



Universiteit  
Leiden  
The Netherlands

## Affect and Learning: a computational analysis

Broekens, D.J.

### Citation

Broekens, D. J. (2007, December 18). *Affect and Learning: a computational analysis*. Leiden Institute of Advanced Computer Science (LIACS), Faculty of Science, Leiden University. Retrieved from <https://hdl.handle.net/1887/12537>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/12537>

**Note:** To cite this publication please use the final published version (if applicable).

# Affect and Learning

*A Computational Analysis*

Joost Broekens



# Affect and Learning

*A Computational Analysis*

PROEFSCHRIFT

ter verkrijging van  
de graad van Doctor aan de Universiteit Leiden,  
op gezag van Rector Magnificus prof. mr. P.F. van der Heijden,  
volgens besluit van het College voor Promoties  
te verdedigen op dinsdag 18 december 2007  
klokke 16:15 uur

door

Douwe Joost Broekens

geboren te Beverwijk, Nederland in 1976

## Promotiecommissie

Prof. dr. Joost N. Kok	promotor
Dr. ir. Fons J. Verbeek	copromotor
Dr. Walter A. Kosters	copromotor
Dr. Joanna J. Bryson	referent
Prof. dr. Bernhard Hommel	
Prof. dr. Thomas H. W. Bäck	
Prof. dr. Sjoerd M. Verduyn Lunel	

ISBN: 978-90-8891-0241

## Contents

### *Chapter*

1	Introduction .....	1
2	Artificial Affect: In the Context of Reinforcement Learning .....	25
3	Affect and Exploration: Affect-Controlled Exploration is Beneficial to Learning...	33
4	Affect and Thought: Affect-Controlled Simulation-Selection .....	55
5	Affect and Modulation: Related and Future work .....	87
6	Affect as Reinforcement: Affective Expressions Facilitate Robot Learning ...	97
7	Affect and Formal Models: Formalizing Cognitive Appraisal Theory .....	115
8	Summary and Conclusion .....	153
	Samenvatting (Dutch) .....	161
	Acknowledgements .....	167
	Glossary .....	171
	References .....	181

