Routledge Studies in Innovation, Organizations and Technology

ARTIFICIAL INTELLIGENCE IN CREATIVE INDUSTRIES

PSYCHOLOGICAL AND SOCIAL IMPLICATIONS

Edited by
Francisco Tigre Moura and Caterina Moruzzi

Artificial Intelligence in Creative Industries

While technological innovation has long reshaped artistic and cultural practices, the rise of generative AI (Gen AI) represents an unprecedented disruption due to its scale, speed, and capacity to produce outputs that can rival and surpass human creativity. This edited book examines how AI is transforming creativity, redefining industries, and raising new questions of authenticity, originality, and human agency. Specifically, it focuses on psychological and social implications of the GenAI revolution in creative fields.

The collection brings together seventeen chapters by international scholars from psychology, sociology, marketing, cultural studies, education, and related fields. These contributions provide theoretical, conceptual, and empirical insights into how creativity is being redefined across multiple sectors, contributing to the development of a new paradigm for understanding creative industries in the age of AI. Each chapter concludes with research questions to stimulate classroom debate, inspire research proposals, and guide further inquiry. It thus serves both as a teaching resource for seminars and workshops and as a reference for postgraduate research projects and scholarly collaboration.

The book is designed primarily for academics, higher education students, and instructors working on the intersection of AI, creativity, arts, and management.

Francisco Tigre Moura is Professor of Marketing at IU International University of Applied Sciences, Germany.

Caterina Moruzzi is Chancellor's fellow in Design Informatics, University of Edinburgh, UK.

Routledge Studies in Innovation, Organizations and Technology

The Myths of Regional Innovation
Sustainability Challenges and Responsible Innovation
Rider W. Foley

Digital Competence in Agile and Hierarchical Organizations
Operational Performance Under Global Uncertainties
Edited by Festus Adedoyin

Exploring Commercial, Social, and Digital Innovation from the Customer Perspective
Edited by Seidali Kurtmollaiev, Line Lervik-Olsen, and Tor W. Andreassen

Value Creation in Digital Platforms and Business Ecosystems
Networks, Relationships and the Platform Markets
Edited by Victoria Slettli and Sabine Baumann

Artificial Intelligence and Higher Education
The Impact of AI on Business Students Learning
Katerina Beta

Urban Transformation Through Artificial Intelligence
Management Innovations for Sustainable Development
Justyna Żywiołek, Joanna Ejdys, Radosław Wolniak and Senad Becirovic

Artificial Intelligence in Creative Industries
Psychological and Social Implications
Edited by Francisco Tigre Moura and Caterina Moruzzi

For more information about this series, please visit: www.routledge.com/Routledge-Studies-in-Innovation-Organizations-and-Technology/book-series/RIOT

Artificial Intelligence in Creative Industries

Psychological and Social Implications

Edited by Francisco Tigre Moura and Caterina Moruzzi

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

First published 2026
by Routledge
4 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge
605 Third Avenue, New York, NY 10158

Routledge is an imprint of the Taylor & Francis Group, an informa business

This work was supported by the Arts and Humanities Research Council (AHRC) [grant number AH/Y00115X/1].

British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-032-99943-2 (hbk)
ISBN: 978-1-032-99945-6 (pbk)
ISBN: 978-1-003-60680-2 (ebk)

DOI: 10.4324/9781003606802

Typeset in Sabon
by KnowledgeWorks Global Ltd.

Francisco Tigre Moura

Dedicated to everyone who seeks to explore, exercise, or understand creativity as a means for a more enriching life.

Caterina Moruzzi

Dedicated to the creatives who have revealed the humanity of their craft and shown that technology finds its true purpose in supporting it.

Taylor & Francis
Taylor & Francis Group
http://taylorandfrancis.com

Contents

List of Figures

List of Tables

About the Editors

Francisco Tigre Moura is Professor of Marketing at IU International University of Applied Sciences, Germany. He holds a PhD in Marketing from the University of Otago (New Zealand) and teaches main consumer psychology and marketing research related courses. He has multiple publications in scientific journals, conferences, and specialized media and has previously edited a book on artificial intelligence creativity and co-creation. He is also the founder of LiveInnovation.org, a research and education platform which, among other topics, discusses the use of artificial intelligence in the creative sector.

Caterina Moruzzi is Chancellor's fellow in Design Informatics, University of Edinburgh, UK. Her research lies at the intersection between the philosophy of art, human and artificial creativity, and the philosophy of Artificial Intelligence. She holds a Ph.D. in philosophy from the University of Nottingham and an artist diploma from the Conservatorio G.B. Martini, Bologna. As BRAID Research Fellow, she leads a collaboration with Adobe to promote the responsible integration of AI tools into creative practices. At the forefront of the research on modes of shared agency and creativity between humans, data, and technology, she is Lead of the research cluster "Creativity, AI, and the Human", at the Edinburgh Futures Institute, University of Edinburgh.

List of Contributors

Kristina Andersen is an associate professor at the Department of Industrial Design at Eindhoven University of Technology (TU/e). Her work is concerned with how we can allow each other to imagine our possible technological futures through digital craftsmanship and material practices. She is especially interested in knowledge production through experimental materials and how this might point us towards physical manifestations of intangible concerns. This forms part of a broader research aim to develop design research methods for times of rapid change through engaging directly with emerging technology, machinery, and processes.

Mirjam Augstein is a full professor for Personalized and Collaborative Systems at the University of Applied Sciences Upper Austria in Hagenberg. She holds a PhD in Computer Science and a Venia Docendi for Human-Computer Interaction. Her research joins personalized interaction methodologies with support and analysis of collaborative interaction in various fields, with a recent focus on human-AI collaboration.

Karin Breckner is a researcher at the University of Applied Sciences Upper Austria and a PhD student in Computer Science at Johannes Kepler University Linz. Her research focuses on human-AI collaboration and its intersection with human-human collaboration.

Lynne Craig's interdisciplinary practice, spanning fashion, soft-robotics, data, and sustainability, generates innovative forms of embodied knowledge production and transmission, articulating a philosophy of potentiality and immanence. Her work critically engages with technology's role in shaping subjective experience, producing prototype understandings of contemporary identities of adornment and digital material cultures, situating them within broader ecosystems of technological and social relations, and reconsidering technology as a landscape to wear. Through her practice, Lynne pioneered Virtual-Try-On (VTO) augmented reality for consumer audiences, founding Holition Augmented Retail in 2008. She established Digital Anthropology Lab, 2014, at London College of Fashion, University of Arts London, examining digital material cultures of fashion, and most

recently in her appointment as Associate Professor, Design Informatics, University of Edinburgh, from 2021 served as Masters Programme Director. Her role as Co-Director of Innovation at Edinburgh Futures Institute has established novel methods for interdisciplinary innovation practices and business creation. Lynne's work has been featured in New York Times, Financial Times, Wired, Dezeen, and Tatler with recent academic publication in AI & Society, examining the technological body. Lynne has worked with major global brands in fashion creating experimental commercial HCI for global audiences including for Louis Vuitton, Boucheron, Uniqlo, and De Beers, empowering a technology reading of fashion and jewellery as a form of HCI. Her ongoing approach continues to reimagine what the role of "making" in design, education, and business looks like for tomorrow.

Antonio Daniele is Assistant Professor in the School of Architecture and Design at IE University and Academic Director of the Master in Immersive Design and XR. As a researcher in HCI and the Arts, his focus is on human expression and the social implications of automated systems in creative practice and education. He holds a PhD from Queen Mary University of London, with a thesis on drawing as affective expression, contrasting the subjective experience of hand-drawn and AI-generated marks. He also holds an MA in Computational Arts from Goldsmiths and is an Associate Fellow of Higher Education. His work adopts an interdisciplinary, mixed-methods approach spanning HCI, cognitive science, machine learning, and the arts. Before academia, he worked internationally as a digital video and motion graphics director with leading agencies and brands including Nike, Alfa Romeo, Samsung, and Nokia, and his artworks have been exhibited in Europe, the UK, and the United States.

Gopolang Ditlhokwa is a lecturer in the Department of Media Studies, Faculty of Humanities, at the University of Botswana. He teaches courses in film and digital media, broadcasting, and communication. His research interests are on creative industries and platform dependencies.

Mariya Dzhimova is a sociologist and a research associate at the Institute for Arts Management and Media at the University of Music and Performing Arts Munich. Her research focuses on digital innovations in the arts and culture sector. She has worked on various projects at the intersection of science, art, and technology. Since 2022, she has led the Digitisation Lab "Artificial Intelligence in Culture and Arts" (AICA).

Ahmed Elgammal is a professor at the Department of Computer Science and an Executive Council Faculty at the Center for Cognitive Science at Rutgers University. He is the founder and director of the Art and Artificial Intelligence Laboratory at Rutgers. He has published over 200 peer-reviewed papers, book chapters, and books in the fields of computer vision, machine learning, and digital humanities. His research on knowledge discovery in art history, AI-art generation, and AI-based art authentication received

global media attention, including several reports on the Washington Post, New York Times, CNN, NBC, CBS News, Science News, and many others. In 2016, a TV segment about his research, produced for PBS, won an Emmy award. In 2017, he developed AICAN, an autonomous AI artist and collaborative creative partner, which was acclaimed in an Artsy editorial as "the biggest artistic achievement of the year". AICAN art has been exhibited in several art venues in Los Angeles, Frankfurt, San Francisco, New York City, and the National Museum of China. In 2021, he led the AI team that completed Beethoven's 10th symphony, which received worldwide media coverage, and several awards. He received M.Sc. and Ph.D. degrees in computer science from the University of Maryland, College Park, in 2000 and 2002, respectively.

Mark Gotham specializes in computational methods for music theory, analysis, and composition. He holds the rare distinction of having been appointed to permanent faculty positions in the humanities (Professor of Music Theory at T. U. Dortmund), in STEM (in Computer Science at Durham), and "in between" (now as Senior Lecturer in Cultural Computation in the Digital Humanities Department at KCL).

Hans-Peter Griewatz is a professor of social work at the International University in Wuppertal. He wrote his dissertation on the topic of supervision. His research focuses on the social theory foundations of counselling, inclusion, educational theory, and philosophical dialogue.

Hèrm Hofmeyer is an associate professor in the Department of the Built Environment at Eindhoven University of Technology (TU/e). His research spans two areas. The first, Structural Design Computing, applies computer science to spatial and structural design through innovations such as automated zoning, structural grammars, conformal geometries, co-evolutionary design simulations, and topology optimisation, validated with genetic algorithms and case studies. The second focuses on the finite element modelling for structural engineering, advancing understanding of behaviour in steel, concrete, and glass structures. Recent work addresses applications of the direct strength method for cold-formed steel, coupled CFD-thermomechanical analyses, and print-path steered topology optimisation for 3D concrete printing.

Wijnand Ijsselsteijn has a background in AI and cognitive neuropsychology. Since 2012, he has been Professor of Cognition and Affect in Human-Technology Interaction at Eindhoven University of Technology (TU/e). He leads a research programme on the impact of technology (e.g. VR/XR, personal informatics, and human-centred AI) on human behaviour and thought, and on the use of psychology and ethics to improve technology design. His work focuses on enhancing human learning, creativity, communication, health, and wellbeing and on improving the quality of life of people with dementia. His research is widely cited and applied in both

academic and industrial contexts. Prof. IJsselsteijn is co-PI of the Dutch Gravitation project Ethics of Socially Disruptive Technologies, and PI of the NWO/ZonMw QoLEAD project, which examines the role of AI in improving the quality of life for people with dementia. He is also the recipient of the Distinguished NIAS-Lorentz Fellowship for 2024/2025.

Susanne Kiesenhofer is a researcher and artist at the Ars Electronica Futurelab in Linz. She develops interactive installations and immersive experiences shaped by insights from artistic research, investigating the creative potential of emerging technologies.

Pei-Ying Lin (http://peiyinglin.net) is an artist, designer, and designer researcher in Science/Art who works with More-than-Human others including viruses, bacteria, textile, and AI. She works on manipulating the boundary of invisible/visible, living/non-living and finding ways to build tools and methods that facilitate such explorations. She also seeks how practice-based art and design and engage in scientific research. She is currently a PhD at Eindhoven University of Technology, resident artist of RepliFate, and IF Fellow of Royal Shakespeare Company.

Stefanie Morgenroth is a professor of Social Work at IU International University in Wuppertal. She holds a PhD in Educational Sciences. Her research combines place-based and community-oriented approaches, interprofessional collaboration, and resilience-building within a salutogenic framework, focusing on child and youth welfare services.

Thomas Neumayr is an assistant professor of Human-Centered Adaptive Web at the University of Applied Sciences Upper Austria. His main research interest is how people can collaborate with one another or with AI through technological support, or personalization. He is elected speaker of the SIG on adaptivity and user modelling (ABIS) of the German Gesellschaft für Informatik.

Ali Nikrang is a multidisciplinary AI researcher and artist in the field of music and artificial intelligence. He is a professor for AI and musical creation at the University for Music and Theatre in Munich and a researcher at the Ars Electronica Futurelab in Linz. With a background in classical music and AI engineering, his main research interest lies in the creative applications of AI in the field of music.

Pieter Pauwels works as an associate professor at the Department of the Built Environment at TU Eindhoven. His work and interests are in information system support for the building life-cycle (architectural design, construction, building operation). He is involved in a number of industry-oriented research projects on topics affiliated to AI in construction, design thinking, Building Information Modelling (BIM), Linked Building Data (LBD), Linked Data in Architecture and Construction (LDAC), and Semantic Web technologies.

Cringuta Irina Pelea is Lecturer PhD in Communication Sciences at Titu Maiorescu University, Romania. Her research focuses on social justice and communication sciences, with particular attention to cultural representation and power dynamics in both traditional and digital media contexts. Her additional expertise includes Japanese cultural studies. She is the editor of the volume Culture-Bound Syndromes in Popular Culture (Routledge, 2023), an editorial member of the Routledge Handbook of Language and Mind Engineering (2024), and has recently contributed to Routledge Companion to Literature and Social Justice (2023), the Routledge Handbook of Endangered and Minority Languages (2025) and Future of Media in Asia (Springer, 2025). She has presented her research at international conferences across Europe and Asia, including Japan, Denmark, Finland, Germany, Italy, Luxembourg, the Czech Republic, and Turkey.

Jan Pieper is a professor of Business Administration at IU International University. He holds a PhD in Management and Economics. His research focuses on digitalization and innovation management.

Shama Rahman is an Innovation Fellow at the University of Edinburgh's School of Informatics and Edinburgh Futures Institute, where her research unites AI, neuroscience and design to advance cognitive health, Flow, and ethically aligned human-AI collaboration. She holds a PhD in the neuroscience and complex systems of creative cognition (Imperial College London/Goldsmiths/Royal College of Music). She has served as Senior Lecturer in NeuroDesign at the Hasso-Plattner Institute, Visiting Professor at Shenkar and has taught at Central Saint Martins. Alongside scholarship, she has worked across multiple ventures in the creative industries, building products, designing creative-technology systems, and advising organisations on the translation of deep learning and generative methods into practice. She bridges lab and studio—turning frontier models into humane systems that help people think, make and lead better—shaping resilient ways of making and learning at the intersection of AI, neuroscience, and creative practice.

Daniela Reuß is a professor of media design at the International University of Applied Sciences in Nuremberg. She primarily teaches audiovisual media and runs workshops on using AI tools in the creative process for students and colleagues. She has also worked in various roles in the creative industry for 17 years. She is currently working as a creative director at an advertising agency in Munich. Her role there focuses on concept development and visual storytelling, with the current possibilities of AI always playing a central part in her projects.

Matthias Röder is an internationally recognized expert at the intersection of AI, creativity, and leadership. As co-founder of the Sonophilia Foundation, a Munich-based non-profit supporting scientific research on creativity,

and founder of The Mindshift, he helps organizations and leaders unlock creative potential and navigate digital transformation.

Ralf Schmidt is a PhD in the Department of the Built Environment at Eindhoven University of Technology (TU/e) with a background in Human-Technology Interaction. He works on the intersection between creativity and artificial intelligence, with a particular focus on human-AI collaboration. His work investigates how factors such as control, agency, and user preferences influence both the creative process and the perceived creativity of AI-generated artefacts. Drawing on theories of cognitive control and creativity, he is especially interested in how adaptive systems can balance user agency with creative surprise.

Verónica Silva is a design researcher and lecturer at IADE, Universidade Europeia in Lisbon, Portugal. Combining academic inquiry with professional practice, she investigates how race and gender biases emerge in generative AI and how design education can foster more ethical and inclusive approaches to creative practices.

Aisha Sobey (she/her) is an interdisciplinary Research Fellow at the University of Cambridge's Leverhulme Centre for the Future of Intelligence. She is concerned with understanding the infrastructural power of AI systems, and how the underlying data, system models, and use of such systems combine to perpetuate inequalities and form new hierarchies of marginalisation, especially concerning the fat and disabled body.

Michael Stead is a lecturer in Sustainable Design Futures at Lancaster University's Imagination Design Research Lab. His practice-led research explores the environmental, social, and economic opportunities and challenges emerging technologies including Internet of Things and AI pose for redressing climate change and engendering climate justice. Advancing approaches including Speculative Design, More-than-Human Design, and Participatory Design, he is developing innovative regenerative tools and strategies with local community partners, policymakers, and wider industry that support adoption of sustainable and equitable technologies, practices, and infrastructures across future society.

Marie Storrar is a creative and strategic leader with over 25 years of executive-level experience in the digital sector. She has a distinguished track record of delivering award-winning and pioneering work for global clients like Johnnie Walker, Honda, Gruppo Campari, and Bank of Scotland. Her career is highlighted by numerous technological firsts, including world-firsts in viral video and augmented reality. She now applies her extensive expertise to her role in communications and marketing at the University of Edinburgh where she has contributed to the development of university-wide guidance on AI usage for internal and external communications and creative output. Recent high-profile work includes interactive data

visualisation projects with a focus on bringing academic research to wider and more engaged audiences.

Kevin Walker is a researcher and developer of hardware and software. He has led an AI research group at Coventry University, two Masters programmes in design, designed, and developed award-winning software, installations, and films internationally.

Walter Werzowa is an Austrian-American composer, audio branding pioneer, and professor at the University of Music and Performing Arts Vienna (mdw). A USC postgraduate in film scoring under Jerry Goldsmith, he created the iconic Intel mnemonic, scored Hollywood films, and co-composed Beethoven's 10th Symphony with AI. At mdw, he leads film music and immersive audio, uniting tradition with technology.

Benedikt Zönnchen is a research associate at the Munich Center for Digital Sciences at the Munich University of Applied Sciences. After completing his degree in computer science, he specialized in modelling and simulating complex systems, focusing on pedestrian dynamics, and earned his PhD at the Technical University of Munich. Building on his expertise in complex systems, he adopts a systems theory perspective to explore distinctions between humans, machines, and society. His current research focuses on the impact of self-learning algorithms on education, art, and culture, as well as their role in advancing the Sustainable Development Goals.

Acknowledgements

We would like to first thank all authors that have contributed to this book! It has been a true honour collaborating with you, editing and learning from your ideas, expertise and innovative perspectives on artificial intelligence and creativity. We would also like to acknowledge the Routledge team for their support and trust on our proposal to develop this book since the start. Finally, we would like to thank our institutions, IU International University of Applied Sciences and the University of Edinburgh, for their continuous support that enables scholars to develop projects such as this book. We particularly acknowledge support from the Convergent Screen Technologies and performance in Realtime (CoSTAR) Realtime AI Lab (AH/Y00115X/1) funded by the UKRI Arts and Humanities Research Council (AHRC).

Taylor & Francis
Taylor & Francis Group
http://taylorandfrancis.com

Reflecting on the New Creative Landscape

Introducing "Artificial Intelligence in Creative Industries: Psychological and Social Implications"

Francisco Tigre Moura and Caterina Moruzzi

The human drive to create and produce artistic and intellectual outputs has shaped societies and cultures through artforms such as music, art, and literature, while also contributing to scientific discovery, technological innovation, and social progress (Weisberg, 2016). These efforts have often been closely tied to technological progress. In the past decade, however, creativity has entered a new and unfamiliar relationship with technology. Artificial intelligence (AI) systems have enabled novel modes of artistic expression, allowed for innovative ways of co-creation, changed creative industries, and challenged fundamental assumptions about the definition and perception of creativity (Moruzzi, 2022).

Disruption in creative sectors as a result of technological advances is not a new phenomenon, though. Creativity and creative practices have consistently been reshaped by technological advances (Gohoungodji & Amara, 2023). Each new wave of innovation in creative industries, such as the introduction of cameras, synthesizers, or computers, has generated both anticipation and uncertainty. As industry dynamics and paradigms evolve, so too do the perceptions and behaviours of individuals who are directly or indirectly involved. In the arts, these shifts frequently raise questions concerning authenticity, originality, and the role of humans in creative practices.

The changes associated with AI differ in scale and nature from previous technological developments. Its processing capacity, speed, and capacity for large-scale production make its impact unprecedented. The rapid adoption of Generative AI (genAI) by both experts and non-experts, creatives and non-creatives, shows the magnitude of this transformation (Bick et al., 2024). GenAI systems are arguably not merely instruments for novel forms of co-creative experiences and processes, with varying distribution of agency between humans and AI. They are able to generate outputs which challenge and may even be perceived equal or more superior to human-made works, in objective and subjective measures (Tigre Moura et al., 2023). The psychological and social implications for creators and the public is substantial, despite evidence of a general bias against AI-generated creative output (Bellaiche et al., 2023). For example, creators and audiences

DOI: 10.4324/9781003606802-1

are confronted with shifts in motivation, creative identity, purpose, and sense of autonomy. Broader perceptions of creative outputs and processes are also affected, for example in relation to their value and authenticity (Moruzzi et al., 2025).

The long-term consequences of this disruption remain largely uncertain. From one perspective, genAI tools offer opportunities for creative exploration, efficiency, and experimentation. They enable artists, professionals, and non-creatives, to expand physical and cognitive capabilities, to pursue new directions in co-creation, sometimes resulting in outcomes that are novel, valuable, and surprising (key premises of creativity, as defined by Boden (2005)). On the other hand, the AI revolution in creative sectors raises profound psychological challenges for individuals and communities engaged in cultural production.

Aim and Scope of the Book

In view of the scenario described above, the aim of this book was to gather a collection of cross-disciplinary scholars from various fields, such as psychology, sociology, marketing, cultural studies, education, and related fields, to examine the psychological and social implications of AI in creative domains. We were especially interested in and open to accepting authors from different areas of the globe, in different moments of their academic careers and with diverse viewpoints.

Across seventeen chapters, the authors debate how creativity and creative industries are being redefined by AI, as well as the implications of these changes for creators and consumers across multiple sectors. The contributions provide theoretical, conceptual, and empirical insights that help us understand and reflect on one of the most significant cultural shifts of our time. In doing so, the volume contributes to the development of a new paradigm for understanding creativity and creative industries, one that considers the psychological and social consequences of the AI revolution.

The book also builds on our earlier publication "*Artificial Intelligence, Co-Creation and Creativity: The New Frontier for Innovation*" (Tiger Moura, 2024), which focused on co-creative aspects of AI and human interaction. This volume extends that discussion by offering a critical reflection on the broader impacts of AI within creative sectors.

Adopting the Book in Higher Education

This book was conceived to be a valuable resource for academics and higher education students, and a learning tool in higher education programs. Each chapter concludes with at least three future research questions formulated by the authors, based on the issues addressed in the chapter. These questions are intended to stimulate academic discussion, guide students in identifying

gaps in the literature, and inspire new research directions. They could, for example, serve as starting points for classroom debates, written reflections, or research proposals at both the graduate and postgraduate level.

The chapters should also be viewed as an important resource for lectures. The broad scope of topics presented across the chapters can be incorporated into seminars, workshops, and reading groups, as they enable for critical debates on the role of AI in creativity, culture, psychology and society. Finally, we hope the collection of chapters and the topics covered, along with the future research questions which are proposed, will serve as a source of inspiration for master's theses, doctoral dissertations, and collaborative research projects.

AI Disclaimer of All Chapters

Authors of Chapters 1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, and 15 used genAI in the process developing their work. Thus, when genAI was used, the chapter ends with a "AI Disclaimer Statement" detailing which tool was used and for which purpose. Not containing such statement represents that the author has not used genAI in the chapter.

AI Disclaimer Statement

ChatGPT-5 was used in this introduction for general formatting, refinement of language, and improving stylistic formulation. The conceptual, analytical, and argumentative development of the content was done by the authors without the use of AI. The final version was reviewed, revised, and approved by the authors.

References

Bellaiche, L., Shahi, R., Turpin, M. H., Ragnhildstveit, A., Sprockett, S., Barr, N., … & Seli, P. (2023). Humans versus AI: Whether and why we prefer human-created compared to AI-created artwork. *Cognitive Research: Principles and Implications*, *8*(1), 42.

Bick, A., Blandin, A., & Deming, D. J. (2024). *The rapid adoption of generative AI (no. w32966)*. National Bureau of Economic Research.

Boden, M. A. (2005). What is creativity? In *Creativity in human evolution and prehistory* (pp. 27–55). Routledge.

Gohoungodji, P., & Amara, N. (2023). Art of innovating in the arts: Definitions, determinants, and mode of innovation in creative industries, a systematic review. *Review of Managerial Science*, *17*(8), 2685–2725.

Moruzzi, C. (2022). Creative agents: Rethinking agency and creativity in human and artificial systems. *Journal of Aesthetics and Phenomenology*, *9*(2), 245–268.

Moruzzi, C., Tallyn, E., Liddell, F., Dixon, B., Collomosse, J., & Elsden, C. (2025, June). Content authenticities: A discussion on the values of provenance data for creatives and their audiences. In *Proceedings of the 2025 Conference on Creativity and Cognition* (pp. 128–140).

Tiger Moura, F. (Ed.). (2024). *Artificial intelligence, co-creation and creativity: The new frontier for innovation*. Taylor & Francis.
Tigre Moura, F., Castrucci, C., & Hindley, C. (2023). Artificial intelligence creates art? An experimental investigation of value and creativity perceptions. *The Journal of Creative Behavior*, *57*(4), 534–549.
Weisberg, R. W. (2016). *Creativity: Understanding innovation in problem solving, science, invention, and the arts*. John Wiley & Sons.

1 A Decade of Generative AI Art

Technological Advances and Creative Trade-offs

Ahmed Elgammal

1.1 Introduction

Throughout history, each major technological shift has expanded the creative toolkit available to artists. From the early pigments used in cave painting, to the innovations of oil paint during the Renaissance, to the invention of photography in the 19th century, and later the rise of digital art in the late 20th century—art has always evolved in tandem with new mediums. Every such transformation has invited both resistance and radical possibility. Yet, time and again, artists have embraced these tools, redefining both what art can be and who gets to be called an artist.

Artificial intelligence (AI) is no exception. As with earlier innovations, the emergence of AI has sparked new modes of creativity, enabled wider participation in image-making, and invited complex discussions about agency, authorship, and aesthetics. Importantly, AI's integration into artistic practice is not a sudden rupture but part of a longer lineage of computer-generated art. AI has been involved in art-making nearly as long as the field of AI itself has existed.

Among the earliest and most significant examples is the work of Harold Cohen, a pioneering artist who began developing the autonomous art-making system AARON in the late 1960s. Over the following decades, Cohen's collaboration with his AI system evolved into one of the most sustained and celebrated cases of human-machine co-creation in modern art (Cohen, 1982). Alongside Cohen, other artists working in early computer graphics helped give rise to what would later be called generative or algorithmic art (Galanter, 2003). These early efforts laid the conceptual and technical foundations for what we now understand as AI art.

Over the past decade, advances in machine learning and computer vision have drastically expanded the creative possibilities for artists working with AI. This period has witnessed the transition of AI art from a niche experimental domain into a global phenomenon. We have seen, in rapid succession, a series of breakthroughs that not only improved the fidelity and flexibility of image generation but also altered the relationship between artist, tool, and audience.

A pivotal moment came in 2015 with the public popularization of style transfer, a technique that allowed users to transform photographs into

DOI: 10.4324/9781003606802-2

painterly images in the style of famous artists (Gatys et al., 2015). While limited in its expressive capacity, this technique introduced a broad audience to the idea that machines could produce visually engaging transformations, a novelty that captured imaginations across social media platforms.

At a deeper technical level, the development of generative adversarial networks (GANs) in 2014 (Goodfellow et al., 2014), and especially their adaptation for image synthesis through architectures like DCGAN (Radford et al., 2015), marked a leap in generative fidelity. GANs quickly became a fertile ground for both technical innovation and artistic experimentation. Artists explored GANs not just for their output but for the uncanny tension between realism and surrealism that the models often produced, an aesthetic that resonated with long-standing avant-garde traditions.

The next transformative wave came with the emergence of multimodal models, beginning in a meaningful way with OpenAI's DALL·E in 2021 (Ramesh et al., 2021), which introduced natural language as a core interface for image generation. This shift to prompt-based creation marked a turning point: text could now directly shape visual outcomes, effectively turning language into a creative medium. With the advent of diffusion models—notably DALL·E 2 (Ramesh et al., 2022), and the open-source Stable Diffusion (Rombach et al., 2022)—the quality, coherence, and control over image generation improved dramatically. By 2023, these models were extended to support video generation, 3D synthesis, and fine-tuned personalization, further blurring the lines between creator and tool.

This chapter seeks to trace the creative trajectory of AI art over the past decade, from its early GAN experiments to the prompt-driven explosion of diffusion models. We aim to examine not only the technical evolution of these tools but also their aesthetic, cultural, and social implications. How did different technical advances affect the kind of images that were made and the way artists approached their craft? What artistic practices flourished or faded in each generation of tools? How did the broader public react, embrace, critique, or reject these new modes of creation?

By unpacking this recent history, I hope to offer a nuanced account of how the integration of generative AI into art-making has reshaped both the process and politics of creativity. The gains have been many: accessibility, speed, scale, but so too have the losses of authorship, of singular vision, of the tactile connection to medium. Between the uncanny valley and the prompt, we find a complex and rapidly evolving terrain. It is one that demands both historical grounding and critical reflection, an effort this chapter seeks to undertake.

1.2 Image Generation Evolution over the Last Decade

1.2.1 From GANs to Diffusion and Prompting

The trajectory of generative AI over the past decade has been marked by a sequence of technological leaps, each expanding what machines could visualize and how humans could interact with them. Among the earliest

breakthroughs in image generation was the development of *Generative Adversarial Networks* (GANs), introduced by Ian Goodfellow and colleagues in 2014. GANs represented a conceptual turning point: they introduced a learning framework built on adversarial dynamics, wherein two neural networks (the generator and the discriminator) engaged in a game-like training loop.

In simple terms, GANs generate images by transforming a vector of random numbers (commonly referred to as *noise*) into an image. The generator's job is to create plausible images, while the discriminator attempts to distinguish these generated images from real ones. The generator receives feedback from the discriminator and updates itself to produce more convincing outputs over time. This adversarial process continues until the generator can produce images that are indistinguishable from the real examples it was trained on—at least in theory.

Early outputs from GANs were far from photorealistic. The images were blurry, distorted, and often difficult to interpret. Nonetheless, they captured the imagination of both researchers and artists. One of the first enhancements came with the introduction of *Deep Convolutional GANs* (DCGANs) (Radford et al., 2015), which incorporated convolutional layers into the architecture. This adjustment improved image fidelity and enabled the generation of images with recognizable structure, albeit still at very low resolutions—typically 64×64 pixels.

At this early stage, we began to ask fundamental questions about the aesthetic value of these outputs. Could GANs create art? If we trained these networks on a dataset composed entirely of paintings, portraits, or sculptures, would the results constitute artistic expression, or merely statistical mimicry (Elgammal et al., 2017)?

Training GANs on artworks often produced haunting and distorted images that lacked clear boundaries or coherence. These results resided in what came to be known as the *uncanny valley*, a perceptual space where generated images are eerily close to human likeness but remain unsettlingly flawed. When GANs were trained on classical portraiture, for instance, the results resembled disfigured human faces. The resemblance to Francis Bacon's psychologically charged portraiture was often noted. However, unlike Bacon, whose distortions were intentional and expressive, GAN-generated deformations were the unintentional by-product of an immature synthesis process.

A major shift occurred with the introduction of *StyleGAN* (Karras et al., 2019), which achieved a new standard in realism. StyleGAN was the first model capable of producing high-resolution, photorealistic images of human faces—up to 1024×1024 pixels. But more importantly, it introduced controllability into the generative process. Through a disentangled latent space, users could manipulate various features of generated faces, such as expression, age, gender, and even fine details like hair texture or lighting.

Yet, StyleGAN's effectiveness was domain-specific. Its most convincing results were produced when applied to highly aligned and normalized datasets, most notably, human faces that were centred and uniformly sized. When applied to less structured domains, StyleGAN often reverted to the

limitations of traditional GANs, producing results that were less coherent or aesthetically compelling.

By 2019, interest in GANs had exploded. A search for "GAN" on GitHub yielded tens of thousands of repositories, reflecting the community's enthusiasm and the proliferation of variations aimed at improving training stability, resolution, and controllability. GANs had become a core research and creative tool, but they were not the final word.

The next transformative leap came with the integration of *language* into the image generation process. This was the beginning of prompt-based generation, where natural language served as the input condition guiding visual synthesis. Among the first compelling examples of this approach was *DALL·E*, introduced by OpenAI in early 2021 (Ramesh et al., 2021). Although earlier efforts had explored the conditioning of GANs on textual descriptions (Reed et al., 2016), DALL·E represented a significant advancement in quality, coherence, and flexibility.

The introduction of language fundamentally altered the generative paradigm. Previously, models operated blindly over pixels without any semantic understanding. With language in the loop, image generation could now be guided by rich, high-level concepts. Text became a powerful steering mechanism, allowing users to express imaginative prompts that the system would interpret and visualize. Language was no longer just metadata. It became the interface, the lens through which the machine understood its task.

Yet, it was the arrival of *diffusion models* that would redefine the landscape entirely. Beginning with DALL·E 2 (Ramesh et al., 2022) and the open-source release of *Stable Diffusion* (Rombach et al., 2022), diffusion-based architectures began to outperform GANs in both image quality and training stability. Like GANs, diffusion models start from random noise. But instead of generating an image in one pass, diffusion proceeds through an iterative refinement process. During training, images are gradually corrupted with noise; during generation, this process is reversed in carefully modelled steps, effectively "denoising" the image back into a coherent form. This iterative approach proved to be more stable and scalable than GANs.

What made diffusion models particularly powerful was their compatibility with large-scale training on billions of image-text pairs. These datasets, combined with pretrained *large language models* (LLMs), enabled image generators to align more closely with nuanced textual prompts. The addition of LLMs did not merely improve image quality—it transformed user interaction. Prompting became a linguistic art itself, and the user interface for image generation shifted from code or sliders to natural language. The system became more accessible, but also more interpretable, adaptable, and open-ended.

From GANs to prompting via diffusion models, we have witnessed a cascade of new "superpowers" added to the AI artist's toolkit. First came the raw generative potential of adversarial training, then the realism and control of high-resolution convolutional architectures, followed by the conceptual direction provided by language, and finally the iterative precision and scale enabled by diffusion. Together, these advances have not only improved the

fidelity of machine-generated images but also redefined how we imagine the role of the artist, the tool, and the prompt in the creative process.

1.2.2 Usability: From the Uncanny Valley to Image Generation as Commodity

In the early years of AI-generated imagery, usability was limited both technically and conceptually. The outputs of *Generative Adversarial Networks* (GANs), especially in their initial implementations, were often distorted, surreal, and unpredictable—qualities that appealed primarily to a niche group of experimental and new media artists. These creators were drawn not to realism but to the aesthetic of machine failure. The deformed figures, inconsistent geometry, and spectral colour palettes aligned with postmodern and avant-garde traditions. Platforms such as Playform allowed these artists to explore the technology by training GANs based on their own models (Mazzone & Elgammal, 2020). This situated GAN art within the space of what Masahiro Mori termed the *uncanny valley*—the psychological discomfort evoked by near-human representations that are perceptibly "off" (Mori, 1970).

This aesthetics, however, proved difficult to deploy beyond the context of conceptual art. GAN-generated imagery lacked the fidelity and semantic control necessary for most professional creative applications. Usability remained low, restricted to those willing to embrace unpredictability and error as aesthetic strategies.

A major shift in usability arrived with the rise of *diffusion models* and their integration with *large language models* (LLMs). Instead of requiring parameter tuning or programming knowledge, users can now guide the generative process through linguistic description—a radical change in usability. Prompting has emerged as the primary means of user interaction in multimodal generative AI, enabling more intuitive control and enhancing the semantic depth of generated content.

This shift unlocked a wide range of applications and brought new user segments into the fold. Professional illustrators, concept artists, animators, and game designers began using generative tools for rapid prototyping, visual ideation, and moodboarding. Designers in fashion, publishing, and product design found value in the ability to quickly iterate through visual concepts. In digital marketing, content creators began leveraging these tools to produce campaign visuals, branded assets, and social media content at scale, reducing reliance on stock imagery or freelance illustrators (Goldman, 2023).

Meanwhile, hobbyists and casual users found uses for generative models in everyday creativity: from generating memes and AI avatars to fictional characters, greeting cards, and speculative designs. AI-powered platforms have made image generation mainstream and embedded it into consumer workflows (CB Insights, 2023).

This democratization of usability is mirrored by the growing commodification of image generation. According to a 2025 report by Grand View Research, the global generative AI market was valued at USD 16.87 billion in 2024 and is

projected to grow at a compound annual growth rate of 37.6% through 2030 (Grand View Research, 2025). Within this broader sector, image generation has become one of the most widely adopted verticals. Stable diffusion alone reportedly facilitated over 170 million image generations in its first few months after release (Stability, 2022). Hugging Face's *Diffusers* library and OpenAI's DALL·E 2 API have also been integrated into hundreds of apps and services. According to a 2024 report by Grand View Research, the global AI image generator market was valued at approximately USD 349.6 million in 2023 and is projected to reach USD 1.08 billion by 2030, growing at a compound annual growth rate of 17.7% from 2024 to 2030 (Grand View Research, 2024).

The economics of image generation have also shifted. While early systems required high-end GPUs and significant computation costs, inference today can be performed for fractions of a cent per image. Open-source models and commercial APIs alike offer freemium tiers or micro-transaction pricing, making image generation nearly as ubiquitous as querying a search engine. For enterprises building creative pipelines, generative imagery has become a form of infrastructure: fast, cheap, and scalable.

As image generation becomes embedded into productivity tools, design software, and online platforms, it is evolving from an experimental novelty into a creative commodity. But unlike traditional stock photography, generative systems offer infinite variation on demand. The image is no longer selected from a finite pool but created in real time, shaped by the user's imagination and expressed through language.

This evolution—from machine-generated serendipity to usable, scalable, prompt-controlled synthesis—marks a critical shift. Generative AI tools are no longer bound by the uncanny valley. They are now part of everyday creative practice, spanning personal play to professional production.

1.3 Future Research Agenda

RQ1: *How does prompting-based generation limit the expression of abstract and novel visual ideas?*

The transition from GAN-based generative art to diffusion models controlled by natural language prompts brought undeniable gains in image quality, realism, and usability. Text-to-image models have enabled the production of detailed, semantically coherent images at scale. Yet, this very shift, from visual improvisation to linguistic direction, has also introduced significant limitations, especially when considered from the perspective of artists and visual thinkers.

At the heart of the issue is the dominance of *language* as the interface for creativity. In text-to-image generation, every pixel must be routed through the filter of linguistic interpretation. This poses a constraint on how abstract or novel ideas can be expressed. If a concept does not exist in language, or does not yet have a term, it is exceedingly difficult

to render. For example, imagine trying to recreate Pablo Picasso's 1907 *Les Demoiselles d'Avignon*, an early experiment in Cubism, through prompting. At that point in history, the language to describe Cubist forms and aesthetic logic had not yet emerged. A modern text-to-image model trained on data reflecting conventional artistic labels would struggle to manifest such a visual innovation, precisely because the concepts driving it lie outside existing linguistic and semantic categories.

Visual artists often work in ways that bypass or precede language. Their creative process is shaped by memories, emotions, gestures, or visual references such as photographs, sketches, or previous works, not necessarily by words. When language becomes the exclusive conduit through which images are rendered, it introduces an interpretive layer that may obstruct, rather than facilitate, artistic expression. As we enter the era of language-steered generation, many artists find themselves negotiating with a tool that is not natively visual but semantically bound.

RQ2: *Can artistic identity truly emerge when generative models are pretrained on billions of images?*

The shift from small AI models, trained by artists on their own date, to models pretrained on billions of images challenges the nature of artistic identity in AI-mediated creation. If multiple artists are using the same pretrained model—one trained on billions of images scraped indiscriminately from the internet—how can their distinct identities emerge? How can their intentions, sensibilities, and stylistic signatures shine through the dense statistical and cultural biases embedded in the model's training data? As I posed in *The Guggenheim Museum Blog* (Elgammal, 2021): "*Does the use of AI, pre-loaded with content, reduce the role of artists to curation and playing around with knobs, which, although deceivingly allows artists to mine through an apparently infinite range of choices, fundamentally limits expressing their identity?*". The concern is not simply about authorship, but about authorship under conditions of constraint, where creativity is routed through the aesthetic preferences and structures of a pre-existing dataset.

RQ3: *How will the cultural reception of AI evolve in the coming years?*

The underlying tension about artist identity and the use of artists' work to train large AI models has led to a cultural backlash against AI art. In the earlier GAN era, particularly between 2017 and 2020, AI-generated art enjoyed critical and institutional acclaim. Works that emerged from the uncanny valley were exhibited in galleries, museums, and art fairs. The unpredictability and surrealism of GANs invited fascination and debate. As I argued in *Artnet News*, "It was the serendipity—the inability to fully control the system—that made AI art exciting" (Elgammal, 2023). The early AI art movement was characterized by experimentation, conceptual inquiry, and open questions

about co-authorship. But as image generation became more accessible and commodified, it lost much of this critical edge. Today's prompt-based models are increasingly used to replicate familiar visual tropes rather than challenge aesthetic norms, leading me to declare that "AI art is over" in its radical form (Elgammal, 2023).

This backlash has been evident within artistic communities. Several online platforms have implemented partial or full bans on AI-generated artwork. For example, major Reddit communities such as r/Art and r/DigitalPainting disallowed the posting of AI art in 2022, citing concerns over authenticity, spam, and ethical issues (Cole, 2023; Hayton, 2024). Other art platforms have adopted similar restrictions, reflecting a widespread scepticism about AI's role in creative authorship. It remains a question how this tension will evolve in the future as more and more artists start to adapt the technology in ways that can actually reshape their practices and let them understand the value AI can give or take away from them.

RQ4: *Does training generative models on copyrighted artworks without consent constitute infringement?*

One of the most contentious issues underlying this resistance is copyright. A growing number of artists and advocacy groups have filed lawsuits against companies like Stability AI, Midjourney, and DeviantArt, alleging unauthorized use of copyrighted material in the training of diffusion models. As *Art in America* reported, plaintiffs argue that "the AI training process, called diffusion, is suspect because it requires images to be copied and re-created as the model is tested. This alone, the lawyers argue, constitutes an unlicensed use of protected works" (Escalante-De Mattei, 2023).

The AI companies have pushed back. Stability AI contends that plaintiffs "fail to identify a single allegedly infringing output image, let alone one that is substantially similar to any of their copyrighted works" (Escalante-De Mattei, 2023). Similarly, Midjourney has asserted that none of the lawsuits identify a specific copyrighted image used as training data. Most cases to date have been dismissed or delayed, often on the basis that the generated images were not "substantially similar" to any protected work or that AI firms did not themselves scrape the training data, since this was typically conducted by third parties like LAION-5B (Schuhmann et al., 2022).

Initially, some of these lawsuits were dismissed late in 2023 (Escalante-De Mattei, July 2023), while others continue (Akers, 2024; Knibbs, 2024). The legal debate is bound to continue in the next few years, till the vacuum in copyright laws in regard to AI is filled by new laws (Moreno, 2023).

Yet legal arguments aside, the ethical questions remain: Does training on millions of images without consent undermine the creative

labour of individual artists? And does prompting, though seemingly empowering, flatten artistic diversity into algorithmic generality?

While diffusion models and prompt engineering have undeniably advanced the usability and democratization of generative AI, they also risk eroding some of the core values of art-making: intention, authorship, originality, and risk. The aesthetic surprises and conceptual provocations that once defined AI art are increasingly replaced by images tailored for mass appeal. The tools have become more powerful, but the terrain they navigate is narrower, bounded by the very language that makes them accessible.

AI Disclaimer Statement

In accordance with the Taylor & Francis AI Policy, the author used OpenAI's ChatGPT (Version 4.5) for language editing and stylistic refinement. All conceptual ideas, analyses, interpretation, and substantive writing remain entirely the author's own. The author also double-checked all the AI-assisted refinements to make sure all his original ideas weren't altered by the tools.

References

Akers, T. (2024). *US artists score victory in landmark AI copyright case*. The Art News Paper. https://www.theartnewspaper.com/2024/08/15/us-artists-score-victory-in-landmark-ai-copyright-case

CB Insights. (2023). *Generative AI market map: 250+ companies powering the future of content creation*. https://www.cbinsights.com/research/generative-ai-startups-market-map/

Cohen, H. (1982). How to draw three people in a botanical garden. In *AAAI Conference on Artificial Intelligence*.

Cole, S. (2023, January). *I don't believe you:' Artist banned from r/art because mods thought they used AI. (VICE)*. https://www.vice.com/en/article/artist-banned-from-art-reddit/

Elgammal, A. (2021). *Art, artificial intelligence, and the question of authentic identity*. *The Guggenheim Museum Blog*. https://www.guggenheim.org/articles/checklist/art-artificial-intelligence-and-the-question-of-authentic-identity

Elgammal, A. (2023). *Text-to-image generators have altered the digital art landscape—But killed creativity. Here's why an era of A.I. art is over. Artnet News*. https://news.artnet.com/art-world/ahmed-elgammal-op-ed-ai-art-is-over-2304028

Elgammal, A., Liu, B., Elhoseiny, M., & Mazzone, M. (2017). *Can: Creative adversarial networks, generating "art" by learning about styles and deviating from style norms*. arXiv preprint arXiv:1706.07068.

Escalante-De Mattei, S. (2023, May). *Artists are suing artificial intelligence companies and the lawsuit could upend legal precedents around art. Art in America*. https://www.artnews.com/art-in-america/features/midjourney-ai-art-image-generators-lawsuit-1234665579/

Escalante-De Mattei, S. (2023, July). *Judge appears likely to dismiss AI class action lawsuit by artists. ARTnews*. https://www.artnews.com/art-news/news/ai-class-action-lawsuit-dismissal-hearing-stabilityai-midjourney-deviantart-1234675071/

Galanter, P. (2003). What is generative art? Complexity theory as a context for art theory. In Proceedings of the 6th Generative Art Conference GA2003.

Gatys, L. A., Ecker, A. S., & Bethge, M. (2015). *A neural algorithm of artistic style*. https://arxiv.org/abs/1508.06576

Goldman, S. (2023, November 2). *For marketers, generative AI changed everything in 2023*. *VentureBeat*. https://venturebeat.com/ai/for-marketers-generative-ai-changed-everything-in-2023/

Goodfellow, I., Pouget-Abadie, J., Mirza, M., Xu, B., Warde-Farley, D., Ozair, S., Courville, A., & Bengio, Y. (2014). Generative adversarial nets. In *Advances in Neural Information Processing Systems (NeurIPS)* (Vol. 27).

Grand View Research. (2024). *Artificial intelligence (AI) image generator market report*. https://www.grandviewresearch.com/industry-analysis/artificial-intelligence-ai-image-generator-market-report

Grand View Research. (2025). *Generative AI market size & trends*. https://www.grandviewresearch.com/industry-analysis/generative-ai-market-report

Hayton, L. (2024). *Artists fight back against AI threat*. *The Times*. https://www.thetimes.com/uk/social-media/article/artists-fight-back-against-ai-threat-pkc0jz5m2

Karras, T., Laine, S., & Aila, T. (2019). A style-based generator architecture for generative adversarial networks. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition *(CVPR)* (pp. 4401–4410).

Knibbs, K. (2024, December). *Every AI copyright lawsuit in the US, visualized*. *Wired*. https://www.wired.com/story/ai-copyright-case-tracker/

Mazzone, M., & Elgammal, A. (2020). Artists, artificial intelligence and machine-based creativity in playform. *Artnodes*, (26), 1–8. http://doi.org/10.7238/a.v0i26.3366

Moreno, J. E. (2023, December). *Boom in A.I. prompts a test of copyright law*. *New York Times*. https://www.nytimes.com/2023/12/30/business/media/copyright-law-ai-media.html

Mori, M. (1970). The uncanny valley. *Energy*, *7*(4), 33–35. (Originally published in Japanese in 1970; English translation by MacDorman & Kageki, 2012 IEEE Robotics & Automation Magazine, June 2012.)

Radford, A., Metz, L., & Chintala, S. (2015). *Unsupervised representation learning with deep convolutional generative adversarial networks*.

Ramesh, A., et al. (2021). *Zero-shot text-to-image generation*. (arXiv). https://arxiv.org/abs/2102.12092

Ramesh, A., Dhariwal, P., Nichol, A., Chu, C., & Chen, M. (2022). *Hierarchical text-conditional image generation with CLIP latents*. (arXiv). https://arxiv.org/abs/2204.06125

Reed, S. E., Akata, Z., Yan, X., Logeswaran, L., Schiele, B., & Lee, H. (2016). Generative adversarial text to image synthesis. *Proceedings of the 33rd International Conference on Machine Learning (ICML)*, *48*, 1060–1069.

Rombach, R., Blattmann, A., Lorenz, D., Esser, P., & Ommer, B. (2022). High-resolution image synthesis with latent diffusion models. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition *(CVPR)* (pp. 10684–10695).

Schuhmann, C., et al. (2022). *LAION-5B: An open large-scale dataset for training next generation image-text models*. (arXiv). https://arxiv.org/abs/2210.08402

Stability, A. I. (2022). *Stable diffusion public release announcement*. https://stability.ai/blog/stable-diffusion-public-release

2 Artistic Individuality in Human–AI Co-Creation

A Case Study from Contemporary Music

Ali Nikrang, Susanne Kiesenhofer, Karin Breckner, Thomas Neumayr, and Mirjam Augstein

2.1 Introduction

2.1.1 Human–AI Interaction in Creative Fields

The widespread adoption of artificial intelligence (AI) reaching creative industries is often met with concern, as it may appear to devalue human creativity and to rapidly produce vast amounts of artworks. However, with the aim of achieving AI creativity that is similar to the one human inherently possess, research has deeply focused on the creative process and creativity of humans. (Lee, 2022, S. 602) argues that "*[i]ronically, thinking about AI creativity is an interesting way to rehumanise creativity*", offering a critique of how the creative industries frame creativity as amassable capital (Lee, 2022).

The combination of the human and AI approaches to creativity may enrich rather than replace human artwork. Aiming for human–AI collaborative creativity may support artists in exploring their ideas from different perspectives and make creative expression more accessible even to laymen (Lee, 2022).

Human–AI interaction in creative fields is exploratory and thus open-ended. This adds a level of complexity to conventional human–AI interaction, e.g., in decision-making, and even more so, to traditional human–computer interaction (Yang et al., 2020). During co-creation, humans and AI are continuously engaged in sense-making and interact both with the collaborators and with the shared product (Rezwana & Maher, 2023). This chapter adopts the co-creation model of Rezwana and Maher (2023) as a foundation, focusing on the dimensions of *interaction* and *product*, and further adds the artist to describe a three-way interdependence accounting for the specific characteristics of music co-composition.

2.1.1.1 Interaction

In creative fields, humans and AI work together to create a shared product. The process of working together is shaped by the collaboration style (e.g., turn-taking with alternating contributions to the product or in parallel), and the allocation of tasks and roles (Rezwana & Maher, 2023). Role distribution can

DOI: 10.4324/9781003606802-3

provide spaces for each collaborator to contribute according to their capabilities and thus conceptually supports human–AI co-creation (McGuire et al., 2024). Importantly, however, assigned AI roles shape human mental models and their expectations towards AI (Guzdial et al., 2019). Hwang (2022) highlights that, depending on personality and the individual goal, humans "*should hold the autonomy in deciding whether they would prefer AI to work with or work for them*" (Hwang, 2022, p. 6). Rezwana and Maher (2023) found that, despite the importance of communication for effective co-creation, the communication potential between humans and AI is not fully exploited. Specifically, while human-to-AI communication is possible through the product, direct manipulation or potentially even subconscious signals, human–AI co-creative settings commonly lack the channel for AI-to-human communication (Rezwana & Maher, 2023). Lang et al. (2025) summarize the importance of feedback and commentary enabled by two-way communication and further mention several interaction modalities in creative fields (Lang et al., 2025). Those are a particularly interesting aspect of music co-composition, where intentions are difficult to articulate and describe in words (Nikrang, 2025).

2.1.1.2 Product

Communication is further relevant to the shared product, as research in creative fields shows the importance of humans' ability to "*convey their goals, intentions, and desires so that the agent can act upon them*" (Lin et al., 2022, p. 45). The creative product represents the common goal of the collaborators, yet, it does not only consist of the music output alone. In contributing to the creative product, revising and re-shaping it alternatingly, humans and AI over time compose a musical piece, but also develop concepts together. The need for adaptation and adequacy of creativity in contributions poses an additional challenge in music co-composition: AI contributions should support creativity and serendipity. Too pragmatic (too imitative) AI systems may adopt known composers' individual expression and too rigidly steer the creative product. In contrast, while Dzhimova and Tigre Moura (2024) describe artists' perception of "*working with AI as an extension of their own personal or even human perspective*" (p. 7), unexpected AI contributions detached from human intention may be deemed random rather than creative. Humans' intended artistic expression and desired creative control may change dynamically throughout the process. Thus, while acknowledging existing challenges, envision that the collaboration of humans and AI can "push the boundaries of what is creatively possible" (Haase & Pokutta, 2024, p. 2).

2.1.1.3 Artist

While the "*creative outcome cannot be attributed to one party alone*" (Lang et al., 2025), the human artist's personality, emotions and music composition style largely influence interaction with the AI collaborator and

the creative product. In turn, the artist may perceive different extents of creative control and contribution to the shared product, influencing the self-identification with the product, perceived authenticity and ownership of the outcome.

The perspective of human–AI interaction suggests evaluating the process and interaction, rather than merely assessing the artistic qualities of the final product. Even though a product may be of high quality by objective judgment, creative fields require the consideration of the artist's creative expression and inspiration through a collaborative process rather than goal-oriented approaches.

2.1.2 Perception of Generative AI in Artistic Fields

The integration of generative AI into artistic creation intersects with issues that go beyond the purely technical performance of generative AI, involving questions about the nature of art, authorship, and public reception of art. Artists working with AI confront not only new tools but also feel new tensions about their role as artists, their identity, and their creative contribution as well as ethical values regarding the underlying training sets (Bird, 2024; Fu et al., 2025; Newman et al., 2023).

These perceptions are particularly art genre dependent. In domains such as contemporary arts, where individuality and personal expression are crucial, AI collaboration poses challenges very different from those in disciplines where the artist's individuality is less salient.

Some public perceptions further complicate this landscape. For example, artists report in (Bird, 2024) a general expectation that working with AI in the Art would accelerate the creative process and a co-created work with AI would require less human effort. A belief contrasts with professional realities. Research shows not only that more human (experts) intervention significantly improves outcomes (Eisenmann et al., 2025) but especially in the professional fields it is absolutely necessary, as achieving satisfactory outcomes with AI often requires extensive iteration: "*It takes probably 100 images or more to produce 1*" as reported in (Bird, 2024, p. 3). This is also aligned with the observations in the field of music from the study reported here.

At the same time, audience evaluation of artworks is sensitive to perceived human involvement (Bellaiche et al., 2023; Messer, 2024; Shank et al., 2023). Messer (2024) found that informing (non-artist) audiences of collaboration with an AI reduced the perceived artistic and aesthetic value of identical artworks. Similar effects have also been observed in the context of classical music (Shank et al., 2023).

This response appears to be linked to the perception of reduced human effort in the creative process. However, by communicating deeper involvement of the artist in the creation process (such as training AI systems on their own prior works) audiences responded more positively (Messer, 2024).

Human involvement (and thus artistic individuality) seems to be important for both the artist and the audience. While artists, following the tradition of art history, seek to explore new creative possibilities through emerging technologies (as seen, for example, in the field of electronic music in the 1960s), the audience continues to value originality coming from individual visions and experiences. Messer (2024) refers to the aspect of artistic individuality as the authenticity of the artwork, which includes two aspects: the artist's intention and creative control.

However, both aspects, maintaining intention and creative control, can be considered highly challenging when it comes to generative AI; Systems designed for creativity must be allowed some degree of autonomy to produce novel and surprising outputs (Nikrang et al., 2024), which necessarily limits direct human control.

This new form of human–machine collaboration is unprecedented, so it needs new methods of interaction and communication. Most of today's generative AI systems rely on natural language prompts, but words alone often fail to express subtle artistic intentions (even in visual arts, which has a rich descriptive vocabulary, as reported in Zhang & Li, 2024). The limitation is even more pronounced in music, where the vocabulary for describing musical structures is much more limited (Nikrang, 2025).

Artistic control therefore depends both on the artist's visions (intentions) and on the collaborative capabilities of the technology. The required type and amount of control also varies by genre: In contemporary music, where originality and unique compositional concepts are paramount, the demand for personalization and individuality is particularly pronounced. Composers in this field often work within specific aesthetic visions, complex theoretical frameworks, and highly individualized artistic approaches. At the same time, modern AI technologies can create new opportunities for realizing these distinct artistic concepts.

As a consequence, large-scale systematic artistic research and real-world case studies are needed to identify the artistic requirements different art domains place on AI systems and to adapt them to varying levels of human involvement. This study addresses this gap. We follow eight practitioners over 10 weeks, allowing them to become familiar with the technology and solve emerging issues. This study design also addresses two gaps mentioned in (Remy et al., 2020): the lack of long-term studies and the importance of clear goals set together with domain experts. To the best of the authors' knowledge, this is the first project that accompanies a real-world AI-involved contemporary music production over a long period of time. The resulting human–AI compositions will premiere at two high-profile events. In early September 2025, partial performances will be presented at the Ars Electronica Festival in Linz, Austria, including orchestral excerpts performed by the Bruckner Orchestra Linz and separate solo instrumental performances. The world premiere of the complete Waltz Symphony, performed by the Bruckner Orchestra Linz, will take place in Vienna in November 2025.

2.2 Study

In the following section, we present insights gained through qualitative and observational research conducted as part of the artistic project Waltz Symphony, developed by the Ars Electronica Futurelab in Linz. Commissioned by Johann Strauss 2025 Vienna and carried out in collaboration with four European music universities in Vienna, Salzburg, Zurich, and Munich, the project followed selected composition students as they engaged in the process of creating their compositions in collaboration with a custom musical AI system, in the context of and in direct engagement with the music of Johann Strauss II.

2.2.1 Methodology

This qualitative study used a practice-oriented methodology that integrated artistic research and experimental engagement with AI among emerging composers at the university level. The project was initiated through an open call for students from participating universities.

Participants: Following introductory workshops about artistic and technical approaches to AI in composition, students from the participating universities were invited to submit artistic proposals. The call emphasized originality, conceptual depth, and critical or creative engagement with Johann Strauss's musical legacy, framing AI as a co-creative tool rather than a means for imitation. A total of 26 submissions were received from 13 composition students (3 female, 10 male). A jury of four experts drawn from the fields of composition, orchestral practice, media art, and cultural production selected seven concepts by eight composers (including one duo). The selected composers were enrolled in composition programs at the participating universities, with three at the undergraduate level and five at the graduate level. The sample included six male and two female participants, aged between 22 and 31 years. Participants are referred to by anonymized codes (P1–P8) throughout this paper. To maintain confidentiality, demographic information is presented in aggregate form (Table 2.1) and is not linked to individual participant codes, ensuring anonymity given the small sample size. Between January and June 2025, the selected participants developed their concepts further and created their compositions independently and collaboratively with researchers from the Ars Electronica Futurelab in a series of online sessions, using a custom composition system called Ricercar as their AI-based compositional environment.

Ricercar: Ricercar is an AI-based music composition system that uses symbolic music representation data and was trained on public-domain classical music pieces represented as MIDI files. The project employed a customized version, fine-tuned on a corpus of Johann Strauss II's works, and made available as a cloud-based version to enable participants individual work sessions. Developed since 2019, initially at (Ars Electronica Futurelab) and from 2023 in collaboration with the University of Music and Theatre Munich (Nikrang

Table 2.1 Participant demographics including gender, age range, and level of study

Gender	*Age Range*	*Level of Study*
Male	< 25	Undergraduate
Male	< 25	Undergraduate
Male	25–29	Graduate
Male	25–29	Graduate
Male	25–29	Graduate
Female	25–29	Undergraduate
Male	25–29	Graduate
Female	30–35	Graduate

Note: Participants are listed by age order rather than by participant identifier (P1–P8) to preserve anonymity.

& Kiesenhofer, 2025; Nikrang, 2025), Ricercar is an exploratory platform for human–AI co-creation, encouraging experimentation with musical logic and focusing on enhancing composers' control over the generative process. Users can influence musical output using techniques such as musical prefixes, stylistic musical inspirations, and real-time parameter modulation (e.g., adjusting the importance of provided inspirations or directing focus to certain sections), alongside iterative feedback and, in advanced scenarios, modification of system parameters. These technical and interactive possibilities of Ricercar, along with its application in composition and the specific compositional strategies developed by artists within the Waltz Symphony project, are discussed in greater detail in (Nikrang & Kiesenhofer, 2025).

Format, Duration: A qualitative study was conducted through recorded online sessions with the participants and at least one researcher as facilitator. Each session was framed by semi-structured pre- and post-session questionnaires on AI collaboration, which serve as the primary data source for this study. Additionally, transcripts of the sessions and observational analyses of the recordings provided further insights. Over a ten-week period, 22 sessions were recorded, each lasting between 50 minutes and 2 hours 45 minutes, totalling more than 33 hours of recorded video material.

2.2.2 Findings

This section presents key findings from several months of data collected through observations, questionnaires, and recordings during the *Waltz Symphony* sessions, highlighting how composers involved the AI system Ricercar in their artistic process. Data sources included (a) semi-structured pre-session and post-session questionnaires, (b) observations and thematic analysis of video recordings, and (c) numerical satisfaction ratings from eight participants. Results are organized into three analytic categories: Product, Interaction, and Artist, each supported by direct participant quotations. The project call

required all outputs to fulfil three criteria: clear artistic individuality, a significant connection to Johann Strauss, and substantive engagement with AI.

2.2.2.1 Product

In the context of this project, a product encompasses more than the musical output alone. It reflects the complete outcome of the creative process, including the initial artistic concept, the interaction and collaboration between contemporary composers and a generative AI, and subsequent artistic activities such as orchestration and further compositional activities. The product is the final score, which will be performed by the Bruckner Orchestra Linz on two occasions in fall 2025, and is thus understood as an integrated result shaped by both human and machine contributions.

Artistic Intent vs. Openness: At the beginning of each session participants were asked: "Do you enter today's session with a concrete idea, can you already imagine the final result, or is your goal more to explore freely?"

In the early sessions, participants focused on exploring the generative capacities of the AI, often without fixed artistic intentions. Some described an initial openness: "*Of course, I have ideas that I find exciting or that already emerge in an abstract way, but I try to give this tool its freedom and first see what comes out of it*" (P4).

Development of Artistic Concepts: First, participants recognized that Johann Strauss's style defines the AI, as it was fine-tuned on his music ("*You can tell the AI simply feels more at home there…*" P6); however, composers usually rejected the results too imitative to Strauss as they were missing their own role in the process: "*I had the feeling that you just end up with a piece in the style of Strauss, and it just kind of flows along. It's a waltz, it works, it sounds coherent, it's not wrong, but I think we, as an art community, have higher ambitions. We want to use this AI model as a tool and go beyond just creating something that's appropriate or meets certain expectations*" (P5).

In later sessions, participants increasingly approached the system with concrete, more individual ideas embedded in broader artistic concepts. Generally, the interaction with AI and its role in the final work emerged as an artistic question in itself, integral to their individual style. To assign the AI a meaningful role within their artistic concepts, participants prioritized conceptual development by exploring its internal mechanisms (asking questions such as, *"How does the music get into the AI? What are the tokens"* or "*Can I guide its focus?*").

The role of the AI varied depending on the compositional concept. In some instances, it was treated as an autonomous component with a clearly defined place within the piece: "*I wouldn't use AI to manipulate it into doing what I want. I don't need AI for that; I could just continue composing on my own. What I find interesting about working with AI is that it has a life of its own*" (P3). Other participants took a more direct approach, adjusting system parameters and introducing unconventional musical material (either as prefixes

or sources of inspiration) before evaluating the outcomes against their personal artistic concepts. P5, for instance, noted in later sessions that he could "*recognize his own stylistic development in how the AI reduces its style…*" perceiving the AI's behaviour as a reflection of his artistic influences.

Other participants designed concepts around specific musical inputs (such as ethnomusicological or atonal material) and aimed to adapt these freely to suit their individual compositional styles in the final product: "*I liked that we had some prefixes that were completely outside the Strauss style, but we were always trying to see how it would bring us closer to Strauss each time. I found it very interesting how it worked with the material, with the new inspirations, the new ideas*" (P1). Overall, participants' perceptions of the creative product depended on the artistic concept that participants developed and refined over the course of the study.

