

## CONTENTS

FOREWORD by A. P. Dempster	vii
PREFACE	ix
CHAPTER 1. INTRODUCTION	3
§1. Synopsis	4
§2. The Idea of Chance	9
§3. The Doctrine of Chances	12
§4. Chances as Degrees of Belief	16
§5. The Bayesian Theory of Partial Belief	18
§6. The Role of Judgment	20
§7. The Representation of Ignorance	22
§8. Combination vs. Conditioning	25
§9. The Representation of Probable Reasoning	28
§10. Statistical Inference	29
§11. The Bayesian Theory as a Limiting Case	32
§12. Probability	33
CHAPTER 2. DEGREES OF BELIEF	35
§1. Subsets as Propositions	35
§2. Basic Probability Numbers	37
§3. Belief Functions	39
§4. Commonality Numbers	40
§5. Degrees of Doubt and Upper Probabilities	42
§6. Bayesian Belief Functions	44
§7. Mathematical Appendix	46
CHAPTER 3. DEMPSTER'S RULE OF COMBINATION	57
§1. Combining Two Belief Functions	58
§2. Multiplying Commonality Numbers	61
§3. Combining Several Belief Functions	62
§4. The Weight of Conflict	64
§5. Conditioning Belief Functions	66
§6. Other Properties of Dempster's Rule	67
§7. Mathematical Appendix	68

CHAPTER 4. SIMPLE AND SEPARABLE SUPPORT FUNCTIONS	74
§1. Simple Support Functions	75
§2. Bernoulli's Rule of Combination	75
§3. The Weight of Evidence	77
§4. Heterogeneous Evidence	79
§5. Conflicting Evidence	82
§6. Separable Support Functions	86
CHAPTER 5. THE WEIGHTS OF EVIDENCE	88
§1. Decomposing Separable Support Functions	89
§2. Combining Weights of Evidence	90
§3. The Assessment of Evidence	93
§4. The Weight of Internal Conflict	95
§5. The Impingement Function	97
§6. The Weight-of-Conflict Conjecture	98
§7. Some Numerical Examples	100
§8. Mathematical Appendix	103
CHAPTER 6. COMPATIBLE FRAMES OF DISCERNMENT	114
§1. Refinements and Coarsenings	115
§2. The Inner and Outer Reductions	117
§3. Is There an Ultimate Refinement?	119
§4. Families of Compatible Frames	121
§5. Consistent Belief Functions	125
§6. Independent Frames	127
§7. Mathematical Appendix	129
CHAPTER 7. SUPPORT FUNCTIONS	141
§1. The Class of Support Functions	142
§2. Support, Dubiety, and Plausibility	144
§3. The Vacuous Extension of a Support Function	146
§4. Evidential Independence	147
§5. Cognitive Independence	149
§6. Mathematical Appendix	152
CHAPTER 8. THE DISCERNMENT OF EVIDENCE	172
§1. Families of Compatible Support Functions	173
§2. Discerning the Interaction of Evidence	175
§3. Discerning Weights of Evidence	182
§4. If the Weight-of-Conflict Conjecture is True	185
§5. Mathematical Appendix	186

CHAPTER 9. QUASI SUPPORT FUNCTIONS	196
§1. Infinite Contradictory Evidence	197
§2. The Class of Quasi Support Functions	199
§3. Chances are not Degrees of Support	201
§4. The Bayesian Profusion of Infinite Weights	202
§5. Bayes' Theorem	204
§6. Mathematical Appendix	209
CHAPTER 10. CONSONANCE	219
§1. Consonant Support Functions	219
§2. The Contour Function	221
§3. The Embarrassment of Dissonance	223
§4. Inferential Evidence	226
§5. Mathematical Appendix	229
CHAPTER 11. STATISTICAL EVIDENCE	237
§1. A Convention for Assessing Statistical Evidence	238
§2. The Weights of Evidence	245
§3. Epistemic vs. Aleatory Combination	247
§4. The Effect of a Bayesian Prior	250
§5. Discounting Statistical Evidence	251
§6. Specifications on Compatible Frames	255
§7. The Role of Supposition	258
§8. Perspective	262
§9. Mathematical Appendix	264
CHAPTER 12. THE DUAL NATURE OF PROBABLE REASONING	274
§1. The Effect of Assumptions	274
§2. The Need for Assumptions	276
§3. Choosing our Frames of Discernment	279
§4. The Role of Epistemic Probability	284
§5. Two Tasks	285
BIBLIOGRAPHY	287
INDEX	292