CHRISTIAN GUCKELSBERGER
PhD Student in Game AI & Computational Creativity

Address	Game AI Research Group	**Date of Birth**	14th December 1986
	SEECS	**Nationality**	German
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Personal Profile

My goal is to engineer autonomous artificial systems that would be deemed creative in their own right by unbiased observers. I address this challenge with formal models of intrinsic motivation. In theoretical investigations and via applied studies in the domain of video games, I demonstrate that such models can give rise to more general, robust and adaptive creative systems. For more information, visit http://gameai.eecs.qmul.ac.uk/team_member/christian-guckelsberger/.

Education

2018–today   **Queen Mary, University of London, London, UK (Game AI Research Group)**

2014–2018   **Goldsmiths, University of London, London, UK (Computational Creativity Group)**

PhD Student in Computer Science

Thesis: Models of Intrinsic Motivation in Video Game AI

Funding: Centre for Intelligent Games & Game Intelligence (IGGI)
            EPSRC PhD programme aimed at advancing commercial video games

Supervision: Prof. Simon Colton (Queen Mary / Monash University),
            Dr. Jeremy Gow (Queen Mary), Dr. Paul Cairns (University of York),
            Dr. Christoph Salge (New York University / University of Hertfordshire)

2007–2014   **Johannes Gutenberg-University, Mainz, Germany**

Magister Artium (M.A., 1st class)

Subjects: History of Art, Computer Science, Business

Thesis: Design and Evaluation of Algorithms for the Creation of Novel
             and Unexpected Recommendations in Art Collections

Funding: Provided by SAP SE Research, Darmstadt, Germany

Supervision: Prof. Matthias Müller (Johannes Gutenberg-University Mainz),
             PD Dr. Jella Pfeifer (Karlsruhe Institute of Technology, KIT),
             Dr. Florian Probst (SAP Research)

Bachelor of Science (B.Sc., 1st class)

Subject: Computer Science

Thesis: Effects of Anticipation in Individually Motivated Behaviour on Survival
             and Control in a Multi-Agent Scenario with Resource Constraints

             In collaboration with the Adaptive Systems Research Group,
             University of Hertfordshire, Hatfield, UK

Supervision: Prof. Daniel Polani (University of Hertfordshire),
             Prof. Stefan Kramer (Johannes Gutenberg-University Mainz)

2010 – 2011   **University of Glasgow, Glasgow, UK (study abroad)**

Subjects: Computer Science, Arts & Media Informatics, History of Art

Funding: German Academic Exchange Service (DAAD)

Language Skills

- German: native language
- English: fluent (speaking, reading, writing)
- French: intermediate (reading); basic (speaking, writing)
- Latin: intermediate (reading, writing)

Research & technical skills

- Very good knowledge of Game AI research, focussing on Non-Player Characters, Procedural Content Generation, and Evaluation. Very good knowledge of Computational Creativity as research field.
- Very good knowledge of formal models of intrinsic motivation, their foundations in cognitive science and philosophy, and their use in robotics and AI.
- Advanced knowledge in probability and information theory, in particular information-theory driven decision-making and (approximate) Bayesian inference. Good knowledge of statistics.
- Advanced knowledge of agent-based modeling and multi-agent systems.
- Good knowledge of C++, Java, Python (SciPy, NumPy) and C#. Development with Visual Studio (Code), XCode, Eclipse, and Spyder. Version management with GIT and SVN.
- Daily use of Microsoft Office. Occasional use of Adobe Photoshop and Premiere to create and edit research diagrams and videos.
- Minor experience in developing games using the Unity and Unreal engines.
- Minor experience in complex network analysis.
- Certified Scrum Master, industry experience as agile developer.

Training

- Machine Learning Summer School, London, 2019
- Research Methods & Skills (4-week workshop at the University of York)
- AI-driven Game Design (4-week workshop at the University of Essex)
- Game Development with Unity & Game AI (4-week workshop at Goldsmiths, University of London)
- Leadership Skills, Negotiation Skills, Presentation Skills (3 separate 2-day workshop at SAP SE)
- Scrum Master training as preparation for working as scrum master for one year at SAP SE Research.

Publications

Journal Articles

- M. Biehl, **C. Guckelsberger**, C. Salge, S. C. Smith, and D. Polani. Expanding the Active Inference Landscape: More Intrinsic Motivations in the Perception-Action Loop. Frontiers in Neurorobotics, pages 1–26, 2018.
- Schulz A., **C. Guckelsberger**, and F. Janssen. Semantic Abstraction for Generalization of Tweet Classification: An Evaluation on Incident-Related Tweets. Semantic Web, 2015.
- **C. Guckelsberger** and D. Polani. Effects of Anticipation in Individually Motivated Behaviour on Survival and Control in a Multi-Agent Scenario with Resource Constraints. Entropy, 16(6):3357–3378, 2014.