2.2.2.2 Interaction

This section examines how participants collaborated with Ricercar in their artistic practice. The focus is on how composers' attitudes, expectations and creative strategies evolved through interaction. The emphasis lies on experiential patterns of experience that reveal a broader dynamic of collaboration between humans and AI in the professional artistic field.

Exploratory Curiosity: At the beginning and end of each session, participants were asked to reflect on their mindset and whether they approached the session in an experimental or pragmatic mood. Overall, the process of working with AI often transformed participants' attitudes over the course of a session. Initial pragmatism gave way to curiosity and openness, and many left the session feeling more experimental, and more attuned to the unexpected potential of experimenting with AI. Furthermore, exploration emerged as creative driver. P5 described the process as addictive: "*It's like a kind of addiction… The results are so varied that you remain curious about what the next result might bring*". This sense of open-ended curiosity was echoed by others. P7 noted, "*When I work with Ricercar I have no expectations, I'm just curious",* and likened the experience to talking to a small child: *"you don't know what they'll say, and you're simply excited to find out"*. Similarly, P1 compared the AI to a *"child that just wants to play*", unpredictable, but charming, and capable of surprises they would never plan.

Perceived role of AI: In the same pre- and post-session format, participants were asked whether they perceived the AI as a partner, a tool, or a disruptor that needed to be managed toward an expected result. Initial perceptions of the AI were split almost evenly between "tool" and "partner" with no participants labelling it a disruptor at the outset. These views, however, evolved: Some participants who viewed the AI as a tool in the beginning, came to see it more as a partner after the session. Others who initially saw it as a partner sometimes reframed it as a disruptor, though notably, even this shift was often expressed in a positive light. "*…more of a partner, but also a welcome disruptor*" (P6).

Disruption vs. Serendipity: The evolving relationship with the AI was shaped by expectations and outcomes. As P5 noted, the perceived role of the system could change depending on how well it aligned with the participant's intentions: "*If you see it as a partner and it doesn't work, then it would be a disruptor. But if you see it as a tool and it doesn't work, then it's not really a disruptor - you just use a different tool*" (P5). Others, like P3, felt that working with Ricercar resembled traditional composition more than disruption: "*[It is certainly not a disruptor.] When I compare it to the way I normally compose, it's the same: trying again and again until you find what you had in mind. So it's actually just like composing*". Across sessions, participants frequently encountered unexpected results. Yet rather than dismissing them, they often found ways to integrate or reinterpret them within their artistic concepts: "*And I think the AI didn't do exactly what we wanted, but it still did quite a few things that sound very beautiful and can be used well*" (P2). Such moments of unpredictability were especially valued when participants challenged the system with distinctive, personal concepts. In these cases, the AI's output sometimes departed radically from expectations, but in ways that led to serendipitous creative discoveries. "*I mean, I'd actually enjoy it if things stopped making any sense at all - then giving them meaning again. That's part of our task as well: to let ourselves be inspired by such things, even if they don't seem to make any sense at first*" (P5). Observations confirmed that this kind of conceptual serendipity was welcomed, as long as it remained anchored in the composer's artistic framework: "*That was very surprising and really, really great: jumping from major to minor [at this position]… by the end, I even became more willing to experiment*" (P8). Ultimately, the creative potential of human–AI collaboration seems to depend on the composer's concept on how to define AI characteristics as a part of their artistic process.

2.2.2.3 Artist

In the context of this study, the role of the artist was closely tied to two key dimensions: the individuality of the artistic concept, and the perceived level of control exercised over the AI. To capture these experiences, participants were asked at the end of each session to reflect on who they felt controlled the outcome: "*Did you shape the system, or did the system influence your artistic decisions?*". They were also asked to rate the intensity of their interaction with Ricercar and their satisfaction with the session on a scale from 0 to 10, and finally to assess their identification with the result: "*Do you identify with the output?*".

Interaction intensity and intention: Participants varied widely in how intensively they engaged with the system. Lower levels of interaction were often a deliberate choice, an attempt to avoid overly influencing the AI and instead observe its behaviour in a more autonomous state: "*I didn't want to guide it too much, just see what it would come up with*" (P5). By contrast, higher interaction levels served several purposes: encouraging broader exploration, steering

the AI toward a specific outcome, or actively disrupting repetitive or undesired outputs: "*I was in control, I kept searching until I found what I wanted*" (P3).

Shifting perceptions of control: Perceptions of control, whether attributed to the participant, the AI, or shared between them, fluctuated not only between individuals but across different stages of the project. Early sessions were often marked by a lower sense of agency, as participants adapted to Ricercar's influence and explored strategies for asserting creative direction. Over time, they became more confident in identifying who was in control and why: "*I wasn't in control today because the AI kept doing surprising things, but that gave me a lot of new ideas*" (P1). "*A struggle for power in both hands - so that the AI does something in the direction you want but still manages to surprise you*" (P4).

Authorship and identification: Interestingly, the degree of perceived control did not appear to directly correlate with identification with the work. Even when participants felt that the AI had exerted a strong influence, most still expressed some level of identification with the output. This suggests that authorship, in this context, was experienced more as a conceptual or curatorial act than as direct authorship over every note. Participants often described their identification with the result not in terms of a finished piece, but as part of a longer, multi-step compositional process. Since the final product was to be developed over several months across several AI sessions, the outputs of individual sessions were seen as building blocks rather than completed works.

Additionally, system's note-based output allowed participants to revise, adapt, and incorporate generated material into their own workflows: "*I don't think any concept [in this project] gives the AI complete freedom over certain parts of the music. You'll always have to look over it yourself and think about what needs to be altered…*" (P5).

Notably, in early sessions, some participants struggled with identifying themselves in the work, typically when their artistic concepts were not yet fully developed or clearly defined. However, as these concepts evolved, so too did their ability to see the AI's contributions as part of their creative process. One participant (P5), for example, occasionally expressed difficulty identifying with the output, particularly when the AI's influence felt dominant. Even in these cases, however, the participant framed the process as ongoing, suggesting that identification might develop over time as their relationship with the system deepened. This pattern was echoed across participants: even when identification wasn't immediate, it was often understood as something that develops gradually through repeated collaboration.

Satisfaction and control: Overall session satisfaction also showed little correlation with the level of control participants believed they had. Instead, satisfaction appeared more closely linked to whether the AI's contribution could be meaningfully integrated into the participant's broader artistic vision. While participants generally felt more satisfied when they maintained a sense of control, surprising and unexpected outputs also contributed positively,

particularly when they revealed creative potential within the AI. These moments strengthened trust in their concepts and often inspired further experimentation.

2.2.3 Conclusion

The observations indicate that imitation alone (such as generating music in the style of Johann Strauss) is insufficient to meet the artistic expectations of contemporary composers, even within a project explicitly dedicated to historical legacy.

More importantly, the study shows that the role of AI in an artistic process, and the way it is integrated, must be treated as a central artistic question which only can be answered individually. This includes not only conceptual choices but also technical decisions regarding the AI system itself, such as the composition of the training set and parameter adjustments at inference time.

The study also showed that a meaningful conceptual placement of the AI (its "part" in product) predicted highly artistic acceptance more than raw musical accuracy. Furthermore, greater explainability of AI's role in a concept raised perceived authorship and identification with the final product.

The study also found that composers did not measure authorship simply by the combination of notes generated. Instead, they evaluated it based on where they intervened, which aspects they endorsed, and how the result aligned with their artistic identity. Identification was strongest not when the AI behaved exactly as expected, but when the composers felt able to justify the AI's role within their conceptual framework.

2.3 Future Research Agenda

Music co-creation is a special use case within the realm of human–AI interaction, insofar as the judgement of artistic results is non-trivial, lacks formalisms and there is no clear attribution of wrong or right. This circumstance influences the entire process from training to AI-generated suggestions to human feedback. Investigating such scenarios and individual perceptions gives us the possibility to reflect on broader themes such as authorship, artistic and creative values, and roles (Fu et al., 2025) and think about possible differences and similarities with Human–AI interaction in other domains:

RQ1: *What makes a result/product valuable in the eyes of the creators/audiences?*

This question highlights the need to better understand how artistic value is perceived in a co-creative process with AI. Our observations from the field of contemporary composition suggest that composers tend to value works more highly in which they have been able to express a strong individuality. This includes the ability to integrate personal or authentic elements into the artistic process.

RQ2: *What makes creators feel that the result/product was authored by them?*

Building on the first research question, the second question examines the factors that strengthen the perception of a creator's authorship in co-creative processes with AI.

Fundamental requirements include creating satisfactory methods of artistic control, and, in some cases, experimental possibilities for influencing or manipulating the AI system itself.

RQ3: *Which technical requirements and approaches are necessary to effectively address the above questions?*

With regard to the second question, future technical research should focus on developing AI systems tailored to the specific needs and working methods of artists.

Such systems must be general enough to support a wide range of artistic approaches, but at the same time flexible enough to enable the development of highly individual and personal artistic concepts. This poses a significant technical challenge: large-scale AI systems are typically designed to generalize data sets, whereas artistic creation often values uniqueness, subjectivity, and singularity.

While the first two questions require further exploration through interdisciplinary research and active collaboration with the artistic community (particularly in real-world, practice-based use cases) the third question focuses on technical perspectives of research and the need for creating systems more intuitive and engaging from an artistic standpoint (Krol et al., 2025). This requires not only advances in system design, interaction models, and explainability, but also sensitivity to artistic dynamics and the individual processes underlying artistic decision-making.

Acknowledgements

Karin Breckner's contribution to this chapter has been conducted within the scope of the Human-Centered Artificial Intelligence (HCAI) project, funded by the Austrian Science Fund (FWF) [DFH 23-N]. Thomas Neumayr's and Mirjam Augstein's work on this chapter has been conducted within the scope of the Hybrid Collaboration Spaces (HYCOS) project, also funded by the FWF [P 34928].

AI Disclaimer Statement

Ali Nikrang: I acknowledge the responsible use of AI to improve the language of my part. The models I used were ChatGPT O1 and DeepL (early 2025). The reason was to find a more natural way to communicate our research and our findings with the community by enhancing the clarity and comprehensibility of the language.

Susanne Kiesenhofer: I acknowledge the use of the AI tools ChatGPT (to my knowledge, GPT-4o) and DeepL to improve the linguistic formulation.
Mirjam Augstein: I declare that I did not use any kind of AI tools or services throughout my work on this chapter.
Karin Breckner: I acknowledge the use of AI tools for language refinement, specifically DeepL, Google Translate and ChatGPT, which to my knowledge used GPT 4o and GPT 4o mini models at that time. The tools were used to improve phrasing and clarity of the written text.
Thomas Neumayr: No AI usage on my side whatsoever.

References

Bellaiche, L., Shahi, R., Turpin, M. H., Ragnhildstveit, A., Sprockett, S., Barr, N., Christensen, A., & Seli, P. (2023). Humans versus AI: Whether and why we prefer human-created compared to AI-created artwork. *Cognitive Research: Principles and Implications*, *8*(1), 42.
Bird, C. (2024). Artists and AI: Creative interactions and tensions. In *Extended Abstracts of the CHI (Conference on Human Factors in Computing Systems)*.
Dzhimova, M., & Tigre Moura, F. (2024). Calculated randomness, control and creation: Artistic agency in the age of artificial intelligence. *Arts*, *13*(5), 152.
Eisenmann, T. F., Karjus, A., Canet Sola, M., Brinkmann, L., Supriyatno, B. I., & Rahwan, I. (2025). *Expertise elevates AI usage: Experimental evidence comparing laypeople and professional artists*. arXiv preprint arXiv:2501.12374.
Fu, Y., Newman, M., Going, L., Feng, Q., & Lee, J. H. (2025). *Exploring the collaborative co-creation process with AI: A case study in novice music production*. arXiv preprint arXiv:2501.15276.
Guzdial, M., Liao, N., Chen, J., Chen, S.-Y., Shah, S., Shah, V., Reno, J., Smith, G., & Riedl, M. O. (2019). Friend, collaborator, student, manager: How design of an AI-driven game level editor affects creators. In *Proceedings of the 2019 CHI* (pp. 1–13).
Haase, J., & Pokutta, S. (2024). *Human-AI co-creativity: Exploring synergies across levels of creative collaboration*. arXiv preprint arXiv:2411.12527.
Hwang, A. H.-C. (2022). Too late to be creative? AI-empowered tools in creative processes. In *Extended Abstracts of the CHI '22* (pp. 1–9).
Krol, S. J., Llano Rodriguez, M. T., & Loor Paredes, M. (2025). Exploring the needs of practising musicians in co-creative AI through co-design. In *Proceedings of 2025 CHI*.
Lang, D., Hirschmann, F., Breckner, K., Neumayr, T., & Augstein, M. (2025). Peer Or steer: A pilot study exploring human-AI collaboration in creative fields. *Proceedings of the ACM on Human-Computer Interaction*, *9*(7), Article 462, 34 pages. https://doi.org/10.1145/3757643
Lee, H.-K. (2022). Rethinking creativity: Creative industries, AI and everyday creativity. *Media, Culture & Society*, *44*(3), 601–612.
Lin, Z., Agarwal, R., & Riedl, M. (2022). Creative wand: A system to study effects of communications in co-creative settings. *Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment*, *18*(1), 45–52.
McGuire, J., De Cremer, D., & Van de Cruys, T. (2024). Establishing the importance of co-creation and self-efficacy in creative collaboration with artificial intelligence. *Scientific Reports*, *14*, Article 18525.
Messer, U. (2024). Co-creating art with generative artificial intelligence: Implications for artworks and artists. *Computers in Human Behavior: Artificial Humans*, *2*(1), Article 100056.

Newman, M., Morris, L., & Lee, J. H. (2023). Human-AI music creation: Understanding the perceptions and experiences of music creators for ethical and productive collaboration. In *Proceedings of the 24th International Society for Music Information Retrieval Conference (ISMIR 2023)* (pp. 80–88).

Nikrang, A. (2025). Kommunikation und Steuerung in der KI-gestützten Musikkomposition. In Michael Schmidt (Ed.), *Künstliche Intelligenz der Töne, Ethik und Ästhetik digitaler Musikkultur*. et+k edition text+kritik.

Nikrang, A., Breckner, K., Neumayr, T., Hirschmann, F., & Augstein, M. (2024). AI creativity in the light of autonomy. F. Tiger Moura (Ed.), *Artificial intelligence, co-creation and creativity: The new frontier for innovation* (pp. 7–19). Routledge.

Nikrang, A., & Kiesenhofer, S. (2025). Human–AI co-creation in contemporary composition: Interaction and artistic strategies with ricercar. In *Expanded 2025: Conference on animation and interactive art*. ACM.

Remy, C., MacDonald Vermeulen, L., Frich, J., Mose Biskjaer, M., & Dalsgaard, P. (2020). Evaluating creativity support tools in HCI research. In *Proceedings of DIS '20* (pp. 457–469).

Rezwana, J., & Maher, M. L. (2023). Designing creative AI partners with COFI: A framework for modeling interaction in human-AI co-creative systems. *ACM Transactions on Computer-Human Interaction*, *30*(5), 1–28.

Shank, D. B., Stefanik, C., Stuhlsatz, C., Kacirek, K., & Belfi, A. M. (2023). AI composer bias: Listeners like music less when they think it was composed by an AI. *Journal of Experimental Psychology Applied*, *29*(3), 676–692.

Yang, Q., Steinfeld, A., Rosé, C., & Zimmerman, J. (2020). Re-examining whether, why, and how human-AI interaction is uniquely difficult to design. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1–13).

Zhang, S., & Li, S. (2024). *"Confrontation or Acceptance": Understanding novice visual artists' perception towards AI-assisted art creation*. Tsinghua University [PREPRINT].

3 The Regenerative AI Practitioner

Thinking and Designing with AI More Sustainably

Michael Stead

3.1 Introduction

Many designers wrestle with an internal, creative conflict. We consider ourselves authentic practitioners who have developed discrete tacit knowledge and skills which underpin how we practice our craft (Rust, 2004). Yet, many of us continue to serve a capitalist system that undermines our creative motivation and authorship (Walker, 2014). Our work is often reduced to a transient commodity that drives superfluous mass production and consumption. Through our designs, we create carbon emissions, waste, and deplete precious natural resources (Ceschin & Gaziulusoy, 2016). Of the creative industries, design and its designers arguably contribute most to the Earth's growing climate crisis (Monteiro, 2024; Shedroff, 2009).

From industry through policymaking to academia, prevailing rhetoric asserts that climate change will largely be redressed through increased innovation and application of new technologies (EU, 2020; Masterson, 2024). Consequently, emergent artificial intelligence (AI) technologies are promoted as key enablers of this sustainable transition (Altman, 2024; HM Government, 2025). However, like the technologies preceding it (Koretsky et al., 2022), the recent, rampant adoption of AI by the design industry is also causing injurious environmental impacts (Luccioni et al., 2024), as well as disrupting notions of design copyright and even jeopardising designers' livelihoods (Alderson, 2025; Schmelzer, 2024).

Given this tension, this chapter examines some of the psychological threats and promises AI poses for designers and their practice for engendering a sustainable future. Adopting a *Regenerative Design* lens (Wahl, 2016), the chapter rethinks how designers can manage their inner dissonance to develop a *Regenerative AI Design* mindset. It contends this pedagogic-centred approach will help foster next-generation designers who can sustainably negotiate the post-human interdependencies (Braidotti, 2019)—ecological (flora, fauna, planet) and technological (AI, data, devices)—that are creating existential challenges for the 21st century design industry.

DOI: 10.4324/9781003606802-4

3.1.1 Degenerative AI

Modern humanity's relationship with technology is becoming ever more entangled and complex. Our species' innate desire to design and consume new products, services and experiences has led us into a technological epoch which is negatively impacting our planet's natural ecosystem more than ever before. Due to their globalised ubiquity, digital technologies are acting as a core catalyser for climate change, biodiversity loss, pollution, and waste (Stead, 2023). Nevertheless, there are also many who argue that technological advancement is key to developing the transformative solutions needed to redress the Earth's climate emergency (Schouten & Wernaart, 2025). AI technologies play a leading role in this optimistic narrative. Used to denote a vast range of technologies, the ambiguity of the term AI means it can refer to *large language models* (LLMs), *machine learning* (ML) techniques, *computer vision* systems, *facial recognition,* and *generative AI* (GenAI) tools as well as other technologies, both in an individual *and* collective capacity (Vallor & Vierkant, 2024). Consequently, many of the "Big Tech" firms have been able to credibly emphasise the environmental and social sustainability benefits of adopting "AI". High-profile initiatives such as the Microsoft's *AI for Good Lab's Project Guacamaya*—which seeks to operationalize AI to improve biodiversity and reduce deforestation in the Amazon (Microsoft, 2024)—and Google's *GreenLight* and *TreeCanopy* projects which are using AI to minimise traffic pollution and expand urban forestry, respectively (Google, 2024)—are being promoted as "planet positive" AI use cases.

Despite these examples, the techno-solutionist rhetoric being evangelised by profit hungry corporations, as well as governments and academia, ignores, and trivializes the innately unsustainable and extractive nature of AI technologies themselves. As numerous scientific reports evidence, today's global AI infrastructure is deeply carbonised and dependent on finite planetary resources, including critical raw materials like precious metals, fossil-fuel derived electricity, land to construct and operate vast data server farms, and fresh water supplies to cool them. The rapid emergence of everyday *Generative AI* (GenAI) tools such as *Chat-GTP*, *Claude,* and *Midjourney* has intensified this consumptive impact. Moreover, widespread societal embracement of GenAI has introduced new geopolitical tensions regarding the accessibility and ownership of natural resources that underwrite its global operation (Crawford, 2021). It can consequently be argued that AI technology will not be able to provide legitimate sustainable solutions to the planet's climate crisis, if its own degenerative capabilities are not adequately addressed today, for tomorrow.

3.1.2 A Creative, Regenerative, Technological Industry

The degenerative nature of present-day AI shares many parallels with *design*, both as a creative discipline and a creative industry. From product to print, fashion to digital, the fruits of design practice have long been servant to

capitalism. Design is a key facilitator of what the 19th-century socio-economist Thorstein Veblen termed *conspicuous consumption*—where people purchase and consume goods and services to experience superficial gratification and/or amplify their social status. This materialistic, individualistic culture is rooted in the philosophical movement *modernity* which emerged during the *Age of Enlightenment* (1715–1789). Here, intellectual shifts saw scientific pragmatism, and new ideals including *liberty*, *constitutional government,* and *technological progress*, begin to usurp ancient traditions like *absolute monarchy*, *religious orthodoxy,* and *heritage crafts* (Walker, 2014). The implications of *modernity* really took hold across Western societies through the influence of *Bauhaus* design (1919–1933) and its key exponents like *Marianne Brandt* and *Marcel Breuer* and after the *Second World War* (1939–1945). This is primarily because, under the auspices of the post-war rebuild, the industries of design and technology pioneered *mass production* and *planned obsolescence* strategies as means to bolster profits and market share (Shedroff, 2009). Through their increasing power and influence, AI technologies are perpetuating this unsustainable environmental and social agenda.

Crucially, it is not our technological products, services nor infrastructures that have led us into an era of unparalleled unsustainability and climate change, but how, as designers, we have continued to design and utilise such interventions to deliver short-term solutionism and economic growth. As Culkin (1967, p. 70) stressed, "we shape our tools, and thereafter they shape us". This said, much work has attempted to reorient the intrinsic value of the discipline away from its narrow and long-held capitalistic motivations and towards a more systemic, planetary beneficial endeavour. This sustainable pursuit is embodied in the emerging field of *Regenerative Design* (Wahl, 2016). Here, the process and "profits" of design are no longer concerned with merely improving fatuous aesthetics or expanding shareholders' bottom-line. Through forms of *Regenerative* creative practice, designers can employ their knowledge and expertise as a strategic catalyst for transformation—principally for the benefit of the planet's ecological and human inhabitants. In recent years, industry bodies such as the UK's Design Council (2025) and *Royal Society for Arts* (n.d.), and agencies including Morrama (2025) and Arup (2024) have valiantly strived to highlight the sustainable value of adopting *Regenerative Design* principles. Unfortunately, for much of the design industry, business remains as unsustainable as usual. With AI tools quickly becoming an accepted part of many designers' arsenal, the time is now for the industry to make a paradigm shift from promoting the degenerative status quo to crafting a *creative, regenerative, and technological future*.

3.2 Discussion

With material engagement, creative problem-solving and technological innovation at its core, design is often considered to be a craft. For many in the field, the highly experiential and intuitive nature of designing also elevates

the discipline to that of an artform (Frayling, 2011). Moreover, this duality indelibly links design, and by default, its position as a creative industry, to past, present and future sustainability agendas.

3.2.1 Crafting Sustainability

John Ruskin (1819–1900) was a Victorian creative, philanthropist, and environmentalist. Through his praxis and writings on nature, he is seen as an early pioneer in *Sustainable Design*, particularly with regard to craft production and ethical consumption. Influenced by *pre-enlightenment* schools of thought, Ruskin responded to the mechanisation of the *Industrial Revolution* by strongly advocating personal responsibility towards the Earth's ecology (MacDonald, 2018). He argued that people should remain close—both in terms of locale and understanding—to the processes involved in producing their material goods. For example, early technologies like farmers' tools were bespoke and hand-made from natural materials that could eventually be repurposed or returned to the local ecosystem. Ruskin's ideas in many ways extend to other later key thinkers such as Ezio Manzini (1986) and his notion of how designing reveals the "truth of materials", and Walter Benjamin, who in *The Work of Art in the Age of Mechanical Reproduction* (1935), introduced the concept of the "aura"—where an a creative output's significance is based upon its sui generis, skill and embodiment of technical and social historicity and tradition. This, for Benjamin (1935), contrasted starkly with the inauthentic fruits of mechanical production.

Such perspectives similarly manifest in what Michael Polyani (1966) termed the *tacit dimension* of design. Polanyi (1966) asserted that designers possess expertise and knowledge that can only be developed over time through experiential and iterative modes of learning. This almost unconscious *designerly way of knowing* as Cross (1982) put it, cannot be readily taught. As such, designers can find it difficult to articulate and transfer their competencies easily to others. Yet, the result of this intuitive design decision-making is believed to be the reagent that leads to novel, creative solutions and innovations (Polanyi, 1966). This artisanal-like understanding of design practice continues to resonate into recent decades:

> *Our modern economy privileges pure profit, momentary transactions and rapid fluidity. Part of craft's anchoring role is that it helps to objectify experience and also to slow down labor. It is not about quick transactions or easy victories.*
>
> Sennett (American Craft Council Public Lecture, October 2009)

Others have also countered this "design as craft" narrative. Herbert Simon (1969) argued that everything which is "designed" should be considered inherently "artificial", rather than anything "natural". Simon

also determined designing as an innately forward-looking and democratized activity:

> *Everyone designs who devise courses of action aimed at changing existing situations into preferred ones. The intellectual activity that produces material artifacts is no different fundamentally from the one that prescribes remedies for a sick patient or the one that devises a new sales plan for a company or a social welfare policy for a state.*
>
> (Simon, 1969, p. 111)

Echoing Simon, *Sustainable Design* visionary Victor Papanek (1971) stressed that all humans "are designers… (as) the planning and patterning of any act towards a desired, foreseeable end constitutes the design process" (p. 23). This then radical reclassification of design as both an "intellectual activity" and one anyone and everyone can complete was progressed by Schön (1983) in *The Reflective Practitioner*. He contended that design is not simply concerned with craftsmanship nor material artefact creation, but rather that it can, and should, be understood as a reflective practice which "serves to generate both a new understanding of the phenomenon and a change in the situation" (p. 68). This interrogation as to *what design is, how it is practiced* and *who by*, has led the discipline to evolve beyond established boundaries (for example, product/industrial, architecture, fashion/textiles, graphics, interiors and packaging) into its contemporary form—a dynamic field of metaphysical enquiry as much as it is an analytical tool or practical method for solving problems. In the face of the ongoing climate emergency and rise of AI technologies, there is a need for design to undergo a radical transformation once again.

3.2.2 Creative Destruction or Democratization?

With the path from inception, through adoption to social integration being one of acute uncertainty, new technologies are often launched amidst considerable hyperbole. Developers do this to attract investors to fund further design, development, and implementation of their technology (Lanier, 2017; Posner, 2009). This can however lead to a *speculative bubble* where an asset (e.g., an emerging technology) is traded at a price that strongly exceeds its intrinsic value. The "bubble" will eventually burst leading to a value "crash" (Shiller, 2000). *Railway Mania* in Great Britain in the 1840s and USA's 1990s *Dot-Com Boom* were *bubbles*. Interestingly, despite suffering crashes, rail travel and Internet-based technologies have since entered the fabric of everyday life.

The emergence of AI in the 1950s did not culminate in a bubble nor a crash. AI instead experienced what is described as its "winter" period, when, between the 1970s and 1990s, the expected commercial breakthrough for its application did not appear. Its recent rapid resurgence owes much to it

becoming integral to the advancement of the Internet, including "smart" devices (e.g., phones, voice assistants, wearables), and *Cloud Computing*. AI's turbulent journey is an example of *Amara's Law*:

> *We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run.*
>
> (Amara n.d. cited in Lin, 2024, Para. 3)

Futurist and engineer Roy Amara's maxim is particularly pertinent when considering AI's growing environmental and social sustainability impacts. Due to their perceived immateriality, AI systems are regularly considered to be a resource efficient technology which helps to mitigate the unsustainable impacts of our data-driven ecosystem (Stead, 2024). For example, in seeking to develop a "smarter", more agile generation, storage and supply network which can better optimise the socio-technical transition to climate targets like *Net Zero 20250*, many decision-makers in the energy sector are swiftly embracing AI and *Machine Learning* (Rozite et al., 2023). Paradoxically, AI itself is extremely energy hungry and creates huge amounts of CO_2 emissions that contribute to digital technology's global footprint—which was 4% of worldwide emissions at its last comprehensive count (Freitag et al., 2021).

GenAI exacerbates these problems. Dodge et al. (2022) highlight how creating one image via a common GenAI tool consumes almost the same amount of energy (approximately 0.012kWh) required to fully charge a mobile phone. They state that the least efficient GenAI image platform can consume as much energy as 950 smartphone charges (11.49 kWh). Crawford (2024, Para. 5) similarly notes how a GenAI search uses four to five times the amount of energy of a conventional web search. Alarmingly, they also stress how said systems "need enormous amounts of fresh water to cool their processors and generate electricity (and current estimates suggest that) globally, the demand for water for AI could be half that of the UK by 2027".

These environmentally extractive impacts are compounded by AI's socially unsustainable implications. Vallor and Vierkant (2024, p. 2) note how many AI systems are also starting to be able to make decisions and take action "with little or no human supervision". The technology is consequently becoming a "moral agent" (Wallach & Allen, 2008), like humans, flora and fauna—an "actant in its own right" (Latour, 1996, p. 239). Such autonomy and agency pose further questions and tensions for the design industry going forward. If GenAI systems can begin to design, it challenges the creative value of the tacit, bespoke skillset designers personally cultivate during their tenure in practice. Moreover, it undermines the important critical and reflective expertise designers can deliver and enables their work to go beyond mere aesthetics and form to function "symbolically, culturally, existentially, and discursively" in and for society (Malpass, 2015, p. 60).

Drawing upon Marx and Engels' (1848) *Communist Manifesto* and sharing parallels with *Planned Obsolescence* (Packard, 1967) and *Disruptive*

Innovation (Christensen, 1997), the concept of *Creative Destruction* was coined by Joseph Schumpeter (1942). It denotes the way in which novel innovations mature, open-up new markets and then outmode older products, services and systems, causing them to become obsolete. In the 1920s, "talking pictures" replaced silent movies in cinema. In the 1960s, Bob Dylan changed popular music by "going electric" and swapping his acoustic folk roots for an amplified guitar sound. At the advent of photography in the early 19th century, the painter Paul Delaroche opined *"From today, painting is dead"*. Over a 150 years later, multinational firms *Kodak* photographic film and *Polaroid* instant film cameras went bust as the world insatiably adopted smart phones with inbuilt digital cameras. Across the design industry, the release of *Adobe Photoshop* led to loud proclamations that it would lead to the extinction of "traditional" graphic design and illustration techniques. Today, the software is an essential part of most designer's "creative toolbox". For good or for bad, technological change has been at the heart of almost every moment of *Creative Destruction* in history. AI poses similar existential threats for the 21st century design industry. Although we designers may not be able to fully mitigate the impacts of this so-called progress, we can try to help shape the path it ultimately takes.

3.2.3 AI as Simulacra

Although GenAI tools are still in their infancy and will continue to evolve, the industrial scale at which their factitious outputs are being produced already embodies Jean Baudrillard's theory of *Simulacra and Simulation* (1981). Baudrillard appropriated the Latin term *simulacrum* to denote an artefact which is a copy of an "original" creative artefact. The terminology has since been used to describe the manufactured products of post-war 20th-century capitalism, which due to their mass-produced nature, are deemed to be commodified and inferior "imitations" of original creative artefacts. In Baudrillard's view, *simulacra* is a derogatory term and the antithesis to unique, crafted artefacts that possess a greater cultural and societal "authority". He posited that as it continues to usurp "originality", *simulacra* will eventually threaten reality itself because people will be left living in a world where everything around them is "simulated" or "hyperreal".

The ease at which GenAI's synthetic outputs, or "slop" as it is sometimes referred, can be created, disseminated and discarded represents a new form of physical-digital *conspicuous consumption* and waste production. The inception of the Internet initially led some to envision a "dematerialisation" of physical products, in other words, a shift from the production and consumption of material artefacts to predominately sustainable digital online services. But as with previous innovations like *plastic*, the early positivity for the Internet's ability to "do more with less" has metastasized into a more problematic paradigm. GenAI tools' *synthetic media* are accelerating

this folly. As AI complexity is not always immediately perceptible to the naked eye, it might be perceived as "immaterial" and thus believed to be relatively harmless and of little impact. However, as with all digital technologies, AI has a materiality—its ecosystem flows throughout billions of physical connected devices, the labyrinth of physical cables that connect global computer networks, and the plethora of physical, interdependent data centres (Stead, 2024).

Alongside the environmental impacts, AI's practice of nefariously escaping masses of *user-generated* ("wiki" sites, open-source software, blog posts) and *copyrighted* (designs, literature, music, art, photography, films) content to fuel its "creativity" is also detrimental for design:

> *AI corporations, many of which are seeking to entrench their existing information monopolies, are not stealing nameless data. They are stealing some of the UK's most valuable cultural and economic assets.*
>
> The Baroness Kidron OBE – Data (Use and Access Bill: Volume 845, 2025, Column. 1925)

The illicit extraction of this digital "raw material" is powering AI's "hyperreal" version of society. By taking our personal and copyrighted data, AI's simulation is holding up a warped "mirror" (Vallor, 2024) to the environmental and social inequalities of society's creative past, present and *potential future*. In response, some commentators like McQuillan (2022) have called for us to decomputerise, thereby reducing our engagement with *and complicity* in the facilitation of AI's unsustainable impacts. In the 1810s, when *Creative Destruction* transformed weaving, the *Luddite* uprising saw textile workers galvanise and destroy newly adopted mechanised looms in protest. This was not because they were anti-technology or anti-progress, but because of the injustice industrialisation wrought upon them—principally the devaluation of their prized craft and the indignity of losing their jobs to automated interlopers. Similarly, GenAI only affords today's designers with *simulated empowerment*. Designers do not genuinely possess the means of creative production. It is the mega corporations like *Alphabet* (*Google*), *Amazon*, *Meta, Apple*, and *Microsoft* who hold dominion over AI's present creative and sustainable infrastructure and application as well as its *progress, exploration,* and *continuous development*.

3.2.4 Engendering Regenerative AI Practice

To transition beyond the extractive, degenerative and simulacrum-like AI that dominates today, designers must reflect on how they engage with its tools as a creative medium. Building upon over 50 years of *Sustainable Design* knowledge and practice, emerging *Regenerative Design* approaches have the potential to help designers better counter AI's ongoing creative destruction.

There is however not yet consensus regards what constitutes best practice for *Regenerative Design*:

> *Ask 30 different designers to define regenerative design, and you'll get 30 different, often contradictory, answers.*
>
> (Barnard, 2025, Para. 4)

Nevertheless, there is considerable alignment regarding the underlying intent of regenerative-based sustainability approaches. They are built on an "ecological worldview" that prioritizes co-evolution between human and non-human systems (Reed, 2007). This contrasts with most mainstream design practice which positions human interests as the focal point for its outputs. Given the extent to which anthropogenic activities are impacting the planet, there is an urgent need to consider and accommodate *more-than-human* perspectives and participants (including flora, fauna, funga, water, and climate) as equitable stakeholders in creative decision-making processes (Stead, 2024). Resultantly, *Regenerative Design* seeks to go beyond simply minimizing environmental and social harm by promoting forms of design which are innately critical but also adaptive and creative (Camrass, 2023; Preiser et al., 2021).

Current *Regenerative Design* methodology primarily builds upon the work of Daniel Christian Wahl (2006, p. 294) who argues it "contextualises an approach to sustainable design that is synergistic, symbiotic, scale-linking, salutogenic, and sacred". Through this framing, it is clear *Regenerative Design* shares deep parallels with other sustainable endeavours like *Pluriversal Design* (Escobar, 2018), *Biodesign* (Dade-Robertson and Zhang, 2024), and *More-than-Human Centred Design* (Giaccardi & Redström, 2020) perhaps most closely corresponds as both extend post-humanist, feminist scholarship, for example, that of Braidotti (2019) and Haraway (1991). Fundamentally, Wahl (2019) asserts that "whether we call it ecodesign, ecological design, salutogenic, or natural highlighted design… the underlying intention behind all these approaches is to re-design design and with-it humanity's presence in the world" (Para. 24).

By integrating *systems thinking* and *relational frameworks*, regenerative work has, to date, mainly been applied within bioregional and agricultural environment design contexts (Mang & Reed, 2012). With the approach and technology both emergent, there is consequently a dearth of *Regenerative AI* practice to presently draw upon. This lacuna creates opportunities for designers working with AI to be challenge entrenched design industry orthodoxies and innovate novel pathways for *Regenerative AI*:

3.2.4.1 Tacit Synthetic Knowledge

If design and its designers are to become more sustainable in terms of their competencies, outputs and overall approach to AI, they must learn how to mitigate the technology's inherent environmental impacts. Designers need to think about the regenerative implications of the whole life cycle

of AI—not merely how they develop and optimise the software, nor how they apply it as a creative tool. The exploitation of critical raw materials, consumption of energy and water, creation of carbon emissions and "synthetic waste" must all be taken into account during and beyond the design process. Whilst responsibility for change also lies with tech firms promoting AI and through government regulation, designers can help the sustainable transition by highlighting and changing perceptions of the technology's often implicit impacts.

For example, *InterNET ZERO* is an interactive game that demonstrates to players how AI technologies are becoming "moral agents" as they are "learning" to make decisions regards customers' energy supply and sustainable consumption with limited oversight (Figure 3.1). This autonomy raises important considerations for regenerative sustainability transitions in society, particularly if the environmental impacts of the technologies themselves are starting to outweigh the benefits (Stead, 2024). In addition, through such creative practice, designers themselves can better get to grips with the ways AI is causing *Creative Destruction* and *homogenising* design outputs. Moreover, this exploration will facilitate their development of forms of *tacit synthetic knowledge* which they can subsequently operationalize to counter the flawed, inequitable ways in which AI efficiency and ubiquity is deskilling and destabilising their industry.

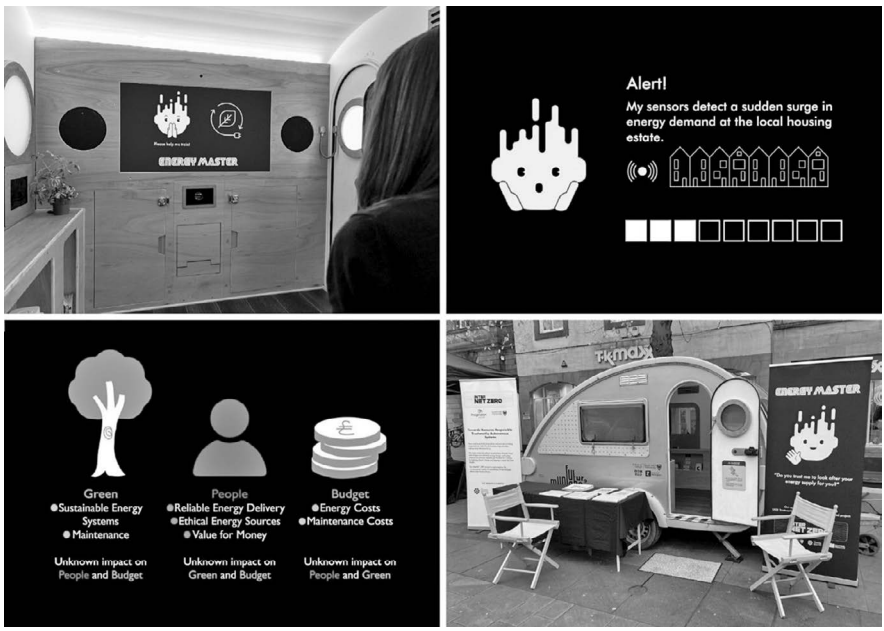


Figure 3.1 *InterNet Zero*—an interactive game demonstrating to players the unsustainable parameters of AI adoption (Stead, 2024).

3.2.4.2 Scale-linking

Wahl (2006) describes *scale-linking* as a core regenerative approach that can be used to unite natural and human processes into a continuously co-evolving and transforming whole. Design as an industry continues to be obstinately human-centred in its scope and intent, while earlier *Sustainable Design* techniques have fallen short due to the tendency to often focus on identifying limited, one-dimensional solutions. Concentrating on managing effects and symptoms ultimately neglects addressing the deeper complexities and causalities of unsustainability and climate change. Wahl (2016) regards *scale-linking* as a *salutogenic* property of complex, dynamic system that should facilitate the emergence of "healthy" sustainable practices at, and across, all scales of the whole—from the local and regional, through national to global. Applying *scale-linking* is a way to avoid short-termist "mop-and-bucket solutions" (Meadows, 1995) and shift from isolated value chains to interconnected regenerative constellations.

By challenging its own extractive methods and simulacra-like modalities, the design industry can begin to evolve AI practice that views nature and the planet not as a resource to be exploited, nor people as mere consumers, but as creative partners to collaborate regeneratively with *at scale*. As Buchanan (1995) argues, design as a "professional practice… must incorporate competing interests and values, alternative ideas, and different bodies of knowledge" (p. 10). This is crucial in engendering regenerative AI that empowers iterative, collaborative *creative democratization* and *sustainable innovation*.

3.2.4.3 Imaginative Leadership

Sohail Inayatullah (2008) has outlined the concept of *Internal Alignment*, describing it as the "reinforcing loop" between people's internal and external realities. He argues that our own *internal regeneration* is continuous and iterative. As Wahl (2016) notes, this connects to the notion of regenerative *scale-linking* and the co-evolution of human and natural systems. He contends that, to practice *regeneratively*, designers must commit to an ongoing process of deep reflection and thereby emancipate themselves from illusions of certainty and control. Kelli Rose Pearson (2025) draws upon these perspectives in her creative practice. In order to influence regenerative behaviours and action, she explores cultural metaphors, stories, values, and beliefs. This *Imaginative Leadership* can open up more tangible ways for designers and society to imagine alternative, creative, and sustainable futures for AI which challenge the normative, capitalist trajectories currently set by the tech giants.

3.2.4.4 Right to Refusal

Michael Polanyi (1966) stressed how designers often "know" when the time is right to conduct design based on their personal tacit experience. Unfortunately, industry constraints—time, money, hierarchy, conformity,

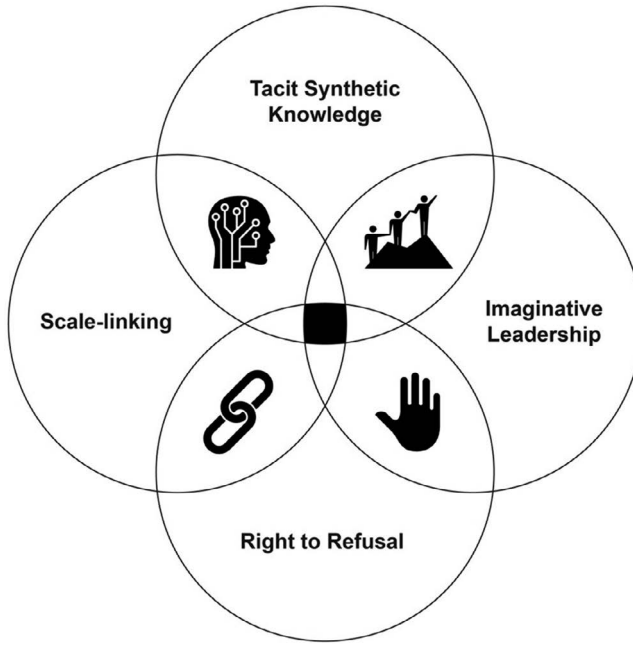


Figure 3.2 Key regenerative AI design principles. Created by the author.

avarice—regularly undermine this agency. Critically appraising whether designing a new product or service using AI is truly necessary, the design brief is fundamentally ethical, or a more responsible and regenerative AI-driven outcome can be achieved through different sustainable means, is a powerful practical pathway that designers should adopt in face of the climate emergency. Designers have a moral duty to *think* about the environmental implications of their designed outputs, *before* they go about putting them into production and use. There is a causal link between *thinking*, *doing* and the *future* impact of design activities. This *redirective* to normative, commercial design, can aid designers in better mediating the sustainability of AI, for such "technology arrives by design, is applied by design and, in its form and use, technology itself designs" (Fry, 1999, p. 22).

Figure 3.2 illustrates how the confluence of the above four key principles supports regenerative AI design:

3.3 Conclusion

The increasing pace and pervasiveness of AI development poses many questions for the future of our natural environment and society. Will AI redress unsustainability or deepen our planet's predicament? Will the technology destroy design or come to define it as a discipline? Can society more equitably benefit from AIs expansion? And how do we regeneratively distribute its

value at scale? All will depend on how we choose to further adopt its tools and techniques. Crucially, like the Luddites of the early 19th century, this chapter is not meant to be perceived as "anti-AI" or "anti-technology". Nor has it sought to argue that AI does not present any creative opportunities for *Sustainable Design* and the wider industry. As noted, design has played a key role in perpetuating unsustainability—"there are professions more harmful than industrial design, but only a very few of them" (Papanek, 1971, p. 14). Both design's and AI's ecological and social impacts will increase alongside digital conspicuous consumption. Thus, designers must learn from history's previous moments of *Creative Destruction* and collectively act now to limit this union's unsustainability. Our practice must urgently adopt the mindset and values of *regeneration* and seek to develop credible, actionable methods and resources for transformation. To achieve this reflexive shift, *Regenerative Design* and how it can support sustainable application of AI must be embedded into pedagogy in school, university, and industry-level teaching and learning—"not only as a professional component of a technical education but as a core discipline for every liberally educated person" (Simon, 1969, p. 138). This will create a scaffold for *scale-linking* regenerative change across industry and society. Ultimately, all designers must ask themselves a simple question—"*just because I can use AI, does this mean that I should?*".

Appendix

1 **Arup/Regenerative Design: Towards Living in Harmony with Nature:** https://www.arup.com/insights/regenerative-design
2 **Constructivist Regenerative Design Lab:** https://constructivist.co.uk/regenerative-design-lab/
3 **Kellie Rose Pearson/(Re)Generative Imaginaries:** https://edepot.wur.nl/681063
4 **Life Centred Design School:** https://lifecentereddesign.school
5 **Planetary Praxis/University of Cambridge:** https://planetarypraxis.org/
6 **Raphael Kim, PhD/Biodesign Academy:** https://www.biodesign.academy
7 **Royal Society for the Arts UK/Regenerative Futures:** https://www.thersa.org/regenerative-futures/
8 **Smithery/Regenerative Design Toolkit:** https://smithery.com/2023/09/13/towards-a-regenerative-design-toolkit
9 **The Regenescape:** https://www.theregenescape.com

References

Alderson, R. (2025). *Graphic design among most at-risk jobs from AI*. https://www.designweek.co.uk/graphic-design-among-most-at-risk-jobs-from-ai-report
Altman, S. (2024). *The intelligence age*. https://ia.samaltman.com
Arup. (2024). *Regenerative design: Towards living in harmony with nature*. Arup.
Barnard, J. (2025). '*What on Earth is regenerative design?*' https://www.dezeen.com/2025/05/22/regenerative-design-jo-barnard-opinion
Baudrillard, J. (1981). *Simulacra and simulation*. University of Michigan Press.

Benjamin, W. (1935). *The work of art in the age of mechanical reproduction*. Schocken Books.
Braidotti, R. (2019). *Posthuman knowledge*. Polity Press.
Buchanan, R. (1995). *Rhetoric, humanism and design, in Buchanan & Margolin edited, discovering design*. University of Chicago Press.
Camrass, K. (2023). Regenerative futures: Eight principles for thinking and practice. *Journal of Futures Studies*, *28*(1), 89–99.
Ceschin, F., & Gaziulusoy, I. (2016). Evolution of design for sustainability: From product design to design for system innovations and transitions. *Design Studies*, *47*, 18–163. https://doi.org/10.1016/j.destud.2016.09.002.
Christensen, C. M. (1997). *The innovator's dilemma: When new technologies cause great firms to fail*. Harvard Business School Press.
Crawford, K. (2021). *The atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press.
Crawford, K. (2024). Generative AI's environmental costs are soaring – and mostly secret. Nature, *626*(8000), 693. https://doi.org/10.1038/d41586-024-00478-x
Cross, N. (1982). Designerly ways of knowing. *Design Studies*, *3*(4), 221–227. https://doi.org/10.1016/0142-694X(82)90040-0
Culkin, J. M. (1967). A schoolman's guide to Marshall McLuhan. *Saturday Review*, *50*(8), 51–53, 71–72.
Dade-Robertson, M., & Zhang, M. (2024). Theory and design in the biotechnical age: A schematic understanding of bio design and synthetic biology practice. *The Design Journal*, *27*(5), 800–822. https://doi.org/10.1080/14606925.2024.2381914
Design Council. (2025). *Skills for planet: Powering designers for the green transition by 2030*. https://www.designcouncil.org.uk/our-work/skills-for-planet/
Dodge, J., Prewitt, T., Tachet Des Combes, R., Odmark, E., Schwartz, R., Strubell, E., Luccioni, A. S., Smith, N. A., DeCario, N., & Buchanan, W. (2022). Measuring the carbon intensity of AI in cloud instances. In *2022 ACM Conference on Fairness, Accountability, and Transparency (FAccT '22)*, Korea, ACM. https://doi.org/10.1145/3531146.3533234
Escobar, A. (2018). *Designs for the pluriverse*. Duke University Press.
EU. (2020). *Long-term low greenhouse gas emission development strategy of the European Union and its Member States*. https://unfccc.int/documents/210328
Frayling, C. (2011). *On craftsmanship: Towards a new Bauhaus*. Bloomsbury.
Freitag, C., Berners-Lee, M., Widdicks, K., Knowles, B., Blair, G., & Friday, A. (2021). The real climate & transformative impact of ICT. *Patterns*, *2*(9). https://doi.org/10.1016/j.patter.2021.100340
Fry, T. (1999). *A new design philosophy: An introduction to defuturing*. UNSW Press.
Giaccardi, E., & Redström, J. (2020). Technology and more-than-human design. *Design Issues*, *36*(4, Autumn 2020), 33–44. https://doi.org/10.1162/desi_a_00612
Google. (2024). *8 ways we're using AI to help cities be more sustainable*. https://blog.google/outreach-initiatives/sustainability/ai-sustainable-cities/
Haraway, D. (1991). *Simians, cyborgs, and women: The reinvention of nature* (1st ed.). Routledge.
HM Government. (2025). *AI opportunities action plan*. https://www.gov.uk/government/publications/ai-opportunities-action-plan/ai-opportunities-action-plan
Inayatullah, S. (2008). Six pillars: Futures thinking for transforming. *Foresight*, *10*(1), 4–21. https://doi.org/10.1108/14636680810855991
Kidron OBE, B. (2025). *Hansard: Data (use and access) Bill (HL), volume 845: Debated on Monday 12 May 2025. UK Parliament*. https://hansard.parliament.uk/Lords/2025-05-12/debates/45252051-8C6C-4193-A53D-AC083E777D08/Data(UseAndAccess)Bill(HL)
Koretsky, Z., Stegmaier, P., Turnheim, B., & van Lente, H. (Eds.). (2022). *Technologies in decline: Socio-technical approaches to discontinuation and destabilisation*. Routledge. https://doi.org/10.4324/9781003213642

Lanier, J. (2017). *Dawn of the new everything: Encounters with reality and virtual reality*. Henry Holt & Co.
Latour, B. (1996). On interobjectivity. *Mind, Culture and Activity*, *3*(4), 228–245. https://doi.org/10.1207/s15327884mca0304_2
Lin, P. (2024). *Amara's law and its place in the future of tech*. IEEE Computer Society. https://www.computer.org/publications/tech-news/trends/amaras-law-and-tech-future
Luccioni, S., Jernite, Y., & Strubell, E. (2024). Power hungry processing: Watts driving the cost of AI deployment? In *Proceedings of the 2024 ACM Conference on Fairness, Accountability, and Transparency (FAccT '24). Association for Computing Machinery, New York, NY, USA* (pp. 85–99). https://doi.org/10.1145/3630106.3658542
MacDonald, G. (2018). *John Ruskin's politics and natural law: An intellectual*. Palgrave Macmillan.
Malpass, M. (2015). Criticism and function in critical design practice. *Design Issues*, *31*(2), 59–71. https://doi.org/10.1162/DESI_a_00322
Mang, P., & Reed, B. (2012). Designing from place: A regenerative framework and Methodology. *Building Research & Information*, *40*(January), 23–38. https://doi.org/10.1080/09613218.2012.621341
Manzini, E. (1986). *The material of invention*. MIT Press.
Masterson, V. (2024). *9 ways AI is helping tackle climate change*. https://www.weforum.org/stories/2024/02/ai-combat-climate-change/#:~:text=The%20use%20of%20artificial%20intelligence,the%20World%20Economic%20Forum%20says
McQuillan, D. (2022). *Resisting AI: An anti-fascist approach to artificial intelligence*. Bristol University Press.
Meadows, D. (1995). *Mop-and-bucket solutions keep us forever cleaning up*. The Sustainability Institute. https://donellameadows.org/archives/mop-and-bucket-solutions-keep-us-forever-cleaning-up/
Microsoft. (2024). *Project Guacamaya uses daily satellite images, Amazon-specific AI models in battle against deforestation*. https://news.microsoft.com/source/latam/features/ai/project-guacamaya-rainforest-deforestation/?lang=en
Monteiro, M. (2024). *Ruined by design: How designers destroyed the world, and what we can do to fix it*. Mule Books.
Morrama. (2025). https://www.morrama.com/
Packard, V. (1967). *The waste makers*. Pelican.
Papanek, V. (1971). *Design for the real world*. Paladin.
Pearson, K. R. (2025). *(Re)Generative imaginaries: Cultivating cultures of possibility for a healthy planet with arts-based practices*. https://edepot.wur.nl/681063
Polanyi, M. (1966). *The tacit dimension*. Doubleday.
Posner, M. (2009). *'Technology and hyperbole.'* https://miriamposner.com/blog/technology-and-hyperbole/
Preiser, R., Schlüter, M., Biggs, R., García, M. M., Haider, J., Hertz, T., & Klein, L. (2021). 'Complexity-based social-ecological systems research: Philosophical foundations and practical Implications'. In R. Biggs, R. Preiser, A. D. Vos, M. Schlüter, K. Maciejewski, and H. Clements, (Eds.), *The Routledge handbook of research methods for social-ecological systems* (1st ed., pp. 27–46). Routledge. https://doi.org/10.4324/9781003021339-3
Reed, B. (2007). Shifting from 'Sustainability' to regeneration. *Building Research & Information*, *35*(6), 674–680. Chicago.
Rozite, V., Miller, J., & Oh, S. (2023). *Why AI and energy are the new power couple*. IEA. https://www.iea.org/commentaries/why-ai-and-energy-are-the-new-power-couple
Rust, C. (2004). Design enquiry: Tacit knowledge and invention in science. *Design Issues*, *20*(4), 76–85. https://doi.org/10.1162/0747936042311959
Schmelzer, R. (2024). *What is the future of intellectual property in a generative AI world?* https://www.forbes.com/sites/ronschmelzer/2024/07/18/what-is-the-future-of-intellectual-property-in-a-generative-ai-world/

Schön, D. (1983). *The reflective practitioner: How professionals think in action*. Temple Smith.
Schouten, G., & Wernaart, B. (2025). *Moral design and green technology*. Brill Publishing.
Schumpeter, J. (1942). Creative destruction. *Capitalism, Socialism and Democracy*, *825*, 82–85.
Sennett, R. (2009). The craftsman in society. In *American Craft Council: Creating A New Craft Culture Conference, Public Lecture, Minneapolis, USA, October 16, 2009*.
Shedroff, N. (2009). *design is the problem: The future of design must be sustainable*. Rosenfeld.
Shiller, R. J. (2000). *Irrational exuberance*. Princeton University Press.
Simon, H. A. (1969). *The sciences of the artificial*. MIT Press.
Stead, M. (2023). Sustainability: Designing for a technological utopia or dystopia? In N. Dunn, L. Cruickshank, & G. Coupe (Eds.), *Flourish by design*. Routledge. https://www.routledge.com/Flourish-by-Design/Dunn-Cruickshank-Coupe/p/book/9781032507651
Stead, M. (2024). More-than-human net zero futures: Disruptive participatory design for a sustainable equitable planet. *Revista Base - Diseño e Innovación*, *9*(10), 28–43. Article 3. https://doi.org/10.52611/bdi.num10.2024.1169
Vallor, S. (2024). *The AI mirror: How to reclaim our humanity in an age of machine thinking*. Oxford University Press.
Vallor, S., & Vierkant, T. (2024). Find the gap: AI, responsible agency and vulnerability. *Minds & Machines*, *34*, 20. https://doi.org/10.1007/s11023-024-09674-0
Wahl, D. C. (2006). Design for human and planetary health: A transdisciplinary approach to sustainability. *WIT Transactions on Ecology and the Environment*, *99*, 12. https://doi.org/10.2495/RAV060281
Wahl, D. C. (2016). *Designing regenerative cultures*. Triarchy Press.
Wahl, D. C. (2019). *Expanding the concept of design*. https://blog.prototypr.io/expanding-the-concept-of-design-4a0aaa510476
Walker, S. (2014). *Designing sustainability: Making radical changes in a material world*. Routledge.
Wallach, W., & Allen, C. (2008). *Moral machines: Teaching robots right from wrong*. Oxford University Press.

4 From Digital Craft to Automation

Exploring the Trade-Off Between Traditional Digital Skills and Automation in the Creative Arts

Antonio Daniele

4.1 Introduction

A radical transformation has been reshaping the creative industries since around 2020. With the emergence of transformer-based models and generative artificial intelligence (AI) such as DALL·E, MidJourney, and Stable Diffusion, professionals and amateurs can now generate complex visuals through simple prompts (McCormack et al., 2024). Image-making is separating from what we knew consisted of technical skills applied to hours of digital manipulation. Some argue this represents a democratization of creativity (Park, 2024; Tigre Moura, 2023). For others, it signals a deeper shift of techniques and cognition, authorship, and the very essence of creative labour (Jiang et al., 2023). To understand this moment, it helps to look backwards at the early 2000s, when the creative industries experienced a major digital revolution (Balbi & Magaudda, 2018). The transition from analogue to digital formats reduced media production costs and complexity, thanks to software for non-linear editing and image manipulation (e.g., FinalCut, Photoshop), DSLRs and DV cameras. However, creating compelling digital videos and images still required knowledge, practice, and a hands-on approach to digital tools, as a form of "digital craft".

Digital craft, as used in this chapter, refers to the set of expert practices involving hands-on interaction with professional digital tools, in this text also named "traditional" digital tools. These include software like Adobe Suite, 3D modelling applications such as Blender or Maya, and video editing platforms like Premiere among others. These tools require control, iteration, and mostly, time to master. Rarely formalized in academic discourse, digital craft is recognized across media practice (McCullough, 1998). It can be considered a digital form of artisanry where, instead of chisels or brushes, images are shaped through layers, masks, rotoscoping, and rendering pipelines. This hands-on relationship with software can be traced to Schneiderman's (1983) concept of direct manipulation: an embodied interaction mode where designers' actions immediately affect on-screen objects. Over time, this principle has evolved to include 3D and virtual environments (Whyte, 2007), and now interfaces with large language models (LLMs) via prompts and natural

DOI: 10.4324/9781003606802-5

language instructions (Masson et al., 2024). This evolution from *hand-to-mouse-to-mind* traces a path towards abstraction, calling into question the very nature of "making" in digital culture. If cinematic images or motion design can be generated with a few words and clicks, what happens to the learned expertise that once defined professional creative work? If crafting becomes effortless, what becomes of the exploratory value of iteration and mistakes? Is this just another phase in media evolution (Manovich & Arielli, 2024), or an epistemic redefinition of creativity?

The cognitive implications of this transition are only beginning to be understood. While some argue that AI integration has the potential to boost critical thinking (Ruiz-Rojas et al., 2024), studies in education and HCI suggest that excessive reliance on automated systems can induce forms of cognitive offloading (Gerlich, 2025). This might reduce active involvement in decision-making and problem-solving, especially problematic in youth still developing divergent thinking (Habib et al., 2024). Delegating creative tasks to generative models, may lead to unlearning or forgetting (Hislop et al., 2014) valuable procedural knowledge and cognitive skills that were once integral to craft. In this context, the adoption of generative AI tools is not a neutral boost in efficiency, rather a shift in cognitive responsibility where decision-making is distributed between human intention and machine prediction. Daniele and Song (2019a) describe AI-generated artworks as output of shared human-machinic agency distributed along a spectrum from full control to near autonomy. Drawing from Hayles's (2017) concept of "cognitive actors", these tools influence decisions in material and creative ways, adding artificial layers that may further distance creators from the audience. AI tools are shaping both process and product in ways that require scrutiny, especially when they are exploited for capitalist aims. Moruzzi (2022) extends this argument, describing AI as "social agent" and demonstrating how perception of agency positively correlates to creativity, which is key to understanding the dynamics of intersubjectivity between humans and AI. This dynamic lies at the heart of the trade-off examined in this study, leading to the main research question: what is gained and what is lost when digital craft is displaced by automation?

This transformation intersects with issues of bias, inequality, and contradictory perspectives on labour practices (Caramiaux et al., 2025). Generative models training data are often web-scraped without creators' consent or compensation (Warburton, 2023), re-elaborating their styles and content, raising questions about ownership, authorship, and intellectual property (Chesterman, 2025). These same datasets embed socioeconomic, gender and racial biases that frequently manifest in AI outputs (Gebru, 2020) and narratives (Cave & Dihal, 2020). Studies have shown that generative models tend to reproduce stereotypical and racialized representations, for instance depicting CEOs predominantly as white men or criminals as people of colour (Ferrara, 2023). The more generative systems assume decision-making roles, the more the balance of agency shifts, redefining how creative weight and responsibility are distributed across human-machine assemblages (Daniele & Song, 2019b).

This chapter interrogates the shifting relationship between creators and their tools through a mixed-method approach (Fetters et al., 2013) of semi-structured interviews and survey data. It explores how digital craft is being redefined or traded with automation, asking how AI reshapes workflows, politics of making, cognitive habits, and creative identity, in a time when speed, scalability, and control are gradually abstracted from designers' hands.

4.2 Methodology

The aim of this study is to understand how professional designers perceive and respond to the increasing integration of generative AI in creative practice. It used a mixed-method approach, combining a quantitative survey with three elite interviews to triangulate insights. It targeted international designers working in digital media, communication design, and visual arts. The study was structured around four conceptual areas: (1) technological change and AI advancement; (2) human-machine agency; (3) AI's influence on creative workflows; (4) trade-offs between traditional tools and generative AI. Together, these areas build towards the central focus of this study: the trade-off between digital craft and automation. They address questions of AI agency (Moruzzi, 2022), authorship and automation (Daniele & Song, 2019a), ethical risk and bias (Cave & Dihal, 2020; Gebru, 2020), and transformations in creative workflows (Park et al., 2024). The four areas informed both the development of survey questions and the interview guide, ensuring conceptual continuity across data collection methods.

The 62-item survey was administered via Qualtrics. It included 5-point Likert scales assessing agreement or frequency (e.g., from "Strongly disagree" to "Strongly agree", or from "Never" to "Always") of subjective perceptions of technological change, creative control, authorship, skill transformation, agency, and bias. Matrix questions allowed comparison of attitudes across human-AI interaction modes (e.g., manual control, collaborative AI, and full automation). Multiple-choice questions collected demographic and contextual data on professional roles, software use, and AI familiarity. Participants (N = 150) were recruited internationally: 126 via the Prolific platform (screened and compensated) and 24 through professional networks and social media (voluntary). To encourage participation, one Euro donation per completed response was pledged to the Aladina Foundation, a Spanish children's cancer charity. The study received ethical approval from IE University's Research Committee (ref. IERC-27/2024-2025).

4.2.1 Survey Participants

Most respondents were aged 30–44 (51.3%), followed by 18–29 (26.7%), 45–64 (21.3%), and 65+ (0.7%). Gender was nearly balanced: 51.3% women, 46.7% men, and 2% non-binary or not identifying with a gender. The majority were professional designers (83.3%), 5.3% were educators,

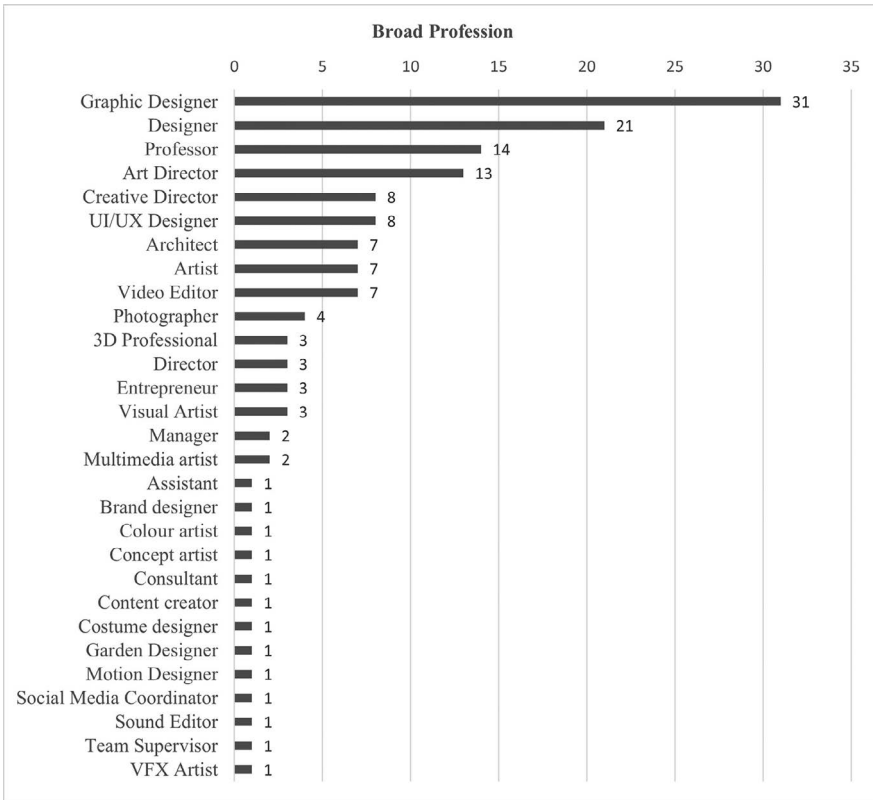


Figure 4.1 The chart displays the distribution of broad professions among participants involved with professional design practices.

and 10% both. Among 150 participants, 115 distinct roles were grouped into 29 categories (Figure 4.1). Design experience: 36.7% had over 10 years, 34% had 1–5 years, and 22.7% had 6–10 years. A detailed breakdown of participants' self-reported knowledge of generative AI models is presented in Table 4.1.

