a distance-based statistical analysis of fuzzy number-valued data" by the {SMIRE} research group. *International Journal of Approximate Reasoning*, 55(7):1575 – 1577, 2014.
- [15] Rallou Thomopoulos, Sébastien Destercke, Brigitte Charnomordic, Iyan Johnson, and Joël Abécassis. An iterative approach to build relevant ontology-aware data-driven models. *Information Sciences*, 221:452–472, 2013.
- [16] Matthias Troffaes, Enrique Miranda, and Sébastien Destercke. On the connection between probability boxes and possibility measures. *Information Sciences*, 224:88–108, 2013.
- [17] Sébastien Destercke, Patrice Buche, and Brigitte Charnomordic. Evaluating Data Reliability: An Evidential Answer with Application to a Web-Enabled Data Warehouse. *IEEE Transactions on Knowledge and Data Engineering*, 25(1):92–105, 2013.
- [18] Sébastien Destercke and Mohamed Sallak. An extension of Universal Generating Function in Multi-State Systems considering epistemic uncertainties. *IEEE Transactions on Reliability*, 62:504–514, 2013.
- [19] Thomas Burger and Sébastien Destercke. How to randomly generate mass functions. *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, 21:645–673, 2013.
- [20] Sébastien Destercke. Independence and 2-Monotonicity: Nice to Have, Hard to Keep. *International Journal of Approximate Reasoning*, 54(4):478–490, 2013.
- [21] Sébastien Destercke and Thomas Burger. Toward an Axiomatic Definition of Conflict Between Belief Functions. *IEEE trans. on systems, man, and cybernetics. Part B*, 43:585–596, 2013.
- [22] Sébastien Destercke and Olivier Strauss. Filtering with clouds. *Soft Computing*, 16(5):821–831, 2012.
- [23] Sébastien Destercke. A K-nearest neighbours method based on imprecise probabilities. *Soft Computing*, 16(5):833–844, 2012.
- [24] Valérie Guillard, C. Guillaume, and Sébastien Destercke. Parameter uncertainties and error propagation in modified atmosphere packaging modelling. *Postharvest Biology and Technology*, 67:154–166, 2012.
- [25] Matthias Troffaes and Sébastien Destercke. Probability boxes on totally preordered spaces for multivariate modelling. *International Journal of Approximate Reasoning*, 52(6):767–791, 2011.
- [26] Sébastien Destercke and Valerie Guillard. Interval analysis on non-linear monotonic systems as an efficient tool to optimise fresh food packaging. *Computers and Electronics in Agriculture*, 79(2):116–124, 2011.
- [27] Sébastien Destercke and Didier Dubois. Idempotent conjunctive combination of belief functions: Extending the minimum rule of possibility theory. *Information Sciences*, 181(18):3925–3945, 2011.
- [28] Sébastien Destercke. Handling bipolar knowledge with imprecise probabilities. *International Journal of Intelligent Systems*, 26(5):426–443, 2011.
- [29] Sébastien Destercke, Patrice Buche, and Valérie Guillard. A flexible bipolar querying approach with imprecise data and guaranteed results. *Fuzzy Sets and Systems*, 169(1):51–64, 2011.

- [30] E. Chojnacki, J. Baccou, and S. Destercke. Numerical sensitivity and efficiency in the treatment of epistemic and aleatory uncertainty. *Int. J. of General Systems*, 39(7):683–704, 2010.
- [31] Lev Utkin and Sébastien Destercke. Computing expectations with continuous p-boxes: Univariate case. *International Journal of Approximate Reasoning*, 50(5):778–798, 2009.
- [32] Sébastien Destercke, Didier Dubois, and Eric Chojnacki. A consonant approximation of the product of independent consonant random sets. *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, 17(6):773, 2009.
- [33] S. Destercke, D. Dubois, and E. Chojnacki. Unifying practical uncertainty representations: I generalized p-boxes. *Int. J. of Approximate Reasoning*, 49(3):649–663, 2008.