Conference & Workshop Proceedings

- A. Denisova, D. Zendle, P. Cairns, and **C. Guckelsberger**. Defining and Measuring Challenge in Digital Games. Under review, 2019

- C. Salge, **C. Guckelsberger**, M. C. Green, R. Canaan, and J. Togelius. Generative Design in Minecraft: Chronicle Challenge. In Proc. 9th Int. Conf. on Computational Creativity (ICCC'19), 2019.

- **C. Guckelsberger**, C. Salge, and J. Togelius. New And Surprising Ways to be Mean: Adversarial NPCs with Coupled Empowerment Minimisation. In Proc. IEEE Conf. on Computational Intelligence in Games (CIG'18), 2018.

- C. Salge, **C. Guckelsberger**, R. Canaan, and T. Mahlmann. Accelerating Empowerment Computation with UCT Tree Search. In Proc. IEEE Conf. on Computational Intelligence and Games (CIG'18), 2018.

- S. Roohi, J. Takatalo, **C. Guckelsberger**, and P. Hämäläinen. Review of Intrinsic Motivation in Simulation-based Game Testing. In Proc. 36th ACM Conf. Human Factors in Computing Systems (CHI'18), 2018.

- M. Biehl, **C. Guckelsberger**, C. Salge, S. Smith, and D. Polani. Free Energy, Empowerment, and Predictive Information Compared. In Proc. 9th Int. Conf. on Guided Self-Organisation (GSO'18), 2018.

- **C. Guckelsberger**, C. Salge, J. Gow, and P. Cairns. Predicting Player Experience without the Player. An Exploratory Study. In Proc. ACM Symp. on Computer-Human Interaction in Play (CHIPlay'17), 2017.

- **C. Guckelsberger**, C. Salge, and S. Colton. Addressing the "Why?" in Computational Creativity: A Non-Anthropocentric, Minimal Model of Intentional Creative Agency. In Proc. 8th Int. Conf. on Computational Creativity (ICCC'17), 2017.

- A. Denisova, **C. Guckelsberger**, and D. Zendle. Challenge in Digital Games: Towards Developing a Measurement Tool. In Proc. 35th ACM Conf. Human Factors in Computing Systems (CHI'17), 2017.

- **C. Guckelsberger**, C. Salge, and S. Colton. Intrinsically Motivated General Companion NPCs via Coupled Empowerment Maximisation. In Proc. IEEE Conf. on Computational Intelligence and Games (CIG'16), 2016.

- **C. Guckelsberger** and C. Salge. Does Empowerment Maximisation Allow for Enactive Artificial Agents? In Proc. 15th Int. Conf. on Synthesis and Simulation of Living Systems (ALIFE'16), 2016.

- **C. Guckelsberger**, C. Salge, R. Saunders, and S. Colton. Supportive and Antagonistic Behaviour in Distributed Computational Creativity via Coupled Empowerment Maximisation. In Proc. 7th Int. Conf. on Computational Creativity (ICCC'16), 2016.

- M. T. Llano, **C. Guckelsberger**, R. Hepworth, J. Gow, J. Corneli, and S. Colton. What If A Fish Got Drunk? Exploring the Plausibility of Machine-Generated Fictions. In Proc. 7th Int. Conf. on Computational Creativity (ICCC'16), 2016.

- A. Schulz, **C. Guckelsberger**, and B. Schmidt. More Features Are Not Always Better: Evaluating Generalizing Models in Incident Type Classification of Tweets. In Proc. Conf. Empirical Methods in Natural Language Processing (EMNLP'15), 2015.

- J. Corneli, A. Jordanous, R. Shepperd, M. T. Llano, J. Misztal, Colton. S., and **C. Guckelsberger**. Computational Poetry Workshop: Making Sense of Work in Progress. In Proc. 6th Int. Conf. on Computational Creativity (ICCC'16), 2015.

- M. T. Llano, M. Cook, **C. Guckelsberger**, S. Colton, and R. Hepworth. Towards the Automatic Generation of Fictional Ideas for Games. In Experimental AI in Games Workshop (EXAG'14), 2014.

Reports

- **C. Guckelsberger**. Conference Report: Eigth International Conference on Computational Creativity. AISB Quarterly, (147), 2017.

- J. Corneli, **C. Guckelsberger**, A. Jordanous, A. Pease, S. Colton, and Y. J. Erden. Conference Report: AISB Members Workshop VII – Serendipity Symposium. AISB Quarterly, (147), 2017.

- **C. Guckelsberger** and A. Schulz. STATSREP-ML: Statistical evaluation & reporting framework for machine learning results. Technical report, Technical University Darmstadt, 2014.