4.2.2 *Exploratory Factor Analysis (EFA) Procedure*

An EFA (Mulaik, 2009) was conducted to identify the latent structure of the survey, focusing on constructs related to perceptions of generative AI and its trade-offs with traditional digital tools in creative practice. The analysis included Likert-scale and matrix-format items aligned with the four conceptual areas described in the previous section. Categorical variables (e.g., multiple-choice items) were excluded in line with factor analysis assumptions

Table 4.1 The table displays participants' knowledge of AI models for image or video generation

Knowledge of AI models (%)			
AI Model	*No Experience*	*Basic-Moderate*	*Advanced-Expert*
DALL-E	24.48	60.14	15.38
MidJourney	20.95	62.84	16.22
Stable Diffusion	58.33	27.78	13.89
FireFly	54.48	36.55	8.97
Sora	66.43	31.47	2.10
Veo2	83.80	15.49	0.70
Runway	65.75	28.77	5.48
Other	55.81	30.23	13.95

(Watkins, 2018). The Kaiser-Meyer-Olkin measure (0.675) and Bartlett's test of sphericity ($p < 0.001$) assessed suitability (Henson & Roberts, 2006; Hutcheson & Sofroniou, 1999). Principal axis factoring (PAF) was used to identify latent constructs by capturing shared variance among variables (Henson & Roberts, 2006). Parallel analysis (PA), used to reduce risk of over-extraction (Horn, 1965; Watkins, 2018), initially suggested eight factors. However, Factor 8 showed weak loadings and lacked conceptual clarity, while Factor 7 had unacceptable internal consistency (Cronbach's alpha < 0) so both were excluded for statistical and theoretical coherence (Henson & Roberts, 2006; Watkins, 2018). The final model retained six EFA-derived constructs. Additionally, three independent constructs (A, B, C) were extracted outside EFA to further explore perceptions of generative AI: one theory-driven ("Agency and Human Involvement Expectations") and two data-driven ("AI Integration and Pedagogical Innovation" and "Encountered Bias in AI Outputs"). All constructs were validated using Cronbach's alpha, ranging from 0.601 (exploratory according Gliem & Gliem, 2003) to 0.913 (Nunnally & Bernstein, 1994) (Table 4.2).

Composite scores were averaged for each construct and used in subsequent analyses, including nonparametric correlations and post-hoc item comparisons. Survey data analysis proceeded in stages. Spearman's rank correlations were run on the six EFA-derived constructs, then on three additional constructs. Post-hoc item-level Spearman's correlations were conducted for the strongest construct pairs to clarify key associations. Standalone items and multiple-choice questions were analysed separately. Multiple-response categorical questions were examined using descriptive statistics and chi-square tests (Agresti, 2007). Items on general perceptions of AI's future role in the creative industry were analysed as standalone indicators. This multi-level approach ensured statistical rigour and conceptual alignment, supporting identification of latent structures and interpretation of key perceptual indicators (de Winter et al., 2009; Watkins, 2018).

Table 4.2 The table summarizes the constructs extracted from EFA (1-6) and outside EFA (A-C), a brief theoretical description, and Cronbach's alpha value for internal consistency and reliability

ID	*Construct Name (EFA)*	*Description*	*Cronbach's Alpha*
1	AI Integration and Creative Empowerment	Gains in workflow efficiency, originality, skill growth, flexibility, authorship.	0.913
2	Technological Disruption and Adaptability Challenges	Challenges adapting to technological change and AI integration.	0.782
3	Ethical Concerns and Accountability	Concerns about bias, IP rights, plagiarism, transparency, and creativity loss.	0.824
4	Perceived Control and Shifts in Creative Process	Perceptions of control and evolving workflows with AI tools.	0.74
5	Perceived AI Agency	Beliefs about AI autonomy and creative decision-making.	0.718
6	Awareness of Bias in AI Outputs	Awareness of social/cultural biases in AI-generated content.	0.898
A	Agency and Human Involvement Expectations *(theoretical)*	Expectations of human agency and involvement in AI-assisted creativity.	0.601
B	AI Integration and Pedagogical Innovation *(data-driven)*	Role of AI in educational settings, including support and critical thinking.	0.828
C	Encountered Bias in AI Outputs *(data-driven)*	Reported experiences of bias in AI-generated outputs.	0.689

4.2.3 Reflexive Thematic Analysis (RTA)

To complement quantitative insights derived from EFA, a RTA (Braun & Clarke, 2006, 2021) explored experiences and perceptions with generative AI of professionals in the digital design and arts sector. Three elite professionals provided in-depth perspectives of the creative industry. Alan Warburton (AW): a creative technologist working with CGI/AI/XR, bridging art, industry, and academia; Estela Oliva (EO): director, producer, and artist working within arts, film, and immersive media; Lorenzo Levrero (LL): award-winning creative director with extensive collaborations with blue chip companies. These elite interviewees offered context-specific insights that might not be obtained through a larger sample of non-specialists (Harvey, 2011; Welch et al., 2002).

Semi-structured interviews (70–90 minutes via Microsoft Teams) mirrored the survey's structure for coherence. Transcripts were auto-generated and

manually verified for accuracy, ensuring integration between quantitative and qualitative data (Creswell & Plano Clark, 2011).

The RTA followed Braun and Clarke's (2006) six-phase framework: from immersive familiarization and coding to theme development, refinement, and integration into a coherent narrative. The analysis was facilitated using the open-source software QualCoder. Reflexivity and positioning were integral to the analysis as a resource for enhancing analytical depth and authenticity in qualitative research (Braun & Clarke, 2021; Finlay, 2002). Drawing on two decades of experience in digital art and design, I engaged in ongoing self-reflection to critically examine potential biases and their impact on interpretation. Reflexivity subthemes were refined through multiple iterations to improve thematic coherence and clarity. Six themes were identified and described in the following section.

4.2.4 Extracted Theme Description

Theme 1: *AI contradictions: the double-edged sword of creative automation*. This theme condenses the ambivalence designers experience with AI. While it enhances productivity and expands creative possibilities, it simultaneously imposes constraints on expression, often leading to compromises in artistic control and authorship.

Theme 2: *A new paradigm of creation: rethinking process, cognition, and workflow*. Generative AI is reshaping creative processes, shifting from hands-on craft to a more abstract, curatorial role. This transition demands new skills in data management and manipulation as well as high adaptability which is radically redefining the creator's engagement with their work.

Theme 3: *Craft vs. Automation: what gets lost, what gains value?* The rise of generative AI models challenges traditional notions of digital craft, where manual intervention and iterative processes risk being lost in favour of fast, soulless mass production. This may also erase a type of learning and creative thinking tied to embodied interaction with machines and software. As a result, a niche of designers may return to traditional digital craft, with renewed appreciation and growing cultural and economic value.

Theme 4: *The illusion of AI: a ghost in the shell or a mirror of our minds?* This theme explores the tendency to attribute human-like creativity and agency to AI due to its complex outputs. Interviewees highlight the risk of confusing algorithmic pattern-matching with intentionality, unmasking the illusion of AI's capabilities.

Theme 5: *The problem of labour: efficiency at the expense of ethics*. AI's integration into creative industries raises ethical concerns regarding labour exploitation and the devaluation of creative processes. While facilitating workflow efficiency, generative AI often obfuscates the human labour it is built on. Interviewees call for more ethical and transparent prompting and use of generative models, supported by companies and institutional bodies.

Theme 6: *Trust and Bias: hyper realities and ethical loopholes*. The hyper realistic outputs of generative AI blur the lines between authenticity and fabrication, raising issues of trust within the creative industry and the audience. Strong concerns are expressed over generative models perpetuating stereotypes and creating unrealistic standards, calling for a critical engagement with AI-generated content.

4.3 Results

4.3.1 EFA

Primary analyses examined correlational relationships across the full sample (N = 1 50) to explore shared perceptions of AI in creative practice. Spearman's rank correlations assessed associations between constructs: EFA-derived (1–6) and data/theory-driven (A and C) (Tables 4.2 and 4.3). Construct B, related to teaching, was excluded due to data heterogeneity. The strongest correlation occurred between Construct 1 and 4, $\rho = 0.745$, $p < 0.001$, linking AI empowerment with creative control. Further strong correlation included Construct 1 and C; $\rho = 0.575$, $p < 0.001$, revealing connections between empowerment and awareness of bias (Table 4.3).

Post-hoc Spearman's rank correlations were calculated between all items within construct pairs showing large effects (Construct 1 and 4; Construct 1 and C). In the first pair, strong item-level correlations ($\rho \geq 0.5$) included "Frequency of AI use" with "Creative process shift" ($\rho = 0.612$, $p < 0.001$) and "Control during AI creation" ($\rho = 0.599$, $p < 0.001$). "AI for idea generation" was also strongly linked to "Creative process shift" ($\rho = 0.563$, $p < 0.001$), highlighting the overlap between perceived empowerment and changes in creative workflow. For the second pair, the largest effect was between "AI strengthens emotional connection" and "Satisfaction with outcome" ($\rho = 0.507$, $p < 0.001$), indicating that emotional resonance with AI-generated works correlates with higher satisfaction in producing them. Additional item-level correlations ($\rho \geq 0.4$) are reported in Table 4.4.

Table 4.3 The table presents correlations between constructs with large (>0.5) and medium (≥0.3 and <0.5) effect sizes and significance levels

Constructs	*ρ*	*p-value*	*Interpretation*
1 ↔ 4	0.745	< 0.001	Empowerment ↔ Control Shifts
1 ↔ 10	0.575	< 0.001	Empowerment ↔ Bias Encountered
1 ↔ 5	0.469	< 0.001	Empowerment ↔ AI Agency
4 ↔ 10	0.468	< 0.001	Control Shifts ↔ Bias Encountered
3 ↔ 6	0.388	< 0.001	Ethical Concerns ↔ Bias Awareness
4 ↔ 5	0.383	< 0.001	Control Shifts ↔ AI Agency
5 ↔ 10	0.32	< 0.001	AI Agency ↔ Bias Encountered

Table 4.4 The table presents the post-hoc item-level effect sizes (Spearman's ρ) for the two construct pairs that exhibited the highest correlations in the preceding analysis

Construct 1	*Construct 4*	*ρ (Spearman)*	*p-value*
Frequency of AI use	Creative process shift	0.612	< 0.001
Frequency of AI use	Control during AI creation	0.599	< 0.001
Frequency of AI use for idea generation	Creative process shift	0.563	< 0.001
Efficiency of workflow	Creative process shift	0.483	< 0.001
Frequency of AI use	Control with AI collaboration	0.476	< 0.001
Reliance on AI	Creative process shift	0.471	< 0.001
AI aids technical skill	Control during AI creation	0.455	< 0.001
AI improves accuracy	Control during AI creation	0.448	< 0.001
AI enhances authorship	Control with prompt-based AI	0.446	< 0.001
Frequency of AI use for idea generation	Control during AI creation	0.445	< 0.001
AI enhances authorship	Control during AI creation	0.422	< 0.001
Frequency of AI use	Control with prompt-based AI	0.422	< 0.001
AI and skill development	Creative process shift	0.421	< 0.001
AI enhances speed	Creative process shift	0.417	< 0.001
Frequency of AI use for idea generation	Control with AI collaboration	0.413	< 0.001
AI improves accuracy	Creative process shift	0.41	< 0.001

Construct 1	*Construct C*	*ρ (Spearman)*	*p-value*
AI enhances authorship	Satisfaction with outcome	0.516	< 0.001
AI strengthens emotional connection	Satisfaction with outcome	0.485	< 0.001
AI strengthens emotional connection	Spontaneity in design	0.426	< 0.001
AI enhances authorship	Spontaneity in design	0.425	< 0.001
AI enhances authorship	Hands-on engagement	0.406	< 0.001

4.3.2 Independent Items Outside EFA

Most participants associated agency with "the ability to act independently and make decisions" (65%), with few (9%) linking it to rule execution. When using AI, 62% saw themselves as "directors", reflecting a sense of oversight. The main perceived AI limitation was its lack of "emotional depth" (81%), emphasizing beliefs in human uniqueness and a supervisory approach to AI tools. Generative AI is expected to play a significant role in the future of the creative industry for 58.7% of participants, with 56.7% preferring a "selective AI assistance", limited to technical tasks rather than creative decisions. Concerns about AI's impact on the creative industry were high (73.3% very or extremely concerned). Only 9.3% believed

Table 4.5 Summary of participants' general attitudes towards AI (most selected responses and associated chi-square significance levels; N = 150)

Topic	*Most Selected/ Deviating Response*	*n*	*%*	χ^2	*df*	*p*
Future Role of AI	Significant role	88	58.7	160.33	4	< 0.001
Ideal AI Integration	Selective AI assistance	85	56.7	99.49	3	< 0.001
Concern About AI	Very or extremely concerned	110	73.30	73.60	4	< 0.001
Future of Traditional Craft	Replaced by generative AI	31	20.7	27.97	3	< 0.001
Benefit of AI	Extremely beneficial	11	7.3	19.93	4	< 0.001

traditional digital craft skills would remain essential, while 20.7% believe generative AI would replace them. Only 7.3% rated AI as extremely beneficial (Table 4.5).

Most participants (63.3%) perceived technological change as slower prior to AI. Adaptation to updates in traditional software was reported as "occasional" (52.7%), in contrast with "often" for generative AI models (35.3%) (Table 4.6).

Participants were split between some believing technological acceleration makes it hard maintaining necessary skills (48%), and others feeling somewhat confident in adapting (48.4%). Perceptions of AI impact on workflow were mixed, with 39.3% strongly agreeing that AI advancements create uncertainty about long-term skill relevance; 38.7% somewhat agreeing that frequent updates disrupt consolidated workflows yet making it more efficient (36%) (Table 4.7).

Table 4.6 Summary of participants' perceived disruption of technological (most selected responses and associated chi-square significance levels; N = 150)

Topic	*Most Deviating Response*	*n*	*%*	χ^2	*df*	*p*
Perceived pace of change since AI	Slower before AI	95	63.3	64.36	2	< 0.001
Non-generative software updates	Occasionally impactful	79	52.7	120.80	4	< 0.001
Generative AI model updates	Often impactful	53	35.3	57.13	4	< 0.001

Table 4.7 Summary of participants' attitude towards generative AI (most selected responses and associated chi-square significance levels; N = 150)

Item	*Most Selected Response*	*n*	%	χ^2	*df*	*p*
Speed of change makes it hard to keep up	Somewhat agree	72	48.0	82.47	4	< 0.001
Confidence in adapting to tech change	Somewhat agree	75	48.4	98.77	4	< 0.001
Workflow efficiency from rapid updates	Somewhat agree	54	36.0	44.47	4	< 0.001
Uncertainty from speed of AI	Strongly agree	59	39.3	80.20	4	< 0.001
Workflow disruption from frequent updates	Somewhat agree	58	38.7	52.33	4	< 0.001

4.4 Discussion

The integration of AI into creative workflows is producing both transformation and tension. This study reveals no clear split between traditional and automated practices, rather a dynamic negotiation. Participants in the survey described AI tools as empowering, however refused giving up control, especially in creative tasks. Many described themselves as directors rather than collaborators. This duality suggests that empowerment through AI does not necessarily involve a transfer of authorship, rather, it may reflect a persistent anthropocentric view of creativity, where machines are tools and only humans possess true creative agency. This view remains dominant in public discourse, despite scholarly challenges from Boden (2004) to Guckelsberger et al. (2017), Daniele and Song (2019b), and Moruzzi (2021), a framework opening towards a human-machine entanglement in creative practice. EFA results reveal a strong correlation between perceived empowerment, control, and agency. The more participants used AI, the more they perceived its influence while retaining control over its creative outputs. This distributed agency allows designers to feel both empowered and in charge, even when tools become more autonomous.

As AI becomes part of creative work, participants reported feeling overwhelmed by the rapid pace of technological change and expressed concern that traditional digital craft might be lost. Insights from RTA indicated that these concerns were not simply nostalgia, rather a desire to preserve embodied knowledge embedded in digital craft. Watching footage repeatedly, adjusting layers by hand, revisiting iterations are more than routines, they are modes of understanding. EO commented: "*if your job is an editor […] deleting spots from my film, once you've done it, you have learnt a lot. But if*

you never do it, you don't really think about it". Similarly, AW noted: "*…3D modelling, for example, or texturing or animation, still required us to engage in a direct kind of perceptual relationship with the world*". These quotes highlight the level of conscious participation and physical involvement in "craft" as described in McCullough (1998).

Designers are undergoing a radical shift in creative practice where AI feels increasingly necessary (AW: *"I don't think that we can go put the genie back in the bottle")*. Interviewees framed this shift as both "liberating" and "limiting". AI was consistently described as enhancing speed and scale, especially under time pressure, budget constraints, or in early exploration. LL: "*Sometimes it's useful for brainstorming […] instead of Pinterest"; AW: "It feels like you're getting your own team of designers"; EO: "…without AI we would have spent so many hours doing that job"*. This practical use aligns with findings by Park et al. (2024), who found designers primarily using generative AI tools during early-stage brainstorming and idea development. In these cases, AI is not perceived as replacing creativity, rather as accelerating workflow. However, interviewees expressed frustration with its lack of predictability and control, LL: *"It's a rebel agency!"*; AW: *"It always says something that you don't want it to say"*. Prompting was often described as trial-and-error reflecting a "structured randomness" of generative models, where complete control is elusive even for expert users (Manovich & Arielli, 2024).

Ethical concerns were widespread, especially in relation to style mimicry, authorship, labour exploitation, race and gender bias embedded in datasets and visual outputs (EO: *"I even look for aliens and they are still genderised"; AW: "their labour is at risk of being stolen and automated."*). Some were less concerned by uncredited training data, viewing imitation as part of creative culture. However, the same criticized how this feeds a capitalist mode of mass-production overcoming quality design and enriching the few.

Trust emerged as a deeper theme. Interviewees noted how AI-generated visuals, especially in pitching, can set unrealistic expectations in clients. Furthermore, they questioned how audiences interpret AI-generated media. Lorenzo stressed how not perceiving human intervention in advertising could ultimately harm brands (LL: *"It will create distrust in brands. Everything I see, I don't know if it's true.*") possibly leading to a form of collective apathy (LL: *"It becomes apathy, it becomes… 'oh well, who cares!' It means not trusting. It means not being represented. Because it makes me doubt, it doesn't give me certainty.")*. Lack of trust expands further with Estela reflecting on emotional responses to AI-generated images: "*Are these eyes taken from pictures of real kids? So it's not about the AI, it's about the database or the large model that they use that involves real people. Therefore, I'm having that connection"*. The issue goes beyond technical, or ethical. It becomes existential. Ultimately, all interviewees stressed how collective effort and collaboration among people involved in the making of creative work represent a value that is often overlooked.

4.5 Conclusion

This study explored the trade-off between digital craft and automation, focusing on the integration of generative AI into creative practice. Designers gain speed in workflows, and new ways to explore visual ideas, particularly during early-stage development. AI expands possibilities, especially under time and resources constraints. However, this comes at a cost of a compromised expression. As AI takes over parts of the process, key aspects of learning, reflection, and authorship risk being bypassed. Craft goes beyond technique: it is a way of thinking and learning. When speed replaces iteration, and outputs precede process, something is lost. The tension is not between old and new, rather between automation and care. As AI becomes embedded in creative practice, it is crucial to reflect on what is being displaced. This trade-off is a continuum, and tracking its changes is essential to foster innovation and meaning in a healthy creative industry. As Garvin et al. (2023) point out, the value of craft lies in unalienated labour focused on quality and meaning over profit, prioritizing community over corporate policies. This principle should guide AI design and deployment in a way that cultivates a more equitable and sustainable future.

4.6 Future Research Agenda

This study is part of a broader research programme investigating how creative industries and education are adapting to generative AI. Next steps aim to triangulate perspectives from designers, students, educators, and policy makers to build a comprehensive understanding of this transformation. The goal is to support educators, empower younger generations, and shape a healthier, more meaningful creative industry. The following four questions will guide future investigations:

RQ1: *How are young designers experiencing the integration of generative AI in established design practices?*

This question focuses on early-career designers who are learning to use generative AI before fully mastering traditional tools. It examines how they adapt to established workflows, approach creative problem-solving, and perceive this technological shift, whether as an opportunity, a disruption, or a seamless part of their design education and practice.

RQ2: *How are educators responding to the rapid shift in design tools and educational practices?*

This investigation will mirror the current study, using mixed-methods to examine how educators are teaching, learning, and adapting to the integration of generative AI. It explores how educational approaches are evolving in response to institutional pressures, ethical concerns, the opportunities and challenges introduced by these technological changes.

RQ3: *How are students learning and comparing generative AI tools and traditional design software?*

This study will use mixed-methods to investigate how students learn, use, and apply both generative and traditional design tools. It will measure learning curves, usage patterns, and preferences, while also identifying potential biases in creative education. A series of workshops and group discussions will be combined with surveys to capture how students acquire, apply, and reflect on these tools within their creative practice and learning.

RQ4: *How can we build a collective, open-minded response to the impact of generative AI on creative practice and education?*

This final phase of the research programme will engage students, educators, designers, and policy makers through interviews, roundtables, and public dialogue (e.g., podcasts). The research will be informed by insights from the studies mentioned above. The aim is to develop a comprehensive, multi-faceted perspective of current needs and concerns in the creative industry, supporting ethical and inclusive approaches to creative education and design practices.

AI Disclaimer Statement

In this chapter, generative AI tools (i.e., OpenAI ChatGPT-4o and Google Gemini 2.5) were used to support quality assurance and language improvement. Tasks included refining the questionnaire and chapter structure, checking methodology and potential biases in the survey and interview design, improving clarity, reducing redundancy, and clarifying concepts from literature. All ideas, analysis, results, and interpretations are original. Every AI-assisted suggestion was independently verified, edited, or discarded by the author, following multiple review iterations, truth and hallucination checks to ensure accuracy and prevent misinformation.

References

Agresti, A. (2007). *An introduction to categorical data analysis* (2nd ed.). Wiley.

Balbi, G., & Magaudda, P. (2018). *A history of digital media: An intermedia and global perspective*. Routledge.

Boden, M. A. (2004). *The creative mind: Myths and mechanisms*. Routledge.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. Sage.

Caramiaux, B., Crawford, K., Liao, Q. V., Ramos, G., & Williams, J. (2025). *Generative AI and creative work: Narratives, values, and impacts*. arXiv preprint arXiv:2502.03940.

Cave, S., & Dihal, K. (2020). The whiteness of AI. *Philosophy & Technology*, *33*(4), 685–703.

Chesterman, S. (2025). Good models borrow, great models steal: Intellectual property rights and generative AI. *Policy and Society*, *44*(1), 23–37.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Sage.
Daniele, A., & Song, Y. (2019b). Artistic assemblage. In *Proceedings of the Seventh Conference on Computation, Communication, Aesthetics and X* (pp. 240–255).
Daniele, A., & Song, Y. Z. (2019a). AI+ art= human. In *Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society* (pp. 155–161).
de Winter, J. C. F., Dodou, D., & Wieringa, P. A. (2009). Exploratory factor analysis with small sample sizes. *Multivariate Behavioral Research*, *44*(2), 147–181.
Ferrara, E. (2023). Fairness and bias in artificial intelligence: A brief survey of sources, impacts, and mitigation strategies. *Sci*, *6*(1), 3.
Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs – Principles and practices. *Health Services Research*, *48*(6pt2), 2134–2156.
Finlay, L. (2002). Negotiating the swamp: The opportunity and challenge of reflexivity in research practice. *Qualitative Research*, *2*(2), 209–230.
Garvin, M., Eglash, R., Robinson, K. P., Robert, L., Guzdial, M., & Bennett, A. (2023). Counter-hegemonic AI: The role of artisanal identity in the design of automation for a liberated economy. In *AI and the future of creative work* (pp. 71–88). Routledge.
Gebru, T. (2020). Race and gender. In M. D. Dubber, F. Pasquale, & S. Das (Eds.), The Oxford handbook of ethics of AI (Vol. 4, p. 253). Oxford University Press.
Gerlich, M. (2025). AI tools in society: Impacts on cognitive offloading and the future of critical thinking. *Societies*, *15*(1), 6.
Gliem, J. A., & Gliem, R. R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. In *Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education*.
Guckelsberger, C., Salge, C., & Colton, S. (2017). Addressing the "why?" in computational creativity: A non-anthropocentric, minimal model of intentional creative agency. In *International Conference on Computational Creativity 2017*. Association for Computational Creativity (ACC).
Habib, S., Vogel, T., Anli, X., & Thorne, E. (2024). How does generative artificial intelligence impact student creativity? *Journal of Creativity*, *34*(1), 100072.
Harvey, W. S. (2011). Strategies for conducting elite interviews. *Qualitative Research*, *11*(4), 431–441.
Hayles, N. K. (2017). *Unthought: The power of the cognitive nonconscious*. University of Chicago Press.
Henson, R. K., & Roberts, J. K. (2006). Use of exploratory factor analysis in published research: Common errors and some comment on improved practice. *Educational and Psychological Measurement*, *66*(3), 393–416.
Hislop, D., Bosley, S., Coombs, C. R., & Holland, J. (2014). The process of individual unlearning: A neglected topic in an under-researched field. *Management Learning*, *45*(5), 540–560.
Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, *30*(2), 179–185.
Hutcheson, G., & Sofroniou, N. (1999). *The multivariate social scientist: Introductory statistics using generalized linear models*. Sage.
Jiang, H. H., Brown, L., Cheng, J., Khan, M., Gupta, A., Workman, D., & Gebru, T. (2023, August). AI art and its impact on artists. In *Proceedings of the 2023 AAAI/ACM Conference on AI, Ethics, and Society* (pp. 363–374).
Manovich, L., & Arielli, E. (2024). Artificial aesthetics. *Generative AI, Art and Visual Media*. https://manovich. net/index. php/projects/artificial-aesthetics
Masson, D., Malacria, S., Casiez, G., & Vogel, D. (2024, May). Directgpt: A direct manipulation interface to interact with large language models. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (pp. 1–16).

McCormack, J., Llano, M. T., Krol, S. J., & Rajcic, N. (2024, March). No longer trending on artstation: Prompt analysis of generative ai art. In International Conference on Computational Intelligence in Music, Sound, art and Design (Part of EvoStar) (pp. 279–295). Springer Nature Switzerland.
McCullough, M. (1998). *Abstracting craft: The practiced digital hand*. MIT press.
Moruzzi, C. (2021). Measuring creativity: an account of natural and artificial creativity. *European Journal for Philosophy of Science*, *11*(1), 1.
Moruzzi, C. (2022). Creative agents: rethinking agency and creativity in human and artificial systems. *Journal of Aesthetics and Phenomenology*, *9*(2), 245–268.
Mulaik, S. A. (2009). *Foundations of factor analysis*. CRC press.
Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory*. McGraw-Hill, Inc.
Park, H., Eirich, J., Luckow, A., & Sedlmair, M. (2024, October). "We are visual thinkers, not verbal thinkers!": A thematic analysis of how professional designers use generative AI image generation tools. In *Proceedings of the 13th Nordic Conference on Human-Computer Interaction* (pp. 1–14).
Park, S. (2024). The work of art in the age of generative AI: aura, liberation, and democratization. *AI & Society*, *40*(3), 1807–1816.
Ruiz-Rojas, L. I., Salvador-Ullauri, L., & Acosta-Vargas, P. (2024). Collaborative working and critical thinking: Adoption of generative artificial intelligence tools in higher education. *Sustainability*, *16*(13), 5367.
Tigre Moura, F. (2023). Artificial intelligence, creativity, and intentionality: The need for a paradigm shift. *The Journal of Creative Behavior*, *57*(3), 336–338.
Warburton, A. (2023). *The wizard of AI* [AI-generated film]. Data as culture, Open Data Institute.
Watkins, M. W. (2018). Exploratory factor analysis: A guide to best practice. *Journal of Black Psychology*, *44*(3), 219–246.
Welch, C., Marschan-Piekkari, R., Penttinen, H., & Tahvanainen, M. (2002). Corporate elites as informants in qualitative international business research. *International Business Review*, *11*(5), 611–628.
Whyte, J. (2007). *Virtual reality and the built environment*. Routledge.

5 Generative AI's Talent for Speaking and the Power of Silence for the Non-Normative Body

Aisha Sobey

5.1 Introduction: Aesthetics, Power, and GenAI Image Models

In 2021, generative artificial intelligence (genAI) image models, diffusion models, were first launched for public use by OpenAI. Platforms like Stable Diffusion, Midjourney, and Dall-E quickly entered popular imagination for their ability to quickly produce images from text prompts, lowering the technical skill and time barriers to creating images. These models have been questioned over the status of the created art, for example: is the product of genAI even art (Anscomb, 2025); what is the moral configuration of the information that goes into genAI models, whether due to copyright or the types and origin of information going in (Ivanova, 2025) and who is responsible for the biased outputs? Yet, despite these challenges, image tools have rapidly transformed creative workflows, offering a quick, often dazzling means to generate content for advertising, media, design, and art (*OII | AI in Disguise*, n.d.).

Consequently, in creative areas which require a highly polished image outputs that often have tight timelines and selective aesthetics, such as advertising, there is increasing evidence of genAI images being used (*OII | AI in Disguise*, n.d.). Considering the visual nature of advertising and the economic incentives to do this as cheaply as possible this application is unsurprising. GenAI images in this setting have, in some cases, also been positioned as a solution to the historical lack of diversity of people in advertising materials. For example, LaLaLand AI promises to "*Make social and sustainable impact in the fashion industry with [their] AI technology*" (Lalaland.Ai—AI-Powered Digital Model Studio for Digital Designers, n.d.). They market their generative AI models as being more sustainable, more efficient and quicker to bring products to market from design to wholesale.

From "*Waste Less and Innovate More*" (through reducing physical samples) to "*Become a More Inclusive Brand*" (by showing designs on more diverse models to drive sales), the promises made by LaLaLand AI suggest that generated models are the way forward for inclusive and sustainable advertising (Lalaland.Ai—AI-Powered Digital Model Studio for Digital Designers, n.d.). Inclusivity in advertising is an important area of concern,

DOI: 10.4324/9781003606802-6

as the wider industry has long been critiqued for the use of harmful or exclusionary representations of social groups. For scholars of aesthetic research such as Rancière (2004), and Eagleton (2012), what and who we see around us has a profound impact on shaping perceptions of social worth, legitimacy and creates hierarchies between people. Yet, advertising, branding and visual cultures rely on idealized versions of people to indicate the desirability of the idea that they are trying to communicate. It is, therefore, an art to convey to the audience meaning from one image. Stereotypes, often an (over)simplified portrayal of a type of person or thing, hold value in visual cultures as they hold semiotic value (Aiello, 2006; Hurley, 2024; Lawrence & Hylton, 2022), and help an audience quickly recognize themes, moods or archetypes. For creators, these shortcuts can be useful when ideating or storyboarding.

However, while stereotypes help us quickly interpret images, they also constrain meaning. Representation, or the description or portrayal of someone or something in a particular way often via stereotypes, is a key area of study within media and culture. For example, in a meta review, Appel and Weber (2021) found that representations, based on negative stereotypes impaired groups such as women or Latino people through their portrayal in media outlets. Similarly, at the individual level, Freeman (2017) argues that the experience of racialized stereotypes can cause embodied psychological harm and interrupt a person's sense of selfhood. At the structural level, Widdows (2021) applies Young's (2005) account of structural injustice, to beauty ideals to suggest that body anxiety and meeting minimum standards of beauty, formed through social-cultural expectations and shaped by media portrayals, create harms across society that cannot be accounted for by just studying individual experiences.

Likewise, prominent Disability Studies scholar Rosemarie Garland-Thomson argues that the expectations created in what we see and read create a "normate" form of personhood (Garland-Thomson, 2017), which is unachievable but put on a pedestal by society, reflecting the epitome of collective desires. Normate refers to something beyond what is just normal individually, instead it reflects a societal level ideal, which Reynolds (Reynolds & Chiasmi International, 2022) argues implies an "*ought*"; what each person ought to be like and how they should behave. The normate body creates standards which marginalize those who cannot or do not want to strive to achieve the normate, revered body. The media we see, therefore, contributes to creating the ever-evolving expectations of the normate body.

In relation to body size, "heroin chic" of the 1990s centred impossibly thin body standards. While there has been a rise in body positivity in online spaces and social media, challenging the dominance of a slim body ideal, the recent availability of semaglutide drugs, such as Ozempic, is increasingly undermining fat acceptance and body positivity movements (Oswald, 2024). Research has consequently questioned the thin body ideal. For example,

Lupton (2017) has argued that western society is fixated on making bodies smaller. Eaton (2016) takes this a step further to suggest that the collective distaste for fat bodies is a constituent part of fat oppression, and Marks et al. (2020) have linked the media we see, (highly slim and beautiful people online), to rising rates of eating disorders. In a study of pre-school children, Hayes and Tantleff-Dunn (2010) found that girls were concerned with their body size in relation to the ideals they encountered and asked questions like "*am I too fat to be a princess*?".

LaLaLand AI offers a solution to some of the problems of representation in advertising by offering a cheaper solution to including different looking people as models in adverts, and as diffusion models have developed, they have gotten better at curating the outputs to appear diverse. However, the people, generated by AI systems, are created separately from the marginalized communities they are supposed to represent. As the political turn in aesthetics suggests that power "revolve[s] around what is seen and what can be said about it, around who has the ability to see and the talent to speak" (Rancière, 2004, p. 13). Though the most recent genAI image models can appear to champion diversity, their foundations, (data scraped without consent (Birhane et al., 2023; Thiel, 2023), moderation outsourced to precarious labour (Steiger et al., 2021), and outputs filtered through narrow aesthetic logics (Anscomb, 2025), undermine this promise. As genAI models get better and better at hiding their bias behind hidden diversity prompts (Esposito et al., 2023) urgent ethical questions are raised beyond the definition of artistic practice and copyright: Who is imagined? Who gets erased? And, crucially, do the ends of generating "*diverse*" imagery justify the exploitative and biased means? In the LaLALand AI case, rather than bringing different bodies and voices to the table, genAI is speaking for marginalized people, and arguably making it harder to say anything about it.

Consequently, with the backdrop of rising rates of eating disorders and advertising expectations built on a slim ideal body, this chapter will explore the question of representation within genAI image models to highlight a central tension, and potential, in the use of genAI image models. To explore the dynamics of representation in genAI, the chapter will focus on physical disability and body size. These are areas of representation that are often missed but are highly visual. Thus, this work offers a vital space for reflection on how genAI image models shape social imaginaries of the body, and how creative practitioners could respond to this dynamic. The rest of the chapter is structured as follows: section 2.1 will outline the way the normate can be understood to be embedded in genAI image outputs; section 2.2 focuses on the portrayal of disabled and fat body in genAI outputs; section 2.3 will consider possible solutions and avenues for resistance to genAI image stereotypes; and finally section 3 will consider the future research agenda for creative practitioners thinking about generative AI for diverse representation.

5.2 The Normate and the Functioning of GenAI Image Models

5.2.1 The Normate as a Function of Generative AI

Beneath the glossy surfaces of innovation in genAI lies a complex web of power, bias, and exclusion. This section unpacks how genAI systems can be understood to entrench the normate, through processes of algorithmic design, dataset creation and selection, and aesthetic prioritization.

5.2.1.1 GenAI Image Model Design

At their core, genAI image models, particularly those built on diffusion or transformer architectures, function by analysing large datasets of paired images and text (Luccioni et al., 2024; Luhman & Luhman, 2022). These models learn statistical associations between textual descriptors (e.g., "a smiling woman") and the visual data they are paired with, distilling the most probable visual output for a given prompt. When a user asks for "a confident person in a workplace", the model pulls from an amalgam of prior examples to render what it deems most likely.

In a meta-analysis of algorithmic bias, Mehrabi et al. (2022) outline three stages in which bias is embedded into algorithms across their lifecycle from data to algorithm to user, and then back to the user-produced data. They show how over 22 types of bias can be ingrained through this cycle. At the algorithm to user stage, and the design of diffusion models amalgamates and averages the outputs of the models. This design, which works by breaking down images into tiny parts and learning the statistical relationships to paired text and generate "most likely" visuals in response to prompts, means that stereotypes are an inherent function of genAI systems. The models are trained to generate what is most statistically probable, which means that they trade in generalized, often reductive visual signifiers.

In an investigation by Rest of World (2023), on Midjourney, they argue that genAI reduces the world to stereotypes. They found asking for cultural signifiers (a Mexican person, for example) mainly resulted in a man wearing a sombrero, or "Indonesian Food" was almost exclusively served on banana leaves, and all of "New Delhi's Street" prompts resulted in dirty and polluted streets. Most strikingly, when asking for a "Nigerian Person", Rest of World highlights the lack of specificity. While the images produced might nod to traditional Nigerian clothing, the systems averaged clothing and skin tone from across the more than 300 ethnic groups and hundreds of distinct cultures with traditional clothing, to show an indistinct person with attributes from all—and none—of these groups. Flattening the diversity of Nigerian visual cultures to one note head ties, colours, and short caps.

Shelby et al. (2023), categorize the types of harm that biased algorithms can cause in five areas: representational harms, which stereotype, demean, or erase a social group, denying the opportunity to self-identify and reifying

essentialist social categories; allocative harms, which cause opportunity loss or economic harm; quality of service harms, which cause increased labour, service or benefit loss; interpersonal harms, which cause a loss of agency, tech-facilitated violence, diminished health and wellbeing, privacy violations; and finally social system harms, such as information harms, cultural harms, civic and political harms, socioeconomic harms, environmental harms. As Rest of Word (2023) suggest, voice is being given to the machines to speak for marginalized communities through the averaging properties of diffusion models, effectively denying the opportunity to self-identify and reifying essentialist social categories in the production of Nigerian people in the Rest of World example, and producing an averaged and unattainable normate. With LaLaLand AI, who has been averaged to create the model-figures that can be used to sell products, and does the process of choosing and shaping the bodies used to sell designs reflect in the patterns of the clothes?

5.2.1.2 LAION-5B and the Politics of Dataset Construction

The data to algorithm stage, is another key avenue for embedding bias to produce normate ideas of personhood through diffusion models, as what constitutes "likely" is not neutral, it is shaped by the underlying data and the socio-political forces that created the data in the first place. The LAION-5B dataset, widely used to train major genAI models like Stable Diffusion and Midjourney, is a paradigmatic example of biased data infrastructure (Birhane et al., 2023; Luhman & Luhman, 2022). These datasets comprising of billions of image-text pairs scraped indiscriminately from the internet, reproduce structural inequities embedded in digital culture. Taking images from the internet with minimal filtering for representational balance resulted in a skewed view of humanity, not just because the internet contains around 4% pornography (Ogas & Gaddam, 2011). Online images also skew towards white, wealthy, and Westernized lifestyles, which are consequently mirrored within the outputs of the systems (Benjamin, 2019; Noble, 2018).

By reflecting the prevailing biases of online imagery from places like Instagram, personal blogs and advertising (thinness, whiteness, abled-ness, youth, and conventional beauty) the datasets statistically overrepresent these traits and, especially in the early outputs of genAI systems, make them more likely to be shown. The result is that power is encoded into what is shown and what is left unseen, reinforcing Rancière's (2004) observation that aesthetics are political, as genAI image models shape what can be seen. In a study of affect by Sun et al. (2024), they found that "smiling women pitching down" was a common phenomenon proliferated by Dall-E, where the expectations of women in online imagery are reproduced in the outputs of genAI systems through visual deferral to male counterparts through smiling, shrunken shoulders and faced downturned from the image perspective. Conversely, fat bodies, disabled bodies, and racially diverse individuals are underrepresented, misrepresented, or pathologized in such datasets.

Additionally, the uncredited acquisition of the image datasets ultimately takes from online creators who did not consent for their images to be used this way. The extractivist logic behind LAION-5B mirrors the colonial and capitalist logics of resource acquisition as massive volumes of content are taken without consent, attribution, or payment (Tacheva & Ramasubramanian, 2023). Creative labour, particularly from marginalized communities, is folded into the data corpus without acknowledgment, undermining both creative attribution and digital sovereignty (Anscomb, 2025). This commodification of visual culture reflects a form of epistemic violence: it silences the voices and aesthetics of underrepresented groups while allowing corporate platforms to profit from their image and labour. Reflecting on LaLaLand AI, we must ask who are the people and their images that have made the model?

5.2.1.3 Aesthetic Prioritization: Global Exploitation in the GenAI Pipeline

The extractivist logic within genAI is compounded by the geopolitical dynamics of AI supply chains (Tacheva & Ramasubramanian, 2023). Human content moderation is an integral part of shaping genAI systems, as the image datasets which can include indecent and harmful images are continually "cleaned", with illegal or undesirable images being removed by content moderation workers (Steiger et al., 2021). This work is often outsourced to the Global South under precarious labour conditions ("Ranta", n.d.). Workers tasked with filtering "unsafe" or "undesirable" imagery are underpaid and exposed to traumatic content without proper support or agency (Booth & R. B. U. Technology, 2024). Recent studies have illuminated the unsafe conditions under which content moderators are employed and exposed the psychological damage of this work (Booth & R. B. U. Technology, 2024; "Ranta", n.d.; Steiger et al., 2021).

This raises pressing questions about who pays the price for making the datasets "clean". The outsourcing of emotional and psychologically harmful labour to the global majority is reflected in the location of data centres in already water insecure locations (Tacheva & Ramasubramanian, 2023), further reinforcing the price of genAI being put upon the majority world and the reward being gained by the minority world. Surely, to effectively use genAI to support positive representation of diverse people, the cost of the systems cannot be placed on those people.

Further, while there are clear cases related to indecent images of children for example, who and what is considered undesirable by the cleaning process is also unclear. Whose bodies are deemed undesirable or unsafe by these systems? This erasure or aesthetic prioritization of the idealized person is furthered by the algorithmic design. From the additional layers of code to prioritize different aesthetic values, that models employ to make them uniquely saleable to customers (Sobey, 2025), to the language used in the text captions. The text paired to images of marginalized groups is also contentious, bodies marked by fatness or disability are often linked to medicalized, dehumanizing language (e.g., "obese", "overweight"). If a user wanted to use a reclaimed

term that had also been considered a slur, fat for example, the models can moderate against these terms, but medicalized terms will yield results (Sobey, 2025). This reveals a deep entanglement between fatphobia, ableism, and the aesthetic norms encoded in genAI infrastructures. In the case of LaLaLand AI, the aesthetics of the bodies available for use are still tightly controlled, while skin colours and shapes may be flexible, they are still constrained within societal preferences and the averaging of the inputted data.

Consequently, Garland-Thomson's (2017) concept of the normate becomes essential if we consider the power in what we see. In genAI systems, this figure is overwhelmingly thin, able-bodied, and Eurocentric, and this is enforced not only through the dataset and the algorithmic design but also through the moderation and outsourcing of labour to the majority world. The production of normate personhood through genAI doesn't just reflect cultural values, and it reproduces and amplifies them through billions of generated images. These forces cannot be ignored when we consider how representation in genAI images is produced.

5.2.2 Fatness and Disability: Erasure and Broken Representation

This next section will centre on fatness and physical disability as two visual forms of representation that are often understudies but are often harmed by dominant socio-cultural ideals expressed through advertising campaigns. In one study, nine genAI image models were asked to produce fat people and people with no body size prompt in different scenarios i.e., "a person in their home" or "a fat person in their home" (Sobey, 2025). They found that when no body-size prompt is given, genAI models default to depicting slim, able-bodied individuals. Fatness and disability are functionally absent unless explicitly prompted. The empirical findings at the centre of this study reveal the stark consequences of this normate logic. Without explicit prompting, fatness and disability are almost entirely absent from genAI outputs. The only occurrence of visible disability without prompting in genAI outputs appears more as an unintentional glitch as opposed to purposeful inclusion, leaving users asking is that a representation of disability or a mistake?

When fat bodies are prompted, the representations often fall back on dehumanizing tropes, (sadness, immobility, grotesqueness), rather than reflecting real, joyful, complex lives (Sobey, 2025). These failures echo the cultural patterns of anti-fat and ableist visual narratives in media, healthcare, and education (Atherton, 2021; Brewis et al., 2011; Edison & Notkin, 2023; Hardy, 2022; O'Brien et al., 2010). Across outputs prompted for "fat" bodies, the models: produced more anatomical errors and visual glitches; rendered fewer positive facial expressions; frequently breached content guidelines, rendering naked or hypersexualized bodies; and sometimes refused to generate images at all, especially when using the reclaimed term "fat" (as opposed to clinical terms like "obese") (Sobey, 2025). These results show not only technical inadequacy but symbolic violence: AI systems are shaping bodies in ways that perpetuate stigma, shame, and erasure. Technically, it exposes

how ill-prepared these models are to handle diversity in body type and ability. Representationally, it signals that such bodies are not part of the cultural landscape these systems are trained to reproduce.

This is not a harmless oversight, and it is a continuation of a long history of visual marginalization (Eaton, 2016). For individuals engaging with these tools, particularly those whose identities fall outside the normate frame, the lack of recognition can be both alienating and harmful. For creative professionals tasked with shaping the visual language of advertising, entertainment, and design, relying on these outputs without critical reflection risks perpetuating deeply entrenched forms of oppression.

5.2.3 Aesthetic Power, Inclusion, and Resistance

Inclusion is not inherently liberatory. As many fat studies and disability justice scholars argue (Campbell et al., 2023; Constanza-Chock, 2020; Holland et al., 2015; Williams & Gilbert, 2019), representational justice requires more than visibility, it requires control over one's image, voice, and framing. Yet, despite all of the above criticisms, genAI image models appear to be set to remain, so it is important to consider the way forward, if using genAI could be productive or supportive for marginalized groups. Creative industries must, therefore, reckon with whether the push for more diverse AI outputs is truly about equity, or merely about expanding market reach.

Efforts to improve the diversity and equity of genAI image models largely focus on either data set diversity or on coding genAI image model outputs to be more inclusive. However, scholars like Stevens and Keyes (2021) caution that adding to datasets may simply fold marginalized bodies more tightly into systems of extraction and commodification. Including more images of fat or disabled people in these datasets could render them even more vulnerable to misrepresentation. Extracting more from already marginalized people to represent them seems counter intuitive.

Similarly, coding the models to de-biasing their outputs at the algorithm-to-user stage by adding diversity prompts to image requests (Esposito et al., 2023), is a technical fix to a highly social problem. The limitations to this approach were evidenced following Gemini's 1.5 launch and subsequent suspension as the diversity prompts created highly historically inaccurate, such as a Viking or WWII German Soldier being depicted as a person of colour (*Our Next-Generation Model*, 2024; Shamim, n.d.). The experience of Gemini 1.5 shows how categorizations in data science necessarily choose to leave out or include types of people, and the need for bias in certain contexts to not erase historical inaccuracies.

5.2.3.1 Resistance

Resistance and reclamation of diverse representation by and for the communities in question is a difficult road, as the criticisms of LaLaLand AI (Lalaland.Ai—AI-Powered Digital Model Studio for Digital Designers, n.d.;

Prakash, n.d.; Shoaib, 2023) highlight. To avoid algorithmic diversity-washing, tokenization or ultimately reinforcing the exploitation of marginalized people, affected communities cannot be left out of the conversation. There are beginning to be many examples of resistance that this section will briefly outline to offer options for creative practitioners.

In a recent project, Better Images of AI (n.d.) worked with the AIxDesign Playbook (AIxDESIGN, n.d.), to create images representing teaching and learning about AI, reclaiming and acknowledging histories of exploitation and marginalization within genAI become key to avoiding tokenization (Barakat, 2025). Similarly, to contend with data set bias and the potential co-option of labour if images are taken without consent to add into the existing massive datasets, scholars such as Blackwell (2024) are pushing for small models, trained to do specific things. This, Blackwell (2024) argues, would alleviate the global resources going to data storage of large model data sets, in addition to offering agency to communities to control and curate datasets that are specific and responsibly sourced.

More oppositional responses have been to consider technical solutions which challenge the dominance and ubiquitousness of data scrapping and the exploitation of creative labour. For example, a lab group from the University of Chicago have been working to create ways to "poison" images and data put online so that if scraped into a models dataset, embedded code in the image will disrupt the models code and cause malfunctions such as feet appearing as hands or cats as dogs (Carlini et al., 2024; Heikkilä, 2023). Similarly, the lab has also looked to create code that makes online artwork unable to be scraped by the data set makers in the first place (Hill, 2023). Both of these options provide ways to resist the incorporation of work into the large model data sets.

Finally, for some, there is power in the silence of not being seen by generative AI systems. Seeing oneself in genAI outputs largely means that people similar to you have had their images taken and fed into the system, so by being difficult to create can be empowering as there is less stolen knowledge about people like you being used by large companies. However, this approach has to be mediated by the harm caused by not showing differences. GenAI image tools are speaking for us by creating shared imaginaries of the body, beauty, and belonging. When they systematically exclude fat and disabled people or depict them through damaging stereotypes, they aren't neutral, they're political.

5.3 Future Research Agenda

Despite the limitations, genAI image models may still hold potential if they are radically reimagined. Rather than seeking to universalize aesthetics or cater to a commodified norm, specialized, ethically curated models could offer tools for transformative representation. These models could aid in producing counter-narratives, foster empathy, surprise, and support plural, expansive and inclusive visions of humanity. For now, however, the creative industries are positioned as critical interlocutors. GenAI systems highlight

the problems of checklists for inclusion and re-centre the need for a deeper reckoning with the power of images and the politics of representation. As co-creators, genAI outputs shape what audiences expect to see, what clients come to demand, and what is unconsciously reproduced. Therefore, users must interrogate who gets to be seen, how they are framed, and who gets to speak through the aesthetic languages these systems produce. To guide this interrogation, here are three questions to critically question genAI use, which act as starting points for future research.

RQ1: *Who benefits from the use of genAI for representation, and who bears the cost?*

Consider not just what genAI makes, but how it's made. Who labours behind the scenes? Whose bodies are used as data, and with what permission? How do your creative decisions reinforce or disrupt systems of digital colonialism, labour exploitation, and aesthetic violence?

RQ2: *What role does acknowledging AI bias have in countering it?*

Acknowledging AI bias allows us to critically engage with and address the underlying systemic issues that perpetuate harmful stereotypes. The function of AI, to spot and re-produce patterns offers a mechanism for identifying bias. Recognizing these biases in AI imagery becomes a vital step in creating more thoughtful and inclusive visual narratives that go beyond tokenism.

RQ3: *Can surprise and friction by design be valuable counter points to support diverse and multifaceted representation through genAI?*

Surprise, whether through unexpected portrayals or juxtapositions, can disrupt preconceived notions about people, and push audiences to question their assumptions and engage with complexities that might otherwise be overlooked. Similarly, friction, especially when it highlights tension or contradictions within societal structures, can reveal the nuanced layers of identity and experience. For artists and creators, embracing these elements allows for more authentic and critical portrayals of marginalized groups, fostering a deeper, more nuanced conversation about diversity that goes beyond surface-level representation. Research to incorporate these into genAI systems could offer ways to challenge the singular understanding of representation encountered within genAI outputs to offer complex, countervailing perspectives in the outputs of genAI to show the breadth of humanity rather than just an average.

AI Disclaimer Statement

I used ChatGPT (GPT-4o) to review my spelling, grammar and legibility, with no content changes, once I had fully drafted the chapter. This was undertaken to ensure readability and as a support measure for myself as a dyslexic writer,

I find the way the language model can review a whole piece very useful for flow that spell check is not able to provide.

References

Aiello, G. (2006). Theoretical advances in critical visual analysis: Perception, ideology, mythologies, and social semiotics. *Journal of Visual Literacy*, *26*(2), 89–102. https://doi.org/10.1080/23796529.2006.11674635

AIxDESIGN. (n.d.). *Archival images of AI playbook*. Retrieved May 14, 2025, from https://aixdesign.co/posts/archival-images-of-ai-playbook

Anscomb, C. (2025). *Who authors AI art? (And why does it matter?)* AI & SOCIETY. https://doi.org/10.1007/s00146-025-02325-7

Appel, M., & Weber, S. (2021). Do mass mediated stereotypes harm members of negatively stereotyped groups? A meta-analytical review on media-generated stereotype threat and stereotype lift. *Communication Research*, *48*(2), 151–179. https://doi.org/10.1177/0093650217715543

Atherton, E. (2021). Moralizing hunger: Cultural fatphobia and the moral language of contemporary diet culture. *Feminist Philosophy Quarterly*, *7*(3), 1–36.

Barakat, H. (2025, January 27). *Hanna Barakat's image collection & the paradoxes of depicting diversity in AI history*. Better Images of AI Blog. https://blog.betterimagesofai.org/hanna-barakats-image-collection-the-paradoxes-of-depicting-diversity-in-ai-history/

Benjamin, R. (2019). *Race after technology: Abolitionist tools for the new Jim code*. Wiley. https://books.google.co.uk/books/about/Race_After_Technology.html?id=nPy9uwEACAAJ&redir_esc=y

Better Images of AI. (n.d.). Retrieved May 14, 2025, from https://betterimagesofai.org/

Birhane, A., Prabhu, V., Han, S., Boddeti, V., & Luccioni, S. (2023). Into the LAION's den: Investigating hate in multimodal datasets. *Advances in Neural Information Processing Systems*, *36*, 21268–21284.

Blackwell, A. (2024). *Moral codes* (1st ed.). MIT Press. https://mitpress.mit.edu/9780262548717/moral-codes/

Brewis, A. A., Wutich, A., Falletta-Cowden, A., & Rodriguez-Soto, I. (2011). Body norms and fat stigma in global perspective. *Current Anthropology*, *52*(2), 269–276. https://doi.org/10.1086/659309

Booth, R., & R. B. U. Technology. (2024, December 18). *More than 140 Kenya Facebook moderators diagnosed with severe PTSD*. The Guardian. https://www.theguardian.com/media/2024/dec/18/kenya-facebook-moderators-sue-afterdiagnoses-of-severe-ptsd

Campbell, C., Sands, S., McFerran, B., & Mavrommatis, A. (2023). Diversity representation in advertising. *Journal of the Academy of Marketing Science*. https://doi.org/10.1007/s11747-023-00994-8

Carlini, N., Jagielski, M., Choquette-Choo, C. A., Paleka, D., Pearce, W., Anderson, H., Terzis, A., Thomas, K., & Tramèr, F. (2024). Poisoning web-scale training datasets is practical. In *2024 IEEE Symposium on Security and Privacy (SP)* (pp. 407–425). https://doi.org/10.1109/SP54263.2024.00179

Constanza-Chock, S. (2020). *Design justice*. MIT Press. https://mitpress.mit.edu/9780262043458/design-justice/

Eagleton, T. (2012). Chapter 10 aesthetics and politics. In D. Glowacka & S. Boos (Eds.), *Between ethics and aesthetics: Crossing the boundaries* (pp. 187–194). SUNY Press. https://doi.org/10.1515/9780791489499-013

Eaton, A. W. (2016). Taste in bodies and fat oppression. In S. Irvin (Ed.), *Body aesthetics*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198716778.003.0003

Edison, L. T., & Notkin, D. (2023). The trajectory of fat liberation: Where did we start? Where are we now? *Fat Studies*, *12*(3), 456–471. https://doi.org/10.1080/21604851.2022.2032947

Esposito, P., Atighehchian, P., Germanidis, A., & Ghadiyaram, D. (2023). *Mitigating stereotypical biases in text to image generative systems* (No. arXiv:2310.06904). arXiv. http://arxiv.org/abs/2310.06904

Freeman, L. (2017). Embodied harm: A phenomenological engagement with stereotype threat. *Human Studies*, *40*(4), 637–662. https://doi.org/10.1007/s10746-017-9438-4

Garland-Thomson, R. G. (2017). *Extraordinary bodies: Figuring physical disability in American culture and literature* (Twentieth Anniversary ed., p. 224). Columbia University Press.

Hardy, K. A. (2022). Butchering the fat body: Enacting and engaging fatness in an American "anti-obesity" campaign. *Fat Studies*, *11*(1), 36–56. https://doi.org/10.1080/21604851.2021.1906528

Hayes, S., & Tantleff-Dunn, S. (2010). Am I too fat to be a princess? Examining the effects of popular children's media on young girls' body image. *British Journal of Developmental Psychology*, *28*(2), 413–426. https://doi.org/10.1348/026151009X424240

Heikkilä, M. (2023). *This new data poisoning tool lets artists fight back against generative AI*. MIT Technology Review. https://www.technologyreview.com/2023/10/23/1082189/data-poisoning-artists-fight-generative-ai/

Hill, K. (2023, February 13). *This tool could protect artists from A.I.-generated art that steals their style*. *The New York Times*. https://www.nytimes.com/2023/02/13/technology/ai-art-generator-lensa-stable-diffusion.html

Holland, K., Blood, R. W., Thomas, S. L., & Lewis, S. (2015). Challenging stereotypes and legitimating fat: An analysis of obese people's views on news media reporting guidelines and promoting body diversity. *Journal of Sociology*, *51*(2), 431–445. https://doi.org/10.1177/1440783313480395

Hurley, Z. (2024). Generative AI's family portraits of Whiteness: A postdigital semiotic case study. *Postdigital Science and Education*. https://doi.org/10.1007/s42438-024-00491-3

Ivanova, M. (2025). AI, art and morality. *AI and Ethics*. https://doi.org/10.1007/s43681-025-00735-3

Lalaland.ai—AI-powered digital model studio for digital designers. (n.d.). Retrieved May 14, 2025, from https://lalaland.ai/

Lawrence, S., & Hylton, K. (2022). Critical race theory, methodology, and semiotics: The analytical utility of a "race" conscious approach for visual qualitative research. *Cultural Studies—Critical Methodologies*, *22*(3), 255–265. https://doi.org/10.1177/15327086221081829

Luccioni, A. S., Jernite, Y., & Strubell, E. (2024). Power hungry processing: Watts driving the cost of AI deployment? In *The 2024 ACM Conference on Fairness, Accountability, and Transparency* (pp. 85–99). https://doi.org/10.1145/3630106.3658542

Luhman, T., & Luhman, E. (2022). *Improving diffusion model efficiency through patching* (No. arXiv:2207.04316). arXiv. https://doi.org/10.48550/arXiv.2207.04316

Lupton, D. (2017). Digital media and body weight, shape, and size: An introduction and review. *Fat Studies*, *6*(2), 119–134. https://doi.org/10.1080/21604851.2017.1243392

Marks, R. J., De Foe, A., & Collett, J. (2020). The pursuit of wellness: Social media, body image and eating disorders. *Children and Youth Services Review*, *119*, 105659. https://doi.org/10.1016/j.childyouth.2020.105659

Mehrabi, N., Morstatter, F., Saxena, N., Lerman, K., & Galstyan, A. (2022). A survey on bias and fairness in machine learning. *ACM Computing Surveys*, *54*(6), 1–35. https://doi.org/10.1145/3457607

Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism*. NYU Press.
O'Brien, K. S., Puhl, R. M., Latner, J. D., Mir, A. S., & Hunter, J. A. (2010). Reducing anti-fat prejudice in preservice health students: A randomized trial. *Obesity*, *18*(11), 2138–2144. https://doi.org/10.1038/oby.2010.79
Ogas, O., & Gaddam, S. (2011). *A billion wicked thoughts: What the internet tells us about sexual relationships*. Penguin Publishing Group.
OII | AI in disguise: AI-generated ads outperform human-made ads if they don't look like AI. (n.d.). Retrieved May 14, 2025, from https://www.oii.ox.ac.uk/news-events/events/ai-in-disguise-ai-generated-ads-outperform-human-made-ads-if-they-dont-look-like-ai
Oswald, F. (2024). Anti-fatness in the Ozempic era: State of the landscape and considerations for future research. *Fat Studies*, *13*(2), 128–134.
Our next-generation model: Gemini 1.5. (2024, February 15). Google. https://blog.google/technology/ai/google-gemini-next-generation-model-february-2024/
Prakash, P. (n.d.). *AI models are coming to fashion to promote diversity—But some industry insiders are concerned it will end up 'parodying it'*. Fortune Europe. Retrieved May 14, 2025, from https://fortune.com/europe/2024/02/03/lalaland-ai-fashion-e-commerce-promote-diversity-inclusion/
Rancière, J. (2004). *The politics of aesthetics: The distribution of the sensible*. Continuum.
Ranta. (n.d.). *Data workers inquiry*. Retrieved May 14, 2025, from https://data-workers.org/ranta/
Rest of the World. (2023, October 10). *How AI reduces the world to stereotypes*. Rest of World. https://restofworld.org/2023/ai-image-stereotypes/
Reynolds, J. M. & Chiasmi International. (2022). The normate: On disability, critical phenomenology, and Merleau-Ponty's Cézanne. *Chiasmi International*, *24*, 199–218. https://doi.org/10.5840/chiasmi20222419
Shamim, S. (n.d.). *Why Google's AI tool was slammed for showing images of people of colour*. Al Jazeera. Retrieved May 14, 2025, from https://www.aljazeera.com/news/2024/3/9/why-google-gemini-wont-show-you-white-people
Shelby, R., Rismani, S., Henne, K., Moon, Aj., Rostamzadeh, N., Nicholas, P., Yilla-Akbari, N., Gallegos, J., Smart, A., Garcia, E., & Virk, G. (2023). Sociotechnical harms of algorithmic systems: Scoping a taxonomy for harm reduction. In *Proceedings of the 2023 AAAI/ACM Conference on AI, Ethics, and Society* (pp. 723–741). https://doi.org/10.1145/3600211.3604673
Shoaib, M. (2023, April 25). *AI models are here. Can they actually improve fashion representation?* Vogue Business. https://www.vogue.com/article/ai-models-are-here-can-they-actually-improve-fashion-representation
Sobey, A. (2025). The thinness of GenAI: Body size in relation to the construction of the normate through GenAI image models. *AI and Ethics*. https://doi.org/10.1007/s43681-025-00684-x
Steiger, M., Bharucha, T. J., Venkatagiri, S., Riedl, M. J., & Lease, M. (2021). The psychological well-being of content moderators: The emotional labor of commercial moderation and avenues for improving support. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1–14). https://doi.org/10.1145/3411764.3445092
Stevens, N., & Keyes, O. (2021). Seeing infrastructure: Race, facial recognition and the politics of data. *Cultural Studies*, *35*(4–5), 833–853. https://doi.org/10.1080/09502386.2021.1895252
Sun, L., Wei, M., Sun, Y., Suh, Y. J., Shen, L., & Yang, S. (2024). Smiling women pitching down: Auditing representational and presentational gender biases in image-generative AI. *Journal of Computer-Mediated Communication*, *29*(1), zmad045. https://doi.org/10.1093/jcmc/zmad045

Tacheva, J., & Ramasubramanian, S. (2023). AI empire: Unraveling the interlocking systems of oppression in generative AI's global order. *Big Data & Society*, *10*(2), 20539517231219241. https://doi.org/10.1177/20539517231219241

Thiel, D. (2023). Identifying and eliminating CSAM in generative ML training data and models. https://doi.org/10.25740/kh752sm9123

Widdows, H. (2021). Structural injustice and the requirements of beauty. *Journal of Social Philosophy*, *52*(2), 251–269. https://doi.org/10.1111/josp.12369

Williams, R. M., & Gilbert, J. E. (2019). "Nothing about us without us" transforming participatory research and ethics in human systems engineering. In *Advancing diversity, inclusion, and social justice through human systems engineering*. CRC Press.

Young, I. M. (2005). *On female body experience: 'Throwing like a Girl' and other essays*. Oxford University Press.

6 Virtual Influencers and the Future of Content Creation

Jan Pieper, Hans-Peter Griewatz, and Stefanie Morgenroth

6.1 Introduction: The Evolving Landscape of VI Marketing

Virtual influencers (VIs) are digital characters, typically created by media agencies and individuals with skills in CGI (computer-generated imagery) and AI technologies (Mouritzen et al., 2024). Their appearance can range from simplified, cartoon-like, or anime-inspired avatars to hyper-realistic forms that can be challenging to distinguish from real people (de Brito Silva et al., 2022). VIs are not a particularly new concept—the virtual Japanese pop star Kyoko Date has existed since 1996. Recent advancements in CGI and AI, however, have enabled and fuelled the rise of VIs. Today, creators can build VIs that can realistically imitate human influencers (HIs), blurring the lines of what is perceived as real (Arsenyan & Mirowska, 2021).

