

# Curriculum Vitae

Maria Arinbjarnar

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## 1 Contact information

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## 2 Personal Details

Born January 16, 1973, Reykjavik, Iceland. Icelandic Citizenship.  
Languages: Icelandic (native), English (fluent), Danish (basic).

## 3 Research Interests

In recent years computer technology has evolved sufficiently to create vibrant virtual worlds that offer high quality graphics and sound effects. Worlds so vast that a player can roam around for months and still have new places to explore, new creatures to fight and new quests to tackle. Morrowind and Guild wars are examples of such worlds. There are social virtual environments such as Second Life full of players that are seeking an alternative lifestyle or simply friendship. Some are even running a full time business, creating goods that they sell to players and then exchange the game world currency for real world currency on E-Bay.

Still lacking in these virtual worlds is a fully interactive drama where the drama emerges around the actions of the player and Non-Player Characters (NPCs), adhering to a specific genre and containing a dramatic arc, where the player is the protagonist or at least a key participant and the players actions directly affect the drama and where the player can interact with NPCs such that the course of the drama changes but still holds true to a known drama genre.

Creating such a truly interactive drama is a significant challenge that is fully worthwhile as it has the potential of revolutionising entertainment, gaming, education, therapy and news coverage.

## 4 Academic Qualifications

I'm a second year Ph.D. student at University of York, Department of Computer Science, my supervisor is Dr Daniel Kudenko and the area of research is "Interactive Drama".

**MSc degree in computer science** *Awarded for excellent performance*, June 2007, from the Department of Computer Science at Reykjavik University.

MSc thesis *Rational Dialog in Interactive Games*

The motivation for this research is the increased call for games that have a high degree of interaction with the player and a dynamic environment with intelligent Non-Player Characters (NPCs). The NPCs currently implemented in computer games rarely act in a rational way, although some have an emotional drive and a set of goals to chase. Their actual interactions are usually preset and/or very limited. Additionally the games themselves have preset narratives that result in games that the average player does not care to play numerous times, simply because the game is always the same.

The question addressed in this thesis is whether an NPC will interact with a player and other NPCs in a rational and goal driven way when given a past life and a decision mechanism based on a causal network like a Bayesian network. Will the NPC adopt a strategy that will maximize its pay-offs?

To answer this question I build a prototype engine that creates NPCs that have past lives, a knowledge base and tools to find a sentence to speak in a rational dialog. The knowledge base and past lives of the NPCs are created from plots that the Dynamic Plot Generating Engine (DPGE) creates. The DPGE creates continuously new plots for murder mystery games that are logically consistent. The interactive interfaces of the NPCs are modeled using Multi-Agent Influence Diagrams (MAIDs) and game theory, a mathematical method of decision-making in competitive situations.

The prototype engine created clearly indicates that there is basis to create NPCs that can participate in a rational dialog by calculating optimal sentences on the fly. The time complexity is linear in respect to number of sentences and more than half of the sentences are calculated in less than 1 minute. Moreover with some standard optimizations these results can be greatly improved.

<http://ru.is/lisalib/getfile.aspx?itemid=10875>

**BSc Computer Science** January 2006, from the Department of Computer Science at Reykjavik University.

BSc project *Murder She Programmed: Dynamic Plot Generating Engine for Murder Mystery Games*

I designed and implemented a new game engine that dynamically creates new game plots for a murder mystery based game. The game engine uses Bayesian networks to create a new plot based on a probability map of a typical murder mystery novel. To abstract plot elements for the construction of the Bayesian network a unique morphology similar to the morphology of the Russian structuralist Vladimir Propp is created. A directed graph, which is inferred from the resulting Bayesian network, is used as a knowledge base for a murder mystery game. This game sets up a complete and consistent murder mystery that is solvable with logical inference. Each new game generates a unique plot, a murder mystery with all the attributes that are needed for such a plot to be logically consistent, coherent, and complete, and make sense to the human perspective.

This game engine is responsive to preset constraints rather than a pre-authored narration, which opens up numerous possibilities for integration in computer games because the constraints can be manipulated by interactions from game events and player interaction. Such that the constraints used to make subplots or in-game quests use data learned from game events and player interaction.

[www-users.cs.york.ac.uk/maria/greinar/BSc.pdf](http://www-users.cs.york.ac.uk/maria/greinar/BSc.pdf)