Patents

- **C. Guckelsberger**, F. Probst, and A. Schulz. Recommender system employing subjective properties, May 12 2016. US Patent App. 14/538,315 (pending).
- O. Grebner, M. Bruchmann, **C. Guckelsberger**, F. Probst, and A. Schulz. Reporting and managing incidents, July 22 2014. US Patent 8,786,433.

Invited Talks

2018	**Microsoft Research Cambridge**
	Intrinsically Motivated Reinforcement Learning for Next-Generation Video Game AI
	New York University (Games Innovation Lab)
	Intrinsic Motivation in Digital Games: From Steering Character Behaviour to Evaluating Game Content
2017	**University of Sussex Centre for Cognitive Science (COGS) Research Seminar**
	Computational Creativity at the Edge of Being: Reconsidering Creativity and Intentional Agency in the Enactive AI Framework
	Enactive Seminars Online (ENSO) Seminar
	Investigating the Role of Empowerment Maximisation in Constitutive Autonomy, Adaptivity and Open-Ended Development
	University of Hertfordshire (Research in Adaptive Systems Group Seminar)
	Predicting Player Experience Without the Player. An Exploratory Study Based on Empowerment as Intrinsic Motivation
	Falmouth University (MetaMakers Institute)
	Intrinsic Motivation in Digital Games: From Steering Character Behaviour to Evaluating Game Content
2016	**University of Hertfordshire (Research in Adaptive Systems Group Seminar)**
	Collaboration in Co-Creative Scenarios via Coupled Empowerment Maximisation: A Case-Study in Video Games
	Tungsten Centre for Intelligent Data Analytics
	Does Empowerment Allow for Fully Enactive Artificial Agents?

Research Experience

Apr 2018 – Jul 2018	**Microsoft Research, Cambridge, UK**
	Intern
	Working on intrinsically motivated, collaborative AI in Project Malmo, an AI experimentation platform built on top of Minecraft.
Jan 2018 – Apr 2018	**Game Innovation Lab, New York University, New York City, US**
	Visiting Scholar
	Fully funded research collaboration with NYU's Game Innovation Lab. Leveraging computational models of intrinsic motivation for game AI.
Sep 2014 – Sep 2016	**Goldsmiths, University of London, UK**
	PhD Student
	Additional research experience in European Commission FP7 project "What-If-Machine" (WHIM, grant no. 611560), spanning across 5 sites. Planning, execution and publication of multidimensional scaling experiments. Applied findings to use-cases in video games.

May 2014 – Sep 2014	**Darmstadt University of Technology, Darmstadt, Germany** Student Research Assistant Design and implementation of a tool for the automatic evaluation of machine-learning experiments. In particular adivising on appropriate statistical tests.
Jun 2011 – Dec 2013	**SAP SE Research, Darmstadt, Germany** Research- & Thesis Student User experience design & development at SAP's international R&D department. Working on BMBF (German Federal Ministry for Education and Research) funded project "Infostrom" (grant no. 13N10711-15), spanning across 10 sites.

Teaching Experience

2017	**Goldsmiths, University of London** Guest Lecturer in Game AI Programming module (IS53049A) B.Sc. Games Programming programme
2016 – 2017	**Goldsmiths, University of London** Teaching Assistant for C++ in module Principles And Applications Of Programming (IS52028A/D) B.Sc. Computer Science & Creative Computing programmes

Workshop & Tutorial Organisation

- Co-organised the First Workshop on Curiosity in Games, held at the ACM Foundations of Digital Games conference (FDG) in Malmo, Sweden, 2018.
- Co-organised the Cybernetic Serendipity Reimagined Symposium as part of the AISB 2018 Convention at the University of Liverpool, Liverpool UK, 2018.
- Co-organised the AISB Members Workshop VII – Serendipity Symposium at St. Mary's University, London, UK, 2017.
- Co-organised the first tutorial on "Intrinsic Motivation in General Game-Playing and NPCs" at the IEEE Conference on Computational Intelligence and Games (CIG'16), Santorini, Greece, 2016.

Awards and Funding

2018	**Finalist in EPSRC "Connected Nations Pioneers" competition** UK-wide competition that recognises exceptional postgraduate research contributions. Finalist in the category "Creative Computing for the Digital Economy" with work on intrinsically motivated Non-Player Characters for Video Games.
2018	**Best paper award at CIG 2018** Awarded for "New and Surprising Ways to be Mean. Adversarial NPCs with Coupled Empowerment Minimisation" at the IEEE Conference on Computational Intelligence and Games in Maastricht, Netherlands.
2017	**Honourable mention at CHI'Play 2017** Awarded for the paper "Predicting Player Experience Without the Player. An Exploratory Study" at the ACM SIGCHI Symposium on Computer-Human Interaction in Play in Amsterdam, highlighting our contribution as one of the top 5 papers in the competition.
2017	**AISB student grant** Travel grant to attend the 8th Int. Conf. on Computational Creativity (ICCC'17), Atlanta, US.
2016	**Mexican National Council of Science and Technology (CONACyT)** Conference fee waiver to attend the 15th Int. Conf. on the Synthesis and Simulation of Living Systems (ALIFE'16), Cancun, Mexico.

