

CHRISTIAN GUCKELSDERGER

PhD Student in Game AI & Computational Creativity

Address	Game AI Research Group SEECs Queen Mary, University of London Mile End Road , E1 4NS London, UK	Date of Birth	14 th December 1986
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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 (140 attendees, <12% acceptance rate)
- 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: Eighth 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

- 2019** **Aalto University (Visual Computing Seminar)**
Intrinsically Motivated Reinforcement Learning for Next-Generation Video Game AI
- University of Helsinki**
Advancing Video Game AI Through Intrinsically Motivated Reinforcement Learning.
A Computational Creativity Perspective
- 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 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 –** **University of Helsinki, Helsinki, Finland**
Sep 2019 Visiting Scholar
Funded research collaboration with the Discovery Research Group.
- Apr 2018 –** **Microsoft Research, Cambridge, UK**
Jul 2018 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
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 advising 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 **Tutorial on the Generative Design in Minecraft (GDMC) Competition**, held at the IEEE Conference on Games (COG) in London, UK, 2019.
- 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.

- IEEE Conf. on Games (CoG'19), London, UK, 2019 (P).
- 4th Int. Workshop on Intrinsically Motivated Open-ended Learning, Frankfurt, Germany, 2019 (O).
- Dagstuhl Seminar on Computational Creativity Meets Digital Literary Studies, Germany, 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
Institution Queen Mary / Monash University
Position Professor of Computational Creativity
Contact s.colton@qmul.ac.uk

Name Prof Daniel Polani
Institution University of Hertfordshire
Position Professor of Artificial Intelligence
Contact d.polani@herts.ac.uk