## 5 Publications

1. Duality of Actor and Character Goals in Virtual Drama, Maria Arinbjarnar and Daniel Kudenko  
*In Proceedings of the 9th International Conference on Intelligent Virtual Agents*. Amsterdam, Holland, 2009.  
[www.cs.york.ac.uk/gidy/articles/IVA09.pdf](http://www.cs.york.ac.uk/gidy/articles/IVA09.pdf)
2. A Critical View of Interactive Drama Systems, Maria Arinbjarnar, Heather Barber and Daniel Kudenko  
*In Proceedings of the AISB'09 Symposium: AI & Games*. Edinburgh, Scotland, 2009.  
[www.cs.york.ac.uk/gidy/articles/AISB09review.pdf](http://www.cs.york.ac.uk/gidy/articles/AISB09review.pdf)
3. Directed Emergent Drama vs. Pen & Paper Role-Playing Games, Maria Arinbjarnar and Daniel Kudenko  
*In Proceedings of the AISB'09 Symposium: AI & Games*. Edinburgh, Scotland, 2009.  
[www.cs.york.ac.uk/gidy/articles/AISB09rpg.pdf](http://www.cs.york.ac.uk/gidy/articles/AISB09rpg.pdf)
4. Schemas in Directed Emergent Drama, Maria Arinbjarnar and Daniel Kudenko  
*In Proceedings of the First Joint International Conference on Interactive*

- Digital Storytelling (ICIDS)*. Erfurt, Germany. November 26 - 27, 2008.  
[www.gjallur.net/greinar/SDED.pdf](http://www.gjallur.net/greinar/SDED.pdf)
5. Dynamic Plot Generation Engine, Maria Arinbjarnar  
*In Proceedings of the Workshop on Integrating Technologies for Interactive Stories (INTECHAIN 2008)*, Playa del Carmen, Cancun, Mexico. January 7-10, 2008  
[www-users.cs.york.ac.uk/ maria/greinar/dpge.pdf](http://www-users.cs.york.ac.uk/ maria/greinar/dpge.pdf)
  6. Rational Dialog in Interactive Games, Maria Arinbjarnar  
*AAAI 2007 Fall Symposium on Intelligent Narrative Technologies*, Westin Arlington Gateway, Arlington, Virginia, November 9-11, 2007  
[www-users.cs.york.ac.uk/ maria/greinar/\[Ari07\].pdf](http://www-users.cs.york.ac.uk/ maria/greinar/[Ari07].pdf)
  7. Performance and Overhead of Semantic Cache Management,  
 Björn Þór Jónsson, Maria Arinbjarnar, Bjarnsteinn Þórsson, Michael J. Franklin, Divesh Srivastava.  
*ACM Transactions on Internet Technology (TOIT)*, August 2006, 3(6),  
 Pages: 302 - 331, Publisher: ACM Press.  
[portal.acm.org/citation.cfm?id=1151091](http://portal.acm.org/citation.cfm?id=1151091)
  8. Modular Simulation of Knowledge Development in Industry: A Multi-Level Framework,  
 Rögnvaldur J. Sæmundsson, Kristinn R. Þórisson, Guðný R. Jónsdóttir, Maria Arinbjarnar, Hilmar Finnsson, Hafthór Guðnason, Vignir Hafsteinsson, Grétar Hannesson, Jónheiður Ísleifsdóttir, Ársæll Þ. Jóhannsson, Gunnar Kristjánsson, Sverrir Sigmundarson.  
*WEHIA 1st International Conference on Economic Sciences with Heterogeneous Interacting Agents*, University of Bologna, Italy, 15-17 June 2006.  
[xenia.media.mit.edu/ kris/ftp/KnowledgeSimulation-WEHIA06.pdf](http://xenia.media.mit.edu/ kris/ftp/KnowledgeSimulation-WEHIA06.pdf)

## 5.1 Technical reports

1. *Performance of Semantic Caching Revisited*,  
 Maria Arinbjarnar, Bjarnsteinn Þórsson, Björn Þór Jónsson.  
 Technical Report RUTR-CS06002, September 2006.  
[www-users.cs.york.ac.uk/ maria/greinar/RUTR-CS06002.pdf](http://www-users.cs.york.ac.uk/ maria/greinar/RUTR-CS06002.pdf)

## 6 Research projects

*Semantic Caching*, with Bjarnsteinn Þórsson  
 Independent study, December and January 2004 - 2005,  
 adviser Björn Þór Jónsson.

An evaluation of the semantic caching architecture against modern hardware and software. Proposed and evaluated two new approaches to query execution at the relational server. Our conclusion is that despite the hardware and software

performance improvements which have reduced query processing time significantly, complex query workloads still present significant difficulties for semantic caching architecture.

*Research on the usability and effectiveness of interactive software for distant work*, with Anna M. Sigurðardóttir.

Summer of 2003, adviser Ásrún Matthíasdóttir and Marta Lárusdóttir.

Funded by The Student Innovation Fund, Reykjavik University and Byggðastofnun. In cooperation with Iceland Telecom.

A research into whether the actual software that is used for distant work communication is in some way not performing to expectations. The result was that there is more of a general attitude problem of the users rather than a lack of good software and bandwidth.

## 7 Summer schools and workshops

- Workshop on Integrating Technologies for Interactive Stories, Playa del Carmen, Cancun, Mexico, 8 - 10 January, 2008.
- Summer School on Game Theory in Computer Science at the BRICS PhD school at the Department of Computer Science, University of Aarhus on June 26 - 30, 2006.
- 18th Nordic Workshop on Programming Theory (NWPT'06), Reykjavik, Iceland, 18 - 20 October, 2006.

