

# Contents

|   |           |
|---|-----------|
| <b>1 Introduction</b>   | <b>1</b>  |
| 1.1 Universal Logic . . . . .   | 1         |
| 1.2 Universal Logic and Logic Translation . . . . .                   | 8         |
| 1.3 Universal Logic Logical Pluralism . . . . .                       | 10        |
| 1.4 Logic, Cognitive Process, and Culture . . . . .                   | 12        |
| <b>2 Universal Logic</b>  | <b>15</b> |
| 2.1 Introduction . . . . .  | 15        |
| 2.2 Algebraic Structures and Universal Logic . . . . .                | 17        |
| 2.2.1 The Relationship between Logic and Algebra . . . . .            | 17        |
| 2.2.2 Algebraic Logic . . . . .                                       | 18        |
| 2.2.3 Three Traditions of Taking Algebraic Methods to Logic . . . . . | 22        |
| 2.3 Toward a General Logic . . . . .                                  | 27        |
| 2.3.1 From Abstract Logic to Universal Logic . . . . .                | 27        |
| 2.4 Neo-Bourbakism . . . . .  | 29        |
| 2.4.1 The Conceptual Approach . . . . .                               | 32        |
| 2.5 Main Strategies and Techniques . . . . .                          | 36        |
| 2.5.1 Strategies . . . . .  | 37        |
| 2.5.2 Main Techniques . . . . .                                       | 41        |

|          |   |           |
|----------|---|-----------|
| 2.5.3    | Logical Two-Valued Semantics and Algebraic Valued Semantics . . . . . | 47        |
| 2.6      | Conclusion . . . . .  | 50        |
| <b>3</b> | <b>Universal Logic and Logic Translation</b>                          | <b>53</b> |
| 3.1      | Introduction . . . . .  | 54        |
| 3.2      | Translation Paradox . . . . .   | 55        |
| 3.2.1    | The Inclusion Relation . . . . .                                      | 55        |
| 3.2.2    | The Translation Relation . . . . .                                    | 58        |
| 3.3      | Development of Logic Translation . . . . .                            | 61        |
| 3.3.1    | Consequence Relations and Logic Translation . . . . .                 | 61        |
| 3.4      | The Systematic Discussion of Logic Translations . . . . .             | 63        |
| 3.4.1    | History: 1968 – 1933 – 1929 – 1925 . . . . .                          | 64        |
| 3.4.2    | History: 1988 – 1973 – 1971 – . . . . .                               | 67        |
| 3.4.3    | History: 2006 – 1990 – . . . . .                                      | 69        |
| 3.5      | Logic Translation and the Deviance of Logics . . . . .                | 73        |
| 3.5.1    | From Expansion/Reduct Cases to Deviant Cases . . . . .                | 73        |
| 3.5.2    | Deviance of Logics . . . . .  | 76        |
| 3.6      | Conclusion . . . . .  | 80        |
| <b>4</b> | <b>Universal Logic and Logical Pluralism</b>                          | <b>83</b> |
| 4.1      | Introduction . . . . .  | 83        |
| 4.2      | Truth-Preservation and GTT . . . . .                                  | 85        |
| 4.2.1    | The Classical case and GTT . . . . .                                  | 87        |
| 4.2.2    | The Relevant Case and GTT . . . . .                                   | 90        |
| 4.2.3    | The Constructive case and GTT . . . . .                               | 94        |
| 4.2.4    | A Unified Model of Negation . . . . .                                 | 99        |
| 4.3      | BRLP-Plurality . . . . .  | 103       |
| 4.3.1    | Plurality . . . . .   | 103       |

|          |   |            |
|----------|---|------------|
| 4.3.2    | From a Strong Sense of Plurality to Constructing BRLP . . . . . | 105        |
| 4.4      | What is the Monism for BRLP . . . . .                           | 109        |
| 4.4.1    | Priest's BRLP-Challenge . . . . .                               | 110        |
| 4.5      | Four Opposition-BRLP Version of Monism . . . . .                | 113        |
| 4.5.1    | Version (i) . . . . .   | 114        |
| 4.5.2    | Version (ii) . . . . .  | 119        |
| 4.5.3    | Version (iii) . . . . .   | 120        |
| 4.6      | Is BRLP Relativism in Logic? . . . . .                          | 123        |
| 4.7      | Conclusion . . . . .  | 129        |
| <b>5</b> | <b>Logic, Cognitive Process, and Culture</b>                    | <b>131</b> |
| 5.1      | Introduction . . . . .  | 132        |
| 5.2      | A Universal Logic System with Dialecticism . . . . .            | 134        |
| 5.2.1    | Some Basic Notions . . . . .                                    | 135        |
| 5.2.2    | From Fuzzy Logic to a Universal Logic System . . . . .          | 137        |
| 5.2.3    | C-UniLog as a Meta-theory . . . . .                             | 138        |
| 5.2.4    | Dialecticism . . . . .  | 140        |
| 5.3      | The Modes of Cognitive Processes . . . . .                      | 142        |
| 5.4      | Cognitive Instrumentalism in Logic . . . . .                    | 144        |
| 5.4.1    | The Cognitive Toolkit . . . . .                                 | 144        |
| 5.4.2    | The Dialectical logic mode and 'Principles'? . . . .            | 146        |
| 5.5      | Interdisciplinary Notions and Pluralism . . . . .               | 152        |
| 5.5.1    | New Logic and Psychologism . . . . .                            | 153        |
| 5.5.2    | Cognition and Descent-with-Modification . . . . .               | 157        |
| 5.5.3    | Revision of Pluralism in Logic . . . . .                        | 158        |
| 5.6      | Conclusion . . . . .  | 161        |
| <b>6</b> | <b>Summary and Future Research</b>                              | <b>165</b> |
| 6.1      | Summary . . . . .   | 166        |
| 6.2      | Future Research . . . . .                                       | 179        |

|  |            |
|--|------------|
| <b>A A Chinese Universal Logic System</b>                | <b>189</b> |
| A.1 Methodology . . . . .                                | 190        |
| A.2 Flexible Truth Value . . . . .                       | 191        |
| A.3 Flexible Proposition Connectives Operation . . . . . | 191        |
| A.4 Flexible Quantifiers . . . . .                       | 196        |
| A.5 Establishment of Flexible Reasoning Models . . . . . | 198        |
| <b>Bibliography</b>                                      | <b>200</b> |