

# Table of Contents

<b>Summary</b>	<b>iii</b>
<b>Zusammenfassung</b>	<b>v</b>
<b>Table of Contents</b>	<b>vii</b>
<b>List of Figures</b>	<b>xi</b>
<b>List of Tables</b>	<b>xii</b>
<b>Chapter I General Introduction</b>	<b>1</b>
<b>1. Introduction</b>	<b>3</b>
<b>2. Medical risk communication</b>	<b>5</b>
<b>3. Numeracy in the context of medical risk communication</b>	<b>6</b>
3.1 The concept of numeracy	6
3.2 Assessing numeracy	7
3.3 The influence of numeracy on medical risk perception and decision making	11
<b>4. Formats used for medical risk communication</b>	<b>12</b>
4.1 Verbal medical risk communication	12
4.2 Numerical medical risk communication	13
4.3 Overview of visual medical risk communication	14
4.4 Pictographs as format for medical risk communication	16
4.5 Different types of iconicity in pictographs	18
<b>5. Information processing of pictographs</b>	<b>19</b>
5.1 Theories of information processing strategies in dependence of numeracy	19
5.2 Measuring methods for assessing information processing	21
5.3 Assessing information processing with eye tracking	22
<b>6. Hypothetical medical scenarios</b>	<b>23</b>
<b>7. Chapter overview</b>	<b>24</b>
<b>References</b>	<b>27</b>
<b>Chapter II Numeric and Graphic Risk Information Processing of High and Low Numerates in the Intuitive and Deliberative Decision Modes: An Eye-Tracker Study</b>	<b>39</b>
<b>Abstract</b>	<b>41</b>
<b>1. Introduction</b>	<b>42</b>
1.1 Processing and comprehension of numeric risk communication formats by low and high numerates	42
1.2 Processing and comprehension of pictorial risk communication formats by high and low numerates	43
1.3 Processes underlying intuitive and deliberative information processing and decision making	44
1.4 Eye tracking to examine intuitive and deliberative information processing while making a decision	44
1.5 Rationale of the present study	45

<b>2. Method</b>	<b>47</b>
2.1 Procedure and materials	47
2.2 Participants	49
<b>3. Results</b>	<b>50</b>
3.1 Manipulation check	50
3.2 Initial focus on pictograph and percentage: Order of processing	51
3.3 Focus on pictograph and percentage over the course of information processing and decision making	52
3.4 Depth of information processing	53
3.5 Degree of attention to percentage and pictograph	54
3.6 Outcomes of decision making	57
<b>4. Discussion</b>	<b>57</b>
4.1 Deriving similar meanings in different ways	59
4.2 Practical implications	62
4.3 Conclusions	62
<b>References</b>	<b>64</b>
<b>Chapter III High Numerates Count Icons and Low Numerates Process Large Areas in Pictographs: Results of an Eye Tracking Study</b>	<b>69</b>
<b>Abstract</b>	<b>71</b>
<b>1. Introduction</b>	<b>72</b>
1.1 Information processing approaches related to numeracy	73
1.2 Empirical evidence of information processing strategies	74
1.3 Rationale of this study	75
<b>2. Experiment 1</b>	<b>76</b>
2.1 Method	76
2.2 Results	81
2.3 Discussion	86
<b>3. Experiment 2</b>	<b>87</b>
3.1 Method	87
3.2 Results	88
3.3 Discussion	90
<b>4. General discussion</b>	<b>91</b>
4.1 Processing strategies of pictographs and their dependence on numeracy	91
4.2 Processing strategies of pictographs when people are guided toward numbers	92
4.3 Limitations and future research	93
4.4 Conclusion and practical implications	94
<b>References</b>	<b>96</b>
<b>Chapter IV Does Iconicity in Pictographs Matter? The Influence of Iconicity and Numeracy on Information Processing, Decision Making, and Liking in an Eye Tracking Study</b>	<b>101</b>
<b>Abstract</b>	<b>103</b>
<b>1. Introduction</b>	<b>104</b>
1.1 Iconicity in pictographs	104

1.2 Rationale of the study and hypotheses	107
<b>2. Method</b>	<b>108</b>
2.1 Participants	108
2.2 Design	109
2.3 Procedures	109
2.4 Measures	111
2.5 Data analysis	112
<b>3. Results</b>	<b>113</b>
3.1 Do iconicity, numeracy, and scenario influence processing strategies of pictographs?	113
3.2 Do iconicity, numeracy, and scenario influence probability estimation?	114
3.3 Do iconicity and numeracy influence recall?	115
3.4 Do iconicity and numeracy influence icon liking?	116
<b>4. Discussion</b>	<b>116</b>
4.1 Do iconicity, numeracy, and scenario influence processing strategies of pictographs?	117
4.2 Do iconicity, numeracy, and scenario influence probability estimation?	117
4.3 Do iconicity and numeracy influence recall?	118
4.4 Do iconicity and numeracy influence icon liking?	118
4.5 Limitations and future research	118
4.6 Conclusion and practical implications	119
<b>References</b>	<b>121</b>
<b>Chapter V Are People Emotionally Aroused by Hypothetical Medical Scenarios in Experiments? An Eye Tracking Study with Pupil Dilation</b>	<b>125</b>
<b>Abstract</b>	<b>127</b>
<b>1. Introduction</b>	<b>128</b>
1.1 Pupil dilation	128
1.2 Rationale of this study	130
<b>2. Methods</b>	<b>130</b>
2.1 Participants	130
2.2 Design	131
2.3 Material and procedure	131
2.4 Data analysis	133
<b>3. Results</b>	<b>134</b>
3.1 Sample description	134
3.2 Pupil dilation: Do medical scenarios evoke higher emotional arousal than non-medical scenarios?	135
3.3 Pupil dilation: Does emotional arousal differ between low, middle, and high risk levels?	135
3.4 Probability estimate: Do people estimate medical probabilities differently than non-medical probabilities when shown in pictographs?	136
<b>4. Discussion</b>	<b>137</b>
4.1 Limitations and future research	138
4.2 Conclusion and practical implications	139
<b>References</b>	<b>140</b>

<b>CHAPTER VI General Discussion</b>	<b>145</b>
<b>1. Introduction</b>	<b>147</b>
<b>2. Overview of the main results</b>	<b>148</b>
<b>3. Conclusive general discussion of the main results and their implications     for medical risk communication</b>	<b>151</b>
3.1 Pictographs as risk communication format for high and low numerates	151
3.2 Iconicity in pictographs	153
3.3 Generalization to real life medical decision situations	154
3.4 Theoretical implications	155
3.5 Practical implications	156
<b>4. Limitations and further research</b>	<b>157</b>
4.1 Adequate measurements	158
4.2 Pictographs as graphical format for medical risk communication	163
4.3 Risk estimation	165
4.4 Practical application of pictographs	166
<b>5. Final conclusions</b>	<b>167</b>
<b>References</b>	<b>169</b>
<b>Acknowledgments</b>	<b>177</b>
<b>Curriculum Vitae</b>	<b>179</b>