- [34] S. Destercke, D. Dubois, and E. Chojnacki. Unifying practical uncertainty representations: II clouds. *Int. J. of Approximate Reasoning*, 49(3):664–677, 2008.
- [35] S. Destercke, D. Dubois, and E. Chojnacki. Possibilistic information fusion using maximal coherent subsets. *IEEE Trans. on Fuzzy Systems*, 17(1):79–92, 2008.
- [36] Sébastien Destercke and Eric Chojnacki. Methods for the evaluation and synthesis of multiple sources of information applied to nuclear computer codes. *Nuclear Engineering and Design*, 238(9):2484–2493, 2008.
- [37] Sébastien Destercke, Serge Guillaume, and Brigitte Charnomordic. Building an interpretable fuzzy rule base from data using Orthogonal Least Squares: Application to a depollution problem. *Fuzzy Sets and Systems*, 158(18):2078–2094, 2007.
- [International conferences with peer reviewing](#)
- [38] Nicolas Sutton-Charani, Sébastien Destercke, and Thierry Denoeux. Application of e2m decision trees to rubber quality prediction. In *IPMU*, pages 107–116, 2014.
- [39] Sébastien Destercke and Olivier Strauss. Kolmogorov-smirnov test for interval data. In *IPMU*, pages 416–425, 2014.
- [40] Sébastien Destercke. Multilabel prediction with probability sets: The hamming loss case. In *IPMU*, pages 496–505, 2014.
- [41] Matthias C. M. Troffaes, Frank P. A. Coolen, and Sébastien Destercke. A note on learning dependence under severe uncertainty. In *IPMU*, pages 498–507, 2014.
- [42] Gen Yang, Sébastien Destercke, and Marie-Hélène Masson. Nested dichotomies with probability sets for multi-class classification. In *Proceedings of ECAI 2014*, pages 363–368, 2014.
- [43] Sébastien Destercke, Mohamed Sallak, and Michaël Poss. Reliability analysis with ill-known probabilities and dependencies. In *Proceedings of ICVRAM 2014*, pages 1–10, 2014.
- [44] Felipe Aguirre, Christelle Jacob, Sébastien Destercke, Didier Dubois, and Mohamed Sallak. Inclusion/exclusion principle for belief functions. In F. Cozman, T. Denœux, S. Destercke, and T. Seidenfeld, editors, *ISIPTA'13: Proceedings of the Seventh International Symposium on Imprecise Probability: Theories and Applications*, pages 3–11, Compiègne, 2013. SIPTA.
- [45] Matthieu Hourbracq, Cédric Baudrit, Pierre-Henri Wuillemin, and Sébastien Destercke. Dynamic credal networks: introduction and use in robustness analysis. In F. Cozman, T. Denœux, S. Destercke, and T. Seidenfeld, editors, *ISIPTA'13: Proceedings of the Seventh International Symposium on Imprecise Probability: Theories and Applications*, pages 159–168, Compiègne, 2013. SIPTA.
- [46] Frédéric Pichon, Sébastien Destercke, and Thomas Burger. Selecting source behavior in information fusion on the basis of consistency and specificity. In *ECSQARU*, pages 473–484, 2013.

- [47] Enrique Miranda and Sébastien Destercke. Extreme points of the credal sets generated by elementary comparative probabilities. In *ECSQARU*, pages 424–435, 2013.
- [48] Sébastien Destercke. A pairwise label ranking method with imprecise scores and partial predictions. In *ECML/PKDD*, pages 112–127, 2013.
- [49] Nicolas Sutton-charani, Sébastien Destercke, and T. Denoeux. Classification trees based on belief functions. In *BELIEF 2012*, pages 77–84, 2012.
- [50] Thomas Burger and Sébastien Destercke. Random generation of mass functions : A short howto. In *BELIEF 2012*, pages 145–152, 2012.
- [51] Sébastien Destercke and Thomas Burger. Revisiting the notion of conflicting belief functions. In Thierry Denoeux and Marie-Hélène Masson, editors, *BELIEF 2012*, volume 164, pages 153–160, 2012.
