Table of Contents

Preface .................................................. xi

Introduction .............................................. xv

PART 1. HISTORICAL AND METHODOLOGICAL LANDMARKS .. 1

Chapter 1. An Assessment of the Evolution of Research and Systems ........................................... 3

1.1. A few essential historical landmarks ......................... 5
  1.1.1. First motivations, first written systems ................. 6
  1.1.2. First oral and multimodal systems ..................... 11
  1.1.3. Current systems: multiplicity of fields and techniques .. 14

1.2. A list of possible abilities for a current system .......... 16
  1.2.1. Recording devices and their use ....................... 17
  1.2.2. Analysis and reasoning abilities ...................... 20
  1.2.3. System reaction types and their manifestation .......... 22

1.3. The current challenges .................................. 23
  1.3.1. Adapting and integrating existing theories ............ 23
  1.3.2. Diversifying systems’ abilities ....................... 25
  1.3.3. Rationalizing the design ............................. 26
  1.3.4. Facilitating the implementation ...................... 27

1.4. Conclusion ........................................... 27


  2.1. Cognitive aspects .................................... 30
    2.1.1. Perception, attention and memory ................. 32
PART 2. INPUTS PROCESSING ........................................ 75

Chapter 5. Semantic Analyses and Representations .......................... 77
  5.1. Language in dialogue and in man–machine dialogue ............. 78
        5.1.1. The main characteristics of natural language .......... 78
        5.1.2. Oral and written languages ............................. 82
        5.1.3. Language and spontaneous dialogue ................... 83
        5.1.4. Language and conversational gestures .................. 84
  5.2. Computational processes: from the signal to the meaning ........ 85
        5.2.1. Syntactic analyses ....................................... 86
        5.2.2. Semantic and conceptual resources ...................... 87
        5.2.3. Semantic analyses ....................................... 89
  5.3. Enriching meaning representation ................................ 91
        5.3.1. At the level of linguistic utterance .................... 91
        5.3.2. At the level of multimodal utterance ................. 93
  5.4. Conclusion .................................................. 94

Chapter 6. Reference Resolution ........................................... 95
  6.1. Object reference resolution ..................................... 96
        6.1.1. Multimodal reference domains .......................... 98
        6.1.2. Visual scene analysis .................................... 100
        6.1.3. Pointing gesture analysis ............................... 101
        6.1.4. Reference resolution depending on determination ....... 102
  6.2. Action reference resolution ..................................... 105
        6.2.1. Action reference and verbal semantics .................. 105
        6.2.2. Analyzing the utterance “put that there” ............ 108
  6.3. Anaphora and coreference processing ............................ 109
  6.4. Conclusion .................................................. 112

Chapter 7. Dialogue Acts Recognition ...................................... 113
  7.1. Nature of dialogue acts ........................................ 114
        7.1.1. Definitions and phenomena ............................. 114
        7.1.2. The issue with indirect acts ............................ 116
        7.1.3. The issue with composite acts .......................... 118
  7.2. Identification and processing of dialogue acts ................... 119
        7.2.1. Act identification and classification .................. 119
        7.2.2. Indirect and composite acts ............................ 121
  7.3. Multimodal dialogue act processing ............................. 122
  7.4. Conclusion .................................................. 124
# Man–Machine Dialogue

## Part 3. System Behavior and Evaluation

### Chapter 8. A Few Dialogue Strategies

8.1. Natural and cooperative aspects of dialogue management
   8.1.1. Common goal and cooperation
   8.1.2. Speaking turns and interactive aspects
   8.1.3. Interpretation and inferences
   8.1.4. Dialogue, argumentation and coherence
   8.1.5. Choosing an answer

8.2. Technical aspects of dialogue management
   8.2.1. Dialogue management and control
   8.2.2. Dialogue history modeling
   8.2.3. Dialogue management and multimodality management
   8.2.4. Can a dialogue system lie?

8.3. Conclusion

### Chapter 9. Multimodal Output Management

9.1. Output management methodology
   9.1.1. General principles of output multimodality
   9.1.2. Human factors for multimedia presentation

9.2. Multimedia presentation pragmatics
   9.2.1. Illocutionary forces and values
   9.2.2. Perlocutionary forces and values

9.3. Processes
   9.3.1. Allocation of the information over communication channels
   9.3.2. Redundancy management and multimodal fission
   9.3.3. Generation of referring expressions
   9.3.4. Valorizing part of the information and text to speech synthesis

9.4. Conclusion

### Chapter 10. Multimodal Dialogue System Assessment

10.1. Dialogue system assessment feasibility
   10.1.1. A few assessment experiments
   10.1.2. Man–machine interface methodologies
   10.1.3. Oral dialogue methodologies
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1.4. Multimodal dialogue methodologies</td>
<td>175</td>
</tr>
<tr>
<td>10.2. Multimodal system assessment challenges</td>
<td>176</td>
</tr>
<tr>
<td>10.2.1. Global assessment or segmented assessment?</td>
<td>176</td>
</tr>
<tr>
<td>10.2.2. Should a multimodal corpus be managed?</td>
<td>178</td>
</tr>
<tr>
<td>10.2.3. Can we compare several multimodal systems?</td>
<td>179</td>
</tr>
<tr>
<td>10.3. Methodological elements</td>
<td>180</td>
</tr>
<tr>
<td>10.3.1. User expertise and system complexity</td>
<td>181</td>
</tr>
<tr>
<td>10.3.2. Questionnaires for users</td>
<td>183</td>
</tr>
<tr>
<td>10.3.3. Extending DQR and DCR to multimodal dialogue</td>
<td>185</td>
</tr>
<tr>
<td>10.3.4. Towards other assessment methods</td>
<td>189</td>
</tr>
<tr>
<td>10.4. Conclusion</td>
<td>190</td>
</tr>
<tr>
<td>Conclusion</td>
<td>191</td>
</tr>
<tr>
<td>Bibliography</td>
<td>193</td>
</tr>
<tr>
<td>Index</td>
<td>203</td>
</tr>
</tbody>
</table>