

UNCERTAINTY IN KNOWLEDGE REPRESENTATION AND REASONING :

A PARTIAL BIBLIOGRAPHY

Didier Dubois

Institut de Recherche en Informatique de Toulouse (IRIT)

CNRS and Université P. Sabatier

dubois@irit.fr

www.irit.fr/~Didier.Dubois

Surveys and general publications

Dubois D., Moral S. and Prade H. (1998) Belief change rules in ordinal and numerical uncertainty theories. In: *Belief Change*, (Dubois, D. Prade, H., eds.), Kluwer Acad. Publ., 311-392.

D. Dubois, H. Prade: Non-standard theories of uncertainty in knowledge representation and reasoning. In *Principles of Knowledge Representation* (G. Brewka, Ed.) CLSI Publications and Folli, Stanford Ca, 1996, 1-32. (also *The Knowledge Engineering Review*, 9(4), 399-416, 1994.)

Dubois D., Prade H., Smets P. (1996) Representing partial ignorance, *IEEE Trans. on Systems, Man and Cybernetics*, 26(3), 1996, 361-377

Halpern J., 2004. *Reasoning about Uncertainty* MIT Press, Cambridge, Mass.

Klir G.J., 2006. *Uncertainty and Information. Foundations of Generalized Information Theory*. J. Wiley.

Smets, P., Ed. (1998) *Quantified Representations of Uncertainty and Imprecision. Handbook of Defeasible Reasoning and Uncertainty Management Systems*, vol. 1, Kluwer Academic, Dordrecht, The Netherlands

Conditionals

Calabrese P. (1987) An algebraic synthesis of the foundations of logic and probability. *Information Sciences*, 42, 187-237.

De Finetti B. (1936) *La logique de la probabilité*. Actes du Congrès Inter. de Philosophie Scientifique, Paris, 1935, Hermann et Cie Editions, IV1-IV9.

D. Dubois and H. Prade, Conditional objects as nonmonotonic consequence relationships. Special issue on Conditional Event Algebra, *IEEE Trans. on Systems, Man and Cybernetics*, 24(12), 1724-1740, 1994.

Goodman I.R., Nguyen H.T. and Walker E.A. (1991). *Conditional Inference and Logic for Intelligent Systems: A Theory of Measure-Free Conditioning*. Amsterdam: North-Holland.

Harper W.L., Stalnaker R., Pearce G. (Eds.) (1981) *Ifs — Conditionals, Belief, Decision, Change, and Time*. D. Reidel, Dordrecht.

Lewis D.K. (1976) Probabilities of conditionals and conditional probabilities. *The Philosophical Review*, 85, 297-315.

Probability Theory

De Finetti B. (1974) *Theory of probability*. Wiley, N. Y.

Fine T. (1983) *Theories of Probability*. Academic Press, New-York

Fishburn, P. C. 1986. The axioms of subjective probabilities. *Statistical Science* 1:335–358.

Hacking I. *The Emergence of Probability*, Cambridge University Press, Cambridge, UK, 1975.

- Kraft C.H. Pratt, J.W., Seidenberg, A. (1959) Intuitive probability on finite sets. *Ann. Math. Stat.* 30, 408-419
- Lindley D.V. (1982) Scoring rules and the inevitability of probability. *Int. Statist. Rev.*, 50, 1-26.
- J. Kyburg, H.E. Smokler, eds *Studies in Subjective Probability* Krieger Pub. Co, Huntington, N.Y., 1980,
- Pearl, J. 1988. *Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference*. Morgan Kaufmann.
- Shafer G. (1978) Non-additive probabilities in the work of Bernoulli and Lambert. *Archive for History of Exact Sciences*, 19, 30
- Savage L.J. (1954) *The Foundations of Statistics*. Wiley, New York. 2nd edition, Dover Publications Inc., New York, 1972.