- [52] Sébastien Destercke and Benjamin Quost. Correcting Binary Imprecise Classifiers: Local vs Global Approach. In Eyke Hüllermeier, Sebastian Link, Thomas Fober, and Bernhard Seeger, editors, *Scalable Uncertainty Management*, volume 7520 of *Lecture Notes in Computer Science*, pages 299–310, Berlin, Heidelberg, 2012. Springer Berlin Heidelberg.
- [53] Yosra Mazigh, Boutheina Ben Yaghlane, and Sébastien Destercke. Evaluation of the naive evidential classifier (nec): A comparison between its two variants based on a real agronomic application. In *SUM*, pages 619–624, 2012.
- [54] Sébastien Destercke and Violaine Antoine. Combining Imprecise Probability Masses with Maximal Coherent Subsets: Application to Ensemble Classification. In *Synergies of Soft Computing and Statistics for Intelligent Data Analysis*, volume 190 of *Advances in Intelligent Systems and Computing*, pages 1–8, Berlin, Heidelberg, 2012. Springer Berlin Heidelberg.
- [55] Matthias C M Troffaes and Sebastien Destercke. A Nested Approach to Multivariate Modelling Using Lower Previsions. In *Proceedings of PSAM 11 & ESREL*, 2012.
- [56] Iyan Johnson, Joel Abécassis, Brigitte Charnomordic, Sébastien Destercke, and Rallou Thomopoulos. Making ontology-based knowledge and decision trees interact: an approach to enrich knowledge and increase expert confidence in data-driven models. In *Knowledge Science, Engineering and Management*, pages 304–316. Springer, 2011.
- [57] Sébastien Destercke. Independence and 2-monotonicity: nice to have, hard to keep. In *Symbolic and Quantitative Approaches to Reasoning with Uncertainty*, pages 263–274. Springer, 2011.
- [58] Olivier Strauss and Sébastien Destercke. F-boxes for filtering. In *European Society for Fuzzy Logic and Technology - EUSFLAT*, 2011.
- [59] Matthias Troffaes, Enrique Miranda, and Sébastien Destercke. On the connection between probability boxes and possibility measures. In *Proceedings of the 7th conference of the European Society for Fuzzy Logic and Technology (EUSFLAT-2011)*. Atlantis Press, 2011.
- [60] Matthias Troffaes and Sébastien Destercke. Probability boxes on totally preordered spaces for multivariate modelling. In *ISIPTA'11: Proceedings of the Seventh International Symposium on Imprecise Probability: Theories and Applications*, 2011.
- [61] Sébastien Destercke, Patrice Buche, and Brigitte Charnomordic. Data reliability assessment in a data warehouse opened on the Web. In *Flexible Query Answering*, 2011.
- [62] Sébastien Destercke and Benjamin Quost. Combining binary classifiers with imprecise probabilities. In *Integrated Uncertainty in Knowledge Modelling and Decision Making*, pages 219–230. Springer, 2011.

- [63] Sébastien Destercke. A k-nearest neighbours method based on lower previsions. In *Computational Intelligence for Knowledge-Based Systems Design*, pages 129–138. Springer, 2010.
- [64] Sébastien Destercke. A new contextual discounting rule for lower probabilities. In *Information Processing and Management of Uncertainty in Knowledge-Based Systems. Applications*, pages 198–207. Springer, 2010.
- [65] Sébastien Destercke and Olivier Strauss. Using Cloudy Kernels for Imprecise Linear Filtering. In Eyke Hüllermeier, Rudolf Kruse, and Frank Hoffmann, editors, *Computational Intelligence for Knowledge-Based Systems Design*, volume 6178 of *Lecture Notes in Computer Science*, pages 198–207, Berlin, Heidelberg, 2010. Springer Berlin Heidelberg.
- [66] Sébastien Destercke. Evaluating trust from past assessments with imprecise probabilities: comparing two approaches. In *Scalable Uncertainty Management*, pages 151–162. Springer, 2010.