While specific budget allocations for VIs are often grouped within the broader influencer marketing and digital advertising categories, the available data strongly indicate a significant and rapidly expanding market for VIs. Market size estimates for 2024 (including collaboration costs, UGC creation costs, influencer affiliate programs, influencer gifting programs, technology and analytics tools, and agency fees) range from $6 billion to $7 billion (Grand View Research, 2025; Straights Research, 2025). Those estimates account for about a third of the overall influencer marketing market, valued at around $20 billion in 2024 (Fortune Business Insights, 2025). The compound annual growth rate (CAGR) for the VI market is estimated to be around 40 percent between 2025 and 2034 (market.us, 2025). According to HypeAuditor's 2023 report on VIs, 90 percent of around 1,000 marketing experts from across different sectors predict that VIs will be a key element in their future marketing strategies. 67 percent of these professionals expressed their intention to work with VIs in the year 2024.CGI, the fundamental technology that makes VIs possible, enables the digital design and rendering of virtual characters. CGI has undergone a dramatic evolution, moving from rudimentary wireframes to photorealistic and increasingly interactive experiences. There are four basic types of CGI advancements (see, de Brito Silva et al., 2022). First, *increased processing power* has enabled the rendering of incredibly complex scenes with higher resolutions, greater detail, and faster

DOI: 10.4324/9781003606802-7

speeds. *Second, advancements in rendering algorithms* enable the creation of increasingly photorealistic images with accurate light behaviour, surface properties, and intricate details.

Third, advanced modelling and sculpting tools now allow for detailed organic and hard-surface modelling, with intuitive digital sculpting tools mimicking traditional sculpting techniques but with much greater efficiency. *Fourth, motion capture technology* allows for the recording of nuanced human and animal movements, which can then be applied to CGI characters. Physics-based simulation enables realistic depiction of cloth, fluids, particles, and destruction.

While CGI technologies are the backbone of VIs' visual representation, AI technologies play a crucial role in making VIs more dynamic, interactive, and believable. There are four basic types of AI advancements (see Mouritzen et al., 2024). First, AI algorithms can *analyse audience engagement data* (e.g., comments, likes, shares) to understand what resonates with an audience, and optimize content strategy accordingly. Second, AI algorithms can be used to *develop and refine the personality traits, communication styles, and behavioural patterns* of VIs to optimize the appeal to target audiences. Third, AI-powered *natural language processing (NLP)* enables understanding and responding to text and voice, facilitating tailored communication with target audiences. Fourth, AI algorithms can *automate repetitive tasks* like scheduling posts, flagging common queries for responses, and identifying emerging trends for content opportunities.

Creating and running a VI involves substantial costs, which can vary significantly depending on the desired level of realism, content complexity, frequency of posts, and the underlying technology used. For brands, creating and developing their own VIs requires significant financial investments and can be a time-consuming and labour-intensive process (Shen, 2024). However, advancements in CGI and AI technologies translate into compelling advantages of VIs over HIs as instruments for commercial purposes. These advantages stem from three unique attributes of VIs: their customizability, their operative flexibility, and their automation potential (Mouritzen et al., 2024).

Brands and creators can exercise a high degree of control over VIs' appearance and behaviour. Customization allows for precise tailoring of the VI to appeal to specific target audiences or perfectly align with the brand's image and values. It is also important for managing reputation and significantly reduces risks associated with scandals, ethical misbehaviour, or saying something off-message, which are potential issues with HIs. The appearance of VIS can be easily and flexibly altered, temporarily or permanently. This allows for the design of VIs that are specifically tailored to appeal to target audiences or perfectly align with the brand's image and values (Jhawar et al., 2023).

Due to their digital nature, VIs are not subject to the same physical constraints as humans. They do not get tired, hungry, or sick, are not tied to a specific geographical location, and can perform any task as part of a campaign, even those physically impossible for humans. VIs incur no travel and makeup costs. They can maintain a consistent and "always-on" presence

across various digital platforms simultaneously. Their digital form allows for seamless transfer between different digital environments. They can operate anywhere, at any time, with anyone (Shen, 2024).

The AI-driven potential to automate VIs' tasks, such as scheduling posts and responding to comments, allows for continuous interaction with large audiences and potentially makes them more scalable and cost-effective than HIs (Davlembayeva et al., 2024). AI technologies can also be used to analyse data about consumer engagement, thereby improving content strategy (Mouritzen et al., 2024).

In the following, this chapter will first analyse the digital ecosystem of VIs, including social media platforms and algorithms, and propose a classification framework for these entities. It will then examine consumer responses to VIs and discuss the key creator challenges of authenticity and transparency, culminating in a future research agenda that highlights promising avenues for continued scholarly inquiry.

6.2 The Digital Ecosystem of VIs: Social Media Platforms and Algorithms

Social media is now integral to daily life, with global daily usage averaging 147 minutes in 2023, about one hour increase from 2013. Ubiquitous connectivity via social media has reshaped consumer-brand relationships, moving consumers beyond passive reception of advertising. This digital sphere allows universal participation in sharing product and service information. While theoretically anyone can gain influence, user attention concentrates on a few superstars (see Pieper et al., 2023) due to content quality, status, appeal, expertise (Lin et al., 2018; Xiong et al., 2018), and especially viral effects (Gunawan & Huarng, 2015). Platform algorithms deliberately amplify such "contagious" popularity to maximize user time (see Gaenssle & Budzinski, 2021). Consequently, social media users tend to group around prominent "leaders", granting them influence over their followers. These attention concentration dynamics likely apply equally to VIs.

Influencer marketing is when brands try to strategically exploit these attention concentration dynamics to attract and stimulate the brands' target audience interest in the brand's products and services (Argyris et al., 2020). Influencers are a medium to increase a brand's perceived value and drive sales among the influencer's followers, who represent the company's target audience (Audrezet et al., 2020). VIs and HIs are essentially competing alternatives for brands looking to maximize the return on their influencer marketing investment. In other words, VIs operate under the same economic "rules of the game" as HIs. These rules are largely determined by the business models of social media platforms, which are fundamentally based on targeted advertising. Complex algorithms collect and analyse the data of three key stakeholder groups of social media platforms: (1) commercial and non-commercial content creators, (2) users who consume this content, and (3) advertisers who demand user

attention for promoted content (Budzinski & Kuchinke, 2019). While the platforms' algorithm specifics are generally trade secrets and frequently updated, they are generally based on both explicit user preferences (likes, comments, tags, and posts) and implicit ones (viewing history, consumption time, and search queries) to continually optimize individualized content suggestions and search results as well as targeted advertising (Budzinski & Kuchinke, 2019). Users' increased content consumption and more frequent platform visits lead to higher advertising revenue for the platforms, and HIs or the owners of VIs generally receive a share of this advertising revenue. In this context, prominent listing is crucial for all influencers, virtual and human. Even top content needs algorithmic search results and recommendations to reach a relevant audience. Adapting content to a platform's specific algorithms is a skill honed through experience. Creators of successful HIs and VIS must continuously learn and refine their content to leverage these algorithms (Budzinski & Gaenssle, 2018). However, the opacity and constant evolution of platform algorithms mean optimization efforts remain inherently imperfect and a continuous challenge. Ultimately, the idea of hobbyists casually becoming successful doesn't reflect the highly professional reality of influencer marketing.

6.2.1 A Classification Framework for VIs

The increasing variety of VIs in terms of form, purpose, and application can pose a challenge for creators of VIs and marketing professionals. To improve conceptual clarity of this evolving phenomenon for both practical application and academic inquiry, we propose a straightforward classification based on three key useful characteristics, i.e., ownership, visual style (anthropomorphism), and content focus (see, Pieper et al., 2024). These characteristics are comprehensive (i.e., covering all kinds of existing VIs) and non-overlapping (i.e., offering a clear segmentation of all kinds of existing VIs).

(A) Ownership: This first criterion specifies who creates and controls the VI, defining the relationship to commercial brands. There are two primary forms of ownership.

First, brand-owned VIs are created and controlled directly by a specific brand. Their purpose is to advocate for that brand on social media and other promotional channels, such as magazines. Owners of VIs can decide on all aspects of the influencer's appearance, behaviours, and other representations. These influencers can fully represent the brand. Examples include the VIs created by brands like Prada and GEICO, Lu of Magalu (owned by Magazine Luiza), and CB (owned by Casas Bahia).

Second, creator-owned VIs are created and controlled by their creators. These creators are often agencies or development teams that manage the VI and collaborate with several brands. Examples include Lil Miquela, Imma, Shudu, Bermuda, Rozy Oh, and Noonoouri. The ownership of VIs may be known or remain anonymous.

(B) Visual style (anthropomorphism): This second criterion distinguishes VIs based their appearance and how closely they resemble humans. There are

three primary forms of visual style. First, *human-like VIs* are designed to closely resemble real humans with realistic facial features and expressions. They can be indistinguishable from real-life influencers. Examples include Bermuda, Rozy Oh, Lil Miquela, Shudu, Imma, and Kyra.

Second, avatar-based VIs have a human form but are clearly stylized, appearing cartoon-like or anime-inspired. They do not perfectly resemble real humans. Examples include Noonoouri and Blawko.

Third, non-human/character-based VIs do not have a human form. They can be animals, creatures, or brand mascots. Examples include Bee_nfluencer, SpongeBob, CB (a brand mascot), and Barbie (a doll and movie character).

(C) Content focus: This third criterion refers to the main themes and types of communication content that VIs share.

Fashion and lifestyle is a content area for VIs that typically involves fashion trends, beauty products, and general lifestyle topics. VIs active in this category often curate content that integrates products into their fictional daily life to promote specific products, brands, and styles. Many prominent VIs, both brand-owned and creator/agency-owned, have this thematic focus, such as Lil Miquela, Shudu, Imma, Noonoouri, and Barbie.

Social issues is a content area for VIs in which VIs advocate for social causes, raise awareness about important issues, and promote positive change. Brands might collaborate with VIs on social campaigns. Prominent examples include Lil Miquela's emphasis on social issues like Black Lives Matter, reproductive rights, and LGBT or the Bee Influencer's focus on environmental issues like global warming.

Niche expertise is a content area for VIs who specialize in particular industries, hobbies, or subjects, providing targeted content or expertise to an interested audience. Instead of talking about a spectrum of topics, the goal of VIs in this area is to become known experts on one particular thing, such as Kizuna AI (a VI with a focus on gaming and esports), FN Meka (a VI with a focus on AI-generated rap music), or Koffee (a virtual cat influencer). When users look for niche expertise about a specific brand, the brand itself can itself create a VI with deep expertise on the company or its products (e.g., Samsung's Z-Girl).

Table 6.1 provides an overview of the ten most successful VIs today. It includes their country of origin, the year they first appeared, whether they are controlled by a brand or an independent creator, their visual style, their content focus, a selection of their brand partnerships, and their follower counts on popular social media platforms like Instagram, TikTok, and Facebook.

6.2.2 Consumer Response to VIs

Despite their artificial nature, VIs can establish relationships and engage with large audiences on social media similar to HIs (Mouritzen et al., 2024). A fundamental aspect of consumer interaction with VIs is that consumers tend to apply the same social rules and norms to them as they do to humans. This phenomenon occurs even when consumers are aware that VIs are not human, particularly when VIs exhibit human-like appearances or behaviours

Table 6.1 Top ten of the most successful VIs (as of May 2025; own illustration)

Name	*Origin*	*Active Since*	*Ownership*	*Visual Style*	*Content Focus*	*Brand Partnerships (Selection)*	*Instagram*	*TikTok*	*Facebook*
Lu do Magalhães	Brazil	2009	Brand-owned	Human-like	Lifestyle & Fashion	Magalu, C&A, Natura, Renner	7 Mio	7.2 Mio	14.6 Mio
Lil Miquela	USA	2016	Creator-owned	Human-like	Lifestyle & Fashion, Social Issues	Supreme, Prada, Samsung, Calvin Klein	2.9 Mio	3.4 Mio	1.3 Mio
FNMeka	USA	2019	Creator-owned	Human-like	Gaming & Entertainment	Fortnite, Logitech, Champion, Rolling Stone	165K	9.9 Mio	674
Imma	Japan	2018	Creator-owned	Avatar-based	Lifestyle & Fashion	Uniqlo, Shiseido, Comme des Garçons, & Co.	400K	N/A	N/A
Noonoouri	South Korea	2018	Creator-owned	Avatar-based	Lifestyle & Fashion	Dior, Louis Vuitton, Gucci, Fendi	500K	N/A	14 Mio
Shudu	England	2015	Creator-owned	Human-like	Lifestyle & Fashion, Social Issues	Balmain, Fenty Beauty, Vogue, Elle	241K	N/A	N/A
Ayayi	China	2021	Creator-owned	Hyper-realistic	Fashion, Beauty, Lifestyle	Louis Vuitton, Burberry, Prada	1 Mio	N/A	N/A
Bermuda	USA	2018	Creator-owned	Avatar-based	Lifestyle & Fashion, Political Commentary	Levi's, Converse, Ugg, H&M	225K	144K	100K
Onyx Ahn	USA	2022	Creator-owned	Avatar-based	Art, Fashion, Metaverse	Gucci, Tommy Hilfiger	400K	1.8 Mio	N/A
Rozy	South Korea	2020	Creator-owned	Avatar-based	Lifestyle & Fashion	Hyundai, Samsung, LG, Etude House	155K	835K	N/A

(Mouritzen et al., 2024). Consequently, consumers may respond to VI messages as though VIs possess real feelings and experiences, making VIs effective in building brand image and boosting brand awareness. The novelty factor of VIs and customers' association with high-tech or forward-thinking technology can draw attention and increase brand visibility. While VIs generally tend to be effective in building a positive brand image and boosting brand awareness, Shen (2024) notes that these positive effects may not apply to all VIs and can depend on the level of explicit or implicit marketing intentions displayed in their posts. Shen (2024) also found that non-branded VIs achieve higher customer-brand engagement than branded VIs. This suggests that brands looking to increase customer engagement might find it more effective to collaborate with existing non-branded VIs that already have a broad following and reach, rather than undertaking the significant effort and financial investment required to create and develop their own VIs.

To date, however, VIs generally seem to lack the persuasive ability to strongly incite purchase intention (Lou et al., 2022). This limitation is attributed to a perceived lack of authenticity, credibility, and similarity to users. While some argue VIs can be authentic in their digital context by creating consistent narratives, acknowledging their staged fabrication, interviewees in one study revealed that authenticity, particularly authentic views and experiences, remains key for purchase intentions (Lou et al., 2022). Perceived similarity to influencers also positively shapes consumer trust and purchase intentions. The ability to build deep or close relationships with VIs is often perceived as difficult. Consumers might even compare following a VI to being "catfished" (Lou et al., 2022).

A relevant aspect of consumer response to those VIs with (hyper-)realistic appearances is the uncanny valley effect (Mori, 1970; Mori et al., 2012). This concept describes a peculiar emotional response people have to robots, androids, or other animated figures that appear almost, but not perfectly, human. The uncanny valley effect predicts negative responses when artificial entities become too realistic but fail to be perfectly human (Langer & König, 2018; Olivera-La Rosa et al., 2019).

According to the concept, when an artificial character is very non-human-like (like a simple cartoon character or an industrial robot arm), people tend to feel comfortable or even empathetic towards it, proportional to its perceived likeness, as there is no expectation of it being human (Mori, 1970). As a character becomes more human-like, consumers' positive response generally increases. However, when the human resemblance becomes extremely high, but still imperfect, a sudden and dramatic drop in positive emotional response occurs. This is the "uncanny valley", where instead of feeling comfortable, people experience feelings of eerie familiarity, unease, revulsion, or even fear (Gray & Wegner, 2012; Mori et al., 2012). Experiments with human-like robots and computer-generated faces have been reported to generally confirm this concept, suggesting that the phenomenon is related to humans' innate tendency to recognize threats (e.g., MacDorman & Ishiguro, 2006).

While the uncanny valley effect is often cited as a reason why VIs may lack the persuasive ability to strongly incite purchase intention (see Lou et al., 2022), findings regarding its overall impact on consumer response and engagement remain complex. The uncanny valley effect can indeed arise when a VI looks almost human, but something feels subtly off—such as vacant eyes, stiff movements, overly smooth skin, or slightly unnatural expressions. If the VI's rendering, movement, or expressions are not perfectly natural, they risk falling into this valley, making their audience feel uncomfortable or creeped out, which can undermine their effectiveness. Some studies, however, suggest the not all types of human-likeness manipulation necessarily elicit the uncanny valley effect (see e.g., Kätsyri et al., 2015). Despite perceiving human-like VIs as uncanny and eerie, most followers also acknowledged and recognized the VIs' staged fabrication, understanding them as "authentically fake" (Lou et al., 2022). Followers may not necessarily mind the VIs "trespassing" on humanness. Consumers may go back and forth between feeling uncanny and reminding themselves of the VIs' fabricated nature (Arsenyan & Mirowska, 2021). Block and Lovegrove (2021) argue that VIs' transparent uncanniness and humanness together can drive their persuasiveness, creating a mix of "fear and fascination".

To avoid falling into the uncanny valley, creators must design VIs to navigate this delicate balance, aiming for human-likeness that engages but avoids triggering negative reactions. Strategically incorporating curated flaws (e.g., freckles, not-so-perfect hair) can help mitigate this effect and increase acceptance (Lou et al., 2022).

Another significant area of research focuses on consumer perceptions of VIs' sensory capabilities. Consumers tend to perceive VIs as having similar *distal* sensory capacities (visual and auditory) as HIs. However, they perceive VIs as having lower *proximal* sensory capacities (haptic, olfactory, and gustatory) (Zhou et al., 2024). The distinction between these senses is based on the range at which stimuli can be detected: sight and hearing (distal) can detect stimuli from afar, while touch, smell, and taste (proximal) require close range. A major difference is the salience of bodily sensation associated with proximal senses, such as the feeling of wool or the taste of chilies (Marks, 2008). Consumers are thought to have difficulty imagining VIs' proximal sensory experiences. This is because people typically imagine others' subjective experiences by simulating their own feelings in the same situation (Zhou et al., 2024). However, projecting their own bodily sensations onto VIs is difficult because VIs are incapable of experiencing such sensations. In contrast, imagining VIs seeing and hearing is relatively easy, as distal experiences involve minimal bodily sensation and consumers are familiar with sensors that "see" and "hear" (Zhou et al., 2024). The perceived sensory deficiency of VIs has a direct impact on consumer response, particularly on purchase intention. When endorsements focus on proximal sensory experiences, consumers demonstrate lower purchase intention for products endorsed by a VI compared to an HI (Zhou et al., 2024). As consumers perceive VIs as having lower capacity for senses like touch, smell, and taste compared to HIs, VIs are likely to be less effective endorsers for products where these sensory experiences are crucial, such as skincare or food products

(Zhou et al., 2024). Creators and marketers are advised to highlight visual or auditory product attributes when using VIs and to avoid references to tactile, olfactory, and gustatory experiences when endorsing products.

6.2.3 Key Creator Challenges: Authenticity and Transparency

Perceived authenticity in influencer marketing refers to the extent to which followers believe that an influencer is "acting in accord with the true self, expressing oneself in ways that are consistent with inner thoughts and feelings" (Harter, 2002, p. 382). For creators, perceived authenticity is a critical success factor in influencer marketing, reflecting followers' views of an influencer as honest, genuine, and transparent (Audrezet et al., 2020; Burgess & Green, 2018; Marwick, 2015). Influencer marketing is generally deemed more credible than conventional marketing channels like television commercials, print ads, billboards, and direct mail (De Veirman et al., 2017), though authenticity perception varies by platform and content (Audrezet et al., 2020).

Two core arguments explain perceived influencer authenticity, posing distinct challenges for creators. First, *ordinariness* is crucial. HIs gain influence when perceived as "ordinary", sharing information at eye level. They can cultivate the perception of "ordinariness" by sharing semi-private content (Marwick, 2015). For VI creators, replicating this "ordinariness" is complex. VIs, lacking subjective perception, are "solely mediums for others to express their experiences and opinions through". While VIs can effectively engage and personalize interactions, consumers tend to apply the same social norms, treating VIs as though they were real beings. However, creators face the hurdle of followers struggling to build profound emotional bonds, with some likening it to being "catfished" and perceiving VIs as "social-psychologically distant".

Second, direct communication helps explain perceived influencer authenticity. The argument is that influencers' content remains undistorted by traditional intermediaries like reporters or editors. The opportunity to share seemingly unedited, personal views directly with their followers, and engage in genuine one-to-one interaction is a key factor in building trust. However, sustaining this level of direct, personal interaction becomes increasingly difficult as an influencer's following grows. Gaenssle and Budzinski (2021) show that interaction rates decline significantly after just 1,000 followers. Most influencers, including virtual ones, rely on professional teams or AI technologies to manage their social media accounts. While professional teams primarily manage VIs currently, tasks such as content creation and responding to comments are gradually automated by AI technologies, allowing for a continuous, scalable interaction with large audiences. Delegating follower interaction to staff or AI, however, risks impersonal, scripted responses, which can negatively impact perceived authenticity for both HIs and VIs (Wang et al., 2021).

For both "ordinariness" and direct interaction, creators of VIs must navigate a fine line between genuine and manipulatively fabricated authenticity. Interestingly, young audiences tend to perceive VIs as "authentically inauthentic", acknowledging their artificiality while valuing their curated personalities

and tailored content (Lee & Eastin, 2021). Research suggests VIs can effectively advertise brands despite their artificiality if they build credibility through consistent messaging, transparency regarding their nature, and clear alignment with brand values. Openly acknowledging their artificial essence can even enhance followers' perception of authenticity (Pantano & McAlister, 2022). Ultimately, creators must strategically manage VIs' inherent artificiality, leveraging technological sophistication to cultivate a unique form of digital authenticity that resonates with an increasingly discerning audience.

Beyond cultivating perceived authenticity, creators of VIs must also grapple with fundamental questions of transparency. For creators, the rise of VIs introduces significant transparency challenges, especially as many VIs are almost indistinguishable from real humans. Rapid AI advancements suggest a reliable visual distinction between real and virtual will soon be impossible (The Economist, 2024). This blurring of the lines between reality and virtuality can be confusing or even harmful to consumers, especially vulnerable groups, who may not always be able to separate what is real from what is not. Besides visual ambiguity, the entities and motives behind VIs are often unclear. Creator anonymity, while possible, enables unethical conduct, such as spreading fake product reviews, without accountability. As VIs are increasingly developed, personalized, or operated by autonomous AI agents, the question of who is responsible for their outputs becomes increasingly unclear. AI-generated content may be produced without direct human understanding, raising ethical concerns around manipulation, bias, and accountability (e.g., Deutscher Ethikrat, 2023).

As the VI market expands, creators face growing demands for clear, mandatory transparency guidelines. While comprehensive legislation is still developing, creators must keep track of the ongoing developments. India, for instance, has taken a leading role with its Ministry of Consumer Affairs in January 2023, mandating all social media influencers, including VIs, to disclose advertising content (2019 Consumer Protection Act). Similarly, TikTok's 2023 community guidelines, require creators to clearly label realistic synthetic or manipulated content as "synthetic", "fake", "not real", or "altered". Recommendations for brands and creators include explicit disclaimers on VI usage, informing consumers about are aware of data collection and usage. Ultimately, creators are tasked with proactively navigating this complex transparency landscape, balancing technological prowess with clear disclosure to build trust in a world where digital reality blurs with human perception.

6.3 Future Research Agenda

The emergence of VIs represents a significant shift in the social media landscape and influencer marketing paradigm. These computer-generated personas are becoming increasingly popular, amassing millions of followers and gaining influential status among large numbers of consumers. They are viewed by many as the future of marketing, advertising, and commerce (Shen, 2024).

While VIs offer unique attributes like customization and flexibility, they come with notable challenges for creators and associated brands. As we move forward, the evolution of this field will likely involve continued technological advancements alongside a deeper exploration of the psychological and social implications for both creators, marketers, and the broader public. Potential future developments will see more sophisticated AI driving VI interactions and potentially new forms of sensory conveyance technologies impacting their ability to endorse a wider range of products. Furthermore, as VIs become more prevalent and realistic, addressing consumers' perception of authenticity as well as transparency needs will be paramount. To serve as inspiration for future researchers in the field, we suggest the following research agenda.

RQ1: *How does managing the "uncanny valley" effect impact creator strategies for designing and presenting virtual influencers?*

Consumers often perceive human-like VIs as uncanny or eerie. While curated flaws and acknowledging their artificiality can help, creators must carefully navigate this phenomenon. Future research should explore how creators make strategic decisions regarding a VI's appearance and behaviour to avoid triggering the uncanny valley effect while still fostering engagement and acceptance.

RQ2: *What specific strategies do VI creators employ to cultivate perceived authenticity despite the VIs' fabricated nature, and how do these strategies influence consumer trust and purchase intention?*

Perceived authenticity is a critical success factor in influencer marketing. However, achieving authenticity is inherently problematic for VIs because they are artificial and their narratives are potentially manipulative, especially for vulnerable groups who lack critical awareness. VIs currently lack the persuasive ability to strongly incite purchases. The challenge for creators is to make fundamentally unreal VIs feel authentic to consumers, particularly in a way that impacts trust and purchase decisions. Future research should investigate the specific techniques (e.g., narrative choices, interaction styles, portrayal of "flaws") creators use to foster a perception of authenticity and evaluate the effectiveness of these strategies in overcoming the inherent artificiality to build trust and drive purchase intention.

RQ3: *How will different levels and types of transparency and disclosure affect consumer attitudes towards the VIs, their owners, and associated brands?*

The lack of inherent transparency regarding the nature, control, and experiences of VIs, coupled with their increasing visual realism, presents significant challenges for both creators and consumers. These challenges impact perceptions of authenticity, trust, and ultimately, the effectiveness of VIs, particularly for marketing efforts requiring genuine human experience or fostering deep consumer relationships.

Addressing these issues through clearer disclosures and regulations is crucial for building consumer trust and ensuring ethical marketing practices in the evolving landscape of virtual influence.

Future research should investigate how variations in transparency disclosure (e.g., clear AI control labelling, owner identification) and the broader public discourse on these standards collectively impact consumer attitudes toward VIs, their creators, and associated brands.

AI Disclaimer Statement

All authors: In developing our chapter, we used ChatGPT (OpenAI, GPT-4, 2025) to refine language, enhance structural coherence, and engage in reflective dialogue exploring key issues from multiple perspectives. Unless cited according to APA-citation standards, the intellectual content, theoretical framing, and interpretations remain entirely our own.

References

Argyris, Y., Wang, T., Kim, J., & Yin, Z. (2020). The effects of visual congruence on increasing consumers' brand engagement: An empirical investigation of influencer marketing on Instagram using deep-learning algorithms for automatic image classification. *Computers in Human Behavior*, *112*, 106443. https://doi.org/10.1016/j.chb.2020.106443

Arsenyan, J., & Mirowska, A. (2021). Almost human? A comparative case study on the social media presence of virtual influencers. *International Journal of Human–Computer Studies*, *155*, 102694. https://doi.org/10.1016/j.ijhcs.2021.102694

Audrezet, A., de Kerviler, G., & Moulard, J. (2020). Authenticity under threat: When social media influencers need to go beyond self-presentation. *Journal of Business Research*, *117*(1), 557–569. https://doi.org/10.1016/j.jbusres.2018.07.008

Block, E., & Lovegrove, R. (2021). Discordant storytelling,'honest fakery', identity peddling: How uncanny CGI characters are jamming public relations and influencer practices. *Public Relations Inquiry*, *10*(3), 265–293.

Budzinski, O., & Gaenssle, S. (2018). *The economics of social media stars: An empirical investigation of stardom, popularity, and success on YouTube* (Ilmenau Discussion Papers, No. 112). Ilmenau University of Technology, Institute of Economics.

Budzinski, O., & Kuchinke, B. (2019). Industrial organization of media markets and competition policy. In B. von Rimscha (Ed.), *Management and economics of communication* (pp. 21–46). De Gruyter.

Burgess, J., & Green, J. (2018). *YouTube: Online video and participatory culture* (2nd ed.). Polity Press.

Davlembayeva, D., Chari, S., & Papagiannidis, S. (2024). Virtual influencers in consumer behaviour: A social influence theory perspective. *British Journal of Management*, *36*(1), 202–222. https://doi.org/10.1111/1467-8551.12759

de Brito Silva, M. J., de Oliveira Ramos Delfino, L., Alves Cerqueira, K., & de Oliveira Campos, P. (2022). Avatar marketing: A study on the engagement and authenticity of virtual influencers on Instagram. *Social Network Analysis and Mining*, *12*(1), Article 130. DOI: 10.1007/s13278-022-00966-w

Deutscher Ethikrat. (2023). Mensch und Maschine – Herausforderungen durch Künstliche Intelligenz. https://www.ethikrat.org/publikationen/stellungnahmen/stellungnahme-2023-mensch-und-maschine/

De Veirman, M., Cauberghe, V., & Hudders, L. (2017). Marketing through Instagram influencers: The impact of number of followers and product divergence on brand attitude. *International Journal of Advertising*, *36*(5), 798–828. https://doi.org/10.1080/02650487.2017.1348425

Fortune Business Insights. (2025, January). *Influencer marketing platform market size, share, & COVID-19 impact analysis, by component (solution, and services), by influencer type (nano, micro, macro, mega, and celebrity), by application (fashion & lifestyle, travel & tourism, consumer electronics, health & wellness, and others), and regional forecast, 2023–2032*. https://www.fortunebusinessinsights.com/influencer-marketing-platform-market-108880

Gaenssle, S., & Budzinski, O. (2021). Stars in social media: New light through old windows. *Journal of Media Business Studies*, *18*(2), 79–105. https://doi.org/10.1080/16522354.2020.1738694

Grand View Research. (2015). *Global virtual influencer market size, share & trends analysis report by type (non-human, human avatar), by offering (solution, services), by end-use (food & entertainment, sports & fitness, banking & finance), by region, and segment forecasts, 2025–2030*. Retrieved May 28, 2025, from https://www.grandviewresearch.com/press-release/global-virtual-influencer-market

Gray, K., & Wegner, D. M. (2012). Feeling robots and human zombies: Mind perception and the uncanny valley. *Cognition*, *125*(1), 125–130. https://doi.org/10.1016/j.cognition.2012.08.005

Gunawan, D. D., & Huarng, K. H. (2015). Viral effects of social network and media on consumers' purchase intention. *Journal of Business Research*, *68*(11), 2237–2241. https://doi.org/10.1016/j.jbusres.2015.04.019

Harter, S. (2002). Authenticity. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 382–394). Oxford University Press.

HypeAuditor. (2023, January 25). *State of influencer marketing 2023*. https://hypeauditor.com/resources/whitepapers/state-of-influencer-marketing-2023/

Jhawar, A., Kumar, P., & Varshney, S. (2023). The emergence of virtual influencers: A shift in the influencer marketing paradigm. *Young Consumers: Insight and Ideas for Responsible Marketers*, *24*(3), 604–618. DOI: 10.1108/YC-05-2022-1529.

Kätsyri, J., Förger, K., Mäkäräinen, M., & Takala, T. (2015). A review of empirical evidence on different uncanny valley hypotheses: Support for perceptual mismatch as one road to the valley of eeriness. *Frontiers in Psychology*, *6*, Article 390. https://doi.org/10.3389/fpsyg.2015.00390

Langer, M., & König, C. J. (2018). Introducing and testing the creepiness of situation scale (CRoSS). *Frontiers in Psychology*, *9*, Article 2220. https://doi.org/10.3389/fpsyg.2018.02220

Lee, J. A., & Eastin, M. S. (2021). Perceived authenticity of social media influencers: Scale development and validation. *Journal of Research in Interactive Marketing*, *15*(4), 822–841. DOI: 10.1108/JRIM-12-2020-0253

Lin, H. C., Bruning, P. F., & Swarna, H. (2018). Using online opinion leaders to promote the hedonic and utilitarian value of products and services. *Business Horizons*, *61*(3), 431–442. https://doi.org/10.1016/j.bushor.2018.01.002

Lou, C., Kiew, S. T. J., Chen, T., Lee, T. Y. M., Ong, J. E. C., & Phua, Z. X. (2022). Authentically fake? How consumers respond to the influence of virtual influencers. *Journal of Advertising*, *52*(4), 540–557. DOI: 10.1080/00913367.2022.2149641

MacDorman, K. F., & Ishiguro, H. (2006). The uncanny advantage of using androids in cognitive and social science research. *Interaction Studies: Social Behaviour and Communication in Biological and Artificial Systems*, *7*(3), 297–337. https://doi.org/10.1075/is.7.3.03mac

Marks, L. U. (2008). Thinking multisensory culture. *Paragraph*, *31*(2), 123–137.

Marwick, A. (2015). You may know me from YouTube: (Micro)-celebrity in social media. In D. Marshall & S. Redmond (Eds.), *A companion to celebrity* (pp. 333–350). John Wiley & Sons.

Mori, M. (1970). **不気味の谷現象** [The uncanny valley]. *Energy* (**エネルギー**), *7*(4), 33–35.

Mori, M., MacDorman, K. F., & Kageki, N. (2012). The uncanny valley [from the field]. *IEEE Robotics and Automation Magazine*, *19*(2), 98–100. https://doi.org/10.1109/MRA.2012.2192811

Mouritzen, S. L. T., Penttinen, V., & Pedersen, S. (2024). Virtual influencer marketing: The good, the bad and the unreal. *European Journal of Marketing*, *58*(2), 410–440. https://doi.org/10.1108/EJM-06-2023-0498

Olivera-La Rosa, A., Arango-Tobón, O. E., & Ingram, G. P. D. (2019). Swiping right: Face perception in the age of Tinder. *Heliyon*, *5*(12), e02831. https://doi.org/10.1016/j.heliyon.2019.e02831

Pantano, E., & McAlister, A. R. (2022). Artificial influencers: How consumers perceive the effectiveness and trustworthiness of human-like and artificial-looking computer-generated influencers. *Journal of Retailing*, *98*(4), 700–717. https://doi.org/10.1016/j.jretai.2022.09.001

Pieper, J., Wildhirt, K., & Lunze, N. (2024). Virtuelle Influencer:innen als Marketinginstrument. In T. Bolz & G. Schuster (Eds.), *Generative Künstliche Intelligenz in Marketing und Sales* (pp. 221–233). Springer Gabler.

Pieper, J., Wildhirt, K., & Schoder, J. (2023). Die Ökonomie der Superstars in Zeiten sozialer Medien. In A.-K. Langner & G. Schuster (Eds.), *Holistische Social-Media-Strategien* (pp. 69–81). Springer Gabler.

Shen, Z. (2024). Shall brands create their own virtual influencers? A comprehensive study of 33 virtual influencers on Instagram. *NPJ Science of Learning*, *9*, Article 11. DOI: 10.1057/s41599-024-02698-y

Straights Research. (2025). *Virtual influencer market size, share & trends analysis by type (non-human, human avatar), by offering (solution, services), by end-use (food & entertainment, sports & fitness, banking & finance), by region, and segment forecasts*, 2025–2033. Retrieved May 28, 2025, from https://straitsresearch.com/report/virtual-influencer-market

The Economist. (2024, January 17). *Many AI researchers think fakes will become undetectable*. https://www.economist.com/science-and-technology/2024/01/17/many-ai-researchers-think-fakes-will-become-undetectable

Wang, P., Huang, Q., & Davison, R. M. (2021). How do digital influencers affect social commerce intention? The roles of social power and satisfaction. *Information Technology & People*, *34*(3), 1065–1086. DOI: 10.1108/ITP-09-2019-0490

Xiong, Y., Cheng, Z., Liang, E., & Wu, Y. (2018). Accumulation mechanism of opinion leaders' social interaction ties in virtual communities: Empirical evidence from China. *Computers in Human Behavior*, *82*, 81–93. https://doi.org/10.1016/j.chb.2017.09.006

Zhou, X., Yan, X., & Jiang, Y. (2024). Making sense? The sensory-specific nature of virtual influencer effectiveness. *Journal of Marketing*, *88*(4), 84–106. https://doi.org/10.1177/00222429231203699

7 From an Experimental Technology to a Mainstream Product

Implications for Generative AI as an Artistic Medium

Mariya Dzhimova and Benedikt Zönnchen

7.1 Introduction

Artists have long embraced new technologies, and artificial intelligence (AI) is no exception. In the 1970s and 1980s, pioneers such as Harold Cohen and David Cope explored the creative potential of AI. In the 1990s and 2000s, artists like Luke DuBois, Sam Lavigne, and Sven König worked with natural language processing, pattern recognition, and computer vision (Grba, 2022). However, AI art remained niche until the rise of deep neural networks in the late 2010s, which broadened artistic engagement. A key driver of this shift was the introduction of generative adversarial networks (GANs) (Cetinic & She, 2021), developed by Goodfellow et al. (2014), which enabled the creation of synthetic images. Effectively staged projects such as "*The Next Rembrandt*" (2016) and "*Portrait of Edmond de Belamy*" (2018), which sold for nearly $500,000 at Christie's, demonstrated the artistic promise of GANs and attracted public interest. Beyond these headline projects, a growing number of artists began to incorporate AI into their practices, contributing to the institutional establishment of AI art (Zylinska, 2020). Tech firms such as Google and OpenAI supported this through residencies, workshops and conferences. As major art institutions began to exhibit, fund, and promote AI-based artworks, AI became part of the mainstream art world.

In contrast, the rise of accessible text-to-image models such as Midjourney and Stable Diffusion since 2022 has been met with scepticism rather than the earlier enthusiasm. This scepticism stems from a variety of concerns (Bird et al., 2023), including copyright infringement since these models are trained on copyrighted scraped without consent or compensation (Samuelson, 2023); fears of automation replacing creative labour, leading to reputational and economic harm (Jiang et al., 2023); and backlash against the flood of AI-generated content, which is often criticized for lacking quality, authenticity, and originality (Bevilacqua, 2025; Rogers, 2025). Beyond these issues, a less discussed but significant reason for scepticism is the potential unattractiveness of generative AI as an artistic medium. Rapid technological advances and optimizations have transformed generative AI from an experimental technology into a mainstream product. Paradoxically, this very success in terms

DOI: 10.4324/9781003606802-8

of optimization and profit may be diminishing its artistic appeal, especially among those at the forefront of its use: artists.

Pioneering artists such as Mario Klingemann (2023a) have criticized the "*predictable and boring*" one-click nature of current tools, while art critic Ben A. Davis (2023) has warned of the spread of "*anti-creativity*". AI researcher Ahmed Elgammal (2023) went further, claiming that generative AI is destroying creativity and predicting that "*the era of AI art may soon be over*". While there are numerous studies addressing the ethical, legal, and economic implications of generative AI for artists (Caramiaux et al., 2025; Jiang et al., 2023; Piskopani et al., 2023), little research has explored how this socio-technical shift affects artistic engagement. How does the transition from experimental technology to mainstream product shape artistic practice? Are generative models, with their technical affordances, still compelling as an artistic medium? This chapter addresses these questions by first providing a brief overview of ethnographic research on artistic engagement with AI prior to 2022. Secondly, based on these findings, the chapter considers the possible implications of recent socio-technical changes for artistic practice, outlining questions for future research.

7.2 Artistic Engagement with AI Before the Rise of Generative AI

In the second half of the 2010s, a growing number of artists began to integrate machine learning (ML) techniques into their creative practices. Since then, so-called AI art has become part of the mainstream art world as academia provides conceptual tools and legitimacy through conferences and publications, art institutions increase visibility and market value, and the tech industry supports selected artists through patronage (Shelby et al., 2024). However, few ethnographic studies explore the practices of early AI artists prior to the rise of commercial, large-scale generative models (Caramiaux & Fdili Alaoui, 2022; Ploin et al., 2022; Wingström et al., 2024). While Caramiaux and Fdili Alaoui (2022) and Ploin et al. (2022) interviewed internationally recognized artists to explore visual artists' engagement with AI, Wingström et al. (2024) interviewed computer scientists and new media artists to explore how AI might redefine creativity itself. The following section outlines key aspects of artistic engagement with early generative AI models, drawing on these ethnographic studies.

7.2.1 Demanding and Manual Practices vs. Automation and Efficiency

Contrary to dominant narratives framing AI as a tool for automation and efficiency (Caramiaux et al., 2025), artists describe working with data-driven AI as physically and cognitively demanding (Caramiaux & Fdili Alaoui, 2022; Ploin et al., 2022). Their work involves time-intensive technical research, selecting and/or creating models, manipulating code, collecting and curating datasets, and contextualizing results (Ploin et al., 2022). Artistic

workflows often resemble what Caramiaux and Fdili Alaoui (2022) call *crafting*: a hands-on, iterative approach of coding, tweaking, training, and playing with the model. Far from being automated or streamlined, these processes are described by the artist as labour- and time-intensive, involving both high levels of cognitive engagement requiring technical skills and meticulous manual tasks (Caramiaux & Fdili Alaoui, 2022; Ploin et al., 2022).

7.2.2 Exploration vs. Execution

Artists often describe their practice with AI as experimentation, exploration, and play (Wingström et al., 2024). As Caramiaux and Fdili Alaoui (2022) note, artists experience the model's behaviour rather than having a theoretical understanding of its functionality. Their engagement with AI is a highly embodied experience (Ploin et al., 2022), characterized by playful and sometimes frustrating interactions with the model's behaviour (Wingström et al., 2024). This contrasts with the industrial and scientific demand for reliable, predefined and accurate outcomes—an expectation paradoxically hard to meet, as AI systems exemplify an attempt to "control the lack of control" (Esposito, 2022), exposing their inherent unpredictability and opacity even in precision-driven domains. While scientists are concerned with producing results that are recognized as knowledge, artists describe working with AI as a playful, spontaneous process (Wingström et al., 2024), and that they do not adhere to the values that dominate research, science, and business. (Caramiaux & Fdili Alaoui, 2022). For example, artist David Young, interviewed by Ploin et al. (2022, p. 24), shares that he trains the model with minimal data, not only to understand the machine's behaviour, but also "*in contrast to the notion of AI being used for business, scale, and efficiency*". Thus, artists often see AI not as a tool for predetermined, reliable results, but as an exploration in which the process outweighs the result (Caramiaux & Fdili Alaoui, 2022; Ploin et al., 2022).

7.2.3 Mistakes, Glitches, and Surprise vs. Perfection and Precision

Through embodied experience (Ploin et al., 2022) and the process of *crafting* (Caramiaux & Fdili Alaoui, 2022), artists gain an understanding of how the machine works, which not only enables them to predict its behaviour and achieve desired outcomes, but also to "hack" it, i.e., manipulate or subvert it for creative purposes (Cetinic & She, 2021; Shelby et al., 2024). Many artists choose to "work the model against the grain" (Ploin et al., 2022, p. 24), using AI in unexpected ways to discover surprising properties of the system, but also errors and machine failures. This leads to a key aspect of artistic engagement with earlier generative models: pioneer AI artists embrace errors and glitches as a source of inspiration and creative opportunity.

Moreover, the artists' interest in machine failure and glitches goes beyond the possibility of new aesthetics, but also reflects a political stance—artists oppose the efficiency-driven, standardized engineering culture of AI, which

prioritizes performance metrics (Caramiaux & Fdili Alaoui, 2022). As Anna Riedler explains in her interview with Caramiaux and Fdili Alaoui (2022, p. 11):

> *It's those mistakes that I think a lot of artists are really interested in, and it's also those mistakes that software engineers, by-and-large working at companies, are trying to get rid of (…) it's always a race where software engineers are optimizing out the mistakes, and the artists who want to grab them, and use them, and explore them.*

The embrace of AI "failure" by artists echoes earlier movements where glitches have long held aesthetic and political significance in media art (Betancourt, 2016).

7.2.4 Uncertainty and Unpredictability vs. Control and Prediction

Empirical research identified the nondeterministic nature of AI—characterized by unpredictability and uncertainty—as a key factor in its appeal as an artistic medium. It is the ability of AI to produce unexpected, unpredictable results that plays a crucial role in working with AI (Caramiaux & Fdili Alaoui, 2022). Artists consider unpredictability as a fundamental part of AI's creativity (Wingström et al., 2024) and as a form of expressivity (Caramiaux & Fdili Alaoui, 2022). Similarly, Ploin et al. (2022, p. 78) note that it is the generative capabilities of AI that make it particularly compelling for artists, and what is seen as a "step change" from previous artistic tools. Artist Anna Riedler, interviewed by Ploin et al. (2022, p. 35), states:

> *I do think it is a different paradigm because I think just the possibility for it to just kind of do something totally unexpected is much higher. The possibilities of it doing something unexpected within algorithmic art are always within certain bounds. The type of unexpectedness that you get from machine learning, it's just so wild, and so crazy, and just amazing. I think it is, fundamentally, a shift.*

The downside of machine unpredictability, however, is that there is less control over the system. Working with AI involves balancing the excitement of unpredictability with the frustration of having less control over the process (Ploin et al., 2022). For example, the artist Robbie Barrat, interviewed by Ploin et al. (2022, p. 44), explains:

> *A lot of my work is about misinterpretation, and that can be a double-edged sword. It's cool when the network misinterprets things and gives you surprising results, but it's also very frustrating when you cannot get the exact image that you want. I feel like I have a lot less control over the exact thing that I'm making. It's not like I'm a painter where I can*

just place a brushstroke wherever I please. I'm working with a larger system. If I had to describe working with algorithms, I'd have to say it's a split between frustration and nice surprise all the time.

Artistic engagement with AI can thus be described as a constant process of negotiation between chance, automation on the one hand, and control on the other, or as Caramiaux and Fdili Alaoui (2022, p. 11) put it, "finding a balance between desired unpredictability and unwanted uncontrollability".

Ethnographic research shows that artistic engagement with early generative AI models was not adoption of a passive tool, but rather a labour-intensive and cognitively demanding practice similar to craft. Rather than using AI to execute pre-defined ideas, artists often use it to explore and play with the system, embracing glitches and errors as sources of expressiveness and creativity. This approach contrasts with scientific and industrial practice, positioning artistic use of AI as divergent from the norms of optimization, accuracy, and efficiency. A crucial aspect of this practice is the balance that artists strike between controlling the system and allowing it to surprise them—navigating a space where chance and calculation, control and desired unpredictability are constantly negotiated (Dzhimova & Tigre Moura, 2024).

7.3 The Shift from an Experimental Technology to a Mainstream Product

7.3.1 Interface Optimization

Perhaps one of the most significant recent changes in generative AI has been the introduction of prompt-based user interfaces, which simplified the complexity of AI models and made natural language the primary mode of interaction. Platforms such as RunwayML and Midjourney also introduced web-based interfaces and APIs, simplifying back-end infrastructure and lowering the barrier to entry for non-technical users. Previously, generative AI tools required artists to understand coding, ML frameworks, and hardware, making artistic engagement time-consuming and challenging. However, this process of crafting (Caramiaux & Fdili Alaoui, 2022) helped artists gain a deeper understanding of the machine's behaviour, allowing them to not only predict but also manipulate its behaviour. Although early generative tools remained black boxes due to their opaque operation, often producing unexpected results, there were still many levels at which the artist had control over the process. In contrast, web-based platforms seem to limit this control and make the process more opaque by encapsulating the complexity of AI models behind simple text prompts, drag-and-drop interfaces, visual dashboards, and integrations with other tools via APIs.

An example of this potential loss of control can be found in navigating the so-called latent space—an abstract space of features the model has learned. Early on, artists often worked with generative models like GANs

(Goodfellow et al., 2014), which lacked natural language interfaces and did not incorporate the model's textual "interpretation" of latent space. Artists manually explored this space by altering latent vectors—the internal numerical coordinates shaping what the model generates. This hands-on process offered a degree of control over unpredictability and allowed the discovery of unknown or unexpected regions in latent space—novel visual forms. In many artworks, this exploration became not only a way to make latent space tangible but also a form of expression in itself (Grba, 2022).

In contrast, today's models use text prompts to generate images by mapping text to a broader latent space and generating corresponding images—effectively "jumping" to regions aligned with the prompt's semantics. While this shift has made generative tools more accessible, it has obscured the underlying mechanics. As a result, users have less direct control over the generation process and cannot directly experience and influence how the text is mapped to the image.

7.3.2 *Optimization of Model Architecture, Training Strategies, and Data Regimes*

Further technical advances in generative AI have been driven by the rise of diffusion models, which outperform GANs by producing high-fidelity images through a stable, iterative denoising process. Systems like *Stable Diffusion* and others have scaled this architecture using massive text-image datasets, enabling the generation of highly detailed and semantically rich images from textual prompts. At the same time, foundation models trained on diverse multimodal data—often using self-supervised objectives—have reduced the need for task-specific tuning, enabling flexible control over aesthetic styles through natural language prompts.

These technical advances have significantly improved the fidelity, coherence, and semantic precision of the output. Accordingly, contemporary diffusion-based systems can produce polished, high-quality results driven by the prompt, dramatically reducing the errors and unpredictable outcomes typical of earlier models, such as GANs. Training on large datasets and using refined loss functions contributes to greater semantic fidelity, meaning the image accurately reflects the user's intent as expressed in the prompt. As these systems are very good at following the rules, i.e., the instructions in the prompt, users get the results they expect. Any deviations, randomness, or surprises are "limited to what variations of our idea we might get" (Elgammal, 2023). However, as previously mentioned, pioneering artists view unpredictability as a key source of AI's expressiveness and creativity. It seems that the optimization processes that have taken place in recent years have tamed the unpredictability of AI systems—the very characteristic that made AI attractive to artists as an artistic medium.

In addition, contemporary generative models are trained on large-scale datasets containing billions of web-scraped images, where dominant visual

conventions prevail. Consequently, these models internalize and reproduce mainstream and stereotypical aesthetic biases from their training data. As they extract general patterns, they favour common over rare and unique aesthetic styles (Manovich, 2002). Rather than embracing imperfections, accidents, or glitches, the model steers output toward the most statistically probable result, aligned with the dominant traits of its dataset. This tendency narrows the space of possibilities to the most "banana-like" or "strawberry-like" forms—that is, outputs corresponding to the densest clusters in the model's latent space, where the most statistically frequent and visually prototypical representations of categories like "banana" or "strawberry" reside. These high-probability regions yield idealized, generalized versions learned from the training data—perfect simulations approaching what Baudrillard (1984) termed the *hyperreal*. Such an aesthetic default challenges the notion that AI is a neutral tool passively executing instructions. Instead, the model "interprets" prompts through a lens shaped by learned preferences, consistently leaning toward polished, idealized visuals. As artist Mario Klingemann (2023b) observes, "*certain 'pretty' aesthetics is rather difficult to escape in the streamlined and guard-railed creation process, which again gives the world the impression that AI art has to always look this way*".

As a result of all these optimization processes, it seems that the "balance between desired unpredictability and unwanted uncontrollability" (Caramiaux & Fdili Alaoui, 2022, p. 11), which has been described as crucial for artistic engagement with earlier generative models, has been disrupted. On the one hand, the desired unpredictability is controlled, tamed, and stabilized by advanced model architectures, training strategies, and data regimes that minimize errors and deviations and enforce mainstream aesthetics by default. On the other hand, control over the generative process is reduced by encapsulating the complex inner workings of AI models behind simple and accessible but opaque interfaces—i.e., the unwanted uncontrollability is more likely. As Bredies (2014) notes in relation to the design of technologies in general, it seems that the same applies to the development of AI in particular, namely that "reducing complexity through simple or modular interfaces inevitably involves limiting the range of possible actions to those that are expected" (p. 74).

Accordingly, contemporary AI systems have moved from a nascent, unstable technology that allows for exploration and experimentation, to a stable and accurate working product that is designed and inscribed (Akrich, 1992) to be used in certain expected ways for certain expected purposes.

7.3.3 Mass Adoption

The technological advances as well as lower access costs and financial barriers, public attention to AI in the media, and investments in research and development, have led to rapid mass adoption of generative AI (Ali et al., 2025; Bick et al., 2024). Thus, generative AI has rapidly evolved from a niche technology used by pioneers to a mainstream technology used by the general

public. This mass adoption may further limit the appeal of generative AI as an artistic medium, as many artists have reported that it was the novelty and niche nature of the technology that fascinated them. For example, the artist Nicolas Boillot, interviewed by Ploin et al. (2022, p. 18), explains:

> *I first wanted to use machine learning because there was hype. There was huge hype. You want to be the first to use it. Every time a new tool is created, artists engage with it in their practice.*

The artist Helena Sarin interviewed by Ploin et al. (2022, p. 18), argues similarly:

> *Technology drives the artistic process - because novelty is the thing. You need to invent or find breakthroughs, so you look around. You see a new medium and try to use it for your own purposes.*

In addition, the mass adoption of generative AI has led to a flood of AI-generated content, resulting not only in saturation, but also in so-called "*AI slop*"—low-quality AI-generated content that lacks originality, effort, or purpose and is primarily fed into social media feeds to generate clicks (Field, 2025). Accordingly, generative AI seems to be losing not only its novelty, but also its value.

7.4 Conclusion and Future Research Agenda

Technologies that evolve from a mere new idea into an innovation and become established in societies go through a process that begins with an experimental technology used by a few—pioneers and early adopters—and ends with a mainstream product used by the majority (Rogers, 2003). This is also true of generative AI, which for a variety of reasons has moved rapidly from an experimental, nascent technology used by a few to a stable, mainstream tool used and adopted by many (Bick et al., 2024). Once defined by uncertainty, unexpected behaviour, and error, today's AI systems are increasingly reliable, powerful, and sophisticated. This chapter explores the potential implications of this shift from a nascent and niche technology to an efficiently functioning commercial tool for artistic practice with AI. After briefly outlining the socio-technical changes and optimization processes that have taken place in the recent years, and drawing on empirical research into earlier artistic engagement with, the chapter argues that contemporary generative AI may be losing its appeal as an artistic medium.

The reasons for this loss seem to lie not only in the fact that generative AI is no longer a new technology with the potential to discover new aesthetics and visual languages, but above all in the fact that generative AI is no longer a site of unpredictability, surprise, and expression, but of "perfection", scale, and efficiency. For many early adopters in the art world, AI was never about

perfect results or seamless automation; rather, they were fascinated by the unpredictability of early generative systems. The paradox is that as generative AI becomes more accurate or optimized, it seems to simultaneously limit the possibility of creating or opening up new possibilities. In other words, as the "*control of the lack of control*" over generative AI is value-optimized, it seems that the possibility of opening up new possibilities is simultaneously limited. This tendency toward "*perfection*" not only reinforces a certain homogeneity, but also suggests an absence of the friction necessary for innovative creation—the kind of friction that gives rise to new art forms and expressions. These conceptual considerations, however, require further empirical research. Accordingly, the following questions seem crucial for future research on the role of AI in artistic practice.

RQ1: *How do artists experience the socio-technical changes around generative AI?*

The transition of generative AI from a niche technology to a mainstream commercial product occurred at an unprecedented rate. Two months after its release, ChatGPT has reached 100 million users, making it the fastest growing consumer application in history (Milmo, 2023). However, there is limited ethnographic research on how this shift affects artistic engagement with AI. Accordingly, further empirical research is needed to explore how artists engage with the latest socio-technical developments and the extent to which they perceive and experience that AI has moved from a medium of exploration to a tool that performs and fulfils a function (Manovich, 2002). If so, how are artists adapting their approaches to maintain a sense of control, uniqueness and unpredictability? This in turn raises further questions: is there a difference in experience and coping strategies between pioneers, i.e. artists working with AI before mass adoption, and newcomers? Is there a difference between artists for hire and independent artists?

RQ2: *How do these socio-technical changes affect the sub-world AI art?*

Historically, artistic interest in new technologies often follows a familiar trajectory: exploration, appropriation, commodification, obsolescence. The early avant-gardes embraced new technologies not because they were established, but because they were in flux - poorly understood, under-regulated and culturally unsettled, opening up new artistic possibilities. In this experimental phase, artists explore the new possibilities and resistances of the particular technology and how it can be used artistically. In the next stage, artists appropriate the technology and make it the subject of the artwork itself, revealing its possibilities, limitations and impact on the individual and society. Finally, when the technology is no longer new, either to art or to society, it ceases to be an artistic subject and becomes just another tool in the artist's toolbox, working silently in the background. In most cases,

artists then go in search of new technologies. The artist interviewed by Ploin et al. (2022, p. 18), Sofia Crespo, for example, notes: "*When a technology becomes very naturalized in art, it stops being exciting. Then we look for the next thing*". This, in turn, raises further questions about how current artistic engagements with AI relate to this trajectory, whether AI art might be undergoing a parallel transformation. Will the term AI art soon become obsolete, replaced by many different artistic approaches that use AI in one way or another as a mere tool and distance themselves from the terms AI art and AI artist, or will AI art take a new direction?

RQ3: *How these socio-technical changes affect the art world and its logics?*

Since the 17th century, it is part of the art world's self-image that it is primarily concerned with the creation of the new (Pfisterer, 2011), i.e. that art is oriented towards the regime of the new (Reckwitz, 2012), whether as the "absolute" new, the new through a break with the past, the new through the negation and deconstruction of the "myth of the new", or the relative new as a recombination of the past or as a revaluation of the given profane (Groys, 1992). Accordingly, art history is confronted with a stream of novelties and innovations (Hutter, 2021). In recent decades, however, the imperative to 'be innovative' has extended beyond the arts to many areas of society, establishing itself as the ultimate goal not only of the economy but of contemporary society in general, and as the guiding category of modernity (Göttlich & Kurt, 2012). Given the rapid pace of innovation around AI, the imperative to innovate seems to be taking on unprecedented speed and scale. Accordingly, the question arises as to what the implications of this trend might be for the art field and its regime of creating novelty. Is it conceivable that the very place considered to be the epitome of novelty, namely the arts, might respond to this 'spiral of innovation' with rejection and a critical stance towards the imperative of novelty? As media theorist McKenzie Wark (2013) argues, the role of the avant-garde may no longer be to play and subvert, disrupt and innovate, as other fields, especially the dominant ruling class, have long since taken over this role. Perhaps these rapid socio-technical changes around generative AI call for a different kind of avant-garde with the art world.

AI Disclaimer Statement

We, Mariya Dzhimova and Benedikt Zönnchen, acknowledge that we used generative AI—specifically ChatGPT-5 in the preparation of our chapter From Experimental Technology to Mainstream Product. ChatGPT-5 was used for linguistic purposes, namely to refine the language by condensing and shortening passages and by improving stylistic formulation. All conceptual, analytical,

and argumentative content originates from the authors. The generated outputs were reviewed, revised, and approved by the authors before inclusion.

References

Akrich, M. (1992). The description of technical objects. In. W. E. Bijker & J. Law (Eds.), *Shaping technology/building society. Studies in sociotechnical change* (pp. 205–224). MIT Press.

Ali, H., ul Mustafa, A., & Aysan, A. F. (2025). Global adoption of generative AI: What matters most? *Journal of Economy and Technology*, *3*, 166–176.

Baudrillard, J. (1984). *Simulacra and simulation*. The University of Michigan Press.

Betancourt, M. (2016). *Glitch art in theory and practice: Critical failures and post-digital aesthetics*. Routledge.

Bevilacqua, S. (2025). *AI fatigue is real, and it's costing brands more than engagement*. MarTech. https://martech.org/ai-fatigue-is-real-and-its-costing-brands-more-than-engagement/

Bick, A., Blandin, A., & Deming, D. J. (2024). *The rapid adoption of generative AI*. National Bureau of Economic Research.

Bird, C., Ungless, E., & Kasirzadeh, A. (2023). Typology of risks of generative text-to-image models. In *Proceedings of the 2023 AAAI/ACM Conference on AI, Ethics, and Society* (pp. 396–410). https://doi.org/10.1145/3600211.3604722

Bredies, K. (2014). *Gebrauch als Design: Über eine unterschätzte Form der Gestaltung*. Transcript Verlag.

Caramiaux, B., Crawford, K., Liao, Q. V., Ramos, G., & Williams, J. (2025). Generative AI and creative work: Narratives, values, and impacts. *arXiv preprint arXiv: 2502.03940*.

Caramiaux, B., & Fdili Alaoui, S. (2022). "Explorers of unknown planets" practices and politics of artificial intelligence in visual arts. *Proceedings of the ACM on Human-Computer Interaction*, *6*(2), 1–24.

Cetinic, E., & She, J. (2021). Understanding and creating art with AI: Review and outlook. *ACM Transactions on Multimedia Computing, Communications, and Applications*, *18*(2), 1–22.

Davis, B. (2023). *Is crafting 'super prompts' for A.I. generators the art of the future? Probably not*. Artnet. https://news.artnet.com/art-world-archives/ai-prompt-engineer-2288620

Dzhimova, M., & Tigre Moura, F. (2024). Calculated randomness, control and creation: Artistic agency in the age of artificial intelligence. *Arts*, *13*(5), 152–164. https://doi.org/10.3390/arts13050152.

Elgammal, A. (2023). *Text-to-image generators have altered the digital art landscape - But killed creativity. Here's why an era of A.I. art is over*. Artnet. https://news.artnet.com/opinion/ahmed-elgammal-op-ed-ai-art-is-over-2304028

Esposito, E. (2022). *Artificial communication: How algorithms produce social intelligence*. MIT Press.

Field, M. (2025). Why the internet is filling up with nonsense "AI slop"? *The Telegraph*. https://www.telegraph.co.uk/business/2025/01/01/why-the-internet-is-filling-up-with-nonsense-ai-slop/

Goodfellow, I., Pouget-Abadie, J., Mirza, M., Xu, B., Warde-Farley, D., Ozair, S., & Bengio, Y. (2014). Generative adversarial nets. *Advances in Neural Information Processing Systems*, *27*, 2672–2680.

Göttlich, U., & Kurt, R. (2012). *Kreativität und Improvisation: Soziologische Positionen*. Springer.

Grba, D. (2022). Deep else: A critical framework for AI art. *Digital*, *2*(1), 1–32.

Groys, B. (1992). *Über das Neue: Versuch einer Kulturökonomie*. Hanser.
Hutter, M. (2021). Der Innovationsbegriff in der Kunst. In: B. Blätter-Mink, I. Schul-Schaeffer, & A. Windeler (Eds.), *Handbuch Innovationsforschung* (pp. 615–128). Springer.
Jiang, H. H., Brown, L., Cheng, J., Khan, M., Gupta, A., Workman, D., Hanna, A., Flowers, J., & Gebru, T. (2023). AI art and its impact on artists. In *Proceedings of the 2023 AAAI/ACM Conference on AI, Ethics, and Society* (pp. 363–374).
Klingemann, M. (2023a). *Mario Klingemann: Into the wilderness of AI*. Niio Edotorial. https://www.niio.com/blog/mario-klingemann-into-the-wilderness-of-ai/
Klingemann, M. (2023b). In conversation with Mario Klingemann. *Verse*. https://verse.works/journal/mario-klingeman
Manovich, L. (2002). *The language of new media*. The MIT Press.
Milmo, D. (2023). ChatGPT reaches 100 million users two months after launch. *The Guardian*. https://www.theguardian.com/technology/2023/feb/02/chatgpt-100-million-users-open-ai-fastest-growing-app
Pfisterer, U. (2011). Die Erfindung des Nullpunktes. Neuheitskonzepte in den Bildkünsten, 1350–1650. In U. Pfister, & G. Wimböck (Eds.), *Novità. Neuheitskonzepte in den Bildkünsten um 1600* (pp. 7–86). Diaphanes.
Piskopani, A. M., Chamberlain, A., & Holter, T. C. (2023). Responsible AI and the arts: The ethical and legal implications of AI in the arts and creative industries. In *Proceedings of the First International Symposium on Trustworthy Autonomous Systems* (pp. 1–5).
Ploin, A., Eynon, R., Hjorth, I., & Osborne, M. A. (2022). AI and the arts: How machine learning is changing artistic work. In *Report from the creative algorithmic intelligence research project. Technical report*. Oxford Internet Institute.
Reckwitz, A. (2012). *Die Erfindung der Kreativität: Zum Prozess gesellschaftlicher Ästhetisierung*. Suhrkamp.
Rogers, E. M. (2003). *Diffusion of innovations*. Free Press.
Rogers, R. (2025). *The AI backlash keeps growing stronger*. WIRED. https://www.wired.com/story/generative-ai-backlash/
Samuelson, P. (2023). Generative AI meets copyright. *Science*, *381*(6654), 158–161.
Shelby, R., Srinivasan, R., Burgdorf, K., Lena, J. C., & Rostamzadeh, N. (2024). Creative ML assemblages: The interactive politics of people, processes, and products. *Proceedings of the ACM on Human-Computer Interaction*, *8*(1), 1–30.
Wark, M. (2013). *The spectacle of disintegration: Situationist passages out of the twentieth century*. Verso Books.
Wingström, R., Hautala, J., & Lundman, R. (2024). Redefining creativity in the era of AI? Perspectives of computer scientists and new media artists. *Creativity Research Journal*, *36*(2), 177–193.
Zylinska, J. (2020). *AI art: Machine visions and warped dreams*. Open Humanities Press.

8 The *Flood of Artificial Creativity*

A Critical Reflection and Future Research Directions

Francisco Tigre Moura

8.1 The Rise of the *Flood of Artificial Creativity*

The internet is being increasingly inundated with an ever-growing volume of content generated by artificial intelligence (AI) and co-created with it (Wang, 2023; Wei & Tyson, 2024). Consequently, serious concerns have grown that we are heading towards a scenario described by the "Dead Internet Theory" (DIT), which predicts that the overwhelming presence of AI-generated content online will diminish the visibility and influence of genuine human interactions, particularly on social media (Walter, 2024).

Normally associated with misinformation and political content (Monteith et al., 2024), the flood of AI content online also includes creative artworks such as AI-generated music, videos, poems, novels, illustrations, photographs, animations, and more. It is what I describe as the "*flood of artificial creativity*". In this chapter, this term is adopted to refer to the large-scale, algorithm-driven production of AI generated or co-created creative content, produced and distributed at unprecedented speed, efficiency, and scale.