Possibility theory and related approaches

- D. Dubois, H. T. Nguyen, H. Prade, Possibility theory, probability and fuzzy sets: misunderstandings, bridges and gaps. In: *Fundamentals of Fuzzy Sets*, (Dubois, D. Prade, H., Eds.), Kluwer, Boston, Mass., The Handbooks of Fuzzy Sets Series, 343-438, 2000.
- D. Dubois, H. Prade, Possibility theory: qualitative and quantitative aspects. In: P. Smets, Ed., *Handbook on Defeasible Reasoning and Uncertainty Management Systems — Volume 1: Quantified Representation of Uncertainty and Imprecision*. Kluwer Academic Publ., Dordrecht, The Netherlands, 169-226, 1998.
- E. Raufaste, R. da Silva Neves, C. Mariné, Testing the descriptive validity of possibility theory in human judgments of uncertainty, *Artificial Intelligence*, 148, 197-218, 2003
- Qualitative approaches to possibility theory*
- De Cooman G. (1997). Possibility theory — Part I: Measure- and integral-theoretic groundwork; Part II: Conditional possibility; Part III: Possibilistic independence, *Int. J. of General Systems*, 25(4), 291-371.
- Dubois D. (1986) Belief structures, possibility theory and decomposable confidence measures on finite sets. *Computers and Artificial Intelligence (Bratislava)*, 5, 403-416.
- Dubois, D.; Lang, J.; and Prade, H. 1994. Possibilistic logic. In Gabbay, D.; Hogger, C.; and Robinson, J., eds., *Handbook of logic in Artificial Intelligence and logic programming*, volume 3. Clarendon Press - Oxford. 439–513.
- Gärdenfors, P. 1988. *Knowledge in Flux: Modeling the Dynamics of Epistemic States*. MIT Press.
- Grove, A. 1988. Two modellings for theory change. *J. Philos. Logic* 17:157–170.
- Halpern J. (1997). Defining relative likelihood in partially-ordered preferential structures. *J. AI Research*, 7, 1-24
- Lewis D.K. (1973) *Counterfactuals*. Basil Blackwell, Oxford. 2nd edition, Billing and Sons Ltd., Worcester, UK, 1986.
- Quantitative approaches*
- I. Couso, S. Montes, P. Gil, The necessity of the strong alpha-cuts of a fuzzy set, *Int. J. on Uncertainty, Fuzziness and Knowledge-Based Systems* 9 (2001) 249–262.
- Dubois D. and Prade H., 1988. *Possibility Theory*, Plenum Press, New York.
- D. Dubois Possibility theory and statistical reasoning *Computational Statistics & Data Analysis*, 51, 47-69, 2006
- Dubois D., Prade H., Smets P. A definition of subjective possibility *International Journal of Approximate Reasoning*, 48, 2008, 352-364
- De Cooman G., Aeyels D. (1999). Supremum-preserving upper probabilities. *Information Sciences*, 118, 173 -212.
- D. Dubois and H. Prade, (1992). When upper probabilities are possibility measures, *Fuzzy Sets and Systems*, 49, 65-74.

- Giles R. (1982) Foundations for a theory of possibility. In: Fuzzy Information and Decision Processes (M.M. Gupta, E. Sanchez, eds.), North-Holland, 183-195.
- Shackle G. L.S. (1961). Decision, Order and Time in Human Affairs, (2nd edition), Cambridge University Press, UK.
- Spohn W., 1988. Ordinal conditional functions: A dynamic theory of epistemic states, In : Harper W. and Skyrms B., (Eds.) Causation in Decision, Belief Change and Statistics, 105-134.
- Zadeh L.A. (1978) Fuzzy sets as a basis for a theory of possibility. Fuzzy Sets and Systems, 1, 3-28.

Inconsistency Management

- N. Rescher, R. Manor (1970) On inference from inconsistent premises. Theory and Decision, 1, 179-219.
- P. Besnard A. Hunter (Eds). Reasoning with Actual and Potential Contradictions Handbook of Defeasible Reasoning and Uncertainty Management Systems, vol. 2, Kluwer Academic, Dordrecht, The Netherlands

Plausible reasoning

- Adams E.W. (1975) The Logic of Conditionals. Reidel, Dordrecht.
- S. Benferhat, D. Dubois and H. Prade, Nonmonotonic reasoning, conditional objects and possibility theory. Artificial Intellig. J., 92 (1997), 259-276.
- Biazzo, V.; Gilio, A.; Lukasiewicz, T.; and Sanfilippo, G. 2002. Probabilistic Logic under Coherence, Model- Theoretic Probabilistic Logic, and Default Reasoning in System P. J. Applied Non-Classical Logics 12(2):189–213.
- Dubois, D.; Fargier, H.; and Prade, H. 2004. Ordinal and probabilistic representations of acceptance. J. Artificial Intelligence Research 22:23–56.
- Friedman N., Halpern J. (1996). Plausibility measures and default reasoning. Proc of the 13th National Conf. on Artificial Intelligence, Portland, OR, 1297-1304.
- Kraus, S.; Lehmann, D.; and Magidor, M. 1990. Nonmonotonic reasoning, preferential models and cumulative logics. Artificial Intelligence 44(1-2):167–207.
- Lehmann, D., and Magidor, M. 1992. What does a conditional knowledge base entail? Artificial Intelligence 55:1– 60.
- Pearl, J. 1990. System z: A natural ordering of defaults with tractable applications to default reasoning. In Proc. Of the 3rd Conf. on Theoretical Aspects of Reasoning about Knowledge (TARK'90), 121–135. Morgan & Kaufmann, San Mateo, CA.