- [67] Fathia Saïs, Rallou Thomopoulos, and Sébastien Destercke. Ontology-driven possibilistic reference fusion. In *On the Move to Meaningful Internet Systems, OTM 2010*, pages 1079–1096. Springer, 2010.
- [68] Sébastien Destercke. A Decision Rule for Imprecise Probabilities Based on Pair-Wise Comparison of Expectation Bounds. In *Combining Soft Computing and Statistical Methods in Data Analysis*, pages 189–197. Springer-Verlag Berlin, 2010.
- [69] Sébastien Destercke. Handling Bipolar Knowledge with Credal Sets. In *Combining Soft Computing and Statistical Methods in Data Analysis*, pages 199–207. Springer, 2010.
- [70] Sébastien Destercke. Fuzzy belief structures viewed as classical belief structures: A practical viewpoint. In *Fuzzy Systems (FUZZ), 2010 IEEE International Conference on*, pages 1–8. IEEE, 2010.
- [71] Sébastien Destercke and Didier Dubois. Can the Minimum Rule of Possibility Theory Be Extended to Belief Functions? In *Symbolic and Quantitative Approaches to Reasoning with Uncertainty*, pages 299–310. Springer, 2009.
- [72] Sébastien Destercke and Didier Dubois. The role of generalised p-boxes in imprecise probability models. In *Proc. of the 6th Int. Symp. on Imprecise Probability: Theories and Applications*, number 1, pages 179–188, 2009.
- [73] Sébastien Destercke, Didier Dubois, and Eric Chojnacki. Computing with generalized p-boxes: preliminary results. In *Proc. Information Processing and Management of Uncertainty*, 2008.
- [74] Enrique Miranda, Matthias Troffaes, and Sébastien Destercke. Generalised p-boxes on totally ordered spaces. In *Soft Methods for Handling Variability and Imprecision*, pages 1–8, 2008.
- [75] Sébastien Destercke and Gert de Cooman. Relating epistemic irrelevance to event trees. In *Soft Methods for Handling Variability and Imprecision*, pages 66–73. Springer, 2008.
- [76] Enrique Miranda, Matthias Troffaes, and Sébastien Destercke. Generalised p-boxes on totally ordered spaces. In *Soft Methods for Handling Variability and Imprecision*, pages 235–242. Springer, 2008.
- [77] Sébastien Destercke, Serge Guillaume, and Brigitte Charnomordic. Using the OLS algorithm to build interpretable rule bases: an application to a depollution problem. In *FUZZ-IEEE*, 2007.
- [78] Lev Utkin and Sébastien Destercke. Computing expectations with p-boxes: two views of the same problem. In *5th International Symposium on Imprecise Probability: Theories and Applications*, 2007.

- [79] Sébastien Destercke, Didier Dubois, and Eric Chojnacki. Relating practical representations of imprecise probabilities. In *Proceedings of the 5th International Symposium on Imprecise Probability: Theories and Applications*, 2007.
- [80] Sébastien Destercke, Didier Dubois, and Eric Chojnacki. Cautious conjunctive merging of belief functions. In *Symbolic and Quantitative Approaches to Reasoning with Uncertainty*, pages 332–343. Springer, 2007.
- [81] Sébastien Destercke and Eric Chojnacki. Evaluation, analysis and synthesis of multiple source information: an application to nuclear computer codes. In *European Safety and Reliability Conference*, 2007.
- [82] Sébastien Destercke and Eric Chojnacki. Handling dependencies between variables with imprecise probabilistic models. In *European Safety and Reliability Conference*, 2007.
- [83] Sébastien Destercke, Didier Dubois, and Eric Chojnacki. Transforming probability intervals into other uncertainty models. In *European Society for Fuzzy Logic and Technology - EUSFLAT*, pages 367–373, 2007.
- [84] Sébastien Destercke and Didier Dubois. A unified view of some representations of imprecise probabilities. In *Soft Methods for Integrated Uncertainty Modelling*, pages 249–257. Springer, 2006.