

TABLE OF CONTENTS

INTRODUCTION	9
Linguistic categories and mathematical sets	9
Organization of this volume	12
CHAPTER 1. MATHEMATICAL SET THEORIES	13
Overview	13
1.1 Cantor's set theory	14
1.1.1 The origins of set theory	15
1.1.2 Basic terminology of Cantor's set theory	17
1.1.3 Cantor's diagonal theorem	19
1.1.4 Russell's paradox	21
1.2 Model ZFC	22
1.2.1 The origins of models ZF and ZFC	23
1.2.2 The core of model ZF	25
1.2.3 Patching the ZF model – the axiom of choice	26
1.2.4 Some outstanding problems of model ZFC	27
1.3 Other ZFC-based set theories	30
1.3.1 Quasi-set theory	30
1.3.2 Fuzzy-set theory	31
1.4 Stanisław Leśniewski's Mereology	32
1.4.1 The history of part-whole concepts in philosophy and mathematics	32
1.4.2 The core of mereology	33
1.4.3 The criticism of mereology	36
1.5 Comparison of mereology, ZFC and ZFC-based theories	38
1.5.1 The axiom of extensionality (the equality of sets)	38
1.5.2 The existence of the empty set	40

1.5.3 The mereological disproving of Cantor's generalized Diagonal Theorem	42
1.5.4 Set of all sets comes back	43
1.5.5 Russell's Paradox revisited	44
1.5.6 Mereology and the law of 'included' middle	45
1.5.7 The axiom of choice	49
1.5.8 Mereology and other ZFC-based set theories	49
1.6 Image-schematic basis of set theories	50
Summary of Chapter 1	54
CHAPTER 2. A COMPARISON OF CATEGORIES AND SETS	57
Overview	57
2.1 Internal structure of categories and sets	59
2.1.1 Internal structure of categories	60
2.1.2 Internal structure of ZFC sets	62
2.1.3 Internal structure of mereological sets	63
2.1.4 Internal structure of quasi sets	64
2.1.5 Internal structure of fuzzy sets	65
2.2 Equality (identity) of categories and sets	65
2.2.1 Equality of categories	66
2.2.2 Equality of ZFC sets	71
2.2.3 Equality of mereological sets	73
2.2.4 Equality of quasi sets	73
2.2.5 Equality of fuzzy sets	74
2.3 Discreteness and continuity of categories and sets	75
2.3.1 Discreteness and continuity of categories	76
2.3.2 Discreteness and continuity of the ZFC sets	77
2.3.3 Discreteness and continuity of mereological sets	79
2.3.4 Discreteness and continuity of quasi sets	79
2.3.5 Discreteness and continuity of fuzzy sets	80
2.4 Basic level categorization	
– linguistic and mathematical description	80
2.4.1 Basic-level categorization in linguistic studies	80
2.4.2 Mathematical (physical) description of basic-level categorization	88
Summary of Chapter 2	101
CHAPTER 3. APPLYING MEREOLOGY IN COGNITIVE SEMANTICS	105

Overview	105
3.1 Countability of English nouns and mereology	106
3.1.1 The perceived size of the referent	107
3.1.2 The method of ‘calculating’ the perceived referent size	108
3.1.3 The results of the corpus research	113
3.1.4 Summing the results of the corpus research	118
3.2 English articles and mereology	119
Summary of Chapter 3	128
SUMMARY AND CONCLUSION	129
APPENDICES	137
Appendix A. Cantor’s set theory	137
Appendix B. The axioms of ZF set theory	138
Appendix C. Some outstanding problems of the ZFC Theory	139
C.1 Banach-Tarski paradox	139
C.2 The continuum hypothesis	140
C.3 Souslin’s problem	140
C.4 Lebesgue’s measurability problem	141
C.5 Kaplansky’s conjecture on Banach algebras	142
C.6 Whitehead problem	142
Appendix D. Patching the ZF theory – the axiom of constructability	143
Appendix E. The Definitions and Axioms of Mereology	143
E.1 The original definitions and axioms formulated by Leśniewski (Leśniewski 1930: 265 ff., traslation J.W.)	144
E.2 The axioms of mereology formulated by Varzi	147
Appendix F. Comparison of certain ZFC and mereology axioms	150
Appendix G. The Proof of Generalised Cantor’s Diagonal Theorem	151
Appendix H. The BNC samples (Section 3.1)	152
Appendix I. The survey sheets and goodness-of-example statistics	173
I.1 The survey sheets	173
I.2 The goodness-of-example statistics	270
I.3 Common features statistics for the eight categories	277
REFERENCES	281