Fuzzy sets, rough sets and logic

- Dubois D., Prade H. (1980) Fuzzy Sets and Systems : Theory and Applications. Mathematics in Sciences and Engineering Series, Vol. 144, Academic Press, New York.
- D. Dubois, H. Prade, Eds. Fundamentals of Fuzzy Sets, Kluwer , Boston, Mass., The Handbooks of Fuzzy Sets Series , 343-438 , 2000.
- Dubois D., Prade H. Possibility theory, probability theory and multiple-valued logics: A clarification . Annals of Mathematics and Artificial Intelligence. 32, 35-66, 2001.
- Hajek P. Metamathematics of Fuzzy Logic, Kluwer, Dordrecht, 1998.
- Pawlak Z. (1991) Rough Sets — Theoretical Aspects of Reasoning about Data. Kluwer Academic Publ., Dordrecht.
- Zadeh L.A. (1965) Fuzzy sets. Information and Control, 8, 338-353.
- Zadeh L.A. (1975) The concept of a linguistic variable and its application to approximate reasoning. in Information Sciences, Part I : 8, 199-249 ; Part II : 8, 301-357 ; Part III : 9, 43-80.
- Zadeh L.A. (1997). Toward a theory of fuzzy information granulation and its centrality in human reasoning and fuzzy logic, Fuzzy Sets and Systems, 90, 111-127.

Imprecise Probabilities

G. de Cooman, A behavioural model for vague probability assessments, *Fuzzy Sets and Systems* 154 (2005) 305–358.

Budescu D., Wallstein T. Processing linguistic probabilities: general principles and empirical evidence. In J.R. Busemeyer, R. Hastie and D. Medin, Reds., *The Psychology of Learning and Motivation: Decision-Making from the Perspective of Cognitive Psychology*, Academic Press, 1995, 275-318.

A. Chateauneuf et J.Y. Jaffray(1989) Some characterizations of lower probabilities and other monotone capacities through the use of Moebius inversion. *Mathematical Social Sciences*, 17, 263-283.

Choquet G. (1953) Theory of capacities. *Ann. Inst. Fourier (Grenoble)*, 5(4), 131-295.

Smith C.A.B. (1961) Consistency in statistical inference and decision. *J. Royal Statist. Soc.*, B-23, 1-37

Walley P. *Statistical Reasoning with Imprecise Probabilities*, Chapman and Hall, 1991

Reasoning with imprecise probabilities

Adams E.W., Levine H.P. (1975) On the uncertainties transmitted from premises to conclusions in deductive inferences. *Synthese*, 30, 429-460.

G. Boole, *An Investigation of the Laws of Thought on which are Founded the Mathematical Theory of Logic and Probabilities*. MacMillan. (Reprinted by Dover, New York, 1958).

Coletti G., Scozzafava R. (2002) *Probabilistic Logic in a Coherent Setting*, Kluwer, Dordrecht.

D. Dubois, L. Godo, R. Lopez de Mantaras, H. Prade: Qualitative reasoning with imprecise probabilities. *J. of Intelligent Information Systems*, 2, 1993, 319-363.

D.Dubois, A. Gilio, G. Kern-Isberner: Probabilistic abduction without priors. *Int. J. Approx. Reasoning* 47(3): 333-351 (2008)

T. Lukasiewicz Local Probabilistic Deduction from Taxonomic and Probabilistic Knowledge-Bases over Conjunctive Events *International Journal of Approximate Reasoning (IJAR)*, 21(1), 23-61, May 1999.

T. Lukasiewicz Probabilistic Deduction with Conditional Constraints over Basic Events *Journal of Artificial Intelligence Research (JAIR)*, 10, 199-241, April 1999.

T. Lukasiewicz Weak Nonmonotonic Probabilistic Logics *Artificial Intelligence*, 168(1-2), 119-161, October 2005.

Paris J. *The uncertain Reasoner's Companion*, Cambridge University Press, 1994

Random sets and Evidence theory

Dempster A. P. (1967). Upper and lower probabilities induced by a multivalued mapping, *Ann. Math. Stat.*, 38, 325-339.

D.Dubois and H.Prade, (1986) A set-theoretic view of belief functions : logical operations and approximations by fuzzy sets. *Int. J. of General Systems*, 12, 193-226.

Jaffray J.Y. (1992) Bayesian updating and belief functions. *IEEE Trans. on Systems, Man and Cybernetics*, 22, 1144-1152.