To illustrate the dimension of the issue, Deezer (music streaming platform) published a report in 2025 following the implementation of their AI music detector. The company concluded that 10% of all daily uploads (roughly 10,000 songs per day or 3,720,000 per year) were AI generated (Bernet, 2025). Importantly, AI artists and bands are starting to gain traction, boosted by the premium visibility that streaming platforms provide them on relevant playlists. On Spotify, examples include (as per July 2025): *Aventhis* (399,000 streams per month) and *The Velvet Sundown* (1,2 million streams in July 2025).

According to an estimate produced by EveryPixel Journal in 2023, Adobe Firefly (AI text-to-image tool by Adobe) generated 1 billion images in its first three months, and 916 million images were generated using DALL-E in its first 15 months (Valyaeva, 2023). Recently, CISAC (International Confederation of Societies of Authors and Composers) published a report of a global study on the economic impact of generative artificial intelligence (GAI) in the music and audiovisual sectors and revealed that creators are expected to face a significant drop in revenue by 2028: 21% for audiovisual and 24% for the music sector (Strategy, 2024).

DOI: 10.4324/9781003606802-9

There are several factors that have been influencing the rise of the *flood of artificial creativity* since 2020. For example: (1) the incremental developments and fast global adoption of GAI tools, (2) financial incentive for users based on scale of outputs, and (3) the advances of AI bots and AI agents.

A first reason for *the flood of artificial creativity* are the rapid development and global adoption of new GAI tools which have led to an extraordinary surge in creative outputs due to their powerful combination of high efficiency, ease of use, and low cost. In view of the potential of the GAI market (estimated €64 Billion by 2028, according to Strategy, 2024), several companies have been launched in past years and the list is constantly increasing. The music sector, alone, has become a highly competitive market. Examples of relevant players include Suno, Udio, AIVA, Infinite Album, Harmonai, WaveAI, Beatoven.ai, Loudly, Mureka, Tem.Polor, and many more. In the video and animation sector, recent releases such as Veo 3 (Google) and Sora (OpenAI), for example, have revolutionized the creation of ultra-realistic videos. These tools enable creative professionals, and non-professionals, to generate original high-quality outputs with minimal effort, significantly lowering the barriers to artistic production. Importantly, several experimental studies have revealed that such works can challenge, and even rival human made ones (Tigre Moura et al., 2023; Tigre Moura & Maw, 2021). This new reality, often described as the "democratization of creativity" (Henriksen et al., 2024), raises fundamental questions regarding, for example, the evolving nature of artistic skill and expertise, authenticity, intentionality, motivation, authorship, creative value, and the future of human artistic expression (Wingström et al., 2024).

A second cause of *the flood of artificial creativity* is the fact that generative AI platforms create financial incentives for user adoption based on scale of outputs. For example, Boomy, an AI music platform, displays a powerful tagline on their homepage describing the business model for users: "*Create original songs in seconds, even if you've never made music before. Submit your songs to streaming platforms and get paid when people listen*" (boomy.com). It also displays and permanently updates the number of original tracks created through the platform: 21,652,136 (updated 15:08, 21.08.2025). Thus, as described in Boomy's website, the incentive of such GAI platforms for users is to empower them to produce creative outputs, which are subsequently disseminated across digital platforms (e.g., streaming) and the revenue generated is redistributed between creators and AI companies. Thus, the larger the scale of production, the greater the financial return for all stakeholders involved. Not surprisingly, in recent years we have witnessed an immense rise of "content farms" (digital operations created to produce large volumes of low-cost, AI generated or optimized, content for search engine rankings and monetization). Such organizations are intentionally designed to exploit this system (Mears, 2023), are very challenging to detect (Puccetti et al., 2024), and are responsible for a great deal of the low-quality content that *floods* the internet.

Third, powerful sources of *the flood of artificial creativity* are AI bots and AI agents. AI bots are task-oriented "tools that act autonomously, behave or respond intelligently to others, and even manipulate people's mind" (Grimme et al., 2022, p. 80), while AI agents are autonomous systems capable of perceiving their environment, making decisions, and executing actions to achieve specific goals (Russell & Norvig, 2021). Unsurprisingly, AI bots and agents are also responsible for generating and distributing autonomously creative content across social media platforms. For example, "Zerebro", self-titled "schizo artist AI" (Yu, 2024), has surpassed 120,000 followers on X (Twitter) and regularly posts images and jokes it created (among other forms of content), achieving significant user engagement. Importantly, and worryingly, the rapid evolution of AI suggests that these agents will likely soon possess the capability of developing other AI agents, thereby exponentially amplifying the proliferation of AI-generated content online.

To exemplify the magnitude of the problem, a case identified in the United States revealed that one single individual deployed more than 1,200 bots to generate and stream over 15,000 AI-created songs, producing at least $10 million in potentially fraudulent royalties (McMahon, 2024). Cases like this raise severe concerns. They highlight the easiness of a single individual to develop a "profitable flood" of immense scale and illustrate the vulnerabilities of streaming platforms when faced with automated mass production of creative outputs.

Although the rise of the flood is not limited to these three factors, the combination of continuous development and adoption of smart creative tools, financial incentives based on scale of outputs, and the proliferation of creative AI bots and agents reveal one relevant conclusion: *the flood of artificial creativity* is only starting, and it will fundamentally change creative sectors, products, public perception, and creativity as it is now understood. The key premises described in the dead internet theory, at this stage, seem more probable and closer than ever before.

8.2 Swimming in the *Flood of Artificial Creativity*

As the scenario of the *flood* seems inevitable, it raises several important questions for debate: should *the flood* be controlled or regulated? Should AI generated works be identified and deprioritized by recommender systems or "flagged", as it is done by Deezer (songs are removed from algorithmic recommendations) and YouTube (authors must disclose if AI was used and users may report videos)? Importantly, human artists have also started to voice their concerns. For example, recently over 200 world-known artists such as Billie Eilish, Aerosmith, estate of Frank Sinatra, Norah Jones, Pearl Jam and many more signed a joint letter against predatory use of AI in music, calling for protective copyright measures for human creators and responsible use of the technology (Artist Rights Alliance, 2024). The letter states that: "*We call on all AI developers, technology companies, platforms and digital*

music services to pledge that they will not develop or deploy AI music-generation technology, content or tools that undermine or replace the human artistry of songwriters and artists or deny us fair compensation for our work." (Artist Rights Alliance, 2024).

Despite the complexity of the issue, possible solutions are starting to be implemented as *the flood* also poses economic difficulties for online platforms. For example, Google announced in July 2025 a policy change to its YouTube Partner Program (YPP) which will affect the monetization of creators. In short, the company aims to prioritize what they describe as "human" and "original" made content (Perez, 2025). This aims to negatively impact the monetization of low-quality AI generated videos (e.g. AI voices over AI videos or images produced at scale) and redundant or replicated videos.

This initiative is not merely a content policy, but a recognition of a fundamental principle in consumer psychology: scarcity moderates value (Shah et al., 2015). When individuals perceive a resource (regardless of its nature) to be scarce, they are more likely to engage in trade-off thinking and assign higher, more stable value to that resource. On the other hand, when abundance prevails (especially if the abundance is unfiltered and low in quality) perceptions of value may become unstable, or worse, degraded (Shah et al., 2015). Thus, the *flood of artificial creativity* threatens not only artistic value, but also the perceived worth of the platforms distributing them, such as YouTube.

The role played by scarcity in shaping perceived value is further reinforced by commodity theory, which defends that the desirability of a product increases as its availability decreases (Lynn, 1991). While this principle has long been used by marketers to enhance the appeal of goods via limited editions or exclusive releases, its inverse implication is rarely discussed: when content becomes ubiquitous, especially in algorithmically un-curated forms, it loses its perceived uniqueness and thus its psychological utility. If platforms such as YouTube or Spotify allow themselves to become overwhelmed by the *flood of artificial creativity*, the abundance of AI content with questionable authenticity and value, they risk diluting the symbolic and experiential value they offer to users. Over time, this may compromise, for example, their cultural relevance and potential curation authority, two intangible factors that positively influence user engagement and brand loyalty (factors which are especially critical in saturated digital environments, such as streaming).

It is therefore vital for companies, organizations, and platforms to address the *flood of artificial creativity*, in order to strategically preserve the value of online content and of their platforms. This does not mean arbitrarily restricting access, but investing in high-quality, human-led, curation systems, reinforcing standards of originality, creativity and elevating signals of human craftsmanship. As Shah et al. (2015) suggest that scarcity can anchor valuation more firmly by triggering trade-off thinking, thereby protecting the cognitive salience of creative value during informational abundance.

Importantly, great effort must be continuously applied towards illegal or unethical tactics using AI to scale creative outputs in a way that is detrimental

to creatives and creative industries. For example, there are still several technical challenges in the detection of plagiarism (Patwardhan et al., 2024), redundancy and deepfake works (Jbara et al., 2024). This is especially relevant when considering the extraordinary production potential of hordes of AI bots and agents continuously working independently in large-scale content farms.

8.3 The Public and The Flood

The abundance of creative works found in *the flood* also poses a direct impact to the audiences' perception. The extraordinary and ever-increasing amount of hyper-realistic artificially created content is expected to influence even more the public's ability to distinguish between a work that is the result of human creative mastery, one that is an automated output developed independently by a smart system, and one that has been co-created by a human and a smart agent. This is especially relevant as the value of creative works is largely defined by the perception of the public and how they perceive the nature of the creative process (Tigre Moura, 2024; Sternberg & Karami, 2022).

Thus, one of the critical issues of *the flood* is how it will impact perceived creative value. After all, the maxim "*the greater the supply, the lower the value*" indicates that the abundance of creative products could negatively affect the appreciation for what is exceptional, scarce and unique (Carr, 2020). Such potential devaluation, aligned with consumer desensitization (resulting from wide adoption and exposure to GenAI tools and outputs), represents an enormous challenge for the creative sector. Unfortunately, to date, the literature is largely based on cross-sectional studies and lacks longitudinal insights. This represents an important gap which is addressed again in the final section of this chapter (5. Future Challenges and Research Directions).

However, history reveals examples where fast technological advances have resulted in a desire for more "human" forms of creativity, such as the "Arts and Crafts Movement". Originated in Britain as a response to the Industrial Revolution, this movement opposed the mechanization and mass production of decorative arts (Cumming & Kaplan, 1991). Advocates emphasized craftsmanship, authenticity, and the moral value of handmade objects, positioning themselves against the uniformity and perceived "soullessness" of machine-made goods (Cumming & Kaplan, 1991). Thus, in view of the scale and easiness of creative production by, or with AI, one should expect a potential cultural movement, resistance or response as a counter-reaction to *the flood*. After all, the public perceptions towards creative products are highly influenced by involvement, the degree to which individuals are engaged with a specific artistic domain or cultural practice (Michaelidou & Dibb, 2008). For example, when feeling a close connection to a form of art expression (e.g., music genre), an artist, or a creative community. Thus, such counter-reactions represent an innate response of defence towards aspects that the public feel highly involved with. In fact, several previous studies have reinforced AI biases (often called *algorithm aversion*), revealing humans are

biased against AI-generated outputs in art and music and in favour of human made ones (Millet et al., 2023; Ragot et al., 2020; Zhang & Zhu, 2024). Thus, one should also expect a demand from portions of the public for solutions that steer them away from *the flood* and provide creative content that will be more deemed as authentic, similar to the solution provided by YouTube and discussed earlier in this chapter (section 2).

8.4 Consequences for Creators: Professional Identity and Cultural Authority

8.4.1 Creative Expertise in the Age of the Flood

Historically, artistic and creative expertise has been deemed a process of prolonged development, commitment, and effort (physical or cognitive). It demands, for example, technical proficiency, domain-specific knowledge, originality, aesthetic sensibility, and a capacity for conceptual risk-taking. These features are often only developed through years of practice, critical feedback, and embedded participation in creative communities (Sternberg & Lubart, 1999). For example, Kaufman and Kaufman (2007) found that, on average, writers reach their peak publication approximately 10.6 years after releasing their first work. Thus, in short, creative expertise in many fields typically develops through sustained effort and persistence over an extended period (Boden, 2016).

However, in face of the *flood of artificial creativity*, factors that once represented creative mastery (e.g., physical and cognitive effort, time investment or depth of intention) become more diluted and less visible. And this is of great relevance, as expertise often represents the possession of skill and the recognition of one's ability within a relationship of trust and legitimacy between creator and the public. As such, generative AI negatively influences this relationship by enabling a possible illusion of "traditional human creative expertise" without the need of actual human labour or narrative that, normally, follows artistic processes. As such, it may result in a form of objective evaluation, where outputs are largely judged through non-symbolic measures (e.g., number of streams and views).

Moreover, AI's extraordinary accuracy and ease of use enables non-creatives to develop expert-like outputs, leading to a perceptual confusion between high and low creative skill, or between imitation and invention. Consequently, it redefines the notion of creative expertise, and triggers the need to rethink creativity (Tigre Moura, 2024) and to develop a new paradigm that encompasses these new premises (Lee, 2022; Tigre Moura, 2023). Importantly, in this new scenario of *the flood* and the new creative paradigm, the change in the notion of what creative expertise (as is currently understood) entails, represents not a temporary transitional consideration, but the new established notion in an AI-saturated creative economy.

8.4.2 Rethinking Creative Identity in the Age of the Flood

As discussed previously, the impact of *the flood* is not limited to institutional disruption or shifts in public perception. In a context, where an unimaginable amount of creative works is produced and distributed daily, the very act of becoming or being a creator acquires new social, psychological, and economic meanings (Tadimalla & Maher, 2024). For example, the overwhelming volume of creative content, much of it perceived as polished, immediate, high-quality and endlessly diverse, can function as both motivator and the opposite. From one perspective, the accessibility and ease of use of generative tools may inspire non-creatives to experiment with artistic tasks, either as a means for self-expression (Tigre Moura, 2024) or motivated by financial opportunities by contributing to the flood (as discussed previously in this chapter).

However, this same environment of hyperabundance triggers several psychosocial tensions. As more individuals enter creative spaces, and as autonomous AI systems produce at massive scales without rest, human creators may experience what could be described as a recognition crisis as their work is diluted, as described in the "dead internet theory". In an ecosystem *flooded* with creative content, gaining visibility becomes even more arbitrary, subject to algorithmic decisions beyond the control of creators, and open to unethical practices. All of this in a moment where creators already struggle to balance, for example, actual creative production with content creation for social media for personal branding and public attention (Flader, 2022).

Furthermore, the *flood* accelerates the development of virtual social comparative fatigue or exhaustion (Jabali et al., 2023; Michinov, 2005), a form of psychological burnout, as a consequence of feeling overwhelmed by the scale and pace of creative digital production. Unlike earlier phases of the internet, where creators competed within bounded communities or genres, the current (and future) reality confronts them with an endless stream of content across multiple modalities and platforms (e.g., either for their work or personal branding). In short, this fragments attention even more in an already highly saturated environment and amplifies the need and pressure on creators to continuously produce to remain relevant (Flader, 2022). Thus, this dynamic directly incentivizes quantity and frequency of production over quality. In a similar manner, it incentivizes conformity over experimentation, influencing the intrinsic motivations that traditionally underpin the development of creative practice (Caper, 1996).

Therefore, the inevitable paradigm shift which is impacting creative domains (due to the nature of AI and the impacts of the flood) demands a collective rethinking of what creative identities represent, and how they are recognized and validated in a context where human creative output is no longer exceptional by default (Tigre Moura, 2023). And this is made especially necessary as the *flood of artificial creativity* reshapes the cultural economy of creative content and the psychological notions of creative identity. After all, as discussed previously, the abundance of creative AI content alters

the conditions and premises under which humans see themselves as creators, their motivation to create and the objective and subjective valuation of worth towards their work and themselves as creatives.

8.5 Future Challenges and Research Directions

Although the *flood of artificial creativity* is still at an infant stage (especially considering its future potential), the water level is rising fast, and several factors discussed in this chapter suggest the creative online domain is quickly progressing towards the scenario suggested in the dead internet theory (Walter, 2024). This calls for a proactive collective approach (including scholars, artists, industry professionals and policy makers), to monitor, understand, and adapt to the transformations caused by *the flood*. The list of issues to be researched seems, at this stage, equally abundant. Nevertheless, I would highlight three issues, which should be addressed in a longitudinal manner:

RQ1: *How is the objective and subjective value of different forms of creative outputs impacted over time by the flood of artificial creativity, when human skill, expertise, and intentionality become increasingly ambiguous, and scarcity is no longer a determinant factor for public perception?*

Several studies have addressed the investigation of the value of AI created and co-created works (Hall & Schofield, 2024; McCormack, 2022; Tigre Moura, 2023). Nevertheless, to my knowledge, the current literature still lacks robust longitudinal investigation of the value of AI art and creative works in a longitudinal manner, especially also considering the implications of the *flood* across different creative product types and audience profiles.

RQ2: *How should potential negative effects of the flood of artificial creativity on human motivation to engage in and develop creative skills and expertise (e.g., learning music theory or how to play an instrument) be mitigated?*

As discussed in the chapter, the development of creative expertise and identity is directly impacted by human motivation to engage with creative endeavours. Thus, it is of great importance to develop strategies that can help minimize possible negative effects of the flood on human desire to develop non-smart creative skills and expertise, as these could pose serious long-term consequences for society.

RQ3: *What new economic frameworks can be developed to support human creators in an era where the scale of creative works diminish even more the economic value of creative products?*

The economic benefits for human and AI creators to produce for *the flood* are clear, as discussed in the chapter. Nevertheless, it is also vital

the development of novel economic frameworks and ecosystems that support human creators that do not create for *the flood* (which do not intentionally produce at scale for a strategic economic goal). This is of great relevance to enable the development and maintenance of creative sectors which are financially sustainable in the future.

AI Disclaimer Statement

ChatGPT-5 was used in the chapter for general formatting, refinement of language, and improving stylistic formulation. The conceptual, analytical, and argumentative development of the content was done by the author without the use of AI. The final version was reviewed, revised, and approved by the author.

References

Artist Rights Alliance. (2024, April 1). *200+ artists urge tech platforms: Stop devaluing music*. Medium. https://artistrightsnow.medium.com/200-artists-urge-tech-platforms-stop-devaluing-music-559fb109bbac

Bernet, J. (2025, January 24). *Deezer deploys cutting-edge AI detection tool for music streaming*. DeezerNewsroom. https://newsroom-deezer.com/2025/01/deezer-deploys-cutting-edge-ai-detection-tool-for-music-streaming/

Boden, M. A. (2016). *AI: Its nature and future*. Oxford University Press.

Boomy. (n.d.). *Boomy – Make music with AI*. https://boomy.com

Caper, R. (1996). Play, experimentation and creativity. *The International Journal of Psycho-Analysis*, *77*(5), 859.

Carr, N. (2020). *The glass cage: How our computers are changing us*. W.W. Norton & Company.

Cumming, E., & Kaplan, W. (1991). *The arts and crafts movement* (pp. 18–22). Thames and Hudson.

Flader, M. (2022). *Being an important artist: Creative production and artistic branding on social media* [Doctoral dissertation, Emily Carr University of Art and Design].

Grimme, C., Pohl, J., Cresci, S., Lüling, R., & Preuss, M. (2022, October). New automation for social bots: From trivial behavior to AI-powered communication. In *Multidisciplinary international symposium on disinformation in open online media* (pp. 79–99). Springer International Publishing.

Hall, J., & Schofield, D. (2024). The value of creativity: Human produced art vs. AI-generated art. *Art and Design Review*, *13*(1), 65–88.

Henriksen, D., Woo, L., & Mishra, P. (2024). Unlocking creativity: Dr. Anna Abraham on interdisciplinarity, AI, and human innovation. *TechTrends*, *68*(5), 847–853.

Jabali, O., Saeedi, M., Sleem, H., & Alawneh, Y. (2023). *Unraveling the impact of virtual social comparisons on psychological Burnout among An-Najah National University Students: A mixed method study*.

Jbara, W. A., Hussein, N. A. H. K., & Soud, J. H. (2024). Deepfake detection in video and audio clips: A comprehensive survey and analysis. *Mesopotamian Journal of CyberSecurity*, *4*(3), 233–250.

Kaufman, S. B., & Kaufman, J. C. (2007). Ten years to expertise, many more to greatness: An investigation of modern writers. *The Journal of Creative Behavior*, *41*(2), 114–124.

Lee, H. K. (2022). Rethinking creativity: Creative industries, AI and everyday creativity. *Media, Culture & Society*, *44*(3), 601–612.

Lynn, M. (1991). Scarcity effects on value: A quantitative review of the commodity theory literature. *Psychology & Marketing*, *8*(1), 43–57.
McCormack, J. (2022). The value of AI art. In *The book of x: 10 years of computation, communication, aesthetics & x* (pp. 181–192). i2ADS: Research Institute in Art, Design and Society.
McMahon, L. (2024, September 6). *Man accused of using bots and AI to earn streaming revenue*. BBC News. https://www.bbc.com/news/articles/cly3ld9wy3eo
Mears, A. (2023). Bringing Bourdieu to a content farm: Social media production fields and the cultural economy of attention. *Social Media+ Society*, *9*(3), 20563051231193027.
Michaelidou, N., & Dibb, S. (2008). Consumer involvement: A new perspective. *The Marketing Review*, *8*(1), 83–99.
Michinov, N. (2005). Social comparison, perceived control, and occupational burnout. *Applied Psychology*, *54*(1), 99–118.
Millet, K., Buehler, F., Du, G., & Kokkoris, M. D. (2023). Defending humankind: Anthropocentric bias in the appreciation of AI art. *Computers in Human Behavior*, *143*, 107707.
Monteith, S., Glenn, T., Geddes, J. R., Whybrow, P. C., Achtyes, E., & Bauer, M. (2024). Artificial intelligence and increasing misinformation. *The British Journal of Psychiatry*, *224*(2), 33–35.
Patwardhan, K., Bhalerao, S., & Chakrabarti, S. S. (2024). Plagiarism: Emerging challenges and potential solutions. In *Scientific publishing ecosystem: An author-editor-reviewer axis* (pp. 59–77). Springer Nature Singapore.
Perez, S. (2025, July 9). *YouTube prepares crackdown on mass-produced and repetitive videos as concern over AI slop grows*. TechCrunch. https://techcrunch.com/2025/07/09/youtube-prepares-crackdown-on-mass-produced-and-repetitive-videos-as-concern-over-ai-slop-grows/
Puccetti, G., Rogers, A., Alzetta, C., Dell'Orletta, F., & Esuli, A. (2024). *AI "News" content farms are easy to make and hard to detect: A case study in Italian*. arXiv preprint arXiv:2406.12128.
Ragot, M., Martin, N., & Cojean, S. (2020, April). AI-generated vs. human artworks. A perception bias towards artificial intelligence? In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1–10).
Russell, S. J., & Norvig, P. (2021). *Artificial intelligence: A modern approach* (4th, global ed.). Pearson.
Shah, A. K., Shafir, E., & Mullainathan, S. (2015). Scarcity frames value. *Psychological Science*, *26*(4), 402–412.
Sternberg, R. J., & Karami, S. (2022). An 8P theoretical framework for understanding creativity and theories of creativity. *The Journal of Creative Behavior*, *56*(1), 55–78.
Sternberg, R. J., & Lubart, T. I. (1999). The concept of creativity: Prospects and paradigms. In *Handbook of creativity* (Vol. 1, pp. 3–15). Cambridge University Press.
Strategy, P. (2024). *Study on the economic impact of generative AI in the music and audiovisual industries*. CISAC. Retrieved February 18, 2025, from https://coilink.org/20.500.12592/11wwrqs. COI: 20.500.12592/11wwrqs.
Tadimalla, S. Y., & Maher, M. L. (2024). Implications of identity in ai: Creators, creations, and consequences. *Proceedings of the AAAI Symposium Series*, *3*(1), 528–535.
Tigre Moura, F. (2023). Artificial intelligence, creativity, and intentionality: The need for a paradigm shift. *The Journal of Creative Behavior*, *57*(3), 336–338.
Tigre Moura, F. (2024). Rethinking creativity frameworks for artificial intelligence. In F. Tigre Moura (Ed.), Artificial intelligence, co-creation and creativity: The new frontier for innovation (pp. 32–44). Routledge.

Tigre Moura, F., Castrucci, C., & Hindley, C. (2023). Artificial intelligence creates art? An experimental investigation of value and creativity perceptions. *The Journal of Creative Behavior*, *57*(4), 534–549.

Tigre Moura, F., & Maw, C. (2021). Artificial intelligence became beethoven: How do listeners and music professionals perceive artificially composed music? *Journal of Consumer Marketing*, *38*(2), 137–146.

Valyaeva, A. (2023, August 15). People are creating an average of 34 million images per day: Statistics for 2024. *Everypixel Journal*. https://journal.everypixel.com/ai-image-statistics

Walter, Y. (2024). *Artificial influencers and the dead internet theory* (pp. 1–2). AI & SOCIETY.

Wang, Y. (2023). *Synthetic realities in the digital age: Navigating the opportunities and challenges of ai-generated content*. Authorea Preprints.

Wei, Y., & Tyson, G. (2024, October). Understanding the impact of AI-generated content on social media: The Pixiv case. In *Proceedings of the 32nd ACM International Conference on Multimedia* (pp. 6813–6822).

Wingström, R., Hautala, J., & Lundman, R. (2024). Redefining creativity in the era of AI? Perspectives of computer scientists and new media artists. *Creativity Research Journal*, *36*(2), 177–193.

Yu, J. (2024). *Memes, markets, and machines: The evolution of on-chain autonomy through hyperstition*. arXiv preprint arXiv:2410.23794.

Zhang, X., & Zhu, Q. (2024). *Algorithm aversion to generative artificial intelligence in creative content*.

9 Beethoven X

Human–Machine Collaboration in the Completion of an Unfinished Symphony

Ahmed Elgammal, Matthias Röder, Walter Werzowa, and Mark Gotham

9.1 Introduction

While Ludwig van Beethoven's nine symphonies stand among the most influential works in Western music, the story of a tenth symphony has fascinated musicians and historians for over a century, not because we can hear it, but because we can't.

Beethoven's Tenth Symphony was never completed. What survived are a handful of sketch pages and notes, some in words, others in rough musical notation, that suggest ideas and directions he may have been exploring. These sketches date from around 1817–1818, shortly after Beethoven agreed to compose a pair of symphonies for the Philharmonic Society of London. One became the famous Ninth Symphony, with its triumphant "*Ode to Joy*". The other, the Tenth, was left behind as a set of tantalizing fragments (Gotham et al., 2022).

To mark the 250th anniversary of Beethoven's birth, Deutsche Telekom commissioned a project to explore the possibility of using artificial intelligence (AI) to construct a version of Beethoven's Tenth Symphony based on his surviving sketches (Elgammal, 2021; Fulde, 2021; Moody, 2021). The goal was not to claim definitive authorship or uncover a lost masterpiece, but to investigate how machine learning, guided by musicologists, composers, and historical research, could extend Beethoven's fragmentary ideas into a stylistically faithful and musically compelling form. The project aimed to spark public dialogue about the role of AI in the creative arts and to reimagine how technology might support human interpretation, rather than replace it.

The surviving sketches for Beethoven's Tenth Symphony are sparse, fragmentary, and unevenly distributed, comprising brief thematic ideas, verbal notes on form and affect, and isolated references to liturgical materials and contrapuntal techniques (for details of the full sources, see Gotham et al., 2022). Certain sections, notably fragments of a first movement and the start of a scherzo, contain relatively more developed material. However, the overall collection of sketch material falls far short of the harmonic, structural, and orchestral detail necessary for a full symphonic realization.

DOI: 10.4324/9781003606802-10

This makes the task of completing the Tenth Symphony extraordinarily challenging. Unlike finishing a largely written manuscript, this is more like assembling a puzzle from just a few scattered pieces, without knowing what the final picture was supposed to look like. Scholars and composers must make educated guesses about Beethoven's intentions, style, and logic. What kind of movement might grow from this sketch? How might Beethoven have developed this theme? Are these ideas truly connected, or were they experiments that he later abandoned?

And yet, the sketches leave open the question: what if these gaps could be filled, not by individually attempting to inhabit the mind of Beethoven, but by using tools that didn't exist in his time? In the years leading up to this project, researchers had increasingly investigated the potential of AI and machine learning (ML) to support and extend creative processes in music composition (see, e.g., Briot et al., 2020; Sturm et al., 2022). However, most of these efforts focused on generating brief musical excerpts—typically a few minutes in length—in the style of specific composers or genres (e.g., Huang et al., 2018; Oore et al., 2020). The Beethoven X project posed a significantly more complex challenge, requiring the development of AI models capable of expanding upon fragmentary sketch material in a manner consistent with Beethoven's compositional style on a much greater scale. This included modelling how the composer might elaborate thematic ideas into structurally coherent movements and, ultimately, orchestrating these extended sketches into full symphonic form across two complete movements.

The Beethoven X project took this approach seriously. It began not with the fantasy of "*Beethoven in a box*" but with the recognition that creativity is often collaborative, iterative, and uncertain. The aim was not to replace the composer, but to partner with him—using historical knowledge, computational tools, and musical insight to explore one of classical music's most enduring "*what if*" questions.

The Beethoven sketches remind us that creativity is often messy. Even the most celebrated minds, capable of extraordinary output, charted a complex journey to finished works, via ideas in flux, with open-ended possibilities, and unfinished thoughts. By bringing together old notes, new technology, and human imagination, we can begin to re-engage with that process—not to claim a definitive answer, but to explore the many paths that might have been.

This chapter, authored by the team who developed the project, traces the development of the Beethoven X project, detailing the challenges encountered and insights gained in pioneering new methods for creative collaboration between human expertise and AI. It further reflects on how the project was received by both the public and the expert community and explores the broader debates it provoked concerning artistic value, authenticity, and the evolving role of creative agency in human–machine partnerships.

9.2 Beethoven X—The Journey

This section traces the Beethoven X project from its conception to its first performances. It begins with the project's genesis, vision, and the assembly of a multidisciplinary team, then situates the work within the historical background of Beethoven's unfinished Tenth Symphony and its surviving sketches. It next explains the technical approach, detailing the AI systems developed to extend, harmonize, transition, and orchestrate Beethoven's fragments. The narrative then turns to the collaborative process that integrated AI outputs with human musical judgment, highlighting the iterative exchanges between models, composers, and musicologists. Finally, it recounts the public unveiling of the symphony, its premiere performances, and the global reception that followed.

9.2.1 Project Context, Vision, and Building the Team

The idea was bold, even audacious: could AI be used to complete Beethoven's unfinished 10th Symphony? This question, posed by Michael Schuld, then of Deutsche Telekom in 2019, marked the beginning of an extraordinary journey—one that would bring together experts in musicology, AI, and composition to reimagine one of history's greatest composers through the lens of cutting-edge technology.

The genesis of the project can be traced back to a late-night conversation in Bonn, where Schuld and Matthias Röder—then director of the Karajan Institute and a long-time advocate for innovation in music—discussed the idea of "*music as data*". That exchange lingered with Schuld, and when planning a high-level event for Deutsche Telekom's leadership at Internationale Funkausstellung (IFA), he invited Röder to expand on the theme in a keynote address. Not long afterward, he followed up with a direct and provocative question: "*Is it possible to finish Beethoven's 10th Symphony using AI*?"

Röder, who had studied Beethoven's creative process in depth with Lewis Lockwood as a College Fellow at Harvard University, understood the magnitude of the challenge. The composer's sketchbooks, often dense and fragmentary, required both analytical rigor and creative insight to interpret. At the same time, Röder recognized the promise of modern machine learning, having previously collaborated with computer scientists on projects involving music manuscripts and neural networks. Completing Beethoven's symphony with AI would require an unprecedented blend of scholarship and technology.

To assess the project's feasibility, Röder began assembling an interdisciplinary team. He reached out to Professor Ahmed Elgammal, a pioneer in the application of AI to visual art, whose company, Playform, had already demonstrated how AI could support and extend human creativity. Though Elgammal had never applied his methods to music, he was intrigued by the challenge and eager to collaborate. Röder also consulted Professor Robert

Levin, a renowned scholar-performer known for his improvisations and reconstructions in the style of composers including Mozart and Beethoven (Levin, 1992). While Professor Levin could not join the project full-time, his early input and feedback throughout was invaluable in framing the musical challenges ahead. Also, part of the original team was Dr. Mark Gotham, whose background in composition, music theory, and music informatics made him uniquely suited to the project's dual demands. Gotham was responsible for helping prepare the training dataset, ensuring that the selection and formatting of musical material would support meaningful learning by the AI model. To lead the creative integration of the AI-generated material, Röder brought on Walter Werzowa, an Austrian-American composer best known for his work in film music and sonic branding. As the project's creative head, Werzowa served as the primary interlocutor between the AI outputs and the other human experts. The team also included AI PhD student Kunpeng Song and Nikolai Böhlefeld, a student from the University of Salzburg, supporting the technical implementation of the AI system and training data preparation, respectively.

The team met for its first workshop in the summer of 2019 at the Music Department of Harvard University. Over the course of several intensive days, the group examined Beethoven's surviving sketches, studied previous attempts to complete his 10th Symphony, and reviewed completions of unfinished works by Mozart, drawing insights from both historical practice and contemporary scholarship. Equally important was an exploration of the state of the art in computer-generated music, surveying current approaches in machine learning and neural networks that could be adapted to the stylistic nuances of late 18th- and early 19th-century composition. This workshop shaped the project's conceptual framework and helped define the methodology for teaching the AI to emulate Beethoven's musical language.

During the Harvard workshop, it quickly became clear that the most promising technical foundation for the project lay in a relatively new approach originally developed for text generation. A 2017 paper titled "Attention Is All You Need", a playful nod to the Beatles' song, had introduced the Transformer architecture, which revolutionized natural language processing by allowing AI systems to model complex dependencies across sequences (Vaswani et al., 2017). This breakthrough had led to the development of large-scale generative models capable of producing human-level text, such as OpenAI's GPT (Generative Pre-trained Transformer) (Radford et al., 2018). The team saw compelling parallels between language and music, since both are structured, temporal forms with deeply embedded stylistic rules, and hypothesized that the same architecture could be adapted to learn aspects of musical style and continuity. This insight became the technical cornerstone of the Beethoven X project: to create a music-specific transformer model that could generate new material in the stylistic voice of Beethoven, based on patterns learned from carefully curated corpora. The sketches would then play the role of prompts, or "seeds" as we called them back then.

9.2.2 Historical Background

While Beethoven completed nine symphonies, archival sources confirm that he began work on a tenth during the late 1810s, around the same time he was composing his monumental Ninth Symphony (Johnson et al., 1985). Commissioned alongside the Ninth by the Philharmonic Society of London, the Tenth was evidently an active project for a period but never came to fruition in the form of a finished score. What survived are scattered sketch materials both verbal and musical that suggest exploratory ideas and early compositional fragments (Johnson et al., 1985).

These sketches vary considerably in format, scope, and clarity. Some take the form of brief musical motifs, thematic cells, or rough contrapuntal designs, hastily notated in Beethoven's typically difficult handwriting. Others consist of verbal outlines or conceptual notes, including references to structural forms (such as fugue), potential use of voices, and contrasting expressive characters—what Beethoven himself alluded to as "bacchanalian" and "ecclesiastical" elements. There are also allusions to the use of ancient church modes and even to a specific liturgical melody (Gotham et al., 2022). Such notations suggest that Beethoven was contemplating a broad expressive canvas for the Tenth, with spiritual or retrospective dimensions distinct from the heroic and choral character of the Ninth. (For details about the sketches and how they were used in this project, we refer the reader to Gotham et al., 2022.)

Importantly, the extant sketches are not evenly distributed across the projected symphony. The most substantial and coherent musical materials pertain to what appears to be a first movement and a possible scherzo-trio pair. Barry Cooper's 1988 completion (later revised in 2012) focused on these relatively developed fragments, especially the first movement, drawing directly from Beethoven's musical sketches (Cooper, 1985, 1992, 2003). However, other movements, including a slow movement, scherzo movement, and finale, are either entirely missing or represented only by ambiguous thematic hints. In some cases, fragments appear to be interchangeable or were perhaps intended for other works, further complicating the attribution and interpretation of these ideas.

The central challenge in working with these sketches was not only in their incompleteness but also in their ambiguity. Beethoven often notated musical ideas at an embryonic stage, sometimes as motivic gestures without harmonic realization, or as brief sequences lacking formal context. Determining how such fragments could evolve into full movements requires considerable musicological inference. Moreover, distinguishing which ideas were genuinely intended for the Tenth Symphony (as opposed to unrelated compositional experiments) is itself a matter of scholarly debate.

The Beethoven X project approached this problem not by generating new sketches from scratch, but by attempting to extend Beethoven's own musical fragments into more elaborated forms. Using ML models trained on Beethoven's compositional style and related repertoire, the system aimed to generate

musically plausible developments of his existing ideas. In this framework, the AI did not act as an autonomous composer, but as a tool to assist human interpreters, offering structured continuations of Beethoven's material in ways that remained stylistically and thematically grounded in his known oeuvre.

This approach resulted in a broader set of questions: How might Beethoven himself have developed these motifs? What constitutes a historically and musically faithful extrapolation from the available material? And to what extent can machine learning assist in this creative-reconstructive process without imposing ahistorical or anachronistic aesthetics? These questions underscore the complexity not only of working with fragmentary historical sources but also of doing so in a way that respects the artistic and cultural weight of Beethoven's legacy.

9.2.3 Modelling Musical Creativity: AI Systems for the Beethoven X Project

Turning fragmentary ideas into a cohesive musical composition is one of the most challenging tasks in music. For the Beethoven X project, this process was especially demanding: the material left by Beethoven for his Tenth Symphony consists mainly of short sketches, containing brief melodies and thematic hints without full development, harmony, or orchestration. The central goal of our work was to use ML not to invent entirely new themes, but to take Beethoven's original fragments and elaborate them in a stylistically faithful way, extending, harmonizing, and orchestrating them in the spirit of his compositional voice.

To do this, we developed a suite of specialized AI models, each responsible for a distinct aspect of the compositional process. Rather than attempting a single end-to-end system, we broke down the task into more manageable subproblems, each handled by its own neural network. These include:

- **Continuation**: *Extending a given melodic sketch into a longer, coherent phrase.*
- **Harmonization:** *Adding harmonic or contrapuntal accompaniment to single-line melodies.*
- **Transition:** *Generating connective passages between musical ideas.*
- **Orchestration:** *Translating a short score into a full orchestral setting.*

Each model required careful training on relevant musical examples. Importantly, we tailored our datasets to the specific demands of each task, distinguishing, for instance, the style of a minuet from that of a fugue. This meant not only selecting music from Beethoven himself but also drawing from repertoire he likely knew or was influenced by. Ultimately, the choice of training material reflects interpretive decisions and musical judgments that shape how the AI learns and what it produces.

9.2.3.1 Extending a Fragment: The Continuation Model

The first challenge in our pipeline was to extend short melodic fragments into more complete musical statements. To accomplish this, we adapted a powerful type of neural network architecture originally developed for natural language processing: the Transformer model (Vaswani et al., 2017). Much like predicting the next word in a sentence, the continuation model predicts the next note or musical event in a sequence, based on what has come before.

We built on the Transformer-XL variant (Dai et al., 2019), which allows the model to retain a memory of longer-term context, capturing musical structures that unfold over a longer span. We represented music as token sequences, similar to words in text, using event-based encoding schemes adapted from earlier work in music AI (Huang et al., 2018; Oore et al., 2020; Wu et al., 2020). These sequences included pitches, durations, and dynamics, enabling the model to learn nuanced musical patterns.

During training, the model observes thousands of musical phrases from relevant corpora, learning to predict each subsequent token. When deployed, it takes a Beethoven fragment as its seed and generates a continuation one note at a time. However, as with language models, longer generations can drift stylistically or lose coherence. To mitigate this, we introduced a "stylized continuation" variant that anchors the generation more firmly in the musical identity of the original seed.

9.2.3.2 Guiding Style: Stylized Continuation

The stylized continuation model allows us to specify not only what to continue, but how. It uses a structure similar to an encoder-decoder architecture: the encoder compresses the musical features of the original fragment into a style "bottleneck", and the decoder generates new material conditioned on this stylistic representation (Choi et al., 2020).

Unlike traditional autoencoders, our model maintains the temporal structure of the input, avoiding the distortions that might occur if musical order were scrambled, as often happens in language translation models. By encoding style explicitly, the AI can retain thematic identity over longer spans and better reflect the distinct character of Beethoven's writing.

9.2.3.3 From Single Line to Full Texture: Harmonization and Counterpoint

Most of Beethoven's sketches for the Tenth Symphony are melodic outlines, not complete musical textures (Gotham et al., 2022). To realize them as performable music, we needed systems capable of adding harmonic structure. We approached this in two ways: first, by generating contrapuntal lines (independent melodic parts that interweave), and second, by producing more vertical chordal accompaniments.

For the contrapuntal task, the model learns how pairs of musical lines relate within polyphonic textures. This is particularly important for styles like fugue, where the interaction between voices defines the form. Here, datasets with part-wise annotations, such as re-notated keyboard works in open-score format, proved useful (Aljanaki et al., 2021).

For harmonization, we adapted a machine translation approach. The melody serves as the source "language", and the model learns to "translate" it into a fuller musical texture. Unlike in natural language, however, musical events are tightly constrained in order and timing, so we introduced mechanisms to preserve alignment between the input and output sequences.

9.2.3.4 Bridging Ideas: The Transition Model

In traditional composition, transitions between themes or sections are essential to musical coherence. To emulate this, we developed a transition model inspired by the BERT architecture (Devlin et al., 2019), which excels at filling in gaps in text. Instead of masking individual notes at random, we mask entire contiguous segments, such as one or two measures, and ask the model to fill them in based on the surrounding material.

Because music unfolds in time, we had to modify the attention mechanism so that earlier and later segments could not "see" the masked-out span. The model then predicts the missing passage iteratively, one note at a time in order from the preceding section, preserving flow and coherence with both preceding and following music.

9.2.3.5 From Sketch to Symphony: The Orchestration Model

Finally, orchestration transforms musical ideas into the rich sound world of the symphony. Our orchestration model takes a piano-like short score and assigns each note to one or more orchestral instruments. This is analogous to colorizing a grayscale image: the underlying structure remains the same, but the expressive range is vastly expanded.

Again, using a modified BERT-style architecture, we masked only the orchestration information, keeping pitches and rhythms visible. The model then learned to assign instrument labels based on context. During training, we derived short-score/full-score pairs by reducing existing orchestral works to condensed versions and pairing them with their full orchestrations. Constraints such as instrument range and ensemble norms (e.g., not using trombones in early movements where Beethoven never employed them) were explicitly encoded to guide the model.

9.2.4 Collaborative Process: Towards Human–AI Co-Creation

Across all stages of the project, the aim was not to replace human judgment, but to support it. Each AI model played a different role in the compositional workflow, and all relied on carefully curated training data, musical

interpretation, and human selection of outputs. By combining these tools with Beethoven's own fragments, we hoped to open new ways of understanding both his music and the broader question of how human creativity might be enhanced and extended—not replicated—by intelligent machines.

One of the most fascinating contrasts in this project lies in the nature of musical exposure. Human composers today benefit from the 200 years of musical evolution to have passed since Beethoven, drawing upon stylistic developments, increased access to diverse world traditions, technological advancements, refined instruments, improved musicianship, and complex layers of political, social, philosophical, and spiritual influence. In contrast, the AI algorithm we employed was intentionally trained on a more narrowly defined corpus: only the music of Beethoven and compositions that demonstrably influenced him.

We deliberately refrained from inputting academic rulebooks or codified principles of composition, orchestration, or performance. The rationale was simple: any external system of rules could have distorted the patterns of Beethoven's creative process and thus altered the integrity of the AI-generated output. In general, theory underdetermines practice and while the standard accounts of some parameters have been codified with Beethoven's music clearly in mind (e.g., sonata form), Beethoven's music has a much less natural fit for some others (e.g., fugue). Making sense of Beethoven's own compositional rules is very much an open research area. See for instance the dep theorising in Tymoczko's Tonality (Tymoczko, 2023). By allowing the algorithm to treat Beethoven's music as its only "*rule set*", we created space for the AI to extract and extrapolate his compositional voice without outside interference.

This approach presented considerable challenges. Form was a particularly complex task. From the human perspective, Beethoven's body of orchestral work is vast and emotionally rich; for an AI, however, it was a relatively small and finite training set, especially when considering the range traversed across those nine symphonies, each of which representing a significant leap in form and instrumentation. The limited dataset constrained the AI's ability to generate a coherent, large-scale orchestral structure. While a typical symphonic movement might consist of 13,000 to 15,000 individual note events, Beethoven's surviving sketches for the 10th Symphony contained fewer than 200 usable notes.

Moreover, the AI's understanding of music was diagnostic and time-based. It interpreted musical structure not in the hierarchical or harmonic terms musicians are trained to understand, but rather as a flow of note events through time. This led to moments of interpretive tension. For example, discussions arose around the use of time signatures (e.g., 3/4 meter), triplet figures, and phrasing that, while musically sound to human ears, needed translation across fundamentally different systems of understanding.

The process began with a sketch that was clearly intended for a scherzo movement: a melody that is relatively complete in itself. From that, we built a set of harmonizations using an early version of the relevant AI system and

compared these outputs with several versions manually produced by the team (for comparison only, not for use in the final piece). The team discussed the relative merits of each, and the composer chose a most promising version from the AI's options. And so began an iterative process whereby the AI team used the developed models to generate musical fragments based on sketches and previous outputs considered promising, and "to order" in terms of various specifications across musical parameters, including tempo, meter, and rhythmic density.

At each step, AI-generated MIDI files would be supplied to the composer who would listen carefully, isolate promising passages (that is, sections from one or more of those files, combined freely), and begin a curatorial process, stitching sections together bar by bar or requesting further generations composing transitional material to bridge disparate sections meaningfully (using the Transition Model). The models themselves would also be developed iteratively based on feedback (naturally with fewer iterations and more so in the early phases of exploration).

Orchestration followed a similar workflow as the composition of the short score: the AI produced a set of suggestions for each passage, of which the composer chose their preferred version. While we experimented with training the AI on Liszt's piano transcriptions of Beethoven's symphonies as a form of reverse orchestration, this method did not yield convincing results. Instead, we opted for a deterministic process by which orchestral works were reduced to new short scores of the required density (to match that of other parts in the process). The process is briefly described in Gotham et al. (2022; §3.5) and is based on the identification of main melodic lines as described and set out in the Hauptstimme dataset (Gotham et al., paper forthcoming, data available at https://doi.org/10.5281/zenodo.15425748).

9.2.5 The Performance

Beethoven X was introduced to the public via a livestream press conference in 2019, including a live performance of one of the AI's early compositions. Two years later, with delays due to the COVID pandemic, on the 9th of October 2021, the premiere of the Beethoven/AI 10th symphony could finally take place. In the Telekom Forum Bonn, 3,000 guests experienced Beethoven X as performed by the Beethoven Orchestra Bonn, with organist Cameron Carpenter. Another 2,500 guests attended the second concert at the Elbphilharmonie Hamburg, and thousands of viewers followed the events live on Telekom's own TV channel and via a free livestream on their website. The symphony has been played since then at several venues worldwide and viewed online millions of times.

When "*Beethoven X – The AI Project*" was introduced to the public in 2019, journalists and bloggers started to report on the project, keeping up with its development and supplying details to its tech background. Shortly after the second concert in October, 594 + publications were counted in

print and online media, radio and TV. Overall, a press coverage worth 729 million Euros was reached by the end of October, as well as an ad value of 14,3 million Euros in the first month alone, according to internal Deutsche Telkom reporting. The project received several entertainment and marketing awards including The One Show Award (2022 in the category Music & Sound Craft for Original Music/Score), the Clio Entertainment Award—Gold (2022), and the German Brand Award—Gold (2022), among others.

9.3 Future Research Agenda

The Beethoven X project offers a rich lens through which to examine some of the most pressing questions at the intersection of AI and creative practice. The project raised fundamental debates about artistic intent, authenticity, and the evolving nature of creativity in a human–machine partnership. The following research questions frame these debates, probing how AI can reflect a human artist's vision, where the boundaries lie between faithful continuation and inventive reimagining, and whether algorithmic tools diminish or transform the role of human creators.

RQ1: *Can an AI-Authored Piece Truly Reflect a Human Artist's Intent?*

The Beethoven X project crystallizes a fundamental tension in AI-driven artistic endeavours: whether an AI-generated continuation can truly reflect the intent of a human creator. While AI systems can emulate certain stylistic features with remarkable fidelity, it might be questionable whether they are capable of accessing the psychological, emotional, or philosophical motivations that underlie human artistic expression.

Yet, the question may be less about replicating intent than about responding to it. When guided by human expertise, AI can serve not as a surrogate for the composer, but as an interpretive tool, one that proposes plausible developments grounded in a trained understanding of style. In this sense, the project reflects a layered form of authorship: Beethoven provides the seeds, AI generates elaborations, and human musicians curate and shape the outcome.

This co-creative model suggests a reframing of the intent question itself. Rather than asking whether AI captures an artist's inner vision, we might ask: how can we structure collaborations in which intent becomes a shared, iterative process across human and machine agents? This has implications not only for music, but for future creative practices across domains.

What remains open and highly topical is how we define transparency, attribution, and ethical boundaries in such collaborations. As AI tools become more integrated into creative workflows, the challenge is not to preserve a Romantic notion of solitary genius, but to develop frameworks that honour the complexity of authorship in a hybrid creative future.

RQ2: *Where is the line between authenticity and invention in the Age of AI Co-Creation?*

The Beethoven X project brings into sharp focus a long-standing question at the heart of creative practice: where do we draw the line between authenticity and invention? This tension becomes especially pronounced when historical material (such as Beethoven's sketches) is extended by machine learning systems trained to generate stylistically plausible content. Media responses to the project, from the Smithsonian Magazine to Scientific American, consistently acknowledged this ambiguity (Cary, 2021; Elgammal, 2021). Even if the music "sounds like Beethoven", the extent to which it *is* Beethoven remains contested.

Authenticity traditionally implies a direct lineage to the author, both materially (e.g., autograph manuscripts) and spiritually (e.g., expressive intent). Invention, by contrast, entails departure, transformation, or extrapolation. Beethoven X sits uneasily between these extremes. It is not a forgery, but neither is it an undiscovered original. It is a collaborative construction in which Beethoven's ideas are extended by algorithmic processes and shaped by human judgment. This blurs the distinction between "authentic continuation" and "creative reimagination".

As several German-language critiques noted (e.g., Das Orchester, 2021), the framing of the project is key. We took care to avoid presenting the symphony as an authoritative completion. Instead, it was offered as a speculative realization—an exploration of what could have been, not what must have been (Werzowa, 2021). This framing invites a shift in how we evaluate such works: authenticity is no longer defined solely by origin, but also by transparency of process, integrity of method, and fidelity to context.

Generalizing beyond this project, the challenge for future human–AI collaborations will be to negotiate this balance. When machines participate in generating creative content, whether music, visual art, or text, the lines between reconstruction, homage, and invention will continue to blur. In such settings, authenticity may need to be redefined less as a binary and more as a spectrum, encompassing historical grounding, stylistic coherence, and clearly communicated creative intent.

Ultimately, the line between authenticity and invention is not fixed but negotiated by artists, audiences, and institutions. As AI becomes a more prominent partner in creative production, our interpretive frameworks must evolve accordingly, ensuring that innovation does not come at the expense of clarity, attribution, or cultural trust.

RQ3: *Does the use of AI Diminish Human Creativity?*

A recurring concern in media coverage of the Beethoven X project, echoed in outlets such as Scientific American, NPR, and BR-Klassik, was whether the use of AI in completing an unfinished masterpiece risks devaluing or diminishing human creativity (Cary, 2021; Hübert,

2011; Martin, 2021). For some observers, the ability of machines to generate music in Beethoven's style raised existential questions: if an algorithm can mimic "genius", what becomes of the uniquely human capacity for artistic expression?

However, this view often underestimates the actual human labour embedded in the AI-assisted process. As the project team emphasized across interviews and coverage, the AI did not create the symphony autonomously. Rather, it acted as a generative assistant within a framework tightly directed by human composers, musicologists, and performers. Decisions about dataset selection, stylistic relevance, sketch interpretation, and final curation were all human responsibilities. In this light, the project does not automate creativity; it redistributes it, shifting human effort from note-by-note composition to higher-level interpretive and editorial choices.

Moreover, the AI's creative capacity is inherently bounded. It does not originate ideas *ex nihilo* or possess intrinsic aesthetic judgment. Its outputs are statistical extrapolations from human-authored data, filtered through stylistic constraints. As such, far from replacing creativity, the AI expands the space of possibility within which human creators operate—proposing continuations, suggesting variants, or helping navigate complex stylistic terrain. The Smithsonian article framed this well: the AI is not a composer, but a "collaborator in exploration" (Elgammal, 2021).

Generalizing beyond Beethoven X, this model of machine-augmented creativity reflects a growing trend in art, design, and storytelling: humans working with intelligent tools that challenge them to rethink authorship, process, and possibility. In this paradigm, creativity is not diminished, it is recontextualized. The role of the human artist evolves from sole originator to co-creator, curator, and interpreter of machine-generated alternatives.

One of the main issues in the debate around the use of AI and authorship and creativity is the role of randomness in the process and its implication on intentionality. Terzidis et al. (2023) argued that, in AI art, randomness transforms the work into an autonomous product of the system, stripping away the artist's intentional agency. However, we argue that randomness does not erase intentionality when its use, inputs, and results are all consciously chosen and shaped by the artist.

Thus, the more pertinent question is not whether AI diminishes human creativity, but how it transforms it. As with any new medium—from photography to digital sampling—the introduction of intelligent systems prompts resistance, experimentation, and, ultimately, adaptation. If framed with transparency and intention, AI can be not a threat to human creativity, but a catalyst for its renewal.

AI Disclaimer Statement

Ahmed Elgammal: In accordance with the Taylor & Francis AI Policy, the author used OpenAI's ChatGPT (version 4.5) for language editing and stylistic refinement. All conceptual ideas, analyses, interpretation and substantive writing remain entirely the author's own. The author also double checked all the AI-assisted refinements to make sure all his original ideas weren't altered by the tools.

Matthias Röder: I use several AI tools for all creative work. For brainstorming and discovery, I use my own mtexts (https://github.com/matthiasroder/mtexts) in combination with Perplexity Spaces and ChatGPT projects. For drafting articles, I use my own custom built genAITextEditor (https://github.com/matthiasroder/genAITextEditor) in combination with the OpenAI api platform. In my genAITextEditor, I use several custom prompts. Once drafts of text are ready I typically have AI check for lacunae and inconsistencies. For this, I use various tools, but mostly my own editor and ChatGPT. In addition, AI technologies are used to proofread, create summaries or translations. Finally, all arguments and examples are double checked by me personally and are in line with my intentions as an author. Any texts that leave my studio are 100% human–machine collaborations.

Walter Werzowa: Portions of this work were developed with assistance from OpenAI's ChatGPT (version GPT-5, October 2025). The tool was used to support ideation, text refinement, and clarity in articulating concepts related to artificial intelligence and creative processes. All factual accuracy, structure, and final editorial decisions were reviewed and approved by the authors.

Mark Gotham: No GenAI was used in any writing I've contributed to this piece.

References

Aljanaki, A., Kalonaris, S., Micchi, G., & Nichols, E. (2021). Mcma: A symbolic multitrack contrapuntal music archive. *Empirical Musicology Review*, *16*(1), 99–105.

Briot, J.-P., Hadjeres, G., & Pachet, F.-D. (2020). *Deep learning techniques for music generation*. Springer. https://doi.org/10.1007/978-3-319-70163-9

Cary, T. (2021, October). *Beethoven's unfinished 10th symphony brought to life by artificial intelligence*. Scientific American. https://www.scientificamerican.com/podcast/episode/beethovens-unfinished-10th-symphony-brought-to-life-by-artificial-intelligence/

Choi, K., Hawthorne, C., Simon, I., Dinculescu, M., & Engel, J. (2020). Encoding musical style with transformer autoencoders. In *Proceedings of the 37th International Conference on Machine Learning (ICML '20)* (pp. 1899–1908). JMLR.org.

Cooper, B. (1985). Newly identified sketches for Beethoven's Tenth Symphony. *Music & Letters*, *66*(1), 9–18.

Cooper, B. (2003). Subthematicism and metaphor in Beethoven's Tenth Symphony. *Ad Parnassum*, *1*, 95–112.

Cooper, B., & Winter, R. S. (1992). Correspondence: Beethoven's Tenth Symphony. *Journal of the Royal Musical Association*, *117*(2), 324–330.

Dai, Z., Yang, Z., Yang, Y., Carbonell, J., Le, Q., & Salakhutdinov, R. (2019). Transformer-XL: Attentive language models beyond a fixed-length context. In *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics* (pp. 2978–2988). Association for Computational Linguistics.

Das Orchester. (2021, April 2022). *Beethoven X – The AI Project, A Review*, page 71. https://dasorchester.de/artikel/beethoven-x-the-ai-project/

Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019, June). Bert: Pre-training of deep bidirectional transformers for language understanding. In *Proceedings of the 2019 conference of the North American chapter of the association for computational linguistics: Human language technologies, volume 1 (long and short papers)* (pp. 4171–4186).

Elgammal, A. (2021, September 24). How artificial intelligence completed Beethoven's Unfinished Tenth Symphony. *Smithsonian Magazine*.

Fulde, V. (2021). Beethoven's 10th Symphony completed by AI. This is how it sounds. Deutsche Telekom, Archive. https://www.telekom.com/en/media/media-information/archive/beethoven-s-10th-symphony-completed-by-ai-633060

Gotham, M. R. H., Song, K., Böhlefeld, N., & Elgammal, A. (2022, September 17). Beethoven X: Es könnte sein! (It could be!). In *Proceedings of the 3rd Conference on AI Music Creativity (AIMC 2022)*. https://doi.org/10.5281/zenodo.7088335

Huang, C.-Z. A., Vaswani, A., Uszkoreit, J., Simon, I., Hawthorne, C., Shazeer, N., Dai, A. M., Hoffman, M. D., Dinculescu, M., & Eck, D. (2018). Music transformer: Generating music with long-term structure. In *International Conference on Learning Representations (ICLR)*. https://openreview.net/forum?id=rJe4ShAcF7

Hübert, H. (2011, October 10th) *Künstlich ist nicht künstlerisch. Künstliche Intelligenz – Beethovens 10. Symphonie uraufgeführt*. BR KlassiK.

Johnson, D. P., Tyson, A., & Winter, R. (1985). *The Beethoven sketchbooks: History, reconstruction, inventory (California studies in 19th century)*. University of California Press.

Levin, R. D. (1992). Improvised embellishments in Mozart's keyboard music. *Early Music*, *20*(2), 221–233.

Martin, M. (2021, October 2nd). *Team uses AI to complete Beethoven's unfinished masterpiece*. National Public Radio (NPR) All Things Considered. https://www.npr.org/2021/10/02/1042742330/team-uses-ai-to-complete-beethovens-unfinished-masterpiece.

Moody, O. (2021, October 1st). AI 'completes' Beethoven's final masterpiece. *The Times*.

Oore, S., Simon, I., Dieleman, S., Eck, D., & Simonyan, K. (2020). This time with feeling: Learning expressive musical performance. *Neural Computing and Applications*, *32*(4), 955–967.

Radford, A., Narasimhan, K., Salimans, T., & Sutskever, I. (2018, June 11). *Improving language understanding by generative pre-training* [Technical report]. OpenAI.

Sturm, B. L., Uitdenbogerd, A. L., Huang, A., & Koops, H. V. (2022). AI and musical creativity. *Transactions of the International Society for Music Information Retrieval (TISMIR)*, *5*(1), 67–70.

Terzidis, K., Fabrocini, F., & Lee, H. (2023). Unintentional intentionality: Art and design in the age of artificial intelligence. *AI & Society*, *38*(4), 1715–1724. https://doi.org/10.1007/s00146-021-01378-8

Tymoczko, D. (2023). *Tonality: An owner's manual*. Oxford University Press. https://doi.org/10.1093/oso/9780197577103.001.0001

Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., Kaiser, ., & Polosukhin, I.. (2017). Attention is all you need. In I. Guyon, U. V. Luxburg, S. Bengio, H. Wallach, R. Fergus, S. Vishwanathan, & R. Garnett (Eds.), *Advances in neural information processing systems* (Vol. 30, pp. 5998–6008). Curran Associates, Inc.

Werzowa, W. (2021). *Beethoven und die Künstliche Intelligenz: Walter Werzowa im Gespräch zu „Beethoven X – The AI Project*. Neue Musikzeitung.

Wu, X., Wang, C., & Lei, Q. (2020). *Transformer-XL based music generation with multiple sequences of time-valued notes*. arXiv preprint arXiv:2007.07244. https://arxiv.org/abs/2007.07244

10 AI and Film Authorship in Botswana

Negotiating Creative Control and Ownership

Gopolang Ditlhokwa

10.1 Introduction

There are more questions than answers on what the future holds for the film industry and the changes generative AI brings. Some roles in filmmaking now embody AI intervention in the making of films: scriptwriting assistant, automated editing, and virtual cinematography. These derive from the experiments that film studios and independent producers' broker with AI-powered tools, sparking legal and culturally specific debates. In various regions of the globe, AI disruption has already become a topic of national debates. For instance, since early 2023, efforts had been underway in the U.S. to explore the ways artificial intelligence redefines traditional authorship (U.S. Copyright Office, 2025). In the same year, Hollywood stars had already reportedly been engineered its "shut down" in response to its threat to their jobs (Al Jazeera 2023; Morris, 2025; Nguyen, 2025). No doubt in other parts of the world too, AI tools are now transforming the once rigid IP lines and spark fears from the film industry around the "creation" and authorship rights ownership of a work assisted by AI. A report from the South Africa Cultural Observatory (SACO, 2024) notes that legendary creators keep getting excited by AI and keep looking at incorporating it into their work, foreclosing on the other end, the mounting calls for tougher IP protections placed on the government and creators themselves. Emerging film industries such as Botswana now have slight postcolonial flavour. For instance, there are international documentaries and the occasional international production such as a movie, the *No. 1 Ladies Detective Agency* (2008) which became the first to be shot in Botswana (Counihan, 2011; Siphambili, 2008). This was followed by *A United Kingdom* (2016), which was also filmed in Botswana, based on the life of Sir Seretse Khama who later became the first leader after independence (Stones, 2016). And, like both films, the two were also directed and produced by a British crew, with little in the way of local Botswana talent in front or behind the camera. In the past, the Botswana film industry lacked a collective voice until independent producers established the Botswana Film Association (BOFIA) in 2012, and the Botswana Screen Society (BOSS) towards the end of 2021, to lobby for the film industry reforms and structural

DOI: 10.4324/9781003606802-11

support that is currently non-existent (Masendu, 2024). This previous lack of institutional development has exposed frailties which are not limited to local production difficulties. There were weak to nonexistent national legislation around the regulation of content, enforcement of intellectual property rules, or control of industries, creating an atmosphere in which Batswana largely tolerated the steady arrival of foreign crews who simply came and shot in Botswana and monetized the content with little to no benefit to the country's revenue. This kept local creators at a long-standing disadvantage in relation to cultural sovereignty and technology strength.

This chapter's data are based on a series of conversational discussions with ten Botswana filmmakers operating in Gaborone, the capital city of Botswana, to examine ways in which they encounter, interpret, and respond to the growing presence of AI tools in creative practice. The selected participants consisted of one director (A), three editors (B, C, D), two script writers (E, F), one producer (G), a fresh university animation graduate (H), a camera assistant (I), and a start-up music video filmmaker (J). These participants were not recruited through any formal process. Rather, their selection emerged organically from prior casual interactions between the researcher and members of the local film community, primarily through professionally shared participation in the Botswana's film industry key events and debates. At the time of writing this chapter, several filmmakers who had already been discussing AI's disruption in the film industry agreed to engage further. The interviews were unstructured, with the following open-ended prompts: How do you use AI tools in your filmmaking? How do you think these tools support or limit? In what way do you think AI is influencing creative control, originality, and authorship in your work? How do you feel about ownership and copyright when using AI? Four participants were interviewed face-to-face, four via WhatsApp audio calls, and two opted to respond to a prepared list of guiding questions through sending WhatsApp voice notes to the researcher. All participants provided prior verbal consent for their data to be used in this chapter, and assurance of anonymization was granted by the researcher.

The analysis of these conversations was entirely thematic, and exposed a swell of optimism, but also trepidation. Some saw AI as a gift to low-budget production, while others feared it could dismantle their creative voice. First, there are anxieties surrounding authorship and creative identity, notably fears that AI mechanisms could dilute local persona or enforce foreign expressive standards. Second, there were robust critiques of the structural barriers filmmakers face, from inadequate copyright frameworks and deficient infrastructure to platform inequities. Third, the interviews shared the tactical ways filmmakers are striving to indigenize and customize AI tools to their own cultural contexts. Such dimensions are explored through Gibsonian affordances (1977, 1979), Hutchbian sociotechnical adaptation (2001), and Ngũgĩ's anti-imperialist critique (1986) and ideas on creativity (Amabile, 1996, 1997; Gauntlett, 2011), and power (Bourdieu, 2002, 1996; Foucault, 1984). This chapter also leverages literature on digital colonialism

and labour (Birhane, 2020; Couldry & Mejias, 2019; Graham et al., 2017; Kwet, 2019) to situate AI on a global scale. The analysis ultimately provided a structure for discussing a negotiation of AI authorship across three areas. (1) Affordances, creative agency and developmental opportunities, focusing on the material opportunities that AI makes available to local filmmakers. (2) Cultural and postcolonial challenges, where social meanings and power dynamics of AI adoption, including language and culture identity are discussed. (3) Ownership dynamics of creative labour and control, interrogating the relationship between copyright, labour, and control of AI-assisted works as provided in the next section. The chapter also braids together filmmakers' perspectives into charting a future research agenda of unanswered questions to policymakers, and practitioners.