2014-2018	**Engineering and Physical Sciences Research Council (EPSRC)**
	4-year full PhD stipend in the IGGI Centre for Doctoral Training: Intelligent Games – Game Intelligence.
2014	**Johannes Gutenberg-University Mainz, Germany**
	Prize for an outstanding Magister thesis.
2013	**Johannes Gutenberg-University Mainz, Germany**
	Prize for an outstanding B.Sc. thesis.
2010-2013	**German Academic Scholarship Foundation (Studienstiftung des deutschen Volkes e.V.)**
	Germany's oldest and largest organisation sponsoring outstanding students irrespective of their political, ideological or religious convictions and affiliations.
2010-2011	**German Academic Exchange Service (DAAD)**
	Full stipend to study one year abroad at the University of Glasgow from the world's largest funding organisation for the international exchange of students and researchers.
2010	**Sir Daniel Stevenson Exchange Scholarship (University of Glasgow)**
	Tuition fee waiver and small bursary to promote the friendly relations between the students of the Universities of Scotland and those of Germany, France and Spain.

Attended Conferences

A: attended, P: presentation, O: poster.

- Dagstuhl Seminar on Computational Creativity Meets Digital Literary Studies, 2019 (A).
- Conf. Social Cognition in Humans and Robots, Hamburg, Germany, 2018 (P).
- IEEE Conf. Computational Intelligence and Games (CIG'18), Maastricht, Netherlands, 2018 (P).
- ACM Symp. Computer-Human Interaction in Play (CHIPlay'17), Amsterdam, Netherlands, 2017 (P).
- 8th Int. Conf. Computational Creativity (ICCC'17), Atlanta, US, 2017 (P & O).
- IEEE Conf. Computational Intelligence and Games (CIG'16), Santorini, Greece, 2016 (P).
- Int. Conf. Synthesis and Simulation of Living Systems (ALIFE'16), Cancun, Mexico, 2016 (P).
- 7th Int. Conf. Computational Creativity (ICCC'16), Paris, France, 2016 (P).
- Workshop Experience and Creativity at Int. Conf. on Case-Based Reasoning (ICCBR'15), Frankfurt, Germany, 2015 (A).
- 6th Int. Conf. Computational Creativity (ICCC'15), Park City, US, 2015 (A).
- PROSECCO Code Camp on Computational Creativity, Coimbra, Portugal, 2015 (A).
- 7th Int. Workshop on Guided Self-Organization at the European Conf. on Complex Systems (ECCS'13), Barcelona, Spain, 2013 (P).

Programme Committees

- 10th Int. Conf. on Computational Creativity (ICCC'19), Charlotte, US, 2019.
- IEEE Conf. on Games (CoG'19), London, UK, 2019.
- 9th Int. Conf. on Computational Creativity (ICCC'18), Salamanca, Spain, 2018.
- IEEE Conf. Computational Intelligence and Games (CIG'18), Maastricht, Netherlands, 2018.
- ACM Symp. on Computer-Human Interaction in Play (CHI PLAY'17), Amsterdam, Netherlands, 2017.
- IEEE Conf. Computational Intelligence and Games (CIG'17), New York City, US, 2017.
- 8th Int. Conf. on Computational Creativity (ICCC'17), Atlanta, US, 2017.
- 7th Int. Conf. on Computational Creativity (ICCC'16), Paris, France, 2016.

Journal Reviewing

- Artificial Life (MIT Press)
- Frontiers in Neurorobotics (Frontiers)
- Connection Science (Taylor & Francis)

Professional Memberships

- **ACC:** The Association for Computational Creativity
- **ACM:** Association for Computing Machinery
- **AISB:** The Society for the Study of Artificial Intelligence and Simulation of Behaviour
- **IEEE:** Institute of Electrical and Electronics Engineers
- **ISAL:** The International Society for Artificial Life

Referees

Name	Prof Simon Colton	**Name**	Prof Daniel Polani
Institution	Queen Mary / Monash University	**Institution**	University of Hertfordshire
Position	Professor of Computational Creativity	**Position**	Professor of Artificial Intelligence
Contact	s.colton@qmul.ac.uk	**Contact**	d.polani@herts.ac.uk