## 8 Academic visits

- Visit to Aalborg University, 24 - 29 September, the Machine Intelligence group headed by Professor Finn Verner Jensen
- Visit to Aalborg University, 26 November - 1 December, the Machine Intelligence group headed by Professor Finn Verner Jensen

## 9 Jobs

- PL/SQL ORACLE Programmer, Transaction database at Landsbanki Iceland, January 2007 - November 2008.  
[www.landsbanki.is](http://www.landsbanki.is)
- Chief Programmer of the Message Manager at Hexia.net, February 2006 - December 2006.  
[hexia.net](http://hexia.net)

- PL/SQL ORACLE Programmer, Data Warehouse at Landsbanki Iceland, May 2005 - February 2006.  
[www.landsbanki.is](http://www.landsbanki.is)

## 10 Teaching

- TA in Algorithms at Reykjavik University, autumn 2005

## 11 Expertise

- Master Data Management, design and implementation of single employee view for Landsbanki. Employee data from Iceland, UK, Luxemburg, Norway, Finland, Canada, Japan, joined in a relational database using ETL tools and ILM along with PL/SQL code to process the data correctly into ORACLE 10g DB.
- Professional knowledge of PL/SQL Oracle for programming packages and processes in a large database at Landsbanki
- Professional knowledge of Java and J2EE in implementing and deploying a large distributed system that takes care of all message handling, including billing, for Hexia.net.
- Academic experience in: Java, Python, C, C++, C#, Prolog, Pascal, Delphi and some general SQL (Oracle, My SQL).

## 12 Referees

### 12.1 Academia

- Dr. Daniel Kudenko, my supervisor at University of York.  
Email: [kudenko@cs.york.ac.uk](mailto:kudenko@cs.york.ac.uk)
- Dr. Luca Aceto, my Masters thesis adviser and taught me Modeling and Verification. Moreover my adviser in independent study *Finding Equilibrium*.  
Telephone +354 599 6419  
Email: [luca@ru.is](mailto:luca@ru.is)
- Dr. Björn Þór Jónsson, my adviser in the independent study *Performance and Overhead of Semantic Cache Management* and taught me Specialized Databases and Performance of Database Systems.  
Telephone +354 599 6240  
Email: [bjorn@ru.is](mailto:bjorn@ru.is)

- Dr. Yngvi Björnsson, my BSc project adviser and taught me Algorithms and Heuristic Searching.  
Telephone +354 599 6226  
Email: [yngvi@ru.is](mailto:yngvi@ru.is)
- Halldór Halldórsson, taught me Linear Algebra and Theory of Computation.  
Telephone +354 599 6224  
Email: [halldor@ru.is](mailto:halldor@ru.is)

## 12.2 Industry

- Guðlaugur Gunnarsson, Specialist, my immediate manager at Landsbanki  
Telephone +354 410 7034  
Email: [guðlaugur.gunnarsson@landsbanki.is](mailto:guðlaugur.gunnarsson@landsbanki.is)
- Skúli Geir Jensson, Head of Software Integration at Landsbanki  
Telephone +354 410 6809  
Email: [skuli.g.jensson@landsbanki.is](mailto:skuli.g.jensson@landsbanki.is)
- Sigurgeir Vilhjálmsson, Chief Software Architect at Landsbanki,  
Telephone +354 410 7051  
Email: [sigurgeir.vilhjalmsjon@landsbanki.is](mailto:sigurgeir.vilhjalmsjon@landsbanki.is)
- Helga Waage CTO Hexia.net, Helga is MSc in Computer Science, Machine Intelligence from Carnegie Mellon University.  
Telephone +354 517 5454  
Email: [helgaw@hexsoftware.net](mailto:helgaw@hexsoftware.net)
- Þórarinn Stefánsson CEO Hexia.net.  
Telephone +354 517 5454  
Email: [toti@hexsoftware.net](mailto:toti@hexsoftware.net)

## 13 Awards

- Awarded for excellent performance in MSc studies in computer science at Reykjavik University.

## 14 Grants

- University of York, Department of Computer Science, 2007 partial Departmental Overseas Research Studentship (DORS) for the duration of a three-year full-time PhD programme. For 2007/08 the annual value of the award is £4,417. <http://www.cs.york.ac.uk/gsp/research/studentships.php>
- Námsjóð Sameinaðra Verktaka hf. (Student-fund of United Engineers) at Reykjavik University 2007, grant to continue studies in order to gain a higher degree in the same field as I am currently graduating from. (150,000 ISK.)
- Nýsköpunarsjóður Námsmanna (Student Innovation Fund) 2003 grant for the project *Research on the usability and effectiveness of interactive software for distant work*. (220,000 ISK.)
- Reykjavik University 2003 grant for the project *Research on the usability and effectiveness of interactive software for distant work*. (110,000 ISK.)

## 15 Interests

Game Theory, Bayesian networks, Algorithms, Theoretical computer science, Philosophy, The human mind, Artificial intelligence, Ethnology, Future society, Computer games, Good books.