

# Contents

<b>1</b>	<b>Contradiction and (in)Consistency</b> . . . . .	1
1.1	Introduction . . . . .	1
1.2	On the Philosophy of the Logics of Formal Inconsistency . . . . .	4
1.3	A Historical Sketch: The Forerunners of the Logics of Formal Inconsistency . . . . .	10
1.4	Paraconsistency and the Nature of Logic . . . . .	11
1.5	Paraconsistency and the Nature of Contradictions . . . . .	15
1.6	Contradiction, Consistency and Negation . . . . .	18
	1.6.1 On Contradiction . . . . .	19
	1.6.2 On Consistency . . . . .	20
	1.6.3 On Negation . . . . .	21
1.7	Varieties of Paraconsistency Involvement . . . . .	24
	References . . . . .	26
<b>2</b>	<b>A Basic Logic of Formal Inconsistency: <math>\mathbf{mbC}</math></b> . . . . .	29
2.1	Introducing $\mathbf{mbC}$ . . . . .	29
2.2	A Valuation Semantics for $\mathbf{mbC}$ . . . . .	35
2.3	Applications of $\mathbf{mbC}$ -Valuations . . . . .	39
2.4	Recovering Classical Logic Inside $\mathbf{mbC}$ . . . . .	43
2.5	Reintroducing $\mathbf{mbC}$ as an Expansion of $\mathbf{CPL}$ . . . . .	50
	2.5.1 The New Presentation $\mathbf{mbC}^\perp$ of $\mathbf{mbC}$ . . . . .	51
	2.5.2 Valuation Semantics for $\mathbf{mbC}$ . . . . .	53
	2.5.3 Equivalence Between $\mathbf{mbC}$ and $\mathbf{mbC}^\perp$ . . . . .	55
	References . . . . .	61
<b>3</b>	<b>Some Extensions of <math>\mathbf{mbC}</math></b> . . . . .	63
3.1	A Wider Form of Truth-Functionality for Consistency . . . . .	63
3.2	A Hidden Consistency Operator . . . . .	68
3.3	Consistency and Inconsistency as Derived Connectives . . . . .	71
3.4	Some Conceptual Differences Between $\mathbf{mbC}$ and $\mathbf{mbC}^\perp$ . . . . .	91
3.5	Inconsistency Operators and Double-Negations . . . . .	95

3.6	Propagating Consistency . . . . .	104
3.7	da Costa's Hierarchy and Consistency Propagation . . . . .	111
3.8	A Stronger Consistency Propagation . . . . .	115
	References . . . . .	119
<b>4</b>	<b>Matrices and Algebraizability.</b> . . . . .	<b>121</b>
4.1	Logical Matrices . . . . .	121
4.2	Uncharacterizability by Finite Matrices. . . . .	122
4.3	The Problem of Algebraizability of <b>LFIs</b> . . . . .	129
4.4	Some 3-Valued <b>LFIs</b> . . . . .	136
4.4.1	Halldén's Logic of Nonsense (1949) . . . . .	136
4.4.2	Segerberg's Logic of Nonsense (1965) . . . . .	138
4.4.3	da Costa and D'Ottaviano's Logic <b>J3</b> (1970). . . . .	140
4.4.4	Sette's Logic <b>P1</b> (1973) . . . . .	144
4.4.5	Asenjo-Priest's Logic <b>LP</b> (1966–1979). . . . .	149
4.4.6	<b>Ciore</b> and Other Related Systems . . . . .	151
4.4.7	<b>LF11, MPT</b> and <b>J3</b> . . . . .	158
	References . . . . .	168
<b>5</b>	<b>LFIs Based on Other Logics.</b> . . . . .	<b>171</b>
5.1	LFIs Based on Positive Intuitionistic Logic . . . . .	171
5.1.1	Basic Features of Positive Intuitionistic Logic . . . . .	171
5.1.2	Johansson's Minimal Logic. . . . .	175
5.1.3	Nelson's Paraconsistent Logic <b>N4</b> . . . . .	179
5.1.4	An Intuitionistic Version of <b>mbC</b> . . . . .	187
5.2	LFIs Based on Fuzzy Logics. . . . .	191
5.2.1	Preliminaries on MFL . . . . .	191
5.2.2	Fuzzy Logics with a Consistency Operator . . . . .	197
5.2.3	Propagation of Consistency and DAT. . . . .	205
5.2.4	Fuzzy Logics with an Inconsistency Operator . . . . .	208
5.3	A Modal LFI Based on Belnap and Dunn's Logic <b>BD</b> . . . . .	211
5.3.1	The Logic $M_{4m}$ of Tetravalent Modal Algebras . . . . .	213
5.3.2	$M_{4m}$ as an <b>LFI</b> . . . . .	218
5.3.3	$M_{4m}$ as a <b>dc</b> -System . . . . .	222
5.3.4	The Contrapositive Implication . . . . .	224
5.3.5	A Hilbert-Style Axiomatization of $M_{4m}^c$ . . . . .	226
5.4	Paraconsistent Modalities, Consistency and Determinedness . . . . .	229
	References . . . . .	233
<b>6</b>	<b>Semantics of Non-deterministic Character for LFIs.</b> . . . . .	<b>237</b>
6.1	Fidel Structures for <b>mbC</b> . . . . .	238
6.2	Fidel Structures for Some Extensions of <b>mbC</b> . . . . .	242
6.3	Non-deterministic Matrices . . . . .	251
6.4	Swap Structures for <b>mbC</b> . . . . .	253
6.5	Swap Structures for Some Extensions of <b>mbC</b> . . . . .	260
6.6	Axiom (cl) and Uncharacterizability by Finite Nmatrices . . . . .	272

6.7	Some Remarks on Fidel Structures and Swap Structures . . . . .	279
6.8	The Possible-Translations Semantics . . . . .	280
6.8.1	Possible-Translations Semantics for Some <b>LFIs</b> . . . . .	280
6.8.2	A 3-Valued Possible-Translations Semantics for <b>Cila</b> . . . . .	282
6.8.3	Some Remarks on Possible-Translations Semantics . . . . .	288
	References . . . . .	290
<b>7</b>	<b>First-Order LFIs</b> . . . . .	293
7.1	The Logic <b>QmbC</b> . . . . .	294
7.2	Basic Properties of <b>QmbC</b> . . . . .	296
7.3	Tarskian Paraconsistent Structures . . . . .	302
7.4	Soundness Theorem for <b>QmbC</b> . . . . .	308
7.5	Completeness Theorem for <b>QmbC</b> . . . . .	310
7.5.1	Henkin Theories . . . . .	311
7.5.2	Canonical Interpretations. . . . .	312
7.6	Compactness and Lowenheim-Skolem Theorems for <b>QmbC</b> . . . . .	316
7.7	<b>QmbC</b> with Equality . . . . .	318
7.8	First-Order Characterization of Other Quantified <b>LFIs</b> . . . . .	322
7.9	First-Order <b>LFII</b> and the Logic of Quasi-truth . . . . .	324
7.9.1	Semantics of Partial Structures. . . . .	324
7.9.2	The Logic <b>QLFII</b> <sub>o</sub> . . . . .	332
7.10	First-Order <b>P1</b> and Partial Structures . . . . .	335
	References . . . . .	343
<b>8</b>	<b>Paraconsistent Set Theory</b> . . . . .	345
8.1	Antinomic Sets and Paraconsistency. . . . .	346
8.2	LFIs Predicating on Consistency . . . . .	349
8.3	Some Extensions of <b>ZFmbC</b> . . . . .	354
8.4	Inconsistent Sets and Proper Classes . . . . .	360
8.5	On Models . . . . .	363
	References . . . . .	365
<b>9</b>	<b>Paraconsistency and Philosophy of Science: Foundations and Perspectives</b> . . . . .	369
9.1	An Epistemological Understanding of Paraconsistency, and Its Significance for Science. . . . .	369
9.2	Consistency and Contradiction in Scientific Theories . . . . .	371
9.2.1	The Heritage of Kant . . . . .	371
9.2.2	Some Historical Examples . . . . .	373
9.2.3	The Beginning of Quantum Theory and Paraconsistency . . . . .	374
9.2.4	Mercury's Orbit and a Non-existent Planet . . . . .	374
9.2.5	Contradictions in Phlogiston, the Imponderable . . . . .	376
9.2.6	The Special Theory of Relativity . . . . .	377
9.2.7	Mathematics, and the Meaning of Objects that Mean Nothing. . . . .	379

9.3 Quasi-truth and the Reconciliation of Science  
and Rationality . . . . . 382

9.4 An Evidence-Based Approach to Paraconsistency . . . . . 384

9.5 Summing Up. . . . . 385

References . . . . . 387

**Index . . . . . 391**

**Index of Logic Systems . . . . . 397**



<http://www.springer.com/978-3-319-33203-1>

Paraconsistent Logic: Consistency, Contradiction and  
Negation

Carnielli, W.; Coniglio, M.E.

2016, XXIV, 398 p. 2 illus., Hardcover

ISBN: 978-3-319-33203-1