

# Contents

Preface .....	vii
Contributors .....	xiii

## **Part I. Introduction**

1. Doing Psychology in an AI Context: A Personal Perspective and Introduction to This Volume .....	3
<i>Robert R. Hoffman</i>	
2. Knowledge and Knowledge Acquisition in the Computational Context .....	12
<i>Stephen B. Regoczei and Graeme Hirst</i>	

## **Part II. Cognitive Theory and Expertise**

3. Modeling Human Expertise in Expert Systems .....	29
<i>Nancy J. Cooke</i>	
4. Mental Models and the Acquisition of Expert Knowledge .....	61
<i>Robert M. Schumacher and Mary P. Czerwinski</i>	
5. Conceptual Analysis as a Basis for Knowledge Acquisition .....	80
<i>John F. Sowa</i>	

## **Part III. Knowledge Elicitation Methods**

6. Implications of Cognitive Theory for Knowledge Acquisition ...	99
<i>Sallie E. Gordon</i>	
7. Knowledge Acquisition and Constructivist Epistemology .....	121
<i>Kenneth M. Ford and Jack R. Adams-Webber</i>	
8. Eliciting and Using Experiential Knowledge and General Expertise .....	137
<i>David S. Prerau, Mark R. Adler, and Alan S. Gunderson</i>	
9. Managing and Documenting the Knowledge Acquisition Process .....	149
<i>Karen L. McGraw</i>	

10. Using Knowledge Engineering to Preserve Corporate Memory . . . . . 170  
*Gary A. Klein*

#### **Part IV. Psychological Research on Expertise**

11. On Being an Expert: A Cost-Benefit Analysis . . . . . 191  
*Robert J. Sternberg and Peter A. Frensch*
12. Mnemonics and Expert Knowledge: Mental Cuing . . . . . 204  
*Francis S. Bellezza*
13. The Role of General Ability in Cognitive Complexity: A Case Study of Expertise . . . . . 218  
*Stephen J. Ceci and Ana Ruiz*

#### **Part V. Expert-Novice Differences and the Development of Expertise**

14. Expert-Novice Differences and Knowledge Elicitation . . . . . 233  
*Mícheál Foley and Anna Hart*
15. When Novices Elicit Knowledge: Question Asking in Designing, Evaluating, and Learning to Use Software . . . . . 245  
*Robert Mack and Jill Burdett Robinson*
16. The Programmer's Burden: Developing Expertise in Programming . . . . . 269  
*Robert L. Campbell, Norman R. Brown, and Lia A. DiBello*

#### **Part VI. Overview**

17. The Psychology of Expertise and Knowledge Acquisition: Comments on the Chapters in This Volume . . . . . 297  
*Stephen Regoczei*
- Appendix A. Bibliography: Psychological Theory and Reviews . . . . . 314
- Appendix B. Bibliography: Empirical and Experimental Investigations of Expertise . . . . . 324
- Appendix C. Bibliography: Knowledge Elicitation . . . . . 338
- Appendix D. Bibliography: Automated Knowledge Elicitation, Representation, and Instantiation ("Knowledge Acquisition") . . . . . 346
- Appendix E. Bibliography: Expertise in Programming . . . . . 359
- Appendix F. Bibliography: AI Theory, Philosophy, and Reviews of Expert Systems . . . . . 363
- Appendix G. Bibliography: Applications of Expert Systems . . . . . 371
- Appendix H. Bibliography: Programming, Building, and Verifying Expert Systems . . . . . 378
- Subject Index . . . . . 383
- Author Index . . . . . 387