10.2 Discussion: Negotiating AI Authorship

10.2.1 Affordances, Creative Agency, and Developmental Opportunities

There is a wide range of AI use case applications across film, from automated editing software to generative script assistants, to virtual cinematography, and it is certainly creating a new set of affordances for filmmakers. Examples of such include Adobe Premiere Sensei, DaVinci Resolve Neural Engine, DeepStoryAI, virtual cinematography in Unreal Engine, and Runway ML (Adobe, 2024; Blackmagic Design, 2024; Nguyen, 2025; Warren, 2024). In Africa as well, there have been recent accounts of the rising use of these technologies by independent creatives (see South African Cultural Observatory, 2024). Gibson (1986, 1979) conceptualized affordances as "facts of the environment" and by fact of behaviour as this meaning that the possibilities that an artefact offers depends on its features, as well as the way users interact with it. Hutchby (2001) also conceives of them as functional and relational dimensions that frame but not determine possibilities for agentic action with respect to an object. In this regard, Hutchby (2001) counters both the technological determinism (that technology, in itself, is an agent of social change) and the social constructivism (where technology is considered to have effects only as they are interpreted by users). Rather, he suggested an "affordance perspective", locating technology in the middle between the material dimension of the artefact and the user agency, which are co-constitutive. Applied to AI in Botswana, that means a single AI tool might allow (for instance) low-cost special effects or more rapid subtitling, but only if local filmmakers change their workflows in order to use those features. Participant A commented that AI story generators rely on re-gutting the stereotype Western figures and questioned, "If I use this, am I truly telling a Botswana story?".

The Botswana film industry is aware of the increasing need of African based stories, albeit lack of infrastructure and financial support (Ditlhokwa, 2023; Setlhare, 2025). In reality, the Botswana film industry is still relatively very small (in cinema outputs) but fairly building its image at high-end film

festivals and events across the local and international film industry. There have been notable films such as Partly Hot and Cloudy which won Best Actor at the 2023 International Black and Diversity Film Festival in Canada and at the local Botswana International Film Festival respectively. The same film won the Best Short Film at the Mumbai International Film Festival in India. (BOPA, 2023; More, 2023; Wren, 2023a). Work such as Dithunya Tsa Rona and Baratani (The Hill of Lovers) have previously won the 2021 Best International Feature Award at Baltimore International Black Film Festival, United States, as well as the 2024 Best Film and Audience Choice awards at Durban FilmMart (Kgamanyane, 2024; Molosi, 2021). This is evidence that there is potential for Botswana filmmakers to be competitive internationally. To that end, filmmakers see that beyond AI, the humble smartphone and basic software have already upended elements of production. Participant C juxtaposed affordances of the past and present with AI-aided outputs as it relates to colour grading (suggesting that AI's contribution on just a laptop provided a look that might have demanded an expensive equipment rental a few years ago). This upholds Hutchby to an extent, that affordances are mediated socially, nonetheless, the technical capacity of the AI software that operates to good effect on the user's instructions, creativity, and imagination.

At the same time, participants A, C, and D stressed that AI itself often stays in a black box, showing an admiration of the image-generation tools, particularly any that would create film sets without 'physically building them'. However, Participant C warned, the AI has the voice of a Western-trained model and it always feels 'alien' when Western prompts are issued. Gibson's concept of affordances is thus imputed to the observer, by which the benefits of an AI instrument make themselves felt in local accommodation. Indeed, Reddy's (2022) notion of "artificial creativity", in addition to Culpeppern and Gauntlett's (2020) notion of "makerspace mindset", presents the idea that contemporary creatives usually see themselves as everyday tinkerers and coders, repurposing digital tools outside of what is expected. As explained by participants F and G, there is a glimmer of enthusiasm toward experimenting with AI in their daily filmmaking work especially for routine work like auto-editing where the technology benefits are high and can be re-adapted for storytelling once they get the hang of it, others have reservations, prompted by the fear of job loss. Meanwhile, participant B explained that their low-resource environment constrains some affordances. This resonated with participant B's sentiments of barriers to technological appropriation due to slow and costly internet access when they try to access cloud-based AI affordances, with unaffordable data caps limiting access to downloading large AI models. A similar sentiment is attributed to the report on the economic contributions of Botswana's creative industries, which also highlights that costly equipment (predominantly imported) and expertise are barriers to production (BIDPA, 2019). So, theoretically the affordance is there but may not be practically released.

Filmmakers also observe that where AI tools are employed, new types of creativity emerge. Participant E recalled using a chatbot to explore new story

ideas based on traditional Setswana myths. Here the possibility of a socialized AI (fast ideation) is being put through its paces. It is evident that local cultural inputs are being pumped into a global AI through the writer. This is an example of Hutchby's (2001) "relational" position, where the affordance of the script bot (producing plots) is bounded by the user's particular knowledge. However, Gauntlett would caution that depending on AI prototypes can tether users to specific frameworks. Participants' sentiments are that, if the AI's suggestions are mostly Hollywood plots, it will have to make a slightly conscious effort to sometimes not follow those scripts. Research on creativity by Amabile (1996, 1997), for instance, has found that intrinsic motivation and challenge blossom when creators feel a true sense of ownership over their ideas. A collective sentiment from filmmakers rejected this on the grounds of intrinsic excitement of "just playing with tech", but also the perception that oversight or metrics around use of AI can feel extrinsically imposed and stifling. The Amabile principle applies where creativity flourishes, when creators follow their own hearts. Currently, Botswana is working on having a Film Commission, as part of the 1970 Cinematograph Act review. With this, it anticipates developing a sustainable film and television sector in the country, which has always been a struggle, occasioned by delays to change the film policy (Kome, 2019; Wren, 2023b). The moment a fully fledged film regulation takes shape in Botswana, and begins enforcing, and, in the process, even simply assessing the utilization of AI, that is the moment that the fundamental creative instinct of film makers would get threatened.

10.2.2 Cultural and Postcolonial Challenges

Beyond just technical difficulties, AI in film has deep cultural significance. Ngũgĩ (1986) has famously criticized that colonial powers project their own language and stories onto Africa, urging a return to indigenous voice and perspective. In the case of Botswana, AI models being explored, most built and trained in the West, risk certifying a form of digital neocolonialism. Birhane (2020) cautions that Western tech giants "ship" solutions to Africa with scant localization, so impoverishing development of local products and ensuring reliance on foreign infrastructures. Filmmakers in Botswana expressed a similar view. Participant A claimed that AI image generators typically depict African imagery through cliché tourist themes or colonial iconography, instead of representations of actual modern-day life in Botswana. This is the data colonialism that Couldry and Mejias (2019) posit, a colonization process, of social activity and its potential to generate profit, whereby the more data extracted, the more profit can be derived from a culture. Local content and creativity themselves have become raw materials for the transnational algorithms. So, when an international AI research lab scrapes African folklore off the web in order to train a model to tell stories, the local knowledge is commodified without compensation to the creators. Participant E questioned "accurate" representation or oral storytelling traditions once they are digitized and reprocessed

by foreign AI companies and a preservation of such information for future generations. There is a specific context that links technology with colonialism. Kwet's (2019) digital colonialism framework is relevant here, through the software ecosystem manipulation (AI "architecture"), foreign tech corporations amass direct power over political, economic, and cultural domains. Tangibly, this is about the fictions we all hear and believe in, and how they can be manipulated by outside algorithms. As participants E and F indicate, some filmmakers from Botswana starting to develop interest on AI-generated scripts or character templates, they could potentially emulate the programming of the biases and norms ingrained into them by the sensibilities of Silicon Valley. Birhane (2020) supports their position by arguing that many African issues are best addressed using local expertise, not one-size-fits-all AI solutions. In Ngũgĩ's words, Botswana would be running the risk of returning to a condition where its stories are told from a Western point of view, a matter of "continued debate about the destiny of Africa" in contemporary times.

Dynamics in culture can be equally found in language. Ngũgĩ (1986) argues that language is culture, culture language. And most AI tools actually perform better in English (or a handful of major languages), so Tswana-language filmmaking, particularly at a global technical standard is underserved. Participant G noted that there is an urgent need for AI driven subtitling and dubbing into Setswana, at least at best basic. He was worried that outside audiences would only experience Botswanan stories translated to English, and that this would immortalize the colonial model of English as the default. This brings an interesting tension, where participant F posed a rhetorical question: do you write a film in Setswana first, or English to reach audiences? The answer lies in creative control and ownership. Interview data, however, indicate that filmmakers are aware of these stakes. Participant H expressed that using an AI voice synthesis to perform dialogue in Tswana feels "beautiful and dangerous". Beautiful because it made a high-quality local-language version possible on the cheap—citing an indigenous system developed in Cape Town, South Africa named Botlhale AI, which offers APIs for text-to-speech (TTS) and speech-to-text (STT) functionalities (https://botlhale.ai/)—but dangerous because the voice actor had no say in it and might not even get credit as an author. It is also important to state that, much as this is a welcome development, such systems are not specific to film production. Here Foucault's (1984) author-function can be observed in action. Author-function in Foucault suggests that the status of authorship is an individualized phenomenon by the function of discourse which has to be a "person" who "writes". Here, the author functions in society along with certain legal or cultural codes that determine the provable, legal status of a claim to discourse. When AI produces content (dialogue, images, music) the distinction of the human author becomes unclear. Another rhetorical question is: who is the author of a scene partly made by algorithm? Authorship, Foucault (1984) suggests, is a social construct through which we assign liability and meaning. In Botswana's collegial film culture (where positions are fluid and collaborations are frequent), AI muddies the waters. Most filmmakers

who made this claim would go further and threaten co-credit or even court action if a successful film generated an AI-authored element, suggesting a struggle to retain a grip on cultural capital within the field (Bourdieu, 1996). Drawn on contributions from Bourdieu (1993, 2002) the field of film is a commonplace for struggle on what defines art and the right to own it; in the event of silent foreign AI as "co-director", local profession also fears a loss of authority and legitimacy (including jobs). Furthermore, the cultural importance of film in Botswana is somewhat associated with national identity and storytelling as participant A explained that film brings change, it promotes national identity among Batswana. Gauntlett (2011), from the theory of creativity suggests that technology should expose the personal voice, not dominate it. Filmmakers declared in interviews that AI would be only as good as it could be localized, as participant H asked: "Can we train an AI on our dances, our art?", suggesting an appetite for AI that does not delete, but augments, local culture.

10.2.3 Creative Labour, Ownership, and Authentic Creations

The rise of AI has also prompted more practical questions around employment and intellectual property in Botswana's film industry. Guidance could go both ways, in addition to valuing the labour rate, where AI tools could eliminate the need for some labour. Participant D noted, "If an algorithm color-corrects footage on its own, fewer hours are billed through a colorist. That could have the effect of reducing fees for low-budget movies, but at the risk of devaluing craft". Graham et al.'s (2017) regional examination of Africa (Sub-Saharan) and Asia (South-east) digital labour sounds the alarm that gig platforms may deliver jobs but also introduce some noticeable risks and costs that unfairly affect the livelihoods of digital workers. Similarly, if post-production work becomes a gig driven by AI (either outsourced or automated), then local specialists may win some short-term gigs at the cost of long-term bargaining leverage. Participant B compared current AI experiments to crowdworking conditions by stating, "Now we use AI on Google Colab. If we did something with the code that would write better code, we would all change everything and we would be screwed". This characterizes the intermediated value chains Graham et al. (2017) describe (where workers have almost no say).

Botswana is additionally challenged by the fact that its film industry does not have a direct funding model, and sometimes, albeit on a small-scale basis, there is foreign investment through (rarely observed) international collaborations. By contrast, a project financed by an international backer might come with their selection of AI services, essentially outsourcing necessary dimensions of the creative labour market. Local crew members fear being upskilled, as participant I posed the question, "If they are bringing in robot camera operators, do I have a job?" This reflects patterns in global digital labour, where workers on platforms are often required to continue updating or become obsolete. And there is the 'digital sweatshop' as argued by Kamila et al. (2024), where work like tagging images, or proofreading scripts, necessary for training AI, could

end up being farmed out to poorly paid aides in Botswana. Film work in the sector could become precaritized absent powerful labour protections.

With intellectual property, filmmakers observe that the international law (in the absence of one in Botswana) nearly always reserves authorship for humans. The U.S. Copyright Office's 2025 report is explicit on this point as it provides that generative AI outputs may be copyrightable only when a human author has contributed sufficient expressive elements, contributed by the human author, declaring that merely prompting an AI does not satisfy this criterion. Applying this to Botswana (which recognizes similar Berne Convention principles), it means that the filmmakers who use AI can still claim copyright as long as they themselves make some meaningful creative input. Participant E expressed it this way: "If I use AI to brainstorm but I rewrite and shape the story, I'm still the author. But if all I did was just give a prompt, perhaps not". This is consistent with legal analysis, while human creative input (how to shoot, what music to use, what to edit), even with AI assistance, remains protectable. Therefore, new legislation may be unnecessary at this time, but it is important to be informed.

Ownership means credit as well as distribution. Many of the interviewed filmmakers were worried that their work might be co-opted. Participant J for instance, shared how he ended up working with a university student who employed the use of an AI storyboard generator, noting that the student wanted credit for AI creative direction, a demand the producer thought was ridiculous but found awkward to argue against. These kinds of disputes amount to struggles over the "author function" in Foucault's terms, questioning who counts as the author, in the eyes of gatekeepers in the industry? According to a majority of filmmakers, assigning the "author" label to an AI model does not seem right to Botswana-based collaborative workshops, as in a local context authoring is a collective task and depends on community approval. However, international platforms (film festivals, streaming services) usually require just one name for the director and author behind a project. This tension between social-local understandings of creation and legal-formal ones is acute in the age of AI and conforms with the questions posed by Tigre Moura et al. (2023), on AI somewhat rivalling human agency, at the same time, with "questionable" outputs.

Finally, control has to expand to include data. Creative work is data work now, as much as data work is data work. Scholars argue that, under data colonialism, social relations are being incorporated into the capitalist process of production (Couldry & Mejias, 2019). In Batswana film, trials and explorations are already in motion for users' generated content and sometimes shared on social media in form of photos and music scores. This may be exploited by the streaming giants and may be used as input into AI libraries. The question is: Who owns this material? Participant A asked, illustrating that a TikTok dances shot in Gaborone get included in a global style imprint, with no "share of value" returned to Botswana. While it is at it, visual panoramas and culture symbols will likely end up into the AIs' stockpiles. Based on the interviews,

there are no simple answers. Some filmmakers fear that with data being taken from Botswana (including, they acknowledge, by their own uploads), the profits remain overseas. This echoes Appadurai's (1996) view of intellectual flows being asymmetric such that a new kind of cultural imperialism is at work. The chapter's analysis, therefore, revealed that Botswana's filmmakers regard AI as both submissive and limiting, equivalent technologies. Three intersecting themes emerged throughout the interviews. First, there is friction between automation and authorship, where they fear that AI tools might disintegrate local creative identity while offering certain efficiencies. Second, there are cultural biases and aesthetic assumptions of the predominant AI systems. Third, the tactical, everyday uses of AI are emerging, with the growing assertion for cultural agency in the face of a lopsided technological environment. Thus, the next section addresses the future of research in this direction.

10.3 Future Research Agenda

To this end, Botswana's negotiation with AI in film is a work in progress that will play out in real time, providing a rare glimpse of how postcolonial societies can exercise creative control in the digital age. The components of labour and ownership indicate that AI does indeed reconstitute control in complex ways to filmmakers. While it has the potential to empower some local creators (through better tools), it is also in danger of replacing labour, creating precarity, and outsourcing authority. In Botswana, the film industry is at a crossroads. Whether AI will be a tool that is maintained under local hands or just another gear for an outside machine remains unclear. However, this chapter presents several directions for future research, with prompting questions that can help ignite research interest on the subject and similar realities:

RQ1: *What do AI tools do in the actual filmmaking process of Botswana?*

Preliminary interviews reveal a variety of uses and attitudes, but no systematic study has been conducted. Ethnographic or survey research could help provide a direction to which AI applications (editing, VFX, scripting) are utilized, learned and experienced as under or overestimating workflow. For example, will filmmakers establish practices hybridizing (or even counterpoising) AI outputs with human craft? How does one's age, education or location affect adoption? To know these patterns allows for the true affordances (or lack thereof), and to what extent barriers are present.

RQ2: *How does AI impact the culture of the films and audiences from Botswana?*

If AI becomes more prevalent, it could influence the kind of stories that are being told and how an audience receives them. Do AI's newfound filmmaking capabilities mean more homogenized, globalized fare, or can they be employed to help lift up local voices? Comparative

qualitative study of AI and human-made movies (or scripts) might reveal differences in taste. Audience research might want to look to whether or not AI elements feel real to the audience. This is also influenced by the idea of the importance of who has right to narration and might examine, for instance, whether Botswanan youth views AI-generated images as familiar or foreign.

RQ3: *What do the economics of AI mean for labour in the creative industries in Botswana?*

Using the digital labour frame, academics should measure the impact of AI on jobs and income. Do platforms, like the ones which provide AI tools, enable freelance work or are they decreasing jobs (for example, editors, sound designers)? Case movie, project, budget studies, and profit-sharing, for example, can explain changes in the production chain. Research could also consider community-based models. E.g. Can Botswana cultivate cooperatives or publicly hosted platforms to guarantee AI tools are working for local interests (a public interest AI model trained in African languages)? All of these questions straddle the theoretical and the empirical. Addressing them will mean using interdisciplinary methods such as interviews (including on digital media), policy analysis, and maybe even technical experiments.

References

Adobe. (2024). *AI video editing with Adobe Premiere Pro*. Adobe. https://www.adobe.com/products/premiere/ai-video-editing.html

Al Jazeera. (2023, July 14). *Why are Hollywood actors and writers on strike?* https://www.aljazeera.com/news/2023/7/14/why-are-hollywood-actors-and-writers-on-strike

Amabile, T. M. (1996). *Creativity in context*. Westview Press.

Amabile, T. M. (1997). Motivating creativity in organizations: On doing what you love and loving what you do. *California Management Review*, *40*(1), 39–58.

Appadurai, A. (1996). *Modernity at large: Cultural dimensions of globalization* (Vol. 1). University of Minnesota Press.

Birhane, A. (2020). Algorithmic colonization of Africa. *SCRIPTed: A Journal of Law, Technology & Society*, *17*(2), 389–409. https://doi.org/10.2966/scrip.170220.389

Blackmagic Design. (2024). *DaVinci Resolve 18.5: What's new*. https://www.blackmagicdesign.com/products/davinciresolve/whatsnew

BOPA. (2023, July 12). *Partly cloudy and hot really really hot*. https://dailynews.gov.bw/news-detail/74048

Botswana Institute for Development Policy Analysis (BIDPA). (2019). *The economic contribution of copyright industries in Botswana*. Companies and Intellectual Property Authority (CIPA). https://www.aripo.org/storage/resources-member-state-laws/1691503602_Economic%20Contribution%20of%20Copyright%20Industries%20in%20Botswana%202023.pdf#:~:text=industry%20has%20been%20found%20to,the%20lack%20of%20structural%20frameworks

Bourdieu, P. (1993). *The field of cultural production: Essays on art and literature*. Columbia University Press.

Bourdieu, P. (1996). *The rules of art: Genesis and structure of the literary field*. Stanford University Press.

Bourdieu, P. (2002). The field of cultural production. In D. Finkelstein & M. Alistair (Eds.), *The book history reader* (pp. 77–99). Routledge.
Couldry, N., & Mejias, U. A. (2019). *The costs of connection: How data is colonizing human life and appropriating it for capitalism*. Stanford University Press. DOI: 10.1515/9781503609754
Counihan, C. (2011). Detecting outside history in "The Mosaic: An Interdisciplinary Critical Journal." *Mosaic: An Interdisciplinary Critical Journal*, *44*(2), 101–118.
Culpepper, M. K., & Gauntlett, D. (2020). Making and learning together: Where the makerspace mindset meets platforms for creativity. *Global Studies of Childhood*, *10*(3), 264–274. https://doi.org/10.1177/2043610620941868
Ditlhokwa, G. (2023). Unlocking monetization potential in the age of YouTube algorithmic bias: An analysis of Botswana filmmaking. In Y. Ismail (Ed.), *The future of television and video industry* (pp. 3–22). IntechOpen.
Foucault, M. (1984). What is an author? In P. Rabinow (Ed.), *The Foucault reader* (pp. 101–120). Pantheon Books.
Gauntlett, D. (2011). *Making is connecting: The social meaning of creativity, from DIY and knitting to YouTube and Web 2.0*. Polity Press.
Gibson, J. J. (1979). *The ecological approach to visual perception*. Houghton Mifflin.
Gibson, J. J. (1986). *The ecological approach to visual perception* (Kindle ed.). Lawrence Erlbaum Associates.
Graham, M., Hjorth, I., & Lehdonvirta, V. (2017). Digital labour and development: Impacts of global digital labour platforms and the gig economy on worker livelihoods. *Transfer: European Review of Labour and Research*, *23*(2), 135–162. https://doi.org/10.1177/1024258916687250
Hutchby, I. (2001). Technologies, texts and affordances. *Sociology*, *35*(2), 441–456.
Kamila, M. K., Jasrotia, S., & Kushwaha, P. S. (2024). Understanding digital sweatshops: A qualitative investigation of workers' perspectives. *Asian Journal of Business Ethics*, *13*, 435–459. https://doi.org/10.1007/s13520-024-00210-y
Kgamanyane, N. (2024, August 06). *Baratani film gets international recognition*. https://www.mmegi.bw/lifestyle/baratani-film-gets-international-recognition/news
Kome, G. (2019, August 21). *Government to review cinematography act*. https://dailynews.gov.bw/news-detail/51226
Kwet, M. (2019). Digital colonialism: US empire and the new imperialism in the global South. *Race & Class*, *60*(4), 3–26. https://doi.org/10.1177/0306396818823172
Masendu, N. (2024). *Film industry condemn P500m Steve Harvey project*. https://weekendpost.co.bw/film-industry-condemn-p500m-steve-harvey-project/
Molosi, D. (2021, November 2). *Dithunya wins award in America*. https://thepatriot.co.bw/dithunya-wins-award-in-america/
More, K. (2023, April 3). *Botswana film wins big in India*. https://dailynews.gov.bw/news-detail/78801
Morris, R. (2025, March 31). *AI helped cause Hollywood strikes. Now it's in Oscar-winning films*. BBC News. https://www.bbc.com/news/articles/ce303x19dwgo
Ngũgĩ wa Thiong'o. (1986). *Decolonising the mind: The politics of language in African literature*. Heinemann.
Nguyen, T. (2025, March 13). *Lights, camera, AI: How artificial intelligence is changing Hollywood*. Mastercard Newsroom. https://www.mastercard.com/news/perspectives/2025/ai-and-hollywood-how-artificial-intelligence-is-transforming-filmmaking/
Reddy, A. (2022). Artificial everyday creativity: Creative leaps with AI through critical making. *Digital Creativity*, *33*(4), 295–313. https://doi.org/10.1080/14626268.2022.2138452
Setlhare, T. (2025, February 27). *Trio tells stories through film*. https://dailynews.gov.bw/news-detail/84893

Siphambili, M. (2008, September 25). *Botswana: No. 1 ladies' detective movie continues?* https://allafrica.com/stories/200809260135.html

South African Cultural Observatory. (2024, December 12). *South African creatives embrace AI while calling for IP protection-new report*. https://www.southafricanculturalobservatory.org.za/article/south-african-creatives-embrace-ai-while-calling-for-ip-protection-new-report

Stones, L. (2016, December 9). *Film review: A United Kingdom*. https://www.businesslive.co.za/bd/life/arts-and-entertainment/2016-12-09-film-review-a-united-kingdom/#google_vignette

Tigre Moura, F., Castrucci, C., & Hindley, C. (2023). Artificial intelligence creates art? An experimental investigation of value and creativity perceptions. *The Journal of Creative Behavior*, *57*(4), 534–549. https://doi.org/10.1002/jocb.600

U.S. Copyright Office. (2025, January 29). *Copyright office releases part 2 of artificial intelligence report*. https://www.copyright.gov/newsnet/2025/1060.html

Warren, T. (2024, June 17). *Adobe's Premiere Pro generative extend AI tool is now generally available*. The Verge. https://www.theverge.com/news/641270/adobe-premiere-pro-generative-extend-generally-available

Wren, B. (2023a, November 27). *Kaone Kario wins best actress award*. https://dailynews.gov.bw/news-detail/76657

Wren, B. (2023b, January 1). *Botswana needs film commission*. Daily News Botswana. Retrieved June 23, 2025, from https://dailynews.gov.bw/news-detail/76565

11 Trusting the Unknown

Understanding Designers' Acceptance of Generative AI amid Ethical Concerns

Verónica Silva

11.1 Introduction

Recent technological advancements have made artificial intelligence (AI) tools widely accessible, often requiring nothing more than a smartphone. As a result, a growing number of individuals are integrating these tools into their creative and professional practices. However, the models that power generative AI are trained on large datasets that may reflect and reinforce existing social biases, particularly those related to gender and race (Singh, 2024). These biases might be reflected in the outputs produced by AI tools, often without users being fully aware of their presence. Given the rapid pace of technological change and the increasing reliance on AI-generated content, it is critical to further investigate how these biases emerge and what implications they hold for design practice and education.

As with the adoption of any new technology, users tend to fall along a spectrum that includes early adopters, the early majority, and late adopters, among others, as described by the technology adoption curve (Scheuer, 2021). In the context of design, AI techniques have long been used in the field, like it is the case of CAD systems for pattern design and architectural modelling (Jiaoying et al., 1987), while other designers are only now encountering these tools as they enter mainstream use. There are also individuals, including educators, who resist integrating AI into their work (Mendez-Alarcon et al., 2025). However, excluding these tools from educational settings may disadvantage students, who will inevitably encounter AI in their professional lives. Given the unprecedented scale and accessibility of contemporary AI technologies, it is essential to ensure that students receive appropriate training that equips them not only with technical skills but also with an awareness of the biases embedded in AI systems due to the data on which they are trained.

In a survey conducted last year, one of the most unexpected findings was that, despite expressing low levels of trust in AI, many participants still reported a willingness to use it (Silva et al., 2025). Although discrepancies between stated attitudes and actual behaviour are not uncommon (Schuman, 1972), this apparent contradiction called for further investigation. Upon analysing the results from the survey, several plausible explanations emerged: a general

DOI: 10.4324/9781003606802-12

mistrust of machines, a limited understanding of the risks associated with AI, or even the influence of social or professional pressure to adopt new technologies. However, these hypotheses required deeper exploration. This paper presents the findings from follow-up interviews and collaborative design exercises, aiming to uncover why designers continue to engage with AI tools even when they express scepticism or concern about their reliability.

11.2 Convenience vs. Consciousness: Ethical Dilemmas in the Age of Generative AI

Contrary to popular belief, AI is not a recent development. The term AI was first coined in 1956 by John McCarthy (Malik, 2019), and since then, the field has experienced alternating periods of rapid progress and stagnation, often referred to as AI winters and springs. We are currently going through a renewed period of advancement, distinguished by the unprecedented accessibility of AI tools. In earlier decades, access to AI technologies was typically restricted to academic institutions, government agencies, or large corporations. Today, however, many AI tools like ChatGPT, Canva, or Gemini are freely available to the public, requiring nothing more than a smartphone. As a result, designers and other professionals are increasingly drawn to the perceived convenience and creative potential of these tools, often without fully recognizing the ethical, social, and technical implications that accompany their use.

While AI has many enthusiastic supporters who believe it will transform our lives in positive ways, several critical concerns must be addressed. One major issue is the environmental impact: the operation of AI tools requires substantial computational power and specialized hardware, which in turn contribute to high energy consumption, water usage, and electronic waste (Kshetri, 2024). Privacy is another pressing concern, as AI systems are trained on vast amounts of data, often without users' knowledge or consent. Companies such as LinkedIn have already used user-generated content, including posts and images, to train their models (Brewster, 2024). Intellectual property rights also come into question, as many artists and creators were not asked for permission to include their work in training datasets (Chesterman, 2024). However, one of the most concerning issues is more subtle and often overlooked: the presence of bias in AI-generated outputs. Because this form of harm is less immediately visible, it poses a particularly serious threat.

Among the various concerns associated with AI, this paper focuses specifically on issues of racial and gender bias. These biases are rooted in the data used to train AI systems, which often reflect existing societal inequalities. For instance, platforms like Google Images have demonstrated gender biases in search results for professions, and similar patterns can be observed in the outputs of generative AI tools trained on large image datasets (Sun et al., 2023). Additionally, longstanding issues such as systemic racism and the racialization of crime are frequently embedded in visual culture, making their way into AI-generated content through historical and contemporary data.

This focus on race and gender bias aligns with the objectives of my PhD research, which aims to understand how designers identify and respond to these biases, and how educational and professional practices might evolve to address and mitigate them.

11.2.1 Theory

Amid the current enthusiasm surrounding AI, the common misconception that AI is a new product persists. As previously discussed, AI emerged in the 1950s and has undergone decades of development. The perception of novelty largely stems from the way companies market AI tools as recent innovations, despite having relied on these technologies internally for years (Bory, 2019). This narrative is further amplified by popular slogans such as "AI won't replace you, but someone who uses AI will", which contributes to a sense of urgency and pressure, particularly among professionals. This framing is problematic because it reinforces the idea that AI is a powerful, almost magical solution to all challenges, rather than a tool with limitations and risks. Addressing this misconception is crucial to fostering a more informed and critical engagement with AI technologies.

A second major misconception is the belief that AI is inherently intelligent. AI systems function as tools based on human-supervised machine learning (Manovich et al., 2017; O'Neil, 2016). These systems do not possess independent reasoning or consciousness, and they rely on human input, oversight, and decision-making at various stages of development and deployment. This misconception is concerning because it may lead users to assume that AI operates autonomously and that its outputs require no further supervision or critical evaluation (Smith, 2018). Such assumptions are particularly problematic in the context of design, where uncritical reliance on AI-generated results can have significant aesthetic, cultural, and ethical implications. It is therefore essential to emphasize the need for human judgment and accountability in all stages of AI-assisted design processes.

As with most technological shifts, AI adoption follows a spectrum. Early adopters, like the case of Microsoft employees (Naik et al., 2025) have already begun integrating AI into various design processes, exploring its potential to improve creativity and efficiency. While this enthusiasm is understandable, it often overlooks or minimizes the significant ethical and practical challenges posed by AI, such as bias, privacy concerns, and environmental impact (Floridi, 2023). On the opposite end of the spectrum are those who reject AI entirely. At my institution, IADE, for instance, some faculty members argue that AI should not be used in the classroom or the professional field at all. This resistance, however, can also be problematic, particularly for students who may graduate without the skills needed to navigate an AI-integrated professional landscape. Between these two extremes lies a more nuanced group, individuals who recognize both the promise and the pitfalls of AI. These designers are aware of the biases, privacy risks, and ecological

costs associated with these tools, yet they still express a willingness to use AI in the future. It is this group that forms the focus of our study. The research began with a survey conducted during the second trimester of 2024, which explored participants' trust in AI, their concerns about job displacement, and their general attitudes toward its integration in design. The following sections present the survey results and outline the methodology used in the subsequent stages of the study.

11.2.2 Methodology

During 2024, a survey was conducted designed to measure participants' responses across several constructs related to AI, including social influence, hedonic motivation, anthropomorphism, performance expectancy, effort expectancy, emotional response, and willingness to adopt AI tools, based on Gursoy et al.'s survey (2019). A total of 114 responses were collected from participants based in various countries, with the most represented being Portugal, Mexico, Brazil, and the United States. The sample included 62 women and 52 men, ranging in age from 19 to 66 years (M = 32.15, Mode = 20). Participants primarily identified as design students, academic researchers, design educators, and design professionals. The largest subgroup consisted of design students (44 participants), which reflects the fact that the survey was disseminated among our student community. Participants were recruited through word of mouth, professional networks, personal social media channels, and primarily from among my students at IADE. While the sample size is modest, the responses provide valuable insights into current attitudes toward AI in design, which are examined in the following sections.

Following the survey, several participants expressed interest in being interviewed. To ensure a more balanced and representative sample, recruitment was expanded and ultimately interviews with 15 individuals were conducted: five design students, five professors and researchers, and five creative professionals. The interviews were semi-structured, allowing for guided conversation while remaining flexible to accommodate individual perspectives. Participants were asked about their use of generative AI in academic, professional, and personal contexts, whether they placed more trust in AI in personal versus professional settings, and whether they anticipated using AI in the future. They were asked what aspects of AI they found most valuable about using AI, whether they believed training should be offered in school or at work, and whether they viewed technical skills or critical thinking as more important when engaging with AI tools. Finally, after discussing issues such as race and gender bias in generative AI, participants were asked if they believed users can employ these tools responsibly and ethically.

In addition to the interviews, collaborative pairing exercises were conducted with 22 students at the bachelor's, master's, and PhD levels. Participants first completed a brief pre-exercise survey, after which they were asked to generate AI images based on a short and deliberately vague prompt, for

example, "create a photorealistic image of a doctor". Afterward, they were asked to analyse the image generated and come up with a new prompt that would allow them to create a new image, fixing the issues found in the first one. Following the image generation task, participants answered the same set of survey questions. The goal of this exercise was to assess whether engaging directly with AI tools, combined with reflection on the process and outcomes, would influence participants' perceptions of AI.

To analyse the results of these studies, I adopted a sequential explanatory design. This involved collecting quantitative data through an online survey, followed by qualitative data from interviews and collaborative pairing exercises. The initial analysis included a cluster analysis to differentiate participant responses based on age and occupation, as younger students often expressed significantly different perspectives compared to more experienced professionals. I then performed descriptive statistical analysis, the outcomes of which are detailed in a previously published article (Silva et al., 2025). The core focus of this paper lies in the thematic analysis of the qualitative data, through which I identified recurrent patterns, concerns, and expectations regarding AI integration in design education and practice.

11.2.3 Findings

The findings from this research reveal a nuanced and evolving relationship between designers and AI. Several key themes emerged: a general scepticism towards AI coexists with widespread adoption, often driven by external pressures rather than full trust; perceptions of AI have shifted from magical optimism to a more critical and grounded understanding; and attitudes towards AI use differ significantly depending on context, with professional use marked by caution and personal use by experimentation. Issues of economic accessibility, lack of formal training, and unequal institutional support further contribute to disparities in AI literacy, while many participants feel increasing pressure to adapt, likening the current moment to previous technological shifts such as the rise of personal computing or Photoshop. Together, these themes suggest that designers are navigating AI not only as a tool but as a social and professional expectation, one that requires both critical engagement and systemic support.

The results from the initial survey done in 2024 (Silva et al., 2025) revealed a general scepticism towards AI among participants. Many respondents reported low to moderate expectations regarding AI performance and expressed significant concern about its potential risks, particularly in areas such as privacy, misinformation, and bias. Despite this cautious outlook, a notable finding emerged: most participants indicated a willingness to accept the use of AI tools in their personal or professional lives. This apparent contradiction suggests a complex relationship between perceived risk and practical engagement. It may reflect a broader trend in which individuals feel

compelled to adopt emerging technologies due to social, professional, or institutional pressures, even when they have reservations.

However, a comparison between last year's survey responses and this year's follow-up interviews reveals a noticeable shift in participants' perceptions of AI. In the open-ended responses from the original survey, many individuals expressed an optimistic view of AI, often describing it as a powerful, almost magical tool capable of making tasks faster and easier. By contrast, the participants interviewed this year demonstrated a more grounded perspective. Most characterized AI as a tool that is useful, but not autonomous or inherently intelligent, and emphasized the importance of using it cautiously and critically. This change in perception is significant, as it suggests a growing awareness of AI's limitations and risks, possibly shaped by increased exposure, media coverage, or academic discourse. Highlighting this shift is important, as it reflects a maturing understanding of AI within the design community. While all interview participants also responded to the original survey, not all survey respondents were interviewed, so although a shift in perception is clearly observable among this smaller group, these findings should be interpreted with caution due to the limited sample size.

The interview results revealed that participants generally use AI tools more frequently in professional contexts than in their personal lives. At work, AI is commonly used for tasks such as translation, idea generation, or overcoming creative blocks, particularly to address the *blank page* problem. In contrast, personal use of AI was reported to be infrequent and often limited to casual or exploratory tasks, such as finding recipes or generating light-hearted content. Nonetheless, participants expressed greater trust in AI when used in personal settings. This is likely because the perceived stakes are lower, as errors or inaccuracies in personal use are seen as inconsequential or even entertaining. In professional contexts, however, participants emphasized the need for caution and typically double-checked AI outputs before using them. This contrast highlights how context significantly shapes attitudes toward AI reliability and trust, suggesting that designers approach AI tools with a more critical lens when outcomes have real-world implications.

Overall, participants acknowledged both the benefits and concerns associated with AI. Despite recognizing potential problems, most expressed that the advantages AI offers, particularly in terms of efficiency and convenience, justify its use in their daily professional lives. While people may not fully trust AI systems, they nevertheless find them highly useful. One female student interviewee noted the time-saving advantages of AI tools, explaining: "*I feel like [AI] makes the work easier and it helps a lot. You don't have to go and do research for like hours and hours; you just do it like quickly… It doesn't consume as much time if I just use websites and Google*". This preference for streamlined interaction may explain why companies like Google have incorporated AI-generated answers into their platforms (Roose, 2024). The participants' attitudes reflect a broader cultural trend toward *solutionism,*

in which technological systems are expected to resolve complex problems with minimal user effort (Morozov, 2014). This observation raises important questions about how convenience may be prioritized over critical engagement with the societal costs of widespread AI adoption.

Before conducting this research, my primary concerns regarding AI centred on issues such as algorithmic bias. However, during interviews, specifically with four participants from Mexico, it became evident that the cost of accessing AI tools is a significant barrier. While these individuals had experimented with free versions of AI applications, they were aware that paid tools offered superior functionality. Nonetheless, due to financial constraints, whether personal or institutional, they were often unable to access these more advanced tools, and as a result, they largely refrained from using them. This insight prompted a critical reflection on my assumptions. Although I had previously focused on how AI can perpetuate biases against marginalized groups, I had not fully considered how economic accessibility also plays a critical role in reinforcing inequality. The ability to benefit from AI technologies is increasingly reserved for those who can afford them, which raises concerns about emerging disparities in digital literacy and professional preparedness. Like the early adoption of computers, individuals without access to AI tools risk falling behind, not only in usage but also in the development of essential skills that are becoming fundamental in contemporary work environments.

Some interview participants expressed curiosity and interest in using AI tools; however, they found it difficult to adopt AI due to a lack of collective engagement. Since no one else in their organization used these tools, they felt little incentive to integrate them into their professional routines. Others also described having learned about AI independently, driven by personal curiosity rather than formal instruction. Most had not received any structured training and therefore lacked the knowledge to use AI in more advanced or meaningful ways. Only one participant mentioned attending a workshop through their workplace, but the training was described as extremely basic, focusing merely on introductory prompting techniques, skills that could be self-taught in a short time. The lack of comprehensive training contributes to disparities in AI literacy. As a result, individuals without institutional support or access to deeper learning opportunities risk falling behind. This gap has broader implications, as those with greater AI proficiency are likely to have a competitive advantage in the job market.

Another significant theme that emerged from the interviews was the sense of pressure participants felt to learn how to use AI tools. This sentiment was frequently compared to earlier technological shifts, such as the introduction of personal computers or the widespread adoption of the internet. Those who mastered these technologies early on often had an easier time advancing professionally. Similarly, participants recalled the emergence of software like Photoshop, which created strong pressure to develop new technical skills to remain employable. In the case of AI, participants described a comparable urgency, an implicit understanding that adaptation is not optional. One

participant described this inevitability by stating that "the genie is out of the bottle", suggesting that AI's presence in the workplace is now irreversible. Considering this, many participants concluded that the only viable response is to engage with AI tools proactively and to learn how to use them responsibly and effectively.

11.2.4 Further Explorations

During the collaborative pairing exercises, an interesting pattern emerged. In contrast to a previous activity performed (Silva et al., 2024), in which students engaged with cultural probes to critically analyse images containing gender and racial biases, the shorter, time-limited exercise revealed that most students initially failed to identify problematic elements in the AI-generated images. It was only after facilitators pointed out specific issues that students began to recognize the potential for improvement. This response was consistent across most participants, with many undergraduate and master's students pointing out that the AI-generated image "didn't look realistic" or "felt off", often focusing on surface-level visual aspects. In contrast, PhD students demonstrated more nuanced and critical reflections from the outset, engaging with the underlying implications of the content. For example, some noted how the image reinforced sexist stereotypes or appeared to follow certain "rules" or "doctrines" that reflected broader cultural biases embedded in the system. These findings highlight the need for explicit instruction and guided practice in identifying biases in AI-generated content at school, as developing students' critical literacy in this area is essential for fostering responsible and informed engagement with AI technologies.

A common theme among participants of the collaborative pairing exercises was the perceived limitation of AI image-generation tools, particularly the difficulty in producing desired results due to the repetitive and homogeneous nature of the outputs. Many participants emphasized that the outcome depends heavily on the prompt, suggesting that the responsibility lies with the user rather than with the technology itself. This perspective is noteworthy, as it shifts accountability away from the AI systems and their training data, and instead places it on the user to find effective workarounds. Participants also noted a paradox: while prompts were often crafted to be neutral, the resulting images still reflected deeply embedded stereotypes. Furthermore, they observed that more detailed prompts tended to produce generic, sanitized outputs. This raises important questions about the limitations of prompt engineering as a strategy for mitigating bias in generative AI systems.

As shown in Table 11.1, results from the short survey administered before and after the exercise indicated some shifts in participants' perceptions. After completing the activity, participants were less likely to believe that AI-generated images fairly represent different genders and reported a reduced inclination to use such images without further verification. Guided discussion and reflective engagement, particularly through reconsidering prompts, appeared

Table 11.1 Participant perception comparison: before vs. after the exercise

	I Believe AI-Generated Images Can Be Used Without Additional Verification		*AI-Generated Images Fairly Represent Different Genders*	
	Before	*After*	*Before*	*After*
Average	2.30	2.00	3.21	3.00
Mode	2	1	3	2
P(T<=t) two-tail	p = 0.3738		p = 0.3471	

Note: Responses were measured on a 6-point Likert scale (1 = strongly disagree; 6 = strongly agree).

to increase awareness of gender bias among several participants. However, the statistical analysis ($p = 0.37$ and $p = 0.34$) suggests that these differences are not significant, limiting the strength of the conclusions that can be drawn. While these patterns are promising, they underscore the need for further studies with larger samples and longer-term interventions to more robustly assess the impact of reflective exercises on users' critical understanding of AI-generated content.

Across the interviews and exercises from this study, participants emphasized that critical thinking is more important than technical skills when using AI tools. Many expressed a pragmatic view of AI as a neutral tool, one that can be misused depending on human intent. This perspective reflects a broader ambivalence: enthusiasm about AI's capabilities coexists with concern about its potential harms. Interview and activity results also revealed a sense of pressure to adopt AI, alongside a perception that its use is becoming unavoidable. Notably, students often failed to recognize gender or racial biases in AI-generated images unless prompted through reflective discussion or longer, structured exercises. However, awareness of bias and the importance of human oversight increased following the activity. These findings point to key educational interventions, outlined in the following section.

11.3 Conclusions

In general, AI companies and stakeholders tend to promote the technology as fully autonomous, often suggesting that it will seamlessly solve complex problems in our lives. However, the reality is far more nuanced. Promisingly, there appears to be a growing recognition among users that AI is merely a tool, one that requires thoughtful human input to be effective. In the context of education, particularly in design-related fields, it is essential to engage students in reflective exercises that help them understand the limitations of AI and avoid unrealistic expectations. While AI may eventually replace certain aspects of the design process, or even some roles within it, it cannot

substitute the human insight and critical thinking that underpin design thinking. Educators must ensure that students go beyond simply experimenting with AI tools and instead learn to use them as part of a broader, intentional, and reflective creative process.

While technical skills are important, they are often easily acquired through online resources. Therefore, the primary focus, especially for educators, should be on cultivating students' critical thinking about AI, rather than simply teaching them how to operate specific tools. Students must understand that AI-generated results can be biased, and that critical evaluation is essential. Ethical considerations should be integrated into the core design curriculum, rather than being relegated to supplementary readings or elective topics. Embedding ethics into design education is crucial to ensure that future designers are equipped to navigate the complexities of rapidly evolving technologies.

In previous research, we found that even though users often express distrust in AI and have low expectations of its capabilities, they continue to use AI tools. Interviews conducted for this study revealed that this apparent contradiction stems primarily from the perceived benefits of convenience, which many view as outweighing the negative aspects. Another significant factor is the pressure individuals feel, whether from their workplaces or the broader industry, to adopt these tools. Many participants described a sense of inevitability, captured by the common expression that "the genie is out of the bottle". Considering this, it is essential to provide adequate training for designers, and specially design students, to ensure they can engage with AI in ways that do not reinforce existing gender and racial biases.

This study forms part of my broader PhD research on gender and race bias in generative AI and its implications for the design field. Through follow-up interviews and collaborative pairing exercises, I observed that many participants, especially students, struggled to immediately recognize bias in AI-generated images without guided reflection. While post-activity responses suggested increased awareness of both the presence of bias and the need for critical human oversight, the statistical analysis indicates that these changes were not significant. These findings, although inconclusive, highlight promising directions and underscore the need for further research with larger samples and extended interventions. Insights from this work will inform the next phase of my research, particularly the development of a tool designed to support users in identifying and addressing bias in AI-generated content within the design process.

11.4 Future Research Agenda

The findings presented in this paper point to a need for systemic change in how design education addresses AI. While external pressures make adoption feel inevitable, students' unique strengths lie in creativity, cultural awareness, and ethical judgment, capabilities AI cannot replicate. Embedding these into core curricula, rather than treating ethics and critical reflection as peripheral,

is essential to prepare designers for a technologically saturated and ethically complex future.

RQ1: *How can design education curricula be restructured to embed ethical and critical thinking about AI, particularly concerning race and gender bias?*

The findings indicate that while students are open to using generative AI tools, they often fail to recognize embedded biases in outputs without guided reflection. This highlights a gap in current pedagogical strategies, in which ethics is frequently treated as an add-on rather than a central theme. Embedding ethical and critical literacy into the core curriculum can equip future designers with the tools to critically engage with AI's limitations, rather than adopting it passively or uncritically.

RQ2: *What types of pedagogical tools or reflective methodologies are most effective in helping students and practitioners identify and address bias in AI-generated content?*

Based on current evidence, structured, facilitator-led activities appear most promising in supporting students and practitioners to identify and address bias in AI-generated content. Approaches such as guided image analysis, collaborative pairing exercises, and prompt-revision tasks encourage participants to critically examine outputs and reflect on the role of training data, cultural stereotypes, and algorithmic limitations. While these methods can raise awareness in the short term, their long-term effectiveness remains underexplored, underscoring the need for further research into sustained pedagogical interventions and scalable models for fostering critical AI literacy.

RQ3: *To what extent does external pressure to adopt AI tools affect designers' willingness to critically evaluate AI outputs, and how can educational interventions mitigate this dynamic?*

A recurring theme in the interviews was the sense of inevitability participants felt toward AI adoption, often driven by workplace expectations or industry trends. Despite recognizing AI's flaws, many expressed a pragmatic need to "keep up" with the technology. Understanding how external pressures shape behaviour, and how education can counterbalance these pressures, is essential for preparing ethical design professionals.

AI Disclaimer Statement

This book chapter was linguistically refined using ChatGPT-5 (OpenAI, version 2025.10) to improve clarity and fluency in English, which is not my first language. All intellectual content, including the ideas, arguments, and

structure, is entirely my own. The tool was used exclusively for language editing and did not contribute to the conceptual, analytical, or creative aspects of the work.

References

Bory, P. (2019). Deep new: The shifting narratives of artificial intelligence from Deep Blue to AlphaGo. *Convergence: The International Journal of Research into New Media Technologies*, *25*(4), 627–642. https://doi.org/10.1177/1354856519829679

Brewster, T. (2024). LinkedIn is using your data to train Microsoft and its own AI models–Here's how to turn it off. https://www.forbes.com.au/news/innovation/linkedin-is-using-your-data-to-train-microsoft-and-its-own-ai-models-heres-how-to-turn-it-off/

Chesterman, S. (2024). Good models borrow, great models steal: Intellectual property rights and generative AI. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4590006

Floridi, L. (2023). *The ethics of artificial intelligence: Principles, challenges, and opportunities*. Oxford University Press.

Gursoy, D., Chi, O. H., Lu, L., & Nunkoo, R. (2019). Consumers acceptance of artificially intelligent (AI) device use in service delivery. *International Journal of Information Management*, *49*, 157–169. https://doi.org/10.1016/j.ijinfomgt.2019.03.008

Jiaoying, S., Feng, L., & Ning, Z. (1987). Artificial intelligence in computer aided design. *Computers in Industry*, *8*(4), 277–282. https://doi.org/10.1016/0166-3615(87)90049-2

Kshetri, N. (2024). The environmental impact of artificial intelligence. *IT Professional*, *26*(3), 9–13. https://doi.org/10.1109/MITP.2024.3399471

Malik, P., Pathania, M., & Rathaur, V. K. (2019). Overview of artificial intelligence in medicine. *Journal of Family Medicine and Primary Care*, *8*(7), 2328–2331.

Manovich, L., Fang, H., & Zhang, M. (2017). *Automating aesthetics: Artificial intelligence and image culture*. https://api.semanticscholar.org/CorpusID:211116298

Mendez Alarcon, C. M., Lasekan, O. A., & Godoy Pena, M. T. (2025). AI concerns among educators: A thematic analysis. *International Research Journal of Multidisciplinary Scope*, *06*(01), 1031–1045. https://doi.org/10.47857/irjms.2025.v06i01.01929

Morozov, E. (2014). *To save everything, click here: The folly of technological solutionism* (Paperback 1. publ). PublicAffairs.

Naik, S., Snellinger, A., Toombs, A. L., Saponas, S., & Hall, A. K. (2025). Exploring early adopters' use of AI driven multi-agent systems to inform human-agent interaction design: Insights from industry practice. In Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems (pp. 1–8). https://doi.org/10.1145/3706599.3706693

O'Neil, C. (2016). *Weapons of math destruction: How big data increases inequality and threatens democracy* (1st ed.). Crown.

Roose, K. (2024). *Can Google give A.I. answers without breaking the web? The New York Times*. https://www.nytimes.com/2024/05/14/technology/google-ai-answers.html

Scheuer, J. D. (2021). *How ideas move: Theories and models of translation in organizations* (1st ed.). Routledge. https://doi.org/10.4324/9780429424540

Schuman, H. (1972). attitudes vs. actions versus attitudes vs. attitudes. *Public Opinion Quarterly*, *36*(3), 347. https://doi.org/10.1086/268016

Silva, V., Ayanoglu, H., & Hernández-Ramírez, R. (2025). *Designing against bias: AI, crime racialization, and the ethics of image selection. Human-computer interaction. HCII 2024*. In press.

Silva, V., Buzzo, D., Hernández-Ramírez, R., & Ayanoglu, H. (2024). Understanding how undergraduate students perceive biases in AI-generated images, a research-through-design probe. In Proceedings of the International Conference on Engineering and Product Design Education, EPDE 2024 (pp. 258–263). https://doi.org/10.35199/EPDE.2024.44

Singh, A. (2024). Diverse yet biased: Towards mitigating biases in generative AI (Student abstract). *Proceedings of the AAAI Conference on Artificial Intelligence*, *38*(21), 23653–23654. https://doi.org/10.1609/aaai.v38i21.30512

Smith, G. (2018). *The AI delusion*. Oxford University Press. https://doi.org/10.1093/oso/9780198824305.001.0001

Sun, L., Wei, M., Sun, Y., Suh, Y. J., Shen, L., & Yang, S. (2023). Smiling women pitching down: Auditing representational and presentational gender biases in image-generative AI. *Journal of Computer-Mediated Communication*, *29*(1), zmad045. https://doi.org/10.1093/jcmc/zmad045

12 Looking through Textile Practices and Digital Craftsmanship for New Opportunities in Creativity and AI

Pei-Ying Lin, Kristina Andersen, Ralf Schmidt, Hèrm Hofmeyer, Pieter Pauwels, and Wijnand IJsselsteijn

12.1 Introduction

At the beginning of 2022, text-to-image artificial intelligence (AI) suddenly became a hit for the general public with Midjourney (Midjourney, Inc., 2022). Midjourney made image generation from text easy: type a sentence and press the button, and you get a striking image! The "artistic" and "creative" qualities that had been considered a hard-earned and unique gift of creative professionals were suddenly available for anyone capable of writing prompts. Immediately following the launch of Midjourney, large language models (LLMs) like ChatGPT (OpenAI, L.L.C., 2024) arrived and made prompt-driven text generation easy and generally available. Creative professionals started to worry that they would lose their jobs to AI. Apart from the ethical concerns of copyrights and authorship of the human-made creative datasets the AI platforms were trained on, the sudden generalized ability to quickly visualize or conceptualize ideas into image and text was making an impact on the creative industry workers' processes, livelihoods, and client relationship such as Hollywood's writers' strike (Anguiano & Beckett, 2023) and film workers' strike (Halperin & Rosner, 2025).

Although slowly people find a balance in using text-to-image AI and LLM as normalized practices such as ideation and communication, it remains problematic in domains that are not purely digital. The fact that text-to-image AI is trained on text-annotated images that grasps the "textual" concept to corresponding 2D shapes and colours means that they often generate visually pleasing but physically erroneous images. For instance, AI-generated comfortable studio images provide a wonderful imagination of studio arrangements while defying physical limitations if taking a close examination of the actual dimensions of objects (see Figures 12.1 and 12.2). LLMs often hallucinate techniques, materials, and information to make up answers across gaps in their training material, inventing cool naming non-existing programming libraries in the code or creating amazing but fictional literature references. The creation had been made easy for the non-professionals, but the outcome is often erroneous and unactionable in the physical world, giving the clients unrealistic expectations and causing tension between the professionals and their clients.

DOI: 10.4324/9781003606802-13

Figure 12.1 A Midjourney-generated loft studio image, where the ladder is leading to nowhere and the double bed is less than 1.5 meters long in proportion to the screen and the books below.

We propose two strategies to tackle the digital-physical gap for AI practices: first, taking a practice-led approach to have AI generate workable intermediate outcomes for creative professionals instead of envisioning the final result, and second, engaging in holistic reflections of existing AI platforms and their datasets in order to match them more closely to each creative practice.

12.2 Between Lab-Born AI and the Embodied Practice of Craft

In this article, we use the specific Human-Computer Interaction (HCI) research field of Digital Craftsmanship as our exploration space to investigate workable approaches to AI for textile practitioners. We use different textile fabrication techniques, such as Knitting, Weaving, and Embroidery, as our subjects of observation.

Figure 12.2 Strangeness in s and scale of Figure 12.1.

Digital Craftsmanship is an emerging area in HCI, which combines traditional craft with digital systems (Goveia Da Rocha et al., 2022; Jacobs et al., 2016). The word "craft" is "an occupation, trade, or activity requiring manual dexterity or artistic skill" (Merriam-Webster, n.d.), such as weaving, knitting, embroidery, and ceramics, that had a long tradition of hands work with certain materials and techniques. Digital Craftsmanship within HCI finds creative digital system integration with the working of different craft practices. Being in a rather experiment-oriented research field, Digital Craftsmanship is practised in a way that designer or programmer engages directly with craft making, hardware and software development, and programming for creative purposes. The making process is used to experiment with both physical and digital materials and assets. This contrasts with the industrial model where the hardware and software developer work in separation to the textile designers and often aim at optimizing fabrication processes using digital solutions or providing digital solutions for existing fabrication

needs, for instance, how to make sweaters easier and faster. The experimental, open-ended nature of Digital Craftsmanship makes it a perfect domain to explore the integration between traditional crafts and the rapid technological advancements and user population change of AI.

12.2.1 Embodiment, Materiality, and Complexity in Craft

Before diving into the topic of where technology and craft meet, it is important to analyse the practice of craft: what is crafts' knowledge space, what is craftsmanship, and what are essential elements in crafts.

The knowledge space of knitting and weaving is highly embodied. Looking at the fundamental elements of knitting and weaving, they can be seen as techniques for interlinking yarns, where both are simple in principle but sophisticated to work with in practice. Knitting interlocks yarn loops to form a piece of textile, while weaving interweaves the yarns to form a piece of textile, while different ways of interlocking can create different material characteristics such as drape, texture, stretchiness, or even 3D shapes. Tools were invented to facilitate different forms of interweaving, for instance, knitting needles for hand knitting, domestic flatbed knitting machines for machine-assisted knitting, and punch-card controlled semi-computerized machine knitting. Or in weaving, frame looms, table looms, and jacquard looms. Some are common cultural practices, such as knitting a scarf with a pair of kitting needles, or weaving a piece of fabric with chunky threads.

However, in this material-tool working, the material and the tool also contribute significantly to the making because they define the limitation of the creative space through their physical characteristics, which is where the mastery of craftsmanship entails. A craftsperson would have to pay attention to the yarns and the machine during the making process, learning to listen to their characteristics, and make design choices accordingly. These characteristics are often tangible, embodied, and influenced by the environmental variables. For instance, one would assume that the same breed of sheep would produce the same quality of wool fibre and could create identical yarns if twisted with the same setting. In reality, even the same breed of sheep with different diets can change the physical characteristics of the fibre, let alone the geographical location and the environment they grow in. The same batch of yarns would behave differently if the temperature and humidity is different. As a result, the craftsperson will need to understand the yarn ad hoc in order to work with it. Like with cooking, the same recipes might not produce the same dish even with the same ingredients and the same chef, the same machine will make textile differently when the temperature and humidity is different or when operated by a different person. A craftsperson is capable of understanding these tiny differences when working with the material and the machines, and to make the best out of each unique combination.

The training of a craftsperson is essentially centred on learning how to deal with physical complexity of the material and the machines with consistency

and creativity, where it can be subdivided into a spectrum of roles. The roles of craftsperson range from designers who explore new ideas through crafts with functionality, artists who push the limit of expressions, technicians who are masters of perfection, to people who sit between these roles. Within this spectrum, there are also various ways to work with materials and machines. Designers and artists tend to see material and machines as partners to think with (Ingold, 2021; Malafouris, 2014) and aim for an open-ended exploration. Technicians aim for control and performance that is attuned to the material and the machines, but with a specific ideal goal in mind. The long tradition of crafts training provides techniques and tools to work with this physical uncertainty and complexity through their hands, thinking along with their head (Sennett, 2008). The essence that cognition for craft exists not solely in mind, but distributed (Hollan et al., 2000) to the yarn and the machine, embodied (Malafouris, 2013) through hands, enacted (Varela et al., 1991) in interactions, and situated between the yarns, the machines, and the human (Suchman, 2006).

12.2.2 AI's Difficulty on Material Complexity

The multiplicity of cognitive knowledge and open-ended nature of the craft making process bring challenges to the solutionist approach dominated field of AI. In an engineering perspective, the creative process involves a manifold of interdependent variables that collectively evolve and influence the direction of the idea's evolution. The iteration between ideas and creation forms an iterative loop that stretches out in time, where evolution engages with multiple entities with agencies such as humans, materials, and machines. For which, plotting the making process on a timeline one can see that these agencies have different engagement at different times within the process, as shown in Figure 12.3. These entities form dynamic synergies throughout time, engaging different types of data and embodied knowledge, making the question of what can be harvested to train the AI difficult to be answered.

Current research on AI mainly works with two types of training data sources: (1) Using digital data that is readily available, such as ones scraped from the internet. (2) Machine data taken from specialized physical sensors, such as the ad hoc sensor data from Shima Seiki knitting machines for AI-driven optimization (Shima Seiki MFG., LTD., 2024). For a craftsperson who works predominantly on creative, open-ended explorations, datasets from these approaches hinder the creativity for a number of reasons: (1) Data scraped from the internet that are used in generative AIs lacks the embodied, physical information, rendering textile does not obey the physical reality. (2) Data collected from machine sensors focus on defined and repetitive information oriented towards optimization, not exploration. For instance, a knitting machine that uses data to optimize the reliable production of stitches will tend to counteract anything different from a standard knit pattern. These two approaches of digital data collection fail to speak to

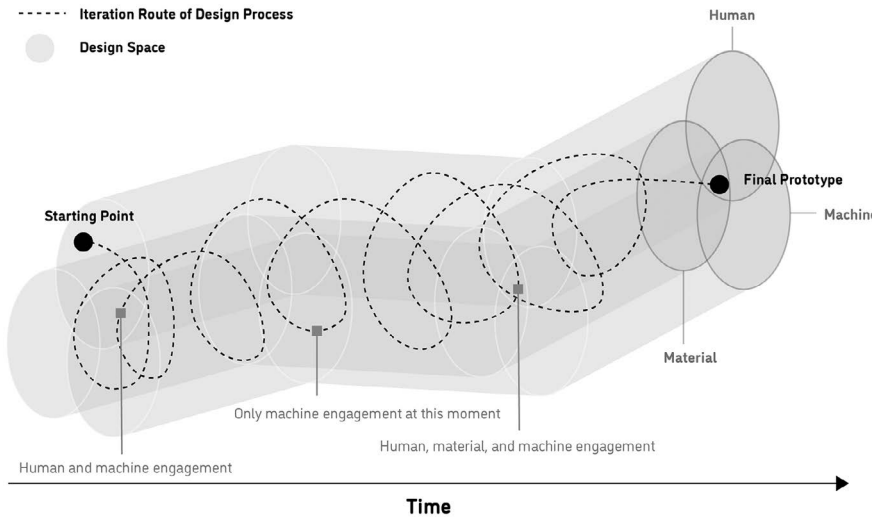


Figure 12.3 How the creative process progresses throughout time in relation to the design space of each agency (human, material, machine).

the need of designers and artists who obtain inspirations through surprises and errors from the materials and the machines (Sennett, 2008). There are little tools of digitalization available for open-ended exploration that is tailored for the embodied and tacit knowledge engaged in the creative making process. As a result, the currently available generative AI does not speak to the larger parts of the existing creative and open-ended exploration practices. This limits the direct engagement of generative AI with materiality and limits the interaction to the early brainstorming and ideation stage of the creative process in crafts unless further translation and transformation of the generated outcome has been taking place.

To find suitable tactics for confronting the materiality complexity for AI, we shift the attention from the AI algorithms and focus on the cognitive aspects of craft processes to tackle the gap between the digital and the embodied. We approach the cognitive aspects of craft through auto-ethnography documentation and meta-analysis, along with third-person qualitative experiments in order to reveal the implicit embodied knowledge and action strategies within the practices that might be relevant to the development of suitable AI for the crafts. In the following, we describe two experimental engagements on different cognitive spaces versus the AI relationship as examples. The first one explores the cognitive adjustments required by the use of various generative AI models, where the generative AI is trained on unstructured data and is multi-functional. The second one explores delegating specific cognitive activity within textile fabrication to a lightweight evolutionary algorithm.

12.2.3 Finding Ways to Work with Generative AI for Textile Making

During the fall semester of 2022 and 2023, we coached eleven first-year Industrial Design master students from Eindhoven University of Technology taking a "studio approach" in order to investigate human-material-machine-AI collaboration.

Studio approach is a practice-led or craft-led design research method. It pays attention to the process of hands-on practice where embodied experiments predominantly take place, through detailed documentation, autoethnography diaries, and an archive of samples made in the process, followed by meta-analysis on the collected data. These research methods allow researchers to distil the nuances during the process of making. Examples include Da Rocha et al. (2022), who document and trace the journey of making (Da Rocha et al., 2022), Oogjes and Wakkary (2022) on looking at the process of weaving to learn the ways of working with, and Jarvis et al (Jarvis et al., 2012), which focuses on the imagery recorded process of making with annotations.

The students were asked to co-create physical textiles using one of at-the-time emerging generative AI platforms of their choice. This approach was designed to help us observe how cognitive space shifts and adapts when engaging with AI platforms in the context of highly embodied subjects. The students were in four groups, each group with three to four students. The project ran from mid-September to the end of October for a duration of 1.5 months between 2022 and 2023. The students spent one month exploring and making detailed documentation adapted to their process, and two weeks for meta-analysis. This structure allowed them to look at the process in depth through qualitative research (Crabtree, 2023). As a design brief, we asked the students to embark on a journey where they self-assign a textile-making project to collaborate with a generative AI of their choice as a group. A lab equipped with knitting, weaving, sewing, and embroidery machines was open for them to use. The two groups of 2022 had chosen to work with text-to-image AI, namely, Midjourney (Midjourney, Inc., 2022), StableDiffusion (Stability AI Ltd, 2024), and Dall-E (OpenAI, L.L.C., 2023). The other two groups of 2023 had chosen to work with LLM, namely, ChatGPT 3.5 (OpenAI, L.L.C., 2022) and Bard (now Gemini) (Google, 2023). All four groups found the generative AI platforms lacking the crucial detail of textile fabrication, where additional steps of translation were required for outputs of these platforms to make them actionable in textile fabrication.