Shafer G. (1976). *A Mathematical Theory of Evidence*, Princeton University Press, Princeton.

Smets P., Kennes R. (1994) The transferable belief model. *Artificial Intelligence*, 66, 191-234.

Smets P. (1997). The normative representation of quantified beliefs by belief functions. *Artificial Intelligence*, 92, 229—242.

Practical representations of imprecise probabilities

- C. Baudrit, D. Dubois, Practical representations of incomplete probabilistic knowledge, *Computational Statistics and Data Analysis* 51 (1) (2006) 86–108.
- L. de Campos, J. Huete, S. Moral, Probability intervals: a tool for uncertain reasoning, *I. J. of Uncertainty, Fuzziness and Knowledge-Based Systems* 2 (1994) 167–196.
- S. Destercke, D. Dubois, E. Chojnacki. Relating practical representations of imprecise probabilities.: *International Symposium on Imprecise Probability: Theories and Applications (ISIPTA 2007)*, Prague (Czech Republic), 2007, G. De Cooman, J. Vejnarova, M. Zaffalon (Eds.), *The Society for Imprecise Probability: Theories and Applications (SIPTA)*, p. 155-164, 2007.
- D. Dubois, L. Foulloy, G. Mauris, H. Prade, Probability-possibility transformations, triangular fuzzy sets, and probabilistic inequalities, *Reliable Computing* 10 (2004) 273–297.
- Ferson, S., Ginzburg, L.R. Different methods are needed to propagate ignorance and variability. *Reliability Engineering and Systems Safety*, 54, 133-144, 1996.
- S. Ferson, L. Ginzburg, V. Kreinovich, D. Myers, K. Sentz, Constructing probability boxes and Dempster-Shafer structures, Tech. rep., Sandia National Laboratories (2003).
- I. Kozine, L. Utkin, Constructing imprecise probability distributions, *I. J. of General Systems* 34 (2005) 401–408.
- A. Neumaier, Clouds, fuzzy sets and probability intervals, *Reliable Computing* 10 (2004) 249–272.

Information fusion

- T. Calvo, G. Mayor, R. Mesiar, Eds. *Aggregation Operators: New Trends and Applications*, *Studies in Fuzziness and Soft Computing*. Vol. 97, Physica-Verlag, Heidelberg, 2002
- Chateauneuf, A. (1994). Combination of compatible belief functions and relation of specificity. In: *Advances in the Dempster-Shafer Theory of Evidence* (M. Fedrizzi, J. Kacprzyk and R.R. Yager, Eds.), 1994, 98-114, Wiley, New York
- R. M. Cooke *Experts in Uncertainty*, Oxford University Press, Oxford, UK, 1991
- J. P. Delgrande, D. Dubois, J. Lang: Iterated Revision as Prioritized Merging. *Int Conference on Principles of Knowledge representation and Reasoning*. KR 2006: 210-220, 2006
- D. Dubois and H. Prade, (1988) Representation and combination of uncertainty with belief functions and possibility measures. *Computational Intelligence (Canada)*, 4(4), 244-264.
- D. Dubois and H. Prade, Possibility theory in information fusion. In: *Data Fusion and Perception*. In : Della Riccia, G., Lenz, H. et Kruse, R., Eds., Springer-Verlag, Berlin, Vol. 431 in the *CISM Courses and Lectures*, 53-76, 2001.
- Dubois D., Prade H. and Yager R. R. (1999). Merging fuzzy information, In Bezdek J.C., Dubois D., Prade H., Eds., *Fuzzy Sets in Approximate Reasoning and Information Systems*, *The Handbooks of Fuzzy Sets Series*, Kluwer Academic Publishers, Dordrecht, 335-401.
- Fodor J. and Yager R. (2000). Fuzzy set-theoretic operators and quantifiers, In *Fundamentals of Fuzzy Sets*, Dubois D. and Prade H., eds., *The Handbook of Fuzzy Sets Series*, Kluwer Academic Publ., Dordrecht, 125-193
- S. French Group consensus probability distributions: a critical survey. In *Bayesian Statistics 2*, J. Bernardo et col. Reds., Elsevier Science, 183-202, 1985.
- E.P. Klement, R. Mesiar, E. Pap *Triangular norms*. Kluwer Academic Pub., Boston, 2000.
- Konieczny, S., and Pino Pérez, R. 2002. Merging information under constraints: a qualitative framework. *J. Logic and Computation* 12(5):773–808.
- K. J. McConway (1981) Marginalization and linear opinion pools. *J. Am. Stat. Assoc.*, 76, 410-414.