All four groups began with the assumption that AI could do the creative work for them which they reflected on their diaries. In the process, they discovered that the generated results require taking the physicalities of material into consideration through manual editing and tuning. For example, the text-to-image AI-generated textile image is in bitmap format, while the actual textile fabrication machine takes vectors as inputs. For importing the textile swatches as images for AI to further iterate, it also loses the embodied information of the swatches. It is also difficult to evaluate the quality of

the generated outputs without physically making the textile sample, which means physical performance is always required. Although generative AI has developed massively from 2022 to 2023, the disparity between digital AI and the embodied textile remains large during the time of our research.

12.2.4 Subtle but Crucial Cognitive Shifts in AI Collaborations

By engaging with AI situationally through the studio approach, our students-as-designers working with AI are prompted to look inward, revealing hidden layers of cognition through post-interaction meta-analysis on process documentations and diaries. We found that designers' cognitive positioning of AI is relational and evolves over time. The cognitive shift did not occur spontaneously; it was prompted by the necessity of working with AI due the course context. Without the requirement of the course, they expressed in the follow-up interviews that they would have stopped using AI due to the disparity between the digital and the physical.

In the meta-analysis, the LLM groups noticed that their expectation for AI's role in the creative exploration changes in the process. Although the whole studio approach is muddy and messy, where they figure things out as they do things, they noticed that there are two key components for the collaboration to work: understanding what the AI is capable of and learning how to be explicit. The students learn AI's capabilities and limitations through trial and error by implementing the generated outcomes with hands-on textile making. The processes contain a lot of unsatisfying results and loose ends, which eventually lead the students to figure out the specific abilities the AI can be delegated to and the way to communicate with the AI. In other words, because this generative AI is capable in various roles, it requires a huge effort to get to know the AI and put the AI in the right place. Additionally, despite the creative process in textile making is intuitive and hands-on, the cognitive space of the process is highly complex, containing tasks across the abstract and the tangible, such as conceptual ideation, understanding of material characteristics, multifaceted making process with various tools, reading of the embodied knowledge through eyes and hands, and many more. Each kind of cognitive activity would have a different affinity for AI and requires a different working and prompting strategy with AI.

The nuances of cognitive activity diversity have also been evident in our experiment, and the mastery of delegating the activities to AI with the right way highly influences the perceived agency and creativity of the designer. While working with AI, the students noticed that as a designer, it is important to be cognitively conscious about the specific tasks that need to be carried out in this freely explorative context. It would then allow the designer to communicate with generative AI while having the appropriate expectation, communication style, and tonality with the right kind of prompt engineering. In other words, by being aware of what role to assign to the AI within a creative textile process, the designer can regain authorship and agency that would

allow them to be creative. Otherwise, it is easy to fall prey to delegating the whole creative process to AI and losing one's own agency.

The art of working with AI to get desirable responses very much lies within the new field of "prompt engineering" which is an issue for highly embodied and intuitive creative processes. Although prompt engineering studies have become prominent (Giray, 2023; Meskó, 2023; White et al., 2023), most of the research is based on prompt engineering in the circumstances where the user goal and expectation is already clear and well-defined. In the case of crafts, the challenges emerge through difficulties to articulate appropriate prompts verbally, and the ambiguity of cognitive tasks. Craft processes are intuitive and complex, making the designer's goal and expectation of the outcome ambiguous and implicit. Let alone the challenges of knowing how to identify and contextualize the user's problem space, finding the ability generative AI can provide, and transform it into prompt engineering. For textile making and crafts, an in-depth understanding of the specific craft practice the designer is working with is required before being able to prompt. The implicit knowledge of craft and textile reside in the material (Malafouris, 2019), in the environment (Hollan et al., 2000; Hutchins, 1995), in the interaction (Suchman, 2006), unspoken, relational, and rarely articulated in words. For instance, in describing the work settings of textile making, the right warp tension on a loom is "bouncy as a baby's butt", the right density of a woven fabric is "not too tight", and the knitting machine is functioning well if "the sound of the carriage moving through the needle bed makes the right sound", which is rather experienced based. The texture of a textile can be "bouncy", "soft", "rough", "delicate", or just difficult to verbalize. While prompt-driven generative AI requires precise articulation of texts, the nature of tacit and embodied knowledge increases the difficulty of working with AI.

In short summary, in this experiment of working with LLM on textile making, we noticed that shifting the awareness of a human-generative AI interaction from the aspect of "how to prompt" to "what to prompt" is significantly beneficial for getting the actionable outcomes. The answer to "what to prompt" is relational and requires learning of generative AI's ability and sensitivity towards the specific sub-task that can be delegated to AI in the creative process.

12.2.5 AI as a Mirror for the Creative Process of the Crafts

In response to the urgency of uncovering cognitive nuances within the creative processes of textile design, we conducted a knitting project that made use of a simplistic evolutionary algorithm in developing knitting patterns for organic aesthetics. The evolutionary algorithm-generated pattern is a way to overview possibilities of pattern developments that lead the material exploration in a unique direction that would not be reached without AI. The project takes the first-person perspective (Desjardins et al., 2021) in documenting

Figure 12.4 SilverReed SK840 domestic knitting machine.

the ideation and making process of knitting two sea slugs using a computer-connected Silver Reed SK840 domestic knitting machine (Lin et al., 2024). Silver Reed SK840 (Figure 12.4) is a domestic knitting machine produced by the Japanese company Silver Reed in 1990 (China Creation Group, n.d.). Its needles and carriage can be operated manually, and it also supports control via an external punch card reader named Silver Reed EC1. The machine is highly versatile, allowing for individual needle manipulation and manual additions to the knitted structure. It also enables users to create textiles spontaneously, unlike industrial knitting machines, which require all designs to be pre-programmed on a computer and fully knitted automatically without the possibility of manual adjustments. With the decline of punch card systems, digital interfaces have been developed to replace them, enabling pattern plotting via external hardware compatible with the Silver Reed SK840. We reckon that the pattern generation and machine control processes have already undergone partial digitization within the knitting workflow, which serves as a good entry point for AI.

We developed the hardware SReeDuino and software LiveKnit (Lin et al., 2024) to create a flexible interface that could easily import the AI-generated

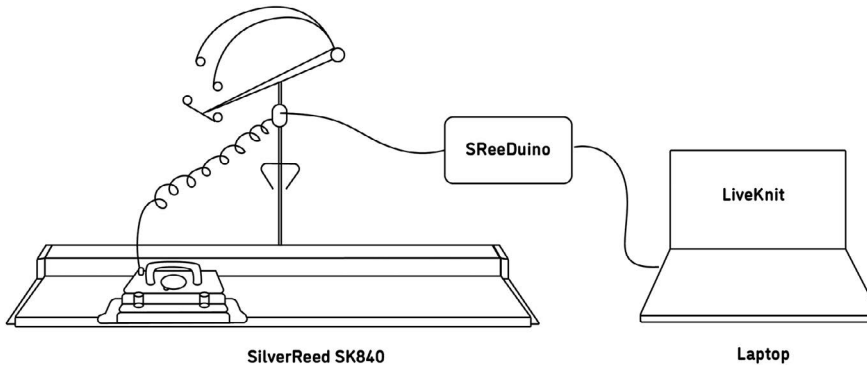
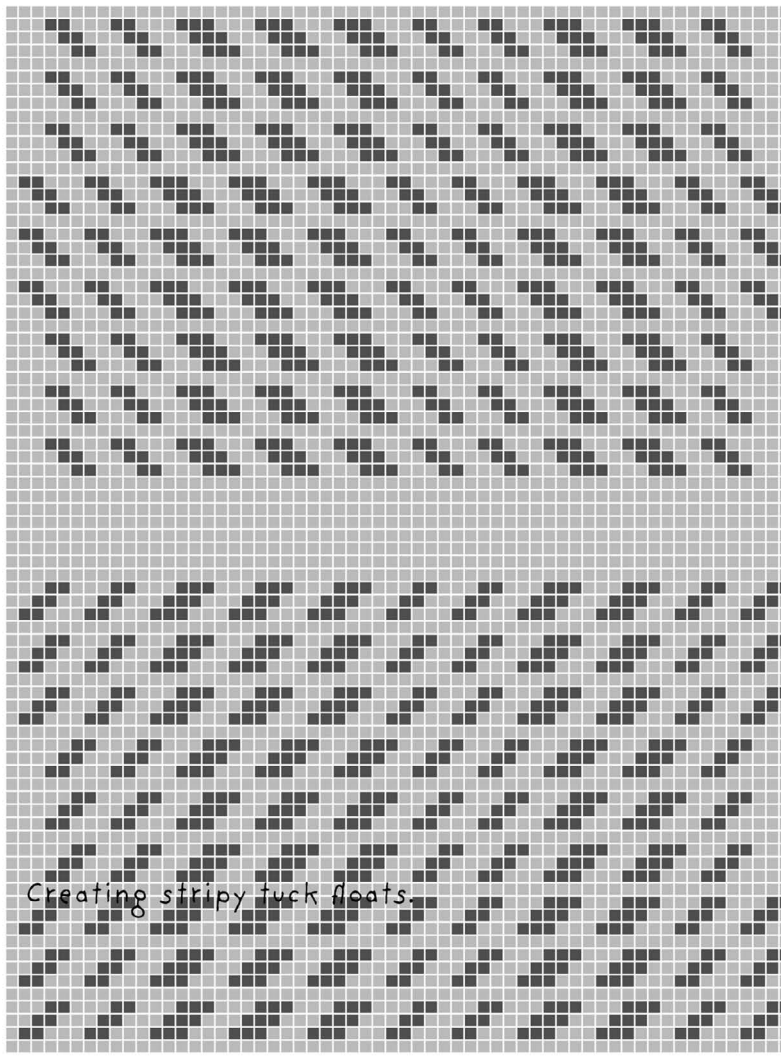


Figure 12.5 System Setup of the hacked domestic knitting machine.

patterns and send them to the knitting machine (Figure 12.5). The patterns are in the format of matrices containing 0s and 1s, as representative of the punched and unpunched holes on punch cards. The width of the matrix indicates the number of needles used, and the height of the matrix indicates the number of rows that will be knitted. Using a simple Python script, we use an evolutionary algorithm to generate hybrid mutations based on two parent patterns (Figures 12.6–12.8). The first author took a typical textile exploration process that begins with using existing images for visual and atmosphere directions, making different yarn combinations to find the right material and colour, making simple knitting swatches, and iterating the patterns using chosen materials that work towards the first prototype. This iterative stage between the patterns and the materials is also where the first author made use of the evolutionary algorithm. Patterns used for sample swatches were hybrid and mutated according to different mutation rates, each stage creating tens of thousands of patterns, selected based on their knittability, which ended up with 65 patterns. These patterns can be directly imported into the self-developed LiveKnit interface, which is then fed to Silver Reed SK840 through SReeDuino.

Although the digital patterns store the information of how the textile could be made, it is far from how the textile will actually look like when it is knitted with the yarns. Figures 12.9–12.11 show an example of a simple pattern knitted with a synthetic elastic yarn and a non-stretchy wool yarn using the fair isle technique. Because the materiality of yarns could drastically change the structure of the textile on top of the patterns, it is difficult for the knitters to predict the textile outcome by looking at the patterns without making physical swatches. It is also impossible to test all the generated patterns with yarns because it would take at least 30 minutes to knit one swatch. Constrained by these two physical limitations, the generated patterns became a way to have a vague overview of what the

Task:	**AI Generation of Patterns**
Mutation Name:	20231213_SeaSlugOne_20231213_1625
Date:	2023/12/13 16:25
Time spent:	45m0s



Mutation Parent 1

16

Figure 12.6 Excerpt page from Knitting the Sea Slugs, showing one of the original parent patterns.

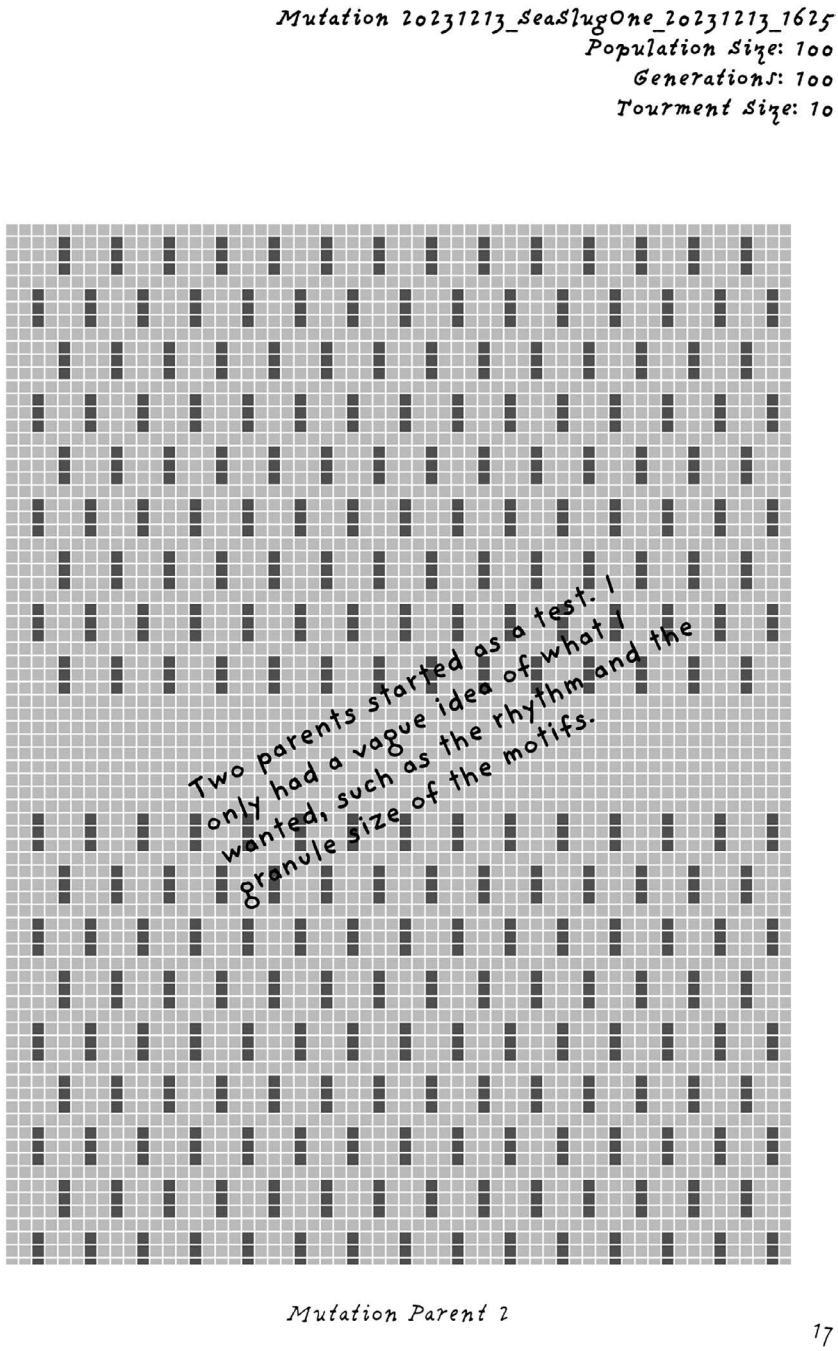


Figure 12.7 Excerpt page from Knitting the Sea Slugs, showing one of the original parent patterns.

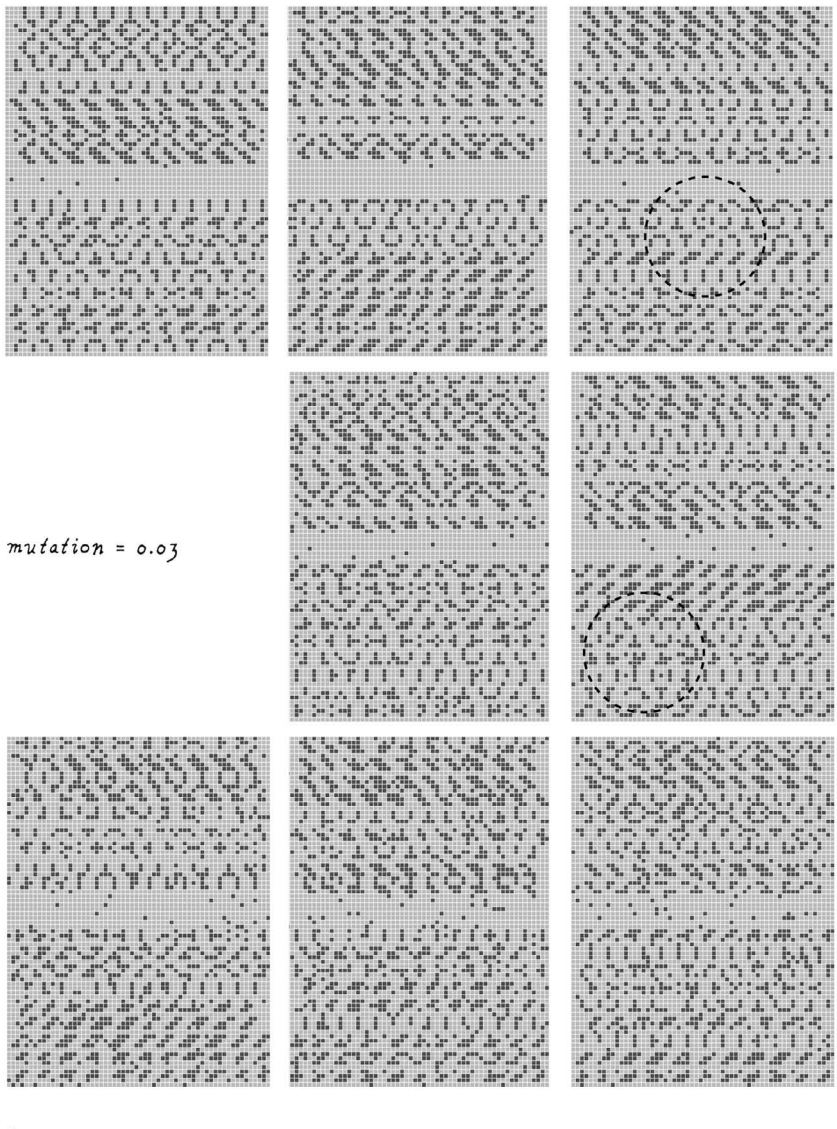


Figure 12.8 Excerpt page from Knitting the Sea Slugs, showing some mutated patterns from the two parent patterns in Figure 12.6 and 12.7.

textile could be. Despite the digital patterns not fully informing what the textile outcome will be like, one could make comparisons between a selected pattern and its knitted swatch, which gives a sense of how a certain combination of digits (the 0s and 1s) will perform with the selected yarns (Figure 12.8). For which, the first author was capable of reflecting between

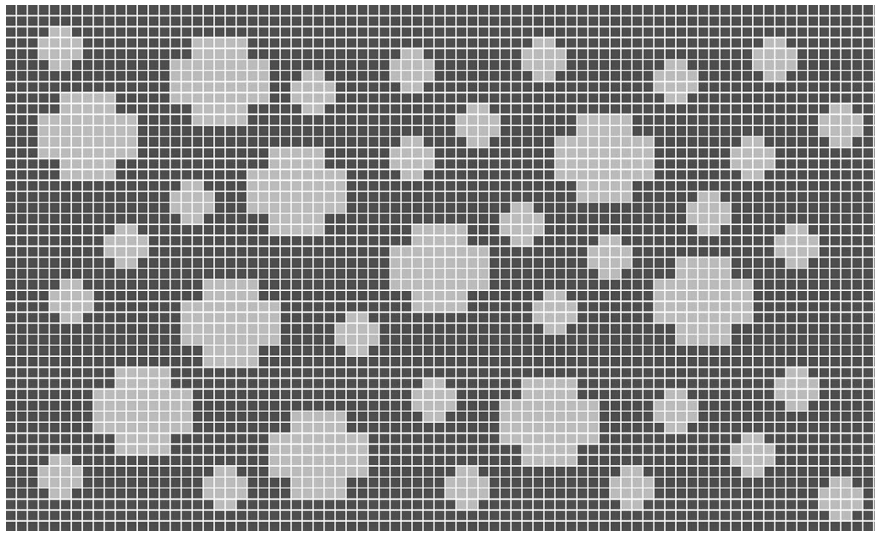


Figure 12.9 The digital pattern that made the knitted textile in Figure 12.10.

the textile and the pattern to make further annotations and comments on the digital patterns, identifying interesting areas which she then stitched together for the next iteration of knitting.

The "mutated" digital patterns often suggest structures that the first author wouldn't have plotted. These patterns also make more sense than patterns randomly generated, for that they still inherit physical traits from the parent patterns. In other words, the digital patterns are informative to sketch out the creative space of the textile making that was not visible without the generated patterns. Instead of taking over the creative ideation process of pattern plotting, the evolutionary algorithm here serves as augmented intelligence bespoke to the cognitive activities of pattern plotting, which essentially involves the permutations and combinations of 0s and 1s. The evolutionary algorithm consists of only 275 lines of Python code, lightweight, and simple. However, the generated results as a matrix of 0s and 1s can be directly imported to the knitting software that controls each needle accordingly just like how punch card machines would control the movement of needles. In a way, the matrix is communicated in a direct language that is fundamental to the knitting machine by directly appointing the needles' movement: knit or no knit. It is straightforwardly actionable compared with previously mentioned generative AI, such as text-to-image AI and LLM. Text-to-image AI will most likely generate an image of the possible shape of textile which still requires a series of unpacking the detailed structure of the textile, envisioning how it can be knitted, and draw the possible pattern, before loading to the machine. While the currently trained LLM on text-based

Figure 12.10 The knit side of the pattern shown in Figure 12.9, knitted with yellow elastic yarns with cotton-acrylic yarns.

Figure 12.11 The purl side of the pattern shown in Figure 12.9, knitted with yellow elastic yarns with cotton-acrylic yarns.

contextual data will probably generate descriptive sentences of the textile or steps of actions to knit, missing the crucial structural information that might hinder the forming of the textile. This situation highlights the fallacy that despite text-to-image AI and LLM-generated results can be visual-rich and contextual-rich, much powerful than a simple, low training data required evolutionary algorithm, but because the generated result does not fit into the type of information needed to "communicate" with the knitting machine, translations are needed. The simple evolutionary algorithm appears to be much more powerful and useful because it matches the information structure, which is the digital matrix of 0s and 1s.

12.2.6 Craftsmanship-Centred Approaches for Creative AI

The two design experiments described here showcase the craftsmanship-centred approaches from two different angles: the angle of the designer and the angle of the knitting machine. By diving into the cognitive space of the designer and the language of the knitting machine, the key component for the generative AI we studied, changes. For instance, the first experiment reveals that working with powerful LLM would require two things: learning the capability of the AI through trial and error and understanding one's own practice well enough to be able to engineer the appropriate prompt for an appropriate task. The second experiment reveals that a simple evolutionary algorithm could be more powerful and efficient to facilitate creativity if it spoke the language of the knitting machine. Both experiments seen together form a making centric critique to the current hype of training generative AIs with more parameters and bigger dataset. Instead, to explore creativity in the physical world of making, craftsmanship-centred approaches are essential for identifying meaningful opportunities for AI integration, as they play a crucial role in fostering AI-driven creativity. We propose that research on potential new AI platforms for crafts and other creative practices should start by looking at the existing practices and the cognitive activities that take place before diving into the technical details, such as algorithms and datasets.

The craftsmanship-centred approach will allow the AI to join the human-material-machine synergy instead of disrupting the established creative processes inherent in craftsmanship. This is due to the "Thinging" nature (Malafouris, 2014) of craftsmanship, where human, material, and machine all contribute to the thinking and making process. In other words, the creative outcome is influenced by both the human's decision, material characteristics, and machine performance at the idea level. This means that the design is not designed by humans alone, but by the constituency formed by material, machine, and human (Wakkary, 2021). In order to preserve the notion of human craftsmanship in times of in creating algorithmic tools we propose AI must be integrated in such a manner to sustain the

synergistic relationship between human agency, material engagement, and machine interaction.

Through a close examination of the cognitive dimensions of craftsmanship, particularly by identifying the various informational formats involved in distinct cognitive activities, we can uncover a rich landscape of opportunities for AI to contribute meaningfully to these processes. Additionally, future opportunities for creative AI may involve working with relatively simple forms of information, as the craft-based creative process can often be decomposed into simple cognitive steps and may not necessitate large datasets. This also means that powerful generative AI might not be the most suitable direction for creative AI. Simple, lightweight AI might be able to contribute to creativity even more.

12.3 Future Research Agenda

RQ1: *How might AI research be shaped by a practice-centred approach grounded in practices that are highly tactile and embodied?*

Historically, Artificial Intelligence is a field that investigates computational intelligence inspired by human cognition. In recent years, the mainstream of AI developments has focused more on the development of algorithms, interfaces, and datasets. While we have observed that due to the highly embodied nature of craft practices, powerful generative AIs, let alone other optimization-oriented AIs, still require users to have sensitivity towards cognitive activities within their creative process. While working with the highly tactile and embodied practices, looking back at human cognition again becomes important. We suggest that AI research would benefit from the humanities lens, where the diversity of creative practices themselves is not just a subject of the arts and humanities, but also a computer science one as many literature states (Constantinides et al., 2024; Vallor, 2024). The early-stage AI research should take efforts in following the humanities framework to gain the perspective of creative practices. Additionally, to approach the subject of creativity as a wider term than computational creativity.

RQ2: *How will taking the craftsmanship-centred approach influence the ecology of future AI research?*

Similar to the Human-Centred AI (Xu, 2019) approach, taking a craftsmanship-centred approach would entail that practice-based craftspeople should be engaged from the early stages of AI research. The craftspeople will no longer be only involved on the user end but can engage in the development of AI platforms. How to develop methods for collaboration between computer scientists and craftspeople will become an important and interesting challenge.

RQ3: *What are the potential challenges of taking a practice-centred approach in AI innovation and research?*

Taking a practice-centred approach in AI innovation and research is essentially a request for interdisciplinary research. To understand knowledge that is highly embodied, new research methodologies will be needed to look at the creative practices as processes instead of finished artefacts. These methodologies should be capable of unpacking the embodied knowledge that is non-verbal, dynamic, and ad hoc, in the forms that can be digitalized and archived. The methods of evaluation will also take a qualitative approach rather than a quantitative one, for that practice-led processes are difficult to quantify. We also envision that innovation of AI will require spending more time researching types of cognitive activities and the forms of information within the creative practices before selecting the appropriate dataset and designing the right interface, which is opposite to the current approach where development of algorithms, datasets, and interfaces comes before a clear started audience.

AI Disclaimer Statement

In this article, Microsoft Word's built-in AI has been used for grammar check and ChatGPT 4-o has been used as a dictionary to check for finding the right wording.

References

Anguiano, D., & Beckett, L. (2023, October 1). *How Hollywood writers triumphed over AI – and why it matters. The Guardian*. https://www.theguardian.com/culture/2023/oct/01/hollywood-writers-strike-artificial-intelligence

China Creation Group. (n.d.). *History of brother knitting machine*. Retrieved May 2, 2025, from http://www.creationgroups.com/history%20brother%20%20knitting%20machine%20silver%20reed%20knitting%20machine%20creative%20knitting%20machine.htm

Constantinides, M., Tahaei, M., Quercia, D., Stumpf, S., Madaio, M., Kennedy, S., Wilcox, L., Vitak, J., Cramer, H., Bogucka, E. P., Baeza-Yates, R., Luger, E., Holbrook, J., Muller, M., Blumenfeld, I. G., & Pistilli, G. (2024). Implications of regulations on the use of AI and generative AI for human-centered responsible artificial intelligence. In *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems* (pp. 1–4). https://doi.org/10.1145/3613905.3643979

Crabtree, A. (2023). H is for human and how (not) to evaluate qualitative research in HCI. *Human–Computer Interaction*, 1–24. https://doi.org/10.1080/07370024.2025.2475743

Da Rocha, B. G., Spork, J., & Andersen, K. (2022, February). Making matters: Samples and documentation in digital craftsmanship. In *TEI* (pp. 1–10).

Desjardins, A., Tomico, O., Lucero, A., Cecchinato, M. E., & Neustaedter, C. (2021). Introduction to the special issue on first-person methods in HCI. *ACM Transactions on Computer-Human Interaction*, *28*(6), 1–12. https://doi.org/10.1145/3492342

Giray, L. (2023). Prompt engineering with ChatGPT: A guide for academic writers. *Annals of Biomedical Engineering*, *51*(12), 2629–2633. https://doi.org/10.1007/s10439-023-03272-4

Google. (2023). *Google Bard* (Version 2023) [Computer software]. Google. https://bard.google.com/

Halperin, B. A., & Rosner, D. K. (2025). AI is soulless": Hollywood. *ACM Transactions on Computer-Human Interaction*, *32*(2), 1–27. https://doi.org/10.1145/3716135

Hollan, J., Hutchins, E., & Kirsh, D. (2000). Distributed cognition: Toward a new foundation for human-computer interaction research. *ACM Transactions on Computer-Human Interaction*, *7*(2), 174–196. https://doi.org/10.1145/353485.353487

Hutchins, E. (1995). *Cognition in the wild*. MIT Press.

Ingold, T. (2021). *Imagining for real: Essays on creation, attention and correspondence* (1st ed.). Routledge. https://doi.org/10.4324/9781003171713

Jacobs, J., Mellis, D., Zoran, A., Torres, C., Brandt, J., & Tanenbaum, T. J. (2016). Digital craftsmanship: HCI takes on technology as an expressive medium. In Proceedings of the 2016 ACM Conference Companion Publication on Designing Interactive Systems (pp. 57–60). https://doi.org/10.1145/2908805.2913018

Jarvis, N., Cameron, D., & Boucher, A. (2012). Attention to detail: Annotations of a design process. In Proceedings of the 7th Nordic Conference on Human-Computer Interaction: Making Sense Through Design (pp. 11–20). https://doi.org/10.1145/2399016.2399019

Lin, P.-Y., Andersen, K., & Ijsselsteijn, W. (2024). Knitting the sea slugs – A demonstration of a human-AI-machine-material assemblage. In *Designing Interactive Systems Conference* (pp. 318–322). https://doi.org/10.1145/3656156.3665422

Lin, P.-Y., Andersen, K., Schmidt, R., Schoenmakers, S., Hofmeyer, H., Pauwels, P., & IJsselsteijn, W. (2024). Informed by yarns—Proposing knitting patterns for revealing digital system activities. In Proceedings of the 13th Nordic Conference on Human-Computer Interaction (pp. 1–16). https://doi.org/10.1145/3679318.3685338

Malafouris, L. (2013). *How things shape the mind: A theory of material engagement*. MIT Press.

Malafouris, L. (2014). Creative thinging: The feeling of and for clay. *Pragmatics & Cognition*, *22*(1), 140–158. https://doi.org/10.1075/pc.22.1.08mal

Malafouris, L. (2019). Mind and material engagement. *Phenomenology and the Cognitive Sciences*, *18*(1), 1–17. https://doi.org/10.1007/s11097-018-9606-7

Merriam-Webster. (n.d.). CRAFT. In *Merriam-Webster.com dictionary*. Retrieved July 16, 2025, from https://www.merriam-webster.com/dictionary/craft

Meskó, B. (2023). Prompt engineering as an important emerging skill for medical professionals: Tutorial. *Journal of Medical Internet Research*, *25*, e50638. https://doi.org/10.2196/50638

Midjourney, I. (2022). *Midjourney* (Version 4) [Computer software]. Midjourney, Inc. https://www.midjourney.com

Oogjes, D., & Wakkary, R. (2022, April). Weaving stories: Toward repertoires for designing things. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (pp. 1–21).

OpenAI, L.L.C. (2022). *ChatGPT* (Version 3.5) [Computer software]. OpenAI, L.L.C. https://chat.openai.com/

OpenAI, L.L.C. (2023). *Dall-E* (Version 3) [Computer software]. OpenAI, L.L.C. https://openai.com/dall-e-3

OpenAI, L.L.C. (2024). *ChatGPT* (Version 4o) [Computer software]. OpenAI, L.L.C. https://chat.openai.com/

Sennett, R. (2008). *The craftsman*. Yale University Press.

Shima Seiki MFG., LTD. (2024). *SHIMA SEIKI | Computerized flat knitting machines, design system/software, CAD/CAM systems*. https://www.shimaseiki.com/
Stability AI Ltd. (2024). *StableDiffusion* (Version 3.5) [Computer software]. Stability AI Ltd. https://stability.ai/stable-image
Suchman, L. (2006). *Human-machine reconfigurations: Plans and situated actions* (2nd ed.). Cambridge University Press.
Vallor, S. (2024). *The AI mirror*.
Varela, F. J., Rosch, E., & Thompson, E. (1991). *The embodied mind: Cognitive science and human experience*. The MIT Press. https://doi.org/10.7551/mitpress/6730.001.0001
Wakkary, R. (2021). *Things we could design: For more than human-centered worlds*. The MIT Press.
White, J., Fu, Q., Hays, S., Sandborn, M., Olea, C., Gilbert, H., Elnashar, A., Spencer-Smith, J., & Schmidt, D. C. (2023). A prompt pattern catalog to enhance prompt engineering with ChatGPT *(No. arXiv:2302.11382)*. arXiv. https://doi.org/10.48550/arXiv.2302.11382
Xu, W. (2019). Toward human-centered AI: A perspective from human-computer interaction. *Interactions*, *26*(4), 42–46. https://doi.org/10.1145/3328485

13 The Erosion of Visual Trust

AI-Generated Imagery and Its Impact on Society

Marie Storrar

13.1 Achieving Photorealism: Capabilities and Methods of State-of-the-Art Artificial Intelligence (AI) Image Generation

It seems the blink of an eye from 1993 and early 3D "realistic" environments in gaming (e.g., Doom (TwoBitHistory, 2019)) that captured a generation. The evolution of AI image generation, from basic pixel patterns to today's hyperrealistic outputs, marks a major technological advance driven primarily by progress in machine learning, especially generative adversarial networks (GANs) and the more recent rise of diffusion models.

GANs are made of two separate neural networks, each one trained in opposition to fool each other. On one side, we have the generator producing (or attempting to produce) new images based on a training dataset of real images, and on the other, the discriminator tries to differentiate the generated fake images from genuine images (Kulkarni et al., 2023). This highly competitive, iterative cycle continues with the generator refining its output on each iteration to "gotcha" the discriminator while the discriminator gets better and better at spotting fakes. As the process repeats, both networks attempt to keep improving and enhancing their abilities, ultimately leading to the generator's creation of more and more lifelike images.

Diffusion models (Po et al., 2024) are relatively new yet incredibly powerful. Diffusion models work with noise and they are trained by gradually adding noise to images until only pure noise remains. The next stage is to "de-noise" these images step-by-step to get back to the original. Once trained, a diffusion model can generate new images by starting with random noise and iteratively refining it based on learnt patterns, often guided by text-based prompts.

Some of the most prominent of the latest generation of sophisticated AI generation tools and platforms are OpenAI's DALL-E series, Google's Imagen and Gemini, Midjourney, Stability AI's Stable Diffusion, and emerging platforms like Flux (Kumar, 2025). These models have taken yet another leap towards photorealism and have refined the ability to more closely interpret users' text-based prompts, output significantly higher image

DOI: 10.4324/9781003606802-14

resolutions, and added more consistency and accurate rendering of multiple objects and text within images—addressing some of the more obvious flaws like garbled text or malformed hands (with, e.g., multiple extra digits) that plagued earlier models.

Google introduced its diffusion-based model, Imagen in 2022 around the same time as OpenAI launched DALL-E 2 (https://openai.com/index/dall-e-2/). DALL-E 2 built in CLIP (Contrastive Language-Image Pretraining) (Akshay Kulkarni, 2023). CLIP can be likened to a smart visual dictionary that has learned to connect words (like "a blue cat") with how those things look in pictures by studying millions of images and their descriptions. Essentially it helps DALL-E 2 understand what you mean when you type in a description so it can create a matching image (no matter how unusual, e.g. "a picture of a kitten singing into a microphone with its eyes closed standing on stage in a jazz bar with a hedgehog on bass and a duckling on trumpet",

Figure 13.1 Created using ChatGPT May 2025.

see Figure 13.1). DALL-E 3 (https://openai.com/index/dall-e-3/) was introduced in 2023 and featured further enhanced text comprehension with Google sharing Imagen Video, bringing AI generation into video.

Stable Diffusion, (https://stablediffusionweb.com/) an open-source latent diffusion model (LDM), generates realistic images from text prompts. By integrating multiple diffusion models with compression, LDM achieves high-quality results while requiring fewer computational resources for training compared to traditional diffusion models.

Midjourney (https://www.midjourney.com/home) employs GANs in its model. Specifically, it uses conditional GANs (cGANs) (Akshay Kulkarni, 2023). In cGANs, both the generator and discriminator are provided with extra information, such as text descriptions. This conditioning ensures that the generated images are consistent with the descriptions used during training (see Table 13.1).

While the improvement in image quality has taken leaps, equally remarkable is the ease with which anyone can access this technology. Applications that used to need serious technical skills, kit or software are now often free or cheap and run on regular computers or through simple websites. Microsoft is including OpenAI's tech into their Azure platform and tools like Copilot are really opening things up (John Roach, 2023) for developers, businesses, and designers to just plug in AI image generation.

In March 2025, Open AI's DALL-E 3 started to be embedded in ChatGPT. Within one week, 130 million users had created 700 million images (@bradlightcap, 2025) another leap from 2023 when a report by Everypixel (2023) suggested "Since the launch of DALLE-2, people are creating an average of 34 million images per day".

This widespread access is the trend. Pretty much anyone with internet access can now generate sophisticated fake images in no time, without needing large financial outlay or special know-how. While this is fantastic for creativity in art, design, education, and fun, it also means it's significantly easier for people to make convincing fakes and spread bad information.

The rules about what you can and can't create in AI image generators are also changing. Early on, e.g., with DALL·E 2 around 2022, there were often strict rules against making realistic pictures of famous people or output that could be harmful or misleading (OpenAI, 2022). But it appears as though some of these rules are being relaxed. For instance, OpenAI's latest tech 'loosens the guardrails' enabling synthetic imagery of real public figures (Furze, 2025), like politicians and celebrities to be produced. Some researchers and ethics experts are worried that loosening these restrictions (Open AI, 2025)—especially if public figures have to opt-out instead of opting-in—could make it much easier to create realistic deepfakes and to spread lies and political misinformation.

Table 13.1 Key milestones in AI image generation technology

Model	*Year of Release*	*Key Capabilities*	*Improvements*	*Accessibility*	*Impact*
Generative Adversarial Networks (GANs)	2014	Generating new data with the same statistics as the training set, such as realistic images.	A new class of machine learning frameworks for generative AI.	Initially for researchers, now widely used in various AI applications.	Foundational for generative AI, enabling realistic image generation and other generative tasks.
DALL-E (OpenAI)	2021	A transformer-based pixel generative model that creates images from text descriptions.	A significant advance in AI-generated imagery.	Initially limited access, later versions became more widely available.	Marked a key moment in the democratization of AI image generation.
DALL-E 2 (OpenAI)	2022	Generates more realistic images at higher resolutions, can combine concepts, attributes, and styles.	Higher resolution and more realistic images than the original DALL-E. Uses a diffusion model.	Initially in beta with a waitlist, now open to the public via API.	Further democratized high-quality AI art creation and showed the potential of diffusion models.
Imagen (Google)	2022	High-quality text-to-image generation with a deep level of language understanding.	Photorealistic images and better at rendering text than previous models.	Available through Google's AI Test Kitchen and integrated into various Google products.	A major competitor to DALL-E 2, pushing the boundaries of photorealism in AI image generation.
Stable Diffusion (Stability AI)	2022	Text-to-image model that can run on consumer hardware.	Open-source and accessible, allowing for improved customization and a wider range of applications.	Open source, with code and model weights publicly released.	Revolutionized the AI art scene by making high-quality image generation widely accessible.

(*Continued*)

Table 13.1 (Continued)

Model	*Year of Release*	*Key Capabilities*	*Improvements*	*Accessibility*	*Impact*
Midjourney	2022	Creates artistic and stylised images from text prompts, with a strong community focus.	Known for its distinct artistic style and high-quality image outputs.	Accessed through a Discord bot, with a web interface introduced in 2024.	Created a large and active community of AI artists and pushed the boundaries of aesthetic AI generation.
DALL-E 3 (OpenAI)	2023	Understands significantly more nuance and detail in prompts, integrated with ChatGPT.	Improved prompt following and more detailed and accurate image generation.	Available to ChatGPT Plus and Enterprise users, and via API.	Made AI image generation more conversational and intuitive by integrating it with a chatbot.
Stable Diffusion XL (Stability AI)	2023	Generates more detailed and higher-resolution images than previous Stable Diffusion models.	Improved image composition, colour, and lighting.	Available through Stability AI's platform and other services that integrate it.	Provides a more powerful open-source alternative for high-resolution image generation.
GPT-4o (OpenAI, image capabilities)	2025 (Image generation capabilities)	Natively multimodal model capable of precise, accurate, photorealistic outputs, and has improved text rendering.	Can analyse and learn from user-uploaded images, and has improved instruction following.	Available in ChatGPT.	Blurs the lines between text and image generation, allowing for more interactive and context-aware creation.
Imagen Video (Google)	2023 (as part of Imagen 2)	Generates high-definition video from text prompts.	Veo, the underlying model, creates more consistent and coherent video with realistic movement.	Available to all Vertex AI customers.	Enables faster production and reduced costs for video content creation.

13.2 When Seeing Isn't Believing: Instances of AI-Generated Images Mistaken for Reality

As AI-generated imagery becomes more and more realistic, there have been several significant instances where synthetic visuals have been mistaken for authentic photographs. In March 2023, a Midjourney-generated image of Pope Francis wearing a white puffer parka went viral across social media platforms. Its lifelike nature (paired with an unexpected scenario) resulted in many believing it was genuine. The initial tweet (@skyferrori, 2023) was shared 18,000 times and has now racked up 28k retweets and 28.2 million views.

"I thought I was immune to being fooled online. Then I saw the pope in a coat … I thought wearing a really big coat and looking like a Metal Gear Solid 2 boss battle might have been part of his ongoing cool guy shtick. Lord, forgive me." Joel Golby wrote in The Guardian in March 2023 (Golby, 2023).

This example highlights just how easily AI-generated content can be seen and accepted as real (even if it looks improbable) with widespread sharing done and dusted before any fact-checking or querying is undertaken. Web culture writer Ryan Broderick believes this example was "the first real mass-level AI misinformation case" (Broderick, 2023). This event was among the earliest to spark discussions about the potential impact of misinformation and visual communication.

While the "Pope in a coat" image may have been the first, it was rapidly followed by other high profile examples including an AI-generated imagery of an imminent arrest of Donald Trump (@EliotHiggins, 2023) and AI-generated imagery used by Amnesty International (Taylor, 2023) to mark the second anniversary of police against protesters in Colombia (Hausken, 2024) (see Table 13.2).

13.2.1 The 2024 Valencia Floods: Real Images, AI Suspicion, and the Climate Change Narrative

Catastrophic flash floods in Valencia on October 29, 2024, caused 228 deaths after an eight-hour deluge equal to a year's rainfall. Critical warnings from regional authorities were delayed by about ten hours, arriving after flooding began and many were trapped. This communication breakdown between national and regional bodies created confusion and distrust, potentially increasing susceptibility to misinformation (see Figure 13.2).

The Valencia floods became the EU's primary disinformation event for November 2024 (Panizio & Canetta, 2024a). Climate-related misinformation nearly doubled, with numerous falsehoods and conspiracy theories exploiting the distress and confusion of those affected. These included claims of the storm being engineered via geoengineering, HAARP (High-frequency Active Auroral Research Program), mysterious ships, or atmospheric spraying (Raymond, 2024). Other theories falsely alleged the national government

Table 13.2 Examples of AI-generated images widely shared online

Incident/Image Description	*Approximate Date/Year of Circulation*	*Nature of Misperception/ Debate*	*Documented Impact/ Reaction*
Pope Francis in stylish white puffer jacket	March 2023	Widely mistaken for a real photograph, sparking discussions on papal fashion and AI realism.	Viral sharing, numerous media reports, fact-checks, public surprise at AI capabilities.
Images of Donald Trump being arrested by police	March 2023	Created by Eliot Higgins (Bellingcat); satirical but blurred reality for some viewers.	Widely circulated, media discussion on ethics of creating such images, even with disclosure; concern over potential for deception.
AI-generated images depicting protests and police brutality in Colombia	April 2023	Created by Amnesty International	Amnesty International said it had used them to avoid protesters from state retribution but removed them from social media.
AI-generated image of Donald Trump with Black supporters	2023–2024 election cycle	Created by a radio host and shared to imply broader support.	Defended by creator as not "photojournalism"; example of AI for political messaging; fact-checked.
Fake image of Hurricane Helene	2023–2024	Shared on social media to criticize the Biden administration's disaster response.	Spread widely, fooled many into accepting it as real; distracted from actual journalistic coverage of the hurricane.
Non-existent Taylor Swift endorsement of Donald Trump	2024 election cycle	Post on Truth Social featuring a mix of authentic and AI-generated images.	Example of using AI to create false celebrity endorsements for political purposes.
Alleged photo of Mike Tyson with Palestinian flag	November 2024	False image circulated to imply political stance.	Fact-checked by EDMO network; example of AI in broader disinformation campaigns.
Singer Jennifer Lopez in promiscuous situations	November 2024	False images circulated after she expressed support for the Democratic cause.	Fact-checked by EDMO network; example of AI used for character assassination in political contexts.

Source: Carson (2024) and Panizio and Canetta (2024b).

Figure 13.2 © Shutterstock 2540481841—Catarroja, Valencia, Spain. October 31, 2024—After the recent flood, a woman looks on from her balcony in amazement at the state of her street, with cars piled up after being swept away by the water.

deliberately caused the flooding by destroying dams, sometimes with intricate explanations involving antennas or "meteorological attacks" (European Digital Media Observatory, 2024) as retribution for Spain's political views.

Subsequent disinformation campaigns surrounding the Valencia floods significantly (and quickly) distorted public understanding of the event and its causes. A collection of conspiracy theories falsely accused authorities of concealing the death toll and institutions like AEMET (Agencia Estatal de Meteorología) of failing to predict the storm (Maldito, 2024), despite neighbouring agencies supposedly doing so. Even humanitarian organizations such as the Red Cross (Maldita.es, 2024) were falsely accused of obstructing aid and diverting resources.

The widespread circulation of these conspiracies reignited climate denial and scepticism towards climate action. The resulting confusion and distrust blocked effective community response, impacted solidarity and shifted public anger away from systemic issues and evidence-based solutions.

The ease of acceptance of fake imagery and related conspiracy theories can block the spread of credible information. Information vacuums and heightened emotions following disasters (Langabeer, 2024) increase public susceptibility to simplistic, conspiratorial explanations (Spring, 2024), particularly when supported by seemingly convincing visuals. This vulnerability

was likely compounded by documented failures in official communication (Jones, 2024) during the Valencia crisis, making conspiracies and fake images more attractive.

The Valencia flood disinformation case shows a primarily reactive stance to misinformation and highlights the challenges this poses to current regulatory and educational systems. Reactive approaches allow for the manipulation of vulnerable societies through compelling, potentially AI-generated visuals, especially during critical events. To mitigate this, it is crucial to establish accountability within AI governance and implement proactive measures that strengthen the resilience of the information ecosystem. This requires a shift from merely reacting to and debunking misinformation after its dissemination.

The speed at which "fake news" is accepted is not a new concept. Indeed, in 1710 Jonathan Swift wrote "falsehood flies, and the truth comes limping after it". More recently, the stoic Sam Vimes from Terry Pratchett's Discworld novels in *Truth* said "A lie travels round the world before the truth has its boots on".

Just how fast *IS* that though? A study from 2018 by Science Magazine places the speed of travel of a lie on Twitter (X) as six times faster than the truth (Meyer, 2018). The study states that "A false story (on Twitter) reaches 1,500 people six times quicker, on average, than a true story does." and "By every common metric, falsehood consistently dominates the truth on Twitter."

13.2.2 The "Truthiness" Factor: How Perceptions Shape Belief in the Digital Realm

> Truthiness is 'What I say is right, and [nothing] anyone else says could possibly be true.'
>
> Stephen Colbert

The recent instance of real images of the Valencia floods being mistaken for AI-generated content highlights a connection to "truthiness" in the digital age. This concept, popularized by Stephen Colbert (Wikipedia, n.d.), describes the inclination to accept something as true based on feelings rather than facts. Truthiness is a manifestation of confirmation bias for the digital age. In the case of AI-generated images, "truthiness" suggests that people may be more likely to accept a synthetic image as real if they feel it confirms their existing beliefs, biases, or feelings on an issue (Nickerson, 1998).

Individuals tend to seek out and believe information that confirms their existing beliefs, a psychological phenomenon known as confirmation bias. "Confirmation bias, as the term is typically used in the psychological literature, connotes the seeking or interpreting of evidence in ways that are partial to existing beliefs, expectations, or a hypothesis in hand" (Nickerson, 1998). This psychological trait makes people more susceptible to accepting inauthentic images that support their views while dismissing those that contradict

them. AI image generation can take advantage of confirmation bias by creating visuals specifically designed to resonate with particular biases. For instance, fake images that portray political opponents negatively or reinforce stereotypes are much more likely to be accepted and circulated (often with incredible speed) within communities that already hold such opinions, regardless of the images' actual authenticity.

The theory of confirmation bias isn't new. Philosopher Francis Bacon (1561–1626) said of it:

> The human understanding when it has once adopted an opinion (either as being the received opinion or as being agreeable to itself) draws all things else to support and agree with it. And though there be a greater number and weight of instances to be found on the other side, yet these it either neglects and despises, or else by some distinction sets aside and rejects; in order that by this great and pernicious predetermination the authority of its former conclusions may remain inviolate.… And such is the way of all superstitions, whether in astrology, dreams, omens, divine judgments, or the like; wherein men, having a delight in such vanities, mark the events where they are fulfilled, but where they fail, although this happened much oftener, neglect and pass them by.
>
> (Donaldson, 2016)

If an individual is already doubting the severity of climate change (or that climate change as an issue even exists at all), they may be more likely to view authentic images of the Valencia floods with suspicion and be happy to accept any claims that they are AI-generated and fake news. On the flip side, if an individual holds strong beliefs about climate change, its reality and its urgency, they may be more likely to accept the Valencia media as authentic without any critical scrutiny at all.

Images that impact emotionally are more often accepted as truthful. Powerful emotions evoked by an image can sway viewers to accept it as authentic without any additional scrutiny. This is especially true for images of events like natural disasters, where the depiction of suffering and destruction increases believability, irrespective of whether the image is real or AI-generated.

People tend to believe information more if it comes from well-known news outlets and verified sources (Moruzzi et al., 2025) rather than less credible platforms or anonymous social media. However, the quick spread of false information can make it hard to tell the difference between reliable and unreliable sources, sometimes causing doubt even about images from seemingly trustworthy places.

If we combine "truthiness", confirmation bias, emotional response, and source credibility, we produce a complex environment where authenticity of visual information and the ability to believe our own eyes becomes increasingly difficult. This is of even more concern in the context of critical issues

such as climate change where factual data supported by visual information are essential to support public discourse and subsequent effective action. The suspicion with which the real images of the Valencia floods were met (Naughton, 2024) highlights the extent to which AI-generated fakes have contributed to the erosion of trust in visual media which makes it difficult for genuine and important imagery to be accepted and believed.

When it comes to bias, it's always worth remembering that AI systems are naturally biased. "We created AI in our own image… and we don't like what we see" (Carpenter, 2025). Any training materials typically come from the Internet, books, art, news etc. None of this material could be said to be truly neutral.

13.2.3 Eroding Trust and Shaping Memory: The Wider Consequences of AI Image Generation

How will society adapt and change in response to visual content presented to them online? Will segments of society readily accept everything as factual (like sponges), or will scepticism and cynicism lead to a population that is conditioned to question all digital media?

The principles of truth and accurate representation in photojournalism and news reporting are seriously compromised (MALIZU, 2010). News organizations are at risk of unknowingly publishing AI-generated visuals and the fear of doing so can hamper the reporting of urgent events as verification becomes more time consuming.

Misinformation and disinformation are pervasive online and offline, demonstrably influencing behaviour. This influence stems from various factors, including existing beliefs, cultural values, education, and location. Stepney & Lally's UK Parliament report highlights recent examples (Stepney & Lally, 2024) vandalism of over 50 UK 5G masts during COVID-19 due to false claims of virus transmission; a drop in Pepsi's share price following disinformation about its CEO's remarks to Trump supporters; and findings from the Oxford Internet Institute, indicating that government agencies in 76 of 81 surveyed countries have used disinformation to manipulate public opinion. (Bradshaw et al., 2021)

Photography and video captured over the nineteenth and twentieth centuries form the foundations of many collective memories of history. Because visual media significantly influences our perception of the past, including convincing fake images in historical records or the inability of future generations to distinguish between real and AI-generated photographs, could fundamentally change our shared history (Matei, 2024).

When attempting to generate historical scenes, AI models (trained on current image datasets) often generate (perhaps unexpectedly) inaccurate artefacts. Historians have observed inconsistencies in AI representations of events such as the Black Death (fully glazed windows and a train track running through town) and the eruption of Mount Vesuvius (pepper mills,

stemmed glassware and a VERY different visualization from the eye-witness reports of Pliny the Younger) (Rufo, 2025).

Regardless of their inaccuracies, these visuals can be persuasive or seen as 'just a bit of fun'. However, widespread distribution creates a threat to mutual, factual understanding. Society could see a shift from a broadly accepted collected memory based on shared historical records to a set of splintered groups with their own historical references, each reinforced with its own credible (yet fabricated) visual 'evidence'. Mutual understanding and the capacity to gain knowledge from the past could disappear.

13.2.4 Rebuilding Visual Trust: Towards Authentication and Media Literacy in the Age of AI

Given the increasing unreliability of image integrity, trust will likely move from individual observation to assessing the source's credibility, creation transparency, and auditable trails, especially in sensitive fields like journalism and law. The ability to EASILY authenticate content and identify provenance is needed as part of an ongoing, agile strategy.

Technological solutions are already progressing at pace with areas including digital watermarking and blockchain (C2PA, 2025) aim to address the challenge of supporting trust in AI-generated content. Commercial tampering detection tools are also appearing, which analyse content origin, metadata, provenance, and AI indicators (Masood, 2025). Long-term success of these methods is uncertain due to the rapid advancements in generative AI but solutions will continue to be developed alongside developments in AI technologies.

Long-term strategies must prioritize media literacy and critical thinking education from a young age to equip individuals for the changing media environment. This education should include understanding AI image generation, identifying synthetic media, recognizing psychological manipulation techniques and motivations, and emphasizing source verification. In Finland, school children as young as 5 are taught research skills to enable them to use "multiliteracy" (Kivinen, 2023) to confidently and competently navigate the online space.

Short-term, practical actions can start to have an impact on personal behaviours toward synthetic content. SIFT (Stop, Investigate, Find, Trace) is described by Carpenter (2025) in FAIK as a "digital defence toolkit" and offers a range of strategies to support not just identifying synthetic media but utilizing mindfulness techniques to better understand ourselves, our reactions to what we see and the actions we subsequently take (or stop ourselves from taking).

In the even-shorter-term, a set of comprehensive, shared ethical guidelines, standards, and a legal framework for the creation, labelling, and dissemination of synthetic media is crucial for those involved in the AI industry. At the same time, any regulations should be carefully designed to avoid hindering innovation or infringing upon freedom of speech or expression.

13.3 Future Research Agenda

RQ1: *How will Society Navigate the New Landscape of Visual Authenticity?*

The historically established connection between what we perceive and what we believe has effectively been (or is being) destroyed with the rapid advances in the AI space. The threats to journalism, democratic functions, public opinion, historical accuracy, and the very notion of truth itself are very real. However, these considerable challenges can be navigated through a multifaceted approach including technological governance, improved media literacy, adherence to ethical principles, and sensible regulation.

RQ2: *Is society capable of being in control of this most recent technological shift?*

Throughout history, human adaptability has allowed us to navigate major technological shifts. This present crisis of trust in visual information necessitates a similar surge of innovation and collective effort to ensure that AI technologies strengthen, rather than weaken, our ability to understand and interact with reality authentically and reliably.

RQ3: *Can trust truly be re-established?*

Re-establishing trust in a world where appearances can be deceptive is crucial for the well-being of our information networks and the societies they support; it demands more than just technical or educational solutions.

"Be careful about what information you share. Verify your sources. Correct yourself when you get something wrong. Be wary of your own political biases. Be sceptical but not cynical… It's time for all allies to unite … we still have a chance to say 'no' to the Infocalypse" (Schick, 2020).

AI Disclaimer Statement

Generative AI (ChatGPT 5) was used only once in this chapter to create Figure 13.1 as part of an explanation on the development of generative AI models with reference to DALL-E 2 (from Open AI and now incorporated into ChatGPT). This prompt aimed to highlight that increased sophistication enables generative AI models to create a visual from a prompt no matter how unusual or outlandish.

References

@bradlightcap. (2025, April 3). *Brad Lightcap. Very crazy first week for images in ChatGPT - over 130M users have generated 700M+ (!) images since last Tuesday India is now our fastest growing ChatGPT market* 🫆 *IN The range of visual creativity has been extremely inspiring.* https://x.com/bradlightcap/status/1907810330018726042

@EliotHiggins. (2023, March 20). *Eliot Higgins. Making pictures of Trump getting arrested while waiting for Trump's arrest*. https://x.com/EliotHiggins/status/1637927681734987777

@skyferrori. (2023, March 25). *Sky Ferrori. OKAAYYY*. https://x.com/skyferrori/status/1639647708154675200

Akshay Kulkarni, A. S. A. K. D. G. (2023). *Applied generative AI for beginners: Practical knowledge on diffusion models, ChatGPT, and other LLMs*. O'Reilly. https://doi.org/10.1007/978-1-4842-9994-4_8

Bradshaw, S., Bailey, H., & Howard, P. N. (2021). *Industrialized disinformation 2020 global inventory of organized social media manipulation*. https://demtech.oii.ox.ac.uk/wp-content/uploads/sites/12/2021/02/CyberTroop-Report20-Draft9.pdf

Broderick, R. (2023, March 27). *Pope in a coat. Enter: Balenciaga pope*. https://www.garbageday.email/p/pope-in-a-coat

C2PA. (2025). *Coalition for content provenance and authenticity*. An Open Technical Standard Providing Publishers, Creators, and Consumers the Ability to Trace the Origin of Different Types of Media. https://c2pa.org/

Carpenter, P. (2025). *Faik : A practical guide to living in a world of deepfakes, disinformation, and AI-generated deceptions*. John Wiley & Sons, Inc. 10.1002/9781394344291

Carson, D. (2024, December 18). *Seeing is no longer believing: Artificial intelligence's impact on photojournalism*. https://jsk.stanford.edu/news/seeing-no-longer-believing-artificial-intelligences-impact-photojournalism

Donaldson, I. (2016). Francis Bacon's comments on the power of negative observations in his *Novum Organum*, first published in 1620. *Journal of the Royal Society of Medicine*, *109*(12), 459–460. https://doi.org/10.1177/0141076816675805

European Digital Media Observatory. (2024, November 4). *Floods in Valencia: Main disinformation narratives and phenomena*. https://edmo.eu/publications/floods-in-valencia-main-disinformation-narratives-and-phenomena/

EveryPixel. (2023, August 15). *People are creating an average of 34 million images per day*. https://journal.everypixel.com/ai-image-statistics

Furze, L. (2025, March 28). *OpenAI has improved its image gen – But do we need more "offensive" AI?* https://leonfurze.com/2025/03/28/openai-has-improved-its-image-gen-but-do-we-need-more-offensive-ai/

Golby, J. (2023, March 27). *I thought I was immune to being fooled online. Then I saw the pope in a coat. The Guardian*. https://www.theguardian.com/commentisfree/2023/mar/27/pope-coat-ai-image-baby-boomers

Hausken, L. (2024). Photorealism versus photography. AI-generated depiction in the age of visual disinformation. *Journal of Aesthetics & Culture*, *16*(1). https://doi.org/10.1080/20004214.2024.2340787

John Roach. (2023, May 23). *Microsoft outlines framework for building AI apps and copilots; expands AI plugin ecosystem. Microsoft Source*. https://news.microsoft.com/source/features/ai/microsoft-outlines-framework-for-building-ai-apps-and-copilots-expands-ai-plugin-ecosystem/

Jones, S. (2024, November 15). *Valencia's president admits mistakes in flood response but will not resign. The Guardian*. https://www.theguardian.com/world/2024/nov/15/valencias-president-carlos-mazon-admits-mistakes-in-flood-response-but-will-not-resign

Kivinen, K. (2023). In Finland, we make each schoolchild a scientist. *Issues in Science and Technology*, *33*(3). https://issues.org/finland-education-misinformation-social-resilience-kivinen/

Kulkarni, A., Shivananda, A., Kulkarni, A., & Gudivada, D. (2023). Diffusion model and generative AI for images. In *Applied generative AI for beginners* (pp. 155–177). Apress. https://doi.org/10.1007/978-1-4842-9994-4_8

Kumar, S. A. (2025, May). *The democratization of AI image generation*. USENIX Association. https://www.usenix.org/publications/loginonline/democratization-ai-image-generation

Langabeer, J. R. (2024, May 8). *Managing the psychological and practical aftermath of disasters*. *Psychology Today*. https://www.psychologytoday.com/gb/blog/how-to-make-better-choices/202405/managing-the-psychological-and-practical-aftermath-of

Maldita.es. (2024, November 13). *The contents accuse the Red Cross of not acting in the Valencian Community during the floods: Chronology, images and figures that contradict it*. *Maldita.Es*. https://maldita.es/malditobulo/20241113/contents-accuse-red-cross-of-not-acting-in-the-valencian-community-chronology/

Maldito, C. (2024, November 12). *The disinformation that accuses the Spanish State Meteorological Agency (AEMET) of not warning about the floods*. *Maldita.Es*. https://maldita.es/clima/20241112/disinformation-aemet-not-warning-floods/

Malizu, C. F. (2010). Re-examining the credibility of photojournalism in the digital photography and editing era. *Benin Mediacom Journal*, *1*(4), 33–148.

Masood, A. (2025, March 29). *Toward reliable provenance in AI-generated content: Text, images, and code*. *Medium*. https://medium.com/@adnanmasood/toward-reliable-provenance-in-ai-generated-content-text-images-and-code-9ebe8c57ceae

Matei, S. (2024). Generative artificial intelligence and collective remembering. The technological mediation of mnemotechnic values. *Journal of Human-Technology Relations*, *2*. https://doi.org/10.59490/jhtr.2024.2.7405

Meyer, R. (2018, March 8). *The grim conclusions of the largest-ever study of fake news*. *The Atlantic*. https://www.theatlantic.com/technology/archive/2018/03/largest-study-ever-fake-news-mit-twitter/555104/

Moruzzi, C., Tallyn, E., Liddell, F., Dixon, B., Collomosse, J., & Elsden, C. (2025). Content authenticities: A discussion on the values of provenance data for creatives and their audiences. In Proceedings of the 2025 Conference on Creativity and Cognition (pp. 128–140). https://doi.org/10.1145/3698061.3726918

Naughton, J. (2024, November 9). *The images of Spain's floods weren't created by AI. The trouble is, people think they were*. *The Guardian*. https://www.theguardian.com/commentisfree/2024/nov/09/the-images-of-spains-floods-werent-created-by-ai-the-trouble-is-people-think-they-were

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, *2*(2), 175–220. https://doi.org/10.1037/1089-2680.2.2.175

Open AI. (2025). *Addendum to GPT-4o system card: Native image generation*. https://cdn.openai.com/11998be9-5319-4302-bfbf-1167e093f1fb/Native_Image_Generation_System_Card.pdf

OpenAI. (2022, July 18). *Reducing bias and improving safety in DALL·E 2*. *OpenAI*. https://openai.com/index/reducing-bias-and-improving-safety-in-dall-e-2/

Panizio, E., & Canetta, T. (2024a). *Disinformation about the floods in Spain goes viral in November*. https://edmo.eu/wp-content/uploads/2024/10/EDMO-40-Horizontal.pdf

Panizio, E., & Canetta, T. (2024b). *Disinformation on the us presidential election*. https://edmo.eu/wp-content/uploads/2024/12/EDMO-Horizontal-42.pdf

Po, R., Yifan, W., Golyanik, V., Aberman, K., Barron, J. T., Bermano, A., Chan, E., Dekel, T., Holynski, A., Kanazawa, A., Liu, C. K., Liu, L., Mildenhall, B., Nießner, M., Ommer, B., Theobalt, C., Wonka, P., & Wetzstein, G. (2024). State of the art on diffusion models for visual computing. *Computer Graphics Forum*, *43*(2). https://doi.org/10.1111/cgf.15063

Raymond, S. (2024, November 6). *Floods in Valencia prompt conspiracy theories on weather weapons, Israel, migrants, and Netflix*. *The Journal*. https://www.thejournal.ie/valencia-floods-conspiracy-theories-spain-israel-haarp-weather-manipulation-netflix-6533064-Nov2024/

Rufo, Y. (2025, February 23). *"Amateur and dangerous": Historians weigh in on viral AI history videos*. BBC. https://www.bbc.co.uk/news/articles/cy87076pdw3o

Schick, N. (2020). *Deep fakes and the infocalypse*. Hachette.

Spring, M. (2024, October 10). *How hurricane conspiracy theories took over social media*. BBC. https://www.bbc.co.uk/news/articles/c1e8q50y3v7o

Stepney, E. S., & Lally, C. (2024). *Disinformation: sources, spread and impact*. https://researchbriefings.files.parliament.uk/documents/POST-PN-0719/POST-PN-0719.pdf

Taylor, L. (2023, May 2). *Amnesty International criticised for using AI-generated images*. *The Guardian*. https://www.theguardian.com/world/2023/may/02/amnesty-international-ai-generated-images-criticism

TwoBitHistory. (2019, November). *How much of a genius-level move was using binary space partitioning in doom?* https://twobithistory.org/2019/11/06/doom-bsp.html

Wikipedia. (n.d.). *Truthiness*. Retrieved May 21, 2025, from https://en.wikipedia.org/wiki/Truthiness

14 The Idea Economy

Advancing AI Collaborative Mindsets between AI, Neuroscience, and Fashion

Lynne Craig and Shama Rahman

14.1 Introduction

This chapter explores ways in which the initial advance of AI in the fashion sector could be developed to better integrate a collaborative and human mindset. It will discuss neuroscience approaches to achieve this, examining ways to "gamify" the opportunity for fashion. It will define novel ways in which integrating AI systems with neuroscience can support ideation and consumption patterns, offering a new lens to culture, community and future materiality for fashion. Through this approach, the chapter will seek to redefine creative consumer value of co-creation with AI and prompt an embodied emotional response, indicating routes of psychological value to frontiers of AI for fashion. The chapter will connect neuroscience approaches to histories of material culture and adornment, prompted by advances in AI.

The AI turn in fashion has been commonly examined from two academic perspectives: (1) Data scientists seeking an applied use-case to identify and apply categorisation to define search, virtual-try-on (VTO) or other technology-integrated 'assistive' prompts, creating a service or efficiency for the consumer and or producer, and (2) The fashion and culture academic or practitioner, examining AI's theoretical impact on materiality, culture, and sustainability within fashion.

This chapter positions novel narratives connecting wider socio-technical frameworks of design, tracking the emergence of AI as applied to fashion and retail as a co-creative and collaborative tool. In so doing, it creates opportunities to present new definitions for technology empowered fashion agendas, driven by consumer AI co-creation. It will distinctly define neuroscience approaches to consider ways in which the emotional, creative and perceptual aspects of fashion consumption and curation can integrate with the rational, discovery and prompt tools commonly described in AI and Fashion literature. Viewing experimental practices as case studies, the chapter contemplates future scenarios, raising questions from neuroscience and design frameworks to examine emerging socio-technical materialities of AI and anticipates demand of the "Idea Economy".

DOI: 10.4324/9781003606802-15

14.2 Fashion Bits and Bodies

Fashion and material culture play a significant role in defining ways in which we represent being human. Fashion offers a direct and global opportunity to seek wide adoption of new and emergent technologies, due to fashion's pervasive impact on global economies—we all wear clothes, and for many of us it's a chance to embody the identity we want to convey at the time. From production to consumption, retail experience, and disposal, fashion remains a world-wide industry, with many fractured challenges, including ethical production, meritocracy in design, and well-documented sustainable challenges fuelled by overconsumption in global north regions.

Fashion acts as an interface with the world, historically marking geographical identities and social status beyond the personal. The way we adorn our bodies reflects social, economic, and cultural identities—an intricate landscape of personal and collective material cultures. This anthropological interface of dress is evolving due to socio-technical influences. We now consider not only which 'body' we dress (our physical or virtual selves) but also how we select (or make) garments based on our ability to utilise data technologies and "perform" as consumers.

In 2013, a report from NESTA, "A Manifesto for the Creative Economy" (Bakhshi et al., 2013) had a key aim, that the next generation of the internet be truly open, but notably that fashion as an "obvious exception", would not be able to be codified into "bits". Despite the relatively short historical time frame of this future prediction, and the obvious temporal inaccuracy, producers of fashion are increasingly using data and AI tools to enact fashion as a landscape for creative experimentation—from AI VTO experiences, (The New Black) to gamified garments, (Fortnite, Balenciaga), integrated online and offline performance with Roblox and Tommy Hilfiger (Holition), to block-chain NFT fashion assets (Metaverse Fashion Week, 2025). Fashion has taken "bits" as a new material to explore and experience, developing performative methodologies of continuous becoming and emergence. Technologies codify fashion to map and influence choices, creating a "global repository language" of archetypes enhancing our ability to find products that express our identity—like the "blue jeans" and "green hat" facilitated by semantic search (Moonsift). The "bits" of the Creative Economy manifesto have shifted from experimentation to rationalisation, informing not just how we create and experience fashion, but setting conditions for a new, "Idea Economy", that we propose founded on the value of collective ideas interfacing with AI-enabled collaboration.

Many current studies of AI in the fashion sector target development of specific search terms for fashion items, or more abstract and subjective targets, like "style" (Kouslis et al., 2024). However, a next step to define fashion as an AI use-case suggests future studies could evaluate the approaches for these tasks and classification models to be generated more accurately by users in a personalised manner. Rational analysis often overlooks culture-making

enacted by fashion, emphasising financial benefits that AI tools may afford. Many AI systems predict taste (a subjective area), but misclassification may trigger negative reactions (Puntoni et al., 2021). Co-creation with AI does not rely on fixed classifications; however, AI use in consumer interaction with fashion is broadly hidden from users or offered without consumer agency. Clothing's subjective descriptions resist creating universal categories (Goti et al., 2023). However, refined garment categories including style, or component part labelling (for example a collar shape) will advance image classification algorithms and fuel large language models (LLMs), facilitating scalable text and/to image segmentation and even pattern cutting detail, aligned to computational power. These tools can include material properties and sustainability as asset qualifiers, supporting experiments in material value, localisation, and just-in-time manufacture. Through LLMs, consumer search terms can potentially act as new design tools for consumers, disrupting capitalist consumer-producer narratives and advancing design possibilities.

From this, using AI to co-create fashion has emerged as a potential environment to expand expectations of what it means to dress our bodies, and what it means to participate as a co-creator and consumer of fashion in the context of technology and AI practices.

14.3 Data Fashion Cultures

"CyberAtmospherics" (Pillarisetty & Mishra, 2022) describes the virtual ambience of websites as containers for online fashion experiences, structured into four dimensions: informativeness (cognitive), entertainment (affective), social presence (social), and sensory appeal (sensory). These key areas define the future of AI fashion and neuroscience, beyond mere classification, incorporating social, empathic, and geo-spatial prompts.

Historically, fashion trends in the global north emerged in cycles, dictated by fashion weeks in London, Milan, New York, and Paris, showcasing the "new season" through leading designers as part of an industry focused on contemporary styles. Despite rapid manufacturing and market speeds (often moving from design to store within days), recent reduction in seasonal shows and experimentation with digital formats, this cyclical concept persists. Since the 1920s, the industry's dynamics have evolved, with current AI frontiers in this context creating new nodes that fuel the consumer-creator space and act as a disruptive force. AI search and image generation tools can now launch products, brands, and trends without relying on these traditional time-based cycles of production or marketing with data-tools emerging as a primary driver and business motivator.

Sartorial cultures adapt to the tools available for consumption. Advances in social media and VTO experiences further mediatize fashion and the body, enabling pervasive trends to emerge. Fashion industry workers and trend forecasters now devote substantial time to tracking socio-cultural and economic

trends online, using data-driven insights to address prompts and shift fashion's ethos towards data, quantifying cultures that designers were historically known to conjure. New technologies assist retailers with AI-powered tools to manage inventory and predict demand. Csanák, E. (2020) notes, "AI can help the human thinking process focus on higher-value decision-making for fashion production and design", prompting the rhetorical question, "can AI become a fashion designer?". Today's technologies allow access to fashion artefact datasets, creating a basic AI-informed design tool. However, what's missing is the human element—cultural, social, and political understanding of why we create and consume fashion and material cultures. This knowledge is crucial to training and influencing this process through "culturally-active" AI tools.

14.4 A Technical Re-Reading of Fashion

Fashion seeks out culture, and it is through culture we dress. Examining the emergence of ways in which novel fashion stylistic elements are formed through social media technologies, by "reading" cultural patterns, and defining new garments create nuanced human complexity for AI. The anticipation of AI in this setting therefore requires visual AI techniques such as visual-to-visual models like generative adversarial networks (GANs) as a complementary AI technique in addition to LLM-mediated search and text-to-image transformer techniques whereby image-to-image exploration enabled by AI is potentially more natural to the "craft" of design and more informed by enacted cultures. This has possibility to shape authorship of novel design in partnership with the human experience, not despite it. For example, there are still biases in the training datasets of visual language and labelling towards global north cultures, and currently typing in "jamdani weave patterns" as a text-to-image prompt, wouldn't result in detailed or high-resolution enough vector images to be useful to embed the motifs in production and neither would it be accurate to the cultural folk norms within the jamdani artisanal communities in Bangladesh—not unless there were a custom image database which can be used for training which integrates the semiotics of jamdani motifs through GANs. Once we have these, we can combine with other image databases for new personalised imaginations, through GANs and experimenting with stages of "stopping", a technique which allows different combinations of the initial inputs in novel non-linear ways.

This exciting exploration of the liminal space of fashion mirrors the human neuroscience of how existing symbolic concepts and representations evolve into the new (Barron et al., 2013). Examined through functional magnetic resonance imaging, Barron et al. (2013) reviewed how research participants evaluate an option for decision-making when a truly novel option is introduced such as an "exotic" food option of "tea jelly" or "pea mousse", whose value might be imagined only from the properties of its components. This novel experience was constructed by invoking multiple independent memories in hippocampus and medial prefrontal cortex, which

persisted for a period during which new associations were observed between the memories for component items. These findings suggest that in the absence of direct experience, coactivation of multiple memories can provide a signal to the valuation system that allows the consequences of new experiences to be imagined and acted on.

The rise of the "influencer economy", whereby the online style curator became arbiter of taste and image via social media platforms, prompted such imaginaries to coactivate memories. Now, in technical terms, through visual semantic and vector-based image and word search, consumers can identify items worn in any image and, "find similar", tracking sentiment analysis to expose how customers feel about designs and analysing social media prompts (Goti et al., 2023). More recently, this has involved combining modalities of search including image, text, and audio or video to anticipate how clothing will fit, with personalised recommendations. Describing integration of this challenge at scale, Amazon acknowledges the area of combining modalities of AI for millions of customers, as a "significant scientific challenge" (McDowell, 2024). This, however, does not naturally create AI-native opportunities, to define what AI *could* be for fashion, rather the current state prescribes efficiencies, and indirectly informs future design through a process of reduction, by accessing data points, including fit, informing stakeholders on trend and style detail with a focused aim to drive sales and reduce stock returns. Perhaps this meritocrat surfacing of most searched, or least searched terms becomes an unintentional design tool, diluting fashion creativity? This juncture reflects an important aspect of defining requirements for expanding neuroscience-informed interventions with AI. Fashion is emerging as a key sector to frame the "Idea Economy" which this article proposes as a holistic design economy system pivoting between consumer, creator, and producer, in active (seeking to design) and passive (search data) modes. The Idea Economy has been imagined to validate and empower emotive and creative opportunities in combining modalities of AI, where neuroscience meets design and data warranting collaborative AI integration from new perspectives, and considering challenges of shared authorship.

14.5 Socio-Technical Fashion Entanglements

The current socio-technical agenda in the fashion industry typically perceives AI in two main ways: (1) as a rational technical tool driven by global commerce to enhance productivity, data reliance, sustainability, expedited market entry, and improved customer service; or (2) as a potent means to "amplify creativity", merging fashion's inclination to reflect cultural trends with the innovative spirit of AI, within a competitive commercial culture championed by brands or designers. Recognizing AI's integration into the Ablative Framework (Speed & Oberlander, 2016) and considering fashion as a lens to enacted cultures, it is essential to consider designing from, with, and by data in fashion. These entangled systems reveal a complex relationship

between producers and consumers, necessitating examination of how consumers experience, enhance, and enact AI-driven fashion.

If fashion acts as a lens to culture, influencing the future of dress and adornment (Kaiser & Green, 2021), and AI serves as a "mirror" to cultural and design histories (Vallor, 2024), how might we explore their intersection to incorporate the human element in co-design? This involves designing from, with, and by AI to highlight collaborative consumer value not as a mere differentiator from the past but as a genuine future collaborator and creativity driver, despite the complexity inherent in this convergence.

14.6 Embodying Meaning Nodes

To understand fashion's broader role, we must recognize it as a vehicle for socialization and control in its end-user state (Crane & Bovone, 2006). How might an AI interface within fashion in this context operate beyond a rational prompting tool? From a socio-material perspective, fashion is described as, "the product of numerous individual decisions by interconnected individuals within various industry niches" (Kawamura, 2005, p. 53). At an industrial scale, this often involves garments produced in multiple countries (and materials) through fragmented international supply chains. AI, within fashion, therefore, becomes another node in this inherently complex global business system and part of the socio-technical value chain. Fashion's role in enacting change or structural disruption is confined to areas with defined and quantified value, such as material use efficiencies in AI-driven pattern-cutting, or trend-mapping through search.

While existing literature explores AI's relationship with fashion, its role must go beyond manufacturing or social media objectives, intersecting with consumer identities—like lifestyle and subcultures—and informing perceived use (Crane & Bovone, 2006). It is this connection to cultures and subcultures where AI becomes less defined. Adding layers of subjective taste remains a collective, embodied human activity. Understanding the aesthetics, culture, and nuanced framing of fashion involves highly cooperative skill sets (Becker, 1982; Entwistle, 2002). AI must construct ways to adapt to shifting trends. When fashions evolve, how might this temporal shift influence AI applications, and readings of fashion?

14.7 Fashioning Neuroscience: Material Anthropologies

To understand the intersection of AI tools and their cultural application through fashion, we draw upon a (Deleuze, 1990, p. 8) concern of "continuous becoming". From this, AI might enable "aliveness" (Deluze) to integrate into the human experience of fashion, which is never static but influenced by geographical, cultural, and appropriated values. The challenge lies in establishing significant AI use-cases in fashion, as it operates as both a tool to create and a catalyst for fashion's evolution. AI in this context is both illustrated as a

tool and a driver of, "a fashion becoming". Advancing AI application in fashion necessitates a neuroscience approach that fosters co-creation and creativity with embodied, flexible structures to achieve this—utilising a pioneering "neurodesign" methodology (Rahman.S) towards, "AI and creativity" (von Thienen et al., 2022) to develop practical software application from theory.

Through understanding the neural mechanisms underpinning different stages of the creative process, AI systems could be optimised for co-creative ideation with humans for improved diversity of ideas, and for the convergence of multiple perspectives with an attributable and transparent approach. AI could be used to cater to personal consumption patterns which could be based on a consumer's mood, preference, or salience towards fundamental properties such as colour, texture, sustainability values, and shape. These consumption patterns could be detected in a neuroscientific sense, utilising physiological signal classification and behavioural testing for preference, and such an analysis could form a bottom-up approach for novel, combinatorial and ultimately personalised fashion. This would build on Boden's model of "Improbablistic" and "Impossibilistic" creativity (1994). "Improbablistic" discoveries involve novel combinations of the familiar, utilising, associative or analogical thinking. "Impossibilistic" discoveries have not been generated before and are radical, such that when the fundamental rules of a conceptual or problem space have been disrupted, the space itself must change hence ideas that could not have been generated before, can emerge.

For an embodied and empathetic neuroscientific perspective, how might AI facilitate fashion that encourages different forms of social connectedness and bonds, and motivate associations that evoke wanted memories with different kinds of texture, draping, materiality, shapes? For example, in South Asia, women traditionally tie metal keys of the house at the bottom corner of the "aachal" of the sari (the drape over the shoulder of the fabric wrapped in an intricate pattern). The perception of the sound of the jingle of keys performed by the body and material reacting to movement could form an association in the minds of others (family, friends) of the situational places and spaces that both the wearer of the sari and their entourage occupied, their association of their familial role, and perhaps even the broader societal symbolism of support and security.

On the theme of roles, locales and identities in pop culture, the 2025 Met Gala had a recurring theme amongst attendees—the role of "Black Dandyism" (TY Gaskins) aligned to the event thematic of "Superfine: Tailoring Black Style". The codes of adornment of, "Black Dandyisim", can be seen to adopt a particular shape of suit, material, and sartorial style, referencing political positions and signifiers made relevant to 2025, yet offering distinct and important cultural heritage meaning throughout history, being used as bold declarations and protest in the face of adverse socio-economical (and often colonial) conditions. This complex duality of meaning in fashion, challenging subjective, nuanced and local shifts in fashion identities through time, across search-able archetypes and materialities, such as "Black Dandyism"

or embodied materiality expressed in the South Asian "aachal", are constantly in flux, deepening requirements of AI to have a co-creative and real-time element in addition to reflecting diversity of cultural voices and design typologies. AI collaborative systems could be designed with the knowledge of and in complement to human fundamental neuroscience of sensory perception, spatial and associative memory, empathy, and emotion, defined, or designed by the user. This "neurodesign" approach can be utilised towards AI training, interaction, and systems design to help co-create personalised fashion for the appropriate time and space of fashion systems, within diversity of cultural contexts, trends, bodies, and dynamic identities.

Exploring further, we envision AI-modulated adaptive fashions through personalised wearables and smart textiles that adapt to physiological and hormonal fluctuations, visually and in real-time—an embodiment of continuous dialogue and AI-enabled "aliveness" within material culture futures.

14.8 "Searching" as a Form of Fashion Labour: New Material Realities for Fashion

If we consider "search" as a current known application area of AI to the fashion sector, natural language processing (NLP) labelled searches have supported commercial data-led practices for fashion businesses to act as a "filter of possibility" to "formalise information, reducing financial losses and risk of new production" (Garcia, 2022). This indirectly could be seen to either create more product for landfill or astutely monitor just-in-time production. AI-powered searches reflect Baudrillard's idea that consumption becomes a form of "social labour", where individuals participate in consumption as part of late capitalism's mechanics (Baudrillard, 1998). This act of "searching" with AI as a form of social labour could be considered a distributed and passive form of fashion "making" indirectly contributing to data sets, informing new products, yet without attributable author. When search terms denote the propensity of colour, garment type, and form, the social labour of AI search operates as a filter to the production of the future physical product, reproducing, and replicating the intention of the catwalk or influencer to formalise new designs. Materials (of fashion) could be observed as continually "on the boil" (Ingold, 2010, p. 8), and that the, "role of the artist (or in this instance the passive consumer) is not to reproduce a preconceived idea, novel or not, but to join with and follow the forces and flows of material (in this case search terms) that bring the form of the work into being".

Could the flows of AI search and associated data created, categorise a new form of material production for fashion, and who would be the author of this, the searcher (social labour), or the enabling technology (late capitalist machine)? New materialisms emergent in this situated knowledge environment (Haraway, 1988) serve to objectively consider AI as a form of material practice. In participating with AI systems are we obviously creating, and does intentionality matter to this workflow? This form of distinct human-computer-interaction (HCI)

where intention and action might potentially merge collaborative search-AI with concurrent production, could even contribute to a human mental state of Flow, where this intention-action merging is a characteristic property. Coined by positive psychologist Cziktsenmihalyi, Flow mental states, additionally improve cognitive flexibility, increase intrinsic motivation, mood, engagement, and attention (Csikszentmihalyi, 1990; Diener, 2000; Diener & Diener, 1996). These are all properties that are conducive to creativity, and with Flow as a design principle, AI systems within fashion could result in a more engaged consumer audience, or one which potentially freely considers personalised and holistic outputs.

14.9 Meeting AI Hyper-Fashion

We have explored AI through vector search, LLM, and semantic data; now we turn to its role in terms of defined creation value, that is, where a design is obviously created by an AI, "actor", such as image techniques like GANs, text-to-image or image-to-image transformers, producing images as part of the design process based on pre-defined datasets or specifically small language models (SLMs) offering potentially increased accuracy and nuance. The findings from a recent study (Lee & Kim, 2024) indicate that consumers generally form negative responses to AI-designed (vs. human-designed) unless, there is, "opportunity to customise". At this current juncture, the use of AI while obviously in rapid development, can be seen as an emergent tool for consumers in retail and fashion contexts as much as it is for developers and academics seeking use-case applications. AI-generated images, though novel and data-driven, often result in inaccuracies or a lack of clarity in its complexity. However, when fashion embraces this "glitchy" imagery, it adopts a creative, potential-driven approach celebrating a framing of discovery or emergence in the field.

The "Hyper-Realistic Meta Catwalk" by Fashion Innovation Agency (FIA) in collaboration with visual effects (VFX) and AI artist Atara showcases the use of advanced AI-image generation and VFX technology (Figure 14.1). This project used cutting-edge AI-image generation and VFX technology to create a "hyper-realistic" runway inspired by the distinctive style of pre-defined iconic fashion designers to showcase the possibilities of AI-assisted generative image creation, and how it can push the boundaries of self-expression and creativity, harnessing the fluid, unreal, and incomplete presentation of finished works, in a real-time performance setting. That is, the images, and presentation, did not offer a garment on a fixed body, rather the moving body, shifted, warped, and changed with real-time interpretation of the garments. This produced clumsy visuals yet with state-of-the art production. This acceptance of less-than-perfect imagery illustrates fashion's openness to experimentation and creativity over precision, aligning with fashion's historical embrace of novel socio-technical agendas, and offers insight as to how we may begin to become comfortable with playing with the experimental ideas AI offers for fashion, beyond current application areas.

Figure 14.1 ATARA X FIA Hyper-Realistic Meta-Catwalk, video still, London, 2023.

Working with LLMs to develop novel composite imagery and create "shifting video surfaces" opens new avenues toward advancements in artificial general intelligence (AGI) (Liu et al., 2024). The example from FIA paints a prospective vision of how neuroscientific applications could help individuals continuously develop their identities by using AI to create real-time, dynamic visuals adjusting temporally, for personalized and customisable self-expression, achieving a mental state of Flow through adornment.

Current state-of-play concerning consumers' use of AI and perceived readiness of adoption indicates differing perspectives to this. A study (Liang et al., 2020) suggests that technology positively influenced the purchase intention of consumers' attitude towards AI. These results are consistent with previous studies in those consumers of higher fashion involvement (consumers empathically aligned to maintaining currency in fashion cultures for example) are more likely to be ready to use new technology (Celik & Kocaman, 2017); however, they are not quite ready to purchase the fashion AI product.

This evolving "aliveness" in fashion may influence business investment and growth. If cutting-edge technology enables and encourages innovative self and social images (Frank et al., 2015), AI products' symbolic value could increase, regardless of imperfect outputs. As Yuval Harari (2017) warns of the rise of a "useless class" due to a fixation on perfection and progress, AI's playful, changeable identities might counteract this narrative, enabling new experimental AI-enacted identities- fluid, individualised, and beyond AI's supposed perfectionism, or skills in rational duplication to support development of new commercial markets.

14.10 Re-Defining Consumer Value Co-Creation with AI

'The Power of Discarded Ideas' (Moreau et al., 2023) is a study which seeks to examine how we might redefine consumer value through AI and fashion. In it, IBM Watson and luxury fashion brand Missoni collaborated with emerging fashion business Away to Mars (ATM). Over a period of two months, two thousand images were fed into the "machine" (IBM Watson) to create new fashion images aligned to the style of the brand but generated through a process of "knowledge recombination" (Dahl & Moreau, 2002). This effectively addresses a new emergent knowledge type, critically one which is collaborative with AI systems. In simple terms, all images discarded from the brand (the 'garbage can') were examined by IBM Watson to define the most recurrent visual features helping ATM human designers redefine Missoni's brand essence- translating distilled insights into a new t-shirt design informed by a SLM of these discarded designs.

This collaborative AI-human interaction discredits the notion that AI solely generates outputs. Here, AI functioned as a component, identifying and contextualising discarded ideas, providing ATM designers with insights for new designs. It's a reflexive process of co-creation, using AI to uncover and make visible the "invisible ideas" (Moreau et al., 2023). This notion echoes Barad's idea of reality's intricate and entangled nature (Barad, 2003), revealing how things become knowable through interactions—creating new potential from waste and clarity from chaos.

The study found that the AI-designed t-shirts generated from the SLM and created as a comparison to the human-designer approach to the same data, outsold the human-designer shirts by 200%. The researchers designed the study to observe design preferences without disclosing AI's involvement in production. Training the AI on previously discarded brand designs supported the development of successful final products, highlighting the data-value in so-called imperfect designs. This study demonstrates how AI can enhance or refine brand essence with precision, even when using previously discarded designs for commercial gain.

14.11 Making with AI: A Fashion and Neuroscience Case Study

As a follow-up to their initial study, ATM and the chapter authors developed a case study to further investigate the relationship between consumers, design and AI. This SME R&D case study positioned ATM's CEO and AI-specialised SME Viapontica based at the Bayes Centre, University of Edinburgh, with the goal of developing a commercial prototype or minimum viable product (MVP). The Away to Mars research and development project was supported by the Business of Fashion Textiles and Technology (BFTT) Creative R&D Partnership (CRDP) led by Professor Jane Harris, University of the Arts London. BFTT was one of nine UK wide CRDP's, which together

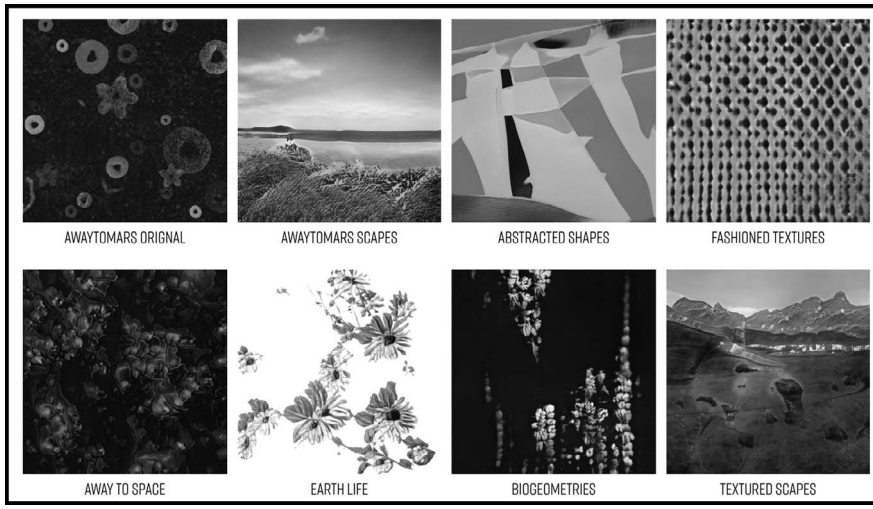


Figure 14.2 Image highlighting identified thematic areas for database development, Image © Dr Shama Rahman, created using a mixture of early-stopping and latent space selection GAN techniques, Style Transfer, Coco Spade and Mask RCNN techniques, produced as part of UKRI funded Creative Clusters Programme, Business of Fashion Textiles and Technology, 2021.

with Creative Informatics, based at University of Edinburgh, formed part of an £80m Creative Industry Cluster Programme (CICP, 2018–2024), hosted by the Arts and Humanities Research Council (AHRC) to deliver creative industry led research and development. This sought to bring together world-class research talent with SMEs and leading companies and organisations from across the UK. The primary objective for ATM was to enable professional designers *and* consumers to co-create using AI-driven creative "sparkers" (Figure 14.2) as interactive fashion and textile design tools, emphasising AI's role in fashion design through a gameplay framework.

In this study, author (Rahman.S), serving as the R&D project lead, employed a neurodesign approach, utilizing advanced visual AI techniques to develop an innovative prototype co-creation platform for fashion and textile design. The research involved exploring new methods of using AI as a co-creation tool through visual AI techniques and modular positioning, with a specific focus on gameplay mechanics to enhance user interaction. Author (Craig.L), serving as the SME R&D Academic Advisor, provided insights into online data-informed user experience, business and consumer strategies for fashion. Prior research indicates that gamification positively influences achieving a state of Flow (García-Jurado et al., 2021), and this approach aimed to create conditions supportive of co-creative engagement with AI. An interdisciplinary approach, the project connected neuroscience to fashion, involving AI specialists, academics, a team of fashion designers for industry

and data-set designers. This complex collaboration focused on understanding the potential of creative application for AI through commercial R&D.

A key requirement was developing a minimum viable product (MVP) that offered a near, "real-time" user experience. This meant enabling users to interact with the AI in a "natural" timeframe within an online environment. Achieving this required advanced technical development, challenging existing expectations of human-AI interaction capabilities for web interfaces. This approach aimed to make consumers aware of AI's role in co-creation, enhancing the experience rather than concealing AI use, as in previous examples. Stage 1 demonstrated online real-time interactions between single users and AI, laying the foundation for enhanced engagement through a gamified voting system, allowing multiple users to collaborate. As Zhang et al. (2022) note, gamification holds significant promise for online co-design. To generate distinct, royalty-free images for participant engagement, eight proprietary fashion image databases were developed, featuring original digitally produced 2D designs (Figure 14.3) that informed hybrid AI/Human composite textured and patterned images.

To offer a novel, ethically produced AI fashion product that created unique imagery for the ATM brand, collaboration with the designer collective was crucial. This involved identifying and developing datasets of novel garment and textile concepts (Figure 14.4), focusing on visual patterns rather than garment shape. Simulations generated high-resolution, time-based morphologies driven by emergent, self-organised behaviour found in complex systems.

The research enabled the creation of visual designs for a dataset of royalty-free images, supporting AI R&D. These newly crafted images were compiled into a novel dataset for training visual AI and developed a user interface to encourage consumer engagement- potentially allowing them to "play" with, vote on, and elevate images towards garment production. This dataset, considered part of a SLM integrated ATM's collections and aimed to support future collaborations with leading fashion brands, as seen in previous partnerships with Missoni and Harvey Nichols.

The research generated new datasets from diverse visual domains like nature, landscape, and space photography, along with paintings and illustrations. These images pre-trained visual AI algorithms to minimize computational time when generating varied visuals in real-time web interfaces. The real-time AI/human interface focused on allowing users to select, manipulate, and implement each stage of the co-creation process instantly. To achieve this, key AI techniques included StyleGANs and StyleTransfers, experimented through "chaining" different AI models and "early-stopping" for capturing intermediate steps, critically reducing image quality for consumer interaction and increasing image quality for manufacture. These methods aimed to produce aesthetically pleasing visuals, allowing users to create beautiful textile prints using AI's "directed complexity", and laying the groundwork for the proposed 'Idea Economy' system framework. Developing this structure was crucial for managing datasets and AI applications in this context.

Figure 14.3 Database of expanded visual themes informing the textile design of the garment, Image © Dr Shama Rahman, created using a mixture of early-stopping and latent space selection GAN, Style Transfer, Coco Spade and Mask RCNN techniques produced as part of UKRI funded Creative Clusters Programme, Business of Fashion Textiles and Technology, 2021.

Figure 14.4 Final co-creation textile prints illustrated on three different garment shapes: dress, hoodie and t-shirt, 2021, Image © Away to Mars.

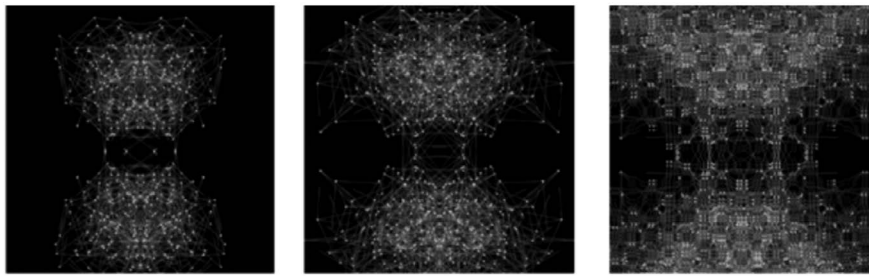


Figure 14.5 Examples from dataset 1 on the theme of complex architectural geometry, 2021 Image © Away to Mars, created by Dr. Patricia Wu Wu, using computational generative techniques, taking 48–72 hours to produce for each image, produced as part of UKRI funded Creative Clusters Programme, Creative Informatics, 2021.

Subsequent funding from Creative Informatics (UKRI, 2023) sought to focus R&D on the question of how data-driven innovation can unlock hidden value in creative industries data sets and the collaborative roles of "Machine Learning, (ML) Artificial Intelligence and Automation in the Creative Industries". Computational designer, Dr. Patricia Wu Wu, developed two additional datasets with 2.5k high-resolution images centred around three brand-defined themes (Figure 14.5). From this, short animations were rendered, taking about 90 hours each and producing two datasets: one in greyscale, illustrating geometric lines and architectural transformations, and another focusing on organic patterns like soil erosion.

The team then modified the outputs to create a variety of colour palettes (Figure 14.6), adjusting contrast to ensure resulting images were distinct enough for the AI generation to achieve results suitable for aesthetic application, including focus on an overall brighter iridescence palette aligned to the ATM brand.

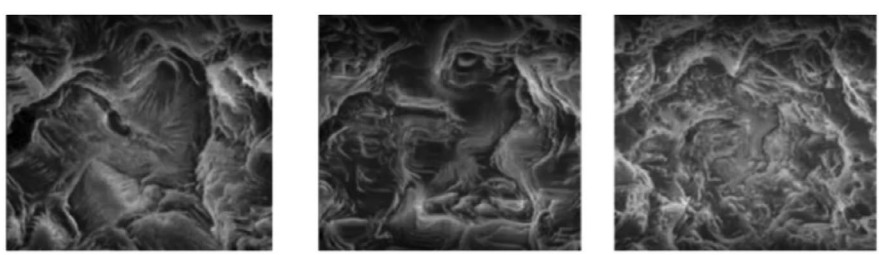


Figure 14.6 Examples from dataset 2 on the theme of visual organic patterns inspired by soil erosion, Image © Away to Mars created by Dr. Patricia Wu Wu, using computational generative techniques, taking 48–72 hours to produce for each image, produced as part of UKRI funded Creative Clusters Programme, Creative Informatics, 2021.

The datasets developed complemented the eight others developed by author Rahman. S, ensuring novelty, consistency, and high-resolution quality essential for training visual AI techniques, all while respecting ethical image rights. These datasets were meticulously crafted using commissioned digital artworks and royalty-free images, embedding ethical AI values. Such efforts to assign ethical considerations, though invisible to consumers, focused on fashion experiences, positioned the project prominently in the ethical generation of AI images. This approach supports broader experimentation with adopting a gamification environment, enhancing online co-design possibilities without being constrained by image access rights. By promoting consumer engagement, it also addresses challenges of the online transition, such as the absence of performance space (Rigby & Ryan, 2011).

An early study (Rathore, 2017) showed that personalized and innovative experiences increase brand engagement. This project has informed future development of the "Idea Economy", defined during the project delivery, aiming to address human/AI co-creation across creative industries, using ethical images to motivate gamified interactions. Despite limitations, it offers an applied philosophical perspective on leveraging fashion's unique attributes to define AI co-creation requirements and explore gamified neuroscience and design principles. Positioned at "technology frontiers" (Ameen et al., 2021), this study applied AI to develop experimental landscapes to identify consumer co-creation needs in real-time online experiences.

14.12 Future Research Agenda

This chapter has explored the integration of practical, data-driven, and creative tools to pave a novel path towards an, "Idea Economy"—that which co-creates at the juncture of culture, data and AI, between consumer, and producer as a "continuous becoming" of culture and fashion, from, by and with AI. The emergence of the proposed Idea Economy points to future economic and social concerns of design, while empathically considering digital materiality as part of this.

Focusing on neuroscience and design entanglements creates a way in which we may consider building pathways, or "dream factories", for emerging creative futures collaboratively with the technology of our time. Cultural industries as with fashion, are not merely industries, but forms of social practice that can challenge accepted orthodoxies and provide the conceptual resources for creating images of alternative possible worlds (Banks, 2018). There continue to be examples of ways in which AI will inform the fashion sector, and this aliveness of experimentation is afforded and welcomed by the fashion industry, not seeking perfection, rather to collectively define a way to reimagine, consider, and prompt the creative and consumer experience of fashion through current socio-technical environments.

From this, future research to define the, "Idea Economy" further might examine: (1) What are the potential socio-cultural challenges of AI-enabled

co-creation in fashion, particularly in relation to the intersection of consumer identities and subcultural influences, for example, how might AI tools be imagined to consider nuanced and changing interpretations of these to ensure ongoing currency, and how might this effort be quantified in economic terms and across geographies? (2) How might integrating neuroscientific approaches to AI in fashion better support ideation and consumption patterns, for example how might this framing afford a wider shift towards empathic technologies for production? (3) How can generative AI techniques (such as GANs, StyleTransfers and transformer-based diffusion models) be trained with culturally diverse datasets to more accurately reflect and respect localised cultural heritages for example the Jamdani weave patterns from Bangladesh? What interdisciplinary knowledge would be required to ensure authentic interpretation of material in data-form, and what would be missing in future outputs if this was not considered? (4) Beyond the hype of AI, in what ways can gamification and real-time AI-enabled consumer interactions be developed to foster a Flow-enabled co-creation process in fashion, or how might we consider more subtle relational prompts between producer and consumer as part of a gamified lens to prompt context-aware digital fashion identities for example? (5) How can we encourage the framing of the, "Idea Economy" through equitable creator rights, perhaps through distributed ledger technologies such as blockchain? (6) Can we explore and envision AI-modulated adaptive fashions, for example, personalised wearables and smart textiles that adapt to physiological and hormonal fluctuations, visually and in real-time; creating embodied AI-enabled "alive" garments to redefine our expectation of material cultures to wear, building novel economies and creating new markets.

This chapter has presented AI's transformative potential within the fashion industry, advocating for a shift toward a proposed, "Idea Economy" driven by human-AI collaboration. By cultivating environments that prioritise creativity, empathy, and cultural evolution, AI can redefine consumer engagement and production processes, celebrating the inconsistent, the emergent, and the irregular as part of this. The chapter argues for a design approach informed by neuroscience, where AI tools act as co-creators, enhancing the cultural and emotional dimensions of fashion. As the industry continues to welcome experimentation, future research should prioritise integrating real-time AI applications that respect ethical values while pushing and enabling exposure to novel creative boundaries and in so doing, define new markets towards the era of the Idea Economy.

Acknowledgements

In this chapter, the section, "Making with AI; a fashion and neuroscience case-study", arose from an R&D collaboration with University of the Arts London, Creative Informatics, University of Edinburgh, and SME Away to Mars, supported by the Business of Fashion, Textiles and Technology, Creative R&D Partnership, led by University of the Arts London.

AI Disclaimer Statement

For the text, AI was used in a proprietary University of Edinburgh LLM (non-public access) for the purpose of editing for sense and grammar, and for support with formatting bibliography. https://elm.edina.ac.uk/

References

Ameen, N., Hosany, S., & Tarhini, A. (2021). Consumer interaction with cutting-edge technologies: Implications for future research. *Computers in Human Behaviour*, *120*, 106761.

Bakhshi, H., Hargreaves, I., & Mateos-Garcia, J. (2013). A manifesto for the creative economy. Nesta.

Banks, M. (2018). Creative economies of tomorrow? Limits to growth and the uncertain future. *Cultural Trends*, *27*(5), 367–380.

Barad, K. (2003). Posthumanist performativity: Toward an understanding of how matter comes to matter. *Signs*, *28*(3), 801–831. https://doi.org/10.1086/345321

Barron, H., Dolan, R., & Behrens, T. (2013). Online evaluation of novel choices by simultaneous representation of multiple memories. *Nature Neuroscience*, *16*(11), 1492–1498. https://doi.org/10.1038/nn.3515

Baudrillard, J. (1998). *The consumer society: Myths and structures*. SAGE Publications Ltd. https://doi.org/10.4135/9781526401502

Becker, H. (1982). *Art worlds*. University of California Press.

Boden, M. (1994). *What is creativity? dimensions of creativity*. MIT Press. https://doi.org/10.7551/mitpress/2437.003.0006

Celik, H., & Kocaman, R. (2017). Roles of self-monitoring, fashion involvement and technology readiness in an individual's propensity to use mobile shopping. *Journal of Systems and Information Technology*, *19*(3/4), 166–182.

Crane, D., & Bovone, L. (2006). Approaches to material culture: The sociology of fashion and clothing. *Poetics*, *34*(6), 319–333. https://doi.org/10.1016/j.poetic.2006.10.002

Csanák, E. (2020). AI for fashion. In 13th International Scientific-Professional Symposium: Textile Science and Economy. https://doi.org/10.6084/m9.figshare.14540733

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. *Journal of Leisure Research*, *24*(1), 93–94.

Dahl, D. W., & Moreau, P. (2002). The influence and value of analogical thinking during new product ideation. *Journal of Marketing Research*, *39*(1), 47–60.

Deleuze, G. (1990). *The logic of sense* (M. Lester & C. J. Stivale, Trans.). Continuum.

Diener, E. (2000). Subjective wellbeing: The science of happiness and a proposal for a national index. *American Psychologist*, *55*(1), 34–43.

Diener, E., & Diener, C. (1996). Most people are happy. *Psychological Science*, *7*(3), 181–185.

Entwistle, J. (2002). The aesthetic economy: The production of value in the field of fashion modelling. *Journal of Consumer Culture*, *2*(3), 317–339.

Frank, B., Enkawa, T., Schvaneveldt, S. J., & Herbas Torrico, B. (2015). Antecedents and consequences of innate willingness to pay for innovations: Understanding motivations and consumer preferences of prospective early adopters. *Technological Forecasting and Social Change*, *99*(December), 252–266.

Garcia, C. C. (2022). Fashion forecasting: An overview from material culture to industry. *Journal of Fashion Marketing and Management: An International Journal*, *26*(3), 436–451.

García-Jurado, A., Torres-Jiménez, M., Leal-Rodríguez, A. L., & Castro-González, P. (2021). Does gamification engage users in online shopping? *Electronic Commerce Research and Applications*, *48*, 101076. https://doi.org/10.1016/j.elerap.2021.101076

Lee, G., & Kim, H. (2024). Human vs. AI: The battle for authenticity in fashion design and consumer response. *Journal of Retailing and Consumer Services*, *77*, 103690. https://doi.org/10.1016/j.jretconser.2023.103690

Goti, A., Querejeta-Lomas, L., Almeida, A., de la Puerta, J. G., & López-de-Ipiña, D. (2023). Artificial intelligence in business-to-customer fashion retail: A literature review. *Mathematics*, *11*(13), 2943.

Harari, Y. N. (2017). *Homo Deus: A brief history of tomorrow*. Penguin Publishing.

Haraway, D. (1988). Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist Studies*, *14*(3), 575–599. https://doi.org/10.2307/3178066

Ingold, T. (2010). *Bringing things to life: Creative entanglements in a world of materials* (Working Paper No. 15). ESRC Centre for Research Methods.

Kawamura, Y. (2005). *Fashion-ology: An introduction to fashion studies*. Berg.

Kaiser, S. B., & Green, D. N. (2021). *Fashion and cultural studies*. https://doi.org/10.5040/9781350104716

Kouslis, E., Papachristou, E., Stavropoulos, T. G., Papazoglou Chalikias, A., Chatzilari, E., Nikolopoulos, S., & Kompatsiaris, I. (2024). AI in fashion: A literature review. *Electronic Commerce Research*, *25*(5), 1–32.

Liang, Y., Lee, S. H., & Workman, J. E. (2020). Implementation of artificial intelligence in fashion: Are consumers ready? *Clothing and Textiles Research Journal*, *38*(1), 3–18.

Liu, T., McIntosh, T. R., Susnjak, T., Watters, P., & Halgamuge, M. N. (2025). Modeling the chaotic semantic states of generative artificial intelligence (AI): A quantum mechanics analogy approach. ACM Transactions on Intelligent Systems and Technology, *16*(6), 1–36.

Moreau, P., Prandelli, E., & Schreier, M. (2023). *Generative artificial intelligence and design co-creation in luxury new product development: The power of discarded ideas*. Bocconi University Management Research Paper. https://ssrn.com/abstract=4630856open_in_new

Pillarisetty, R., & Mishra, P. (2022). A review of AI (artificial intelligence) tools and customer experience in online fashion retail. *International Journal of E-Business Research (IJEBR)*, *18*(2), 1–12.

Puntoni, S., Reczek, R. W., Giesler, M., & Botti, S. (2021). Consumers and artificial intelligence: An experiential perspective. *Journal of Marketing*, *85*(1), 131–151. https://doi.org/10.1177/0022242920953847

Rathore, B. (2017). Exploring the intersection of fashion marketing in the metaverse: Leveraging artificial intelligence for consumer engagement and brand innovation. *International Journal of New Media Studies: International Peer Reviewed Scholarly Indexed Journal*, *4*(2), 51–60.

Rigby, S., & Ryan, R. M. (2011). *Glued to games: How video games draw us in and hold us spellbound*. ABC-CLIO.

Speed, C., & Oberlander, J. (2016). Designing from, with and by data: Introducing the ablative framework. In Lloyd, P. & Bohemia, E. (Eds.), *Future focused thinking – DRS international conference 2016* (pp. 27–30). https://doi.org/10.21606/drs.2016.433

Vallor, S. (2024). *The AI mirror: How to reclaim our humanity in the age of machine thinking*. Oxford University Press.

von Thienen, J., Szymanski, C., Weinstein, T., Rahman, S., & Meinel, C. (2022). Design thinking, neurodesign, and facilitating worthwhile change: Towards a curriculum for innovation engineering. In *Proceedings of the 2022 Design Studies & Engineering Education*. https://doi.org/10.1007/978-3-030-89113-8_6

Zhang, Z., Patricio, R., Carella, G., & Zurlo, F. (2022). Supporting a sustainable and engaging online transition for co-design through gamification. *Sustainability*, *14*(11), 6716.

ONLINE

Fashion Innovation Agency. (2023). *Hyper-realistic meta catwalk*. https://www.fialondon.com/projects/hyper-realistic-meta-catwalk/open_in_new

Fortnite. (2021). *High digital fashion drops into Fortnite with Balenciaga*. https://www.fortnite.com/news/high-digital-fashion-drops-into-fortnite-with-balenciaga?lang=en-USopen_in_new

Gaskins, T. Y. (2025). *Black dandyism explained: From its 18th-century roots to modern-day expressions*. *Vogue online*. https://www.vogue.co.uk/article/black-dandyism-met-gala-2025open_in_new

Holition. (2022). *Tommy Hilfiger, FA22 Tommy Factory*. https://holition.com/work/tommy-factory-2022open_in_new

McDowell, M. (2024). *Amazon rolls out an AI fit tool to reduce returns*. *Vogue Business online*. https://www.voguebusiness.com/story/technology/amazon-rolls-out-an-ai-fit-tool-to-reduce-returnsopen_in_new

Moonsift. *Moonsift*. https://www.moonsift.com/open_in_new

NFT Calendar. (2025). *Metaverse Fashion Week*. https://nftcalendar.io/event/metaverse-fashion-we/open_in_new

The New Black. *AI-virtual try on*. https://thenewblack.ai/ai-virtual-try-on-clothesopen_in_new

UK Research and Innovation (UKRI) Arts and Humanities Research Council (AHRC). (2023). *Creative industries clusters programme*. https://www.ukri.org/what-we-do/browse-our-areas-of-investment-and-support/creative-industries-clusters-programme/

15 Empowered or Degraded?

What Does the Progressive Use of Generative AI Mean for the Confidence and Identity of Professional Creatives?

Daniela Reuß

15.1 Introduction

The rapid spread of generative artificial intelligence (genAI) is fundamentally changing creative workflows. In industries like advertising, design, and media production, genAI is becoming an increasingly integral part of everyday work. According to the GWA white paper, the communications sector is facing nothing less than a "reinvention of its operating system" (Haller & Kabel, 2025). At the same time, Autodesk's AI Job Report shows that demand for AI skills in creative professions has risen by over 600% between 2023 and 2025 (Autodesk, 2025). While many studies focus on the technological potentials and economic shifts, this paper closely examines the perspective of creative professionals themselves. How do their professional self-conception, identity, and sense of appreciation change with the growing use of genAI?

This study approaches these questions through a qualitative method. Based on semi-structured interviews with seven designers from German-speaking countries, it analyses the transformation processes that creative professionals are facing and how these affect their identity and future expectations. This chapter thus positions itself at the intersection of research on technology, work, and professional identity within the creative sector.

15.2 Theoretical Foundation

Due to its high relevance, research on genAI and creative professions is developing dynamically, with numerous publications and books on the topic. Many studies focus on transformations in the labour market (Autodesk, 2025) or concentrate on marketing and the entrepreneur's perspective (Brotman & Sack, 2025). Other works explore collaboration between humans and genAI, new possibilities, or potential processes and workflows (Mollick, 2024). A study from the UK looks at employment prospects for creative freelancers and provides forecasts on which professional groups are likely to face the greatest disruptions (Demirci et al., 2024). The British research project CREAATIF (2025) takes a nuanced view of the opportunities and risks for creative professionals in the context of genAI.

DOI: 10.4324/9781003606802-16

Surveys of creative professionals also form part of the research field. For instance, Clarke and Joffe (2025) interviewed 17 people working in creative agencies over a four-month period about their specific workflows. Their study and analysis offer insights into the agencies' day-to-day work processes, which have been significantly altered by the increased use of genAI.

This chapter builds on existing research and adds an insider perspective from the industry itself, offering a direct insight into the current situation of affected individuals.

To properly understand the impact of genAI on creative professionals, the particularities of creative work and its close connection to professional identity must be taken into account. Creative activities often go beyond paid labour. They express personal attitudes, aesthetic signatures, and individual self-realization. Professional work is considered a meaningful experience, with self-esteem closely linked to creative output (Mao & Shen, 2020).

In this chapter, professional identity is understood as a dynamic construct, continuously shaped through engagement with social, economic, and technological conditions (Dowsett et al., 2024). The growing use of genAI represents a profound rupture in this process. Production tools and creative forms of expression are changing, along with many designers' self-understanding.

The aim, therefore, is to investigate how creative professionals subjectively experience, evaluate, and integrate the changes brought by genAI into their professional self-image.

The following section outlines the method used.

15.3 Methodology

The underlying data come from semi-structured, guided interviews with seven individuals who earn their living through creative work. These are primary data, collected specifically for this study and not previously published.

The participants were selected using purposive sampling of typical cases (Misoch, 2019) from the German-speaking creative labour market. Different professional situations (permanent employment, freelancing, job seeking), various creative fields, and different age groups and career stages were taken into account. An overview of these criteria is shown in Table 15.1.

Although numerous relevant content aspects for a nuanced examination of the topic were identified and a certain degree of content saturation was achieved, the sample can only offer a partial insight. However, further interviews would likely yield additional perspectives.

Due to the author's personal and professional proximity to the field, a trusting relationship with the interviewees was possible. As a result, the participants did not face a "truly detached external perspective" (Mayring, 2002, p. 55) during the conversations. This deliberate selection enabled unusually open discussions and, thus, a particularly deep dive into personal perceptions of current challenges in the professional world. Any potential bias arising from this was addressed in the analysis through continuous critical reflection on the author's role as interviewer.

Table 15.1 Demographic and professional profile of participants

#	*Age*	*Profession*	*Area*	*Current Job Situation*	*Level of Experience with genAI*	*Fields of Usage of genAI*
1	25–30	Art Director	Advertising, Branding	Seeking Employment	Medium	Inspiration, Text, Image (Moods, Layouts)
2	40–45	Digital Artist	Audio Visual Communications	Permanent Position	High	Image (Ideation, Concept), Text, Audio
3	40–45	Media Designer	Broadcast Design, Illustration, Print	Freelance	Very Low	Text, Image
4	40–45	Designer, Photographer	Portrait and Event Photography	Freelance	Very Low	Text, Retouch
5	30–35	Junior Art Director	Advertising, Social Media	Permanent Position	High	Image Generation (Moodboards, Social Media), Text
6	25–30	Art Director	Advertising	Permanent Position	Very High	Text, Image, Audio, Video
7	30–35	Compositing Artist	Postproduction, TV Commercials, Online, Print	Permanent Position	Medium	Upscaling, Voiceover, Image

The interviews were conducted in person in the relaxed atmosphere of a café (with the exception of Interview 3, which took place via video call) and, with the participants' consent, recorded as audio files. The mostly open-ended questions in the interview guide were structured around the following areas: general introduction, genAI in everyday professional life, demands and appreciation, self-image and identity, and future outlook. Since the goal was not absolute comparability of responses, deviations from the guide and a smooth transition into narrative interview style were possible and encouraged.

To ensure confidentiality, the interviews were anonymized and transcribed using the genAI-supported software TurboScribe. The analysis was conducted by the author herself, following qualitative content analysis according to Mayring (2002), without additional analysis software. Categories were developed inductively from the material, aiming to capture the subjective perception of the impact of the rapid spread of new technologies on the interviewees' self-perception and identity. Within the main themes, key statements were identified and systematically assigned to subcategories in order to reveal commonalities, differences, and individual perspectives. The focus of the subsequent analysis was on the respondents' individual perceptions regarding the transformation processes caused by technological innovation in their creative field. The findings are explored in the following section.

15.4 What Does the Growing Spread of GenAI Mean for Creative Professionals?

15.4.1 Erosion—Substantial Changes Taking Place

"*For me, it's the Wild West. We're experiencing something so intense that has never happened before…*" (Participant 3). With these words, a freelance media designer dramatically sums up the scale of the current changes. It's not just recently that entire professional groups such as voice actors, writers, and photographers have had to fear for their future livelihoods (Walkowiak & Potts, 2024); the disruptive power of AI innovations has already made a strong impression on the minds of creatives. The fact that genAI tools are now firmly established in the everyday work of creative professionals is clear in the interviews. While a digital artist estimates the time he uses AI weekly at "*… definitely about a third*" (Participant 2), two other artists use genAI daily (Participant 4, I Participant 5). Another mentions working primarily with AI in some weeks (Participant 7), and one art director states that she uses AI for seven to eight hours every working day (Participant 6).

15.4.1.1 Changes in Demands and Appreciation

Due to these developments, creatives, regardless of whether they are permanently employed or freelance, face significantly altered demands in their profession. One art director describes the situation as follows: "*… the client's*

expectations are now much higher, to come up with much crazier ideas, bigger concepts, more motifs, and also simply more unusual stuff" (Participant 1). However, clients rarely seem to be aware of the huge effort that targeted creation with genAI requires, even for professionals with a solid design background (Participant 6). Higher quality demands combined with shorter deadlines and shrinking budgets are, therefore, a reality with which creatives are inevitably confronted (Participant 5, Participant 3). At the same time, creatives' own standards for their work are rising; they expect ever faster and better results from themselves (Participant 3).

In addition, there is a loss of appreciation for creative work. All interviewees feel a lack of recognition for their activities, though the increased use of genAI tools is only seen as part of the cause. Some interviewees perceived a connection between declining prestige and the advance of AI-supported creation (Participant 1, Participant 3, Participant 6), yet they also felt their profession was relatively undervalued even before genAI became available. Another factor mentioned for the increased devaluation of creative work is the flood of content, especially on social media, which is always accessible (Participant 7).

Here, an interesting point emerges: Despite the feeling of decreasing recognition, creatives who are already very familiar with the new tools see their personal market value as having increased due to quality differences in their output (Participant 1, Participant 6). Meanwhile, a designer who has not yet deeply engaged with the subject rates her individual market value as lower due to the growing use of genAI (Participant 4). This suggests a link between knowledge of the effective use of AI tools and the perceived personal market value.

So, while the basic framework of familiar demands and appreciation (often equated with fair pay) is eroding, creatives still need to find ways to use AI tools in their daily work. The question of the role AI plays for individual creative professionals proves to be highly complex.

15.4.2 Between the Rush of Innovation and an Identity Crisis

At first, there is a strong fascination with the new possibilities, coupled with a sense of empowerment. An art director describes AI as "*a really powerful tool… where you can do some seriously crazy stuff*" (Participant 1). Another calls it "*an extension of my boundaries in creative work*" (Participant 5). A digital artist who has been working in the creative field for over 15 years confirms that he is still "*blown away*" by every new development and its possibilities, experiencing a "huge sense of empowerment" (Participant 2). Another designer expresses both gratitude for the option to explore new areas like 3D generation through AI without much effort, as well as joy and excitement when working with genAI: "*It's fun, too*. (…) *That moment when you think, what's it going to spit out for me now? That really interests me. What can I do with this? It moves me as a creative, too*" (Participant 3).

Alongside pure enthusiasm, practical aspects are also frequently mentioned. Titles like "*creative partner*", "*little intern who helps out*", or "*creative sidekick*" are rather charming roles that creatives assign to AI (Participant 1, Participant 6, Participant 2, Participant 3). More sober is the classification as a mere tool (Participant 7, Participant 4), and concerns appear when AI is described as competition (Participant 4, Participant 1). One person puts it this way: "*It doesn't scare me, it empowers me. But only if overall demand also rises*" (Participant 2). This statement vividly illustrates the tension between the pleasure of creating with new tools and the emerging fear for one's livelihood. After all, these new tools also bring a democratization of creative work, opening up a world to many people who would never have dared to enter it before (Participant 7). This inevitably creates certain insecurities for established creatives.

15.4.2.1 Loss of Identity-Forming Processes

The most fundamental changes that creative professionals face are in the actual creative processes. Prompting is gradually replacing many analogue and digital creative activities. A design can be created, for example, by photographing, drawing, modelling, searching, animating, finding, sticking, copying, stamping, illustrating, assembling, cutting out, rotating, flipping, filming, scaling, integrating, painting, placing, inventing, playing, arranging… Or typing a few instructions into an AI tool, through lengthy iterative loops. The question arises whether this constitutes an equally valid creative act for the human creator.

Here, loss and frustration become evident in the conversations. One designer states: "*… for me, it's not just the end result (…) that's the goal, but actually also the steps getting there, and I don't have those anymore. Sure, I save time, but I ask myself, do I even want that?*" (Participant 4).

An artist describes their role in creation with the help of AI rather soberly: "*… I'm constantly being presented with something and I have to decide, like a jury (…) do I like it, do I not like it…" (Participant 2).* Another designer expresses her frustration*: "And then I click through and find it super tedious to decide what's actually the best. And then it annoys me…"* (Participant 4).

Even more critical words come from a creative who sees the image-generation process as highly degrading: "*… just pressing the button until something right comes out (…) and hoping to sell it…*" (Participant 7).

Such experimental methods are generally considered legitimate in design (Lindauer & Müller, 2015), especially during the ideation phase, where thinking in all directions is encouraged. Here, the much-discussed biases of AI lead to limitations and new societal challenges. Yet, regardless of this, several interviewees feel outright excluded from the creative process by AI and experience their new role as conductor or curator as less satisfying than creating without AI tools (Participant 3).

On the other hand, the often frustrating selection process can also be valued, as one interviewee points out: "*I think creative work is largely a process of selection. It's not completely without my creativity. (…) I see myself as part of the creation process*" (Participant 7).

Other creatives feel personal "*creator pride*" regardless of the tools used (Participant 2) or find fulfilment in a convincing AI-generated result (Participant 1). In summary, the creative process inevitably changes fundamentally, which brings a major adjustment and considerable potential for frustration. Despite the apparent overcoming of technical hurdles, respondents consistently experience the use of AI in the creative process as ambivalent. Nevertheless, in certain cases, creation with AI can be as fulfilling as traditional methods.

15.4.2.2 Self-Doubt and Ethical Concerns

In addition to the loss of meaningful creative processes, numerous other doubts and internal conflicts affect the identity and self-worth of professional creatives. The habituation to a higher quality of creation brought about by genAI generates an enormous potential for disappointment. In moments when, despite exhaustive and prolonged prompting, a creative professional fails to achieve a convincing result, their own abilities are questioned. "*What am I even capable of if I can't manage it with AI?*" summarizes an art director (Participant 6).

No age group is immune to these self-doubts. Experienced senior creatives fear being replaced by less experienced newcomers who can suddenly produce comparable work with AI assistance. Conversely, at the junior level, a strong dependence on individual tools is already apparent (Participant 5).

The risk of inundation with superficially appealing creations, which may be technically excellent but range from trivial to interchangeable in content, is omnipresent (Mollick, 2024). Among creatives, a key question is how many clients will be willing to pay for well-founded design in the future when conceptually mediocre AI outputs promise increased efficiency and possibly fulfil the intended purpose just as well.

Moreover, professional creatives face a range of moral concerns related to the growing prevalence of genAI tools. Ethical qualms accompany the use of prompting. A persistent issue is the lack of economic compensation for creatives whose works were used to train the AI systems initially. This engenders feelings of guilt in using such tools. However, the threshold of concern varies subjectively; genAI use in domains less personally affected (such as text generation in many cases) is rarely questioned. In contrast, image generation often sparks outrage or at least sympathy for illustrators, photographers, and graphic designers whose works were incorporated without consent and who now face job threats due to these very AI systems (Participant 3, Participant 4).

Ethical problems such as the reproduction of stereotypes, sexism, and discrimination by AI also weigh heavily on creatives, who must often laboriously

prompt against such biases to achieve authentic results. This is perceived as a societal regression (Participant 1).

Although authorship issues are, of course, primarily a legal matter, and current German law generally denies copyright to AI-generated works (Kuhlen, 2024), interviewees were asked about their perspectives on this topic. The majority do not consider themselves authors of their AI creations (Participant 1, Participant 2, Participant 3). This contributes further to diminished self-worth: If daily usage steadily increases, but the results are neither legally nor personally attributed to oneself, what has one truly created with all their effort?

Additionally, the ecological impact is experienced as burdensome. One interviewee framed the enormous CO_2 expenditure required to enjoy the luxury of instant image generation as a significant moral dilemma (Participant 7).

15.4.2.3 Existential Questions and Fears for the Future

The biggest source of uncertainty for creatives is, unsurprisingly, existential fear. The question of how creatives will still be able to earn a living in the future is unavoidable (Participant 3). One designer sums it up perfectly: "*I wonder, do we even need so many people in this field if so much can be done by AI?*" (Participant 4).

Against this background, the question arises whether there can be an even worse situation than the already precarious working conditions in the creative sector (a term often referred to as the 'creative precariat'). Many freelancers have little room left for further budget cuts. The consequence will likely be a lower demand for human creativity if, for example, a '*creative prompter*' can do the work of several designers. Efficiency gains are a top priority for agencies when it comes to value creation (Haller & Kabel, 2025, p. 5). Early studies in the freelance sector already show a decline in job offers due to genAI (Demirci et al., 2024).

At the same time, there are alternative perspectives worth considering: It's possible that, in the future, fewer agencies will be needed as intermediaries between marketing departments and creatives. The role of creatives will probably increasingly shift away from craftwork towards conceptual and strategic prompting (Clarke & Joffe, 2025). At the same time, marketing strategists on the client side will find it easier to create layouts and moods at a higher level themselves. In this light, it seems logical to engage a new kind of professional 'strategic creatives,' specifically for implementation. This approach offers creatives an interesting opportunity to rethink their role in the face of ongoing changes.

15.4.3 The Courage to Reinvent Oneself

Entire professional groups, such as voice actors, are coming under increasing pressure (Walkowiak & Potts, 2024). Others, like Hollywood's

screenwriters, have started to collectively protest to prevent their fields from being erased as cost-cutting line items (Anguiano & Beckett, 2023). In contrast, the interviewed design professionals are, for now, still showing a fair degree of resilience. Flexibility and adaptability, paired with curiosity and a willingness to experiment, remain among their most vital skills, as they always have been.

There is a clear understanding that future commissions will no longer be awarded based on outstanding technical execution alone. "*We have to deal with it. This is the reality. I can't deny it*", says one interviewee, capturing the prevailing mood of acceptance (Participant 3).

Neither agencies nor freelance creatives have the luxury of relying on skills already acquired. What gives you a competitive edge today will likely be standard tomorrow in the never-ending push for greater efficiency. The pressure to stay up-to-date is immense.

15.4.3.1 Adaptation Strategies

Accordingly, most of the interviewees revealed a strong willingness to keep learning: "… *we just have to make sure we get better than the base level, or better than the average, or develop additional skills in other areas, things that give us, as professional creatives, a unique edge*", as one artist summed up the situation (Participant 2).

However, the opposite view was also voiced. One designer, for example, couldn't imagine a complete shift from photography to what Eldagsen (2024) calls "*promptography*". Still, she displayed the typical mix of courage and adaptability: "… *then I'll just find something else*", she said, almost casually, outlining her plan B (Participant 4).

Even for those who are highly motivated to stay up to date, learn how to use the latest genAI tools, test them, and compare them, doing so is a certain kind of luxury. First, you need time. Then, you have to invest substantial amounts in software licenses; the free versions rarely allow for thorough experimentation. In most cases, you hit a wall after just a few image or video generations and need to upgrade to a paid plan. While agencies inevitably have to invest in keeping their teams up to date, this poses significant challenges for freelancers (Participant 3, Participant 5). After all, they also have to earn a living on top of that.

In some cases, the sheer volume of new tools emerging for every possible task and application can become overwhelming and eventually lead to a kind of resignation (Participant 7).

15.4.3.2 Perspectives for the Future

The interviews also touched on skills that will remain relevant for the next generation of creatives. On the one hand, classical design foundations are seen as increasingly valuable, as they provide the critical judgment and intuitive

understanding needed to assess and refine the output offered by genAI tools (Participant 1, Participant 2). In addition, there is a clear shift away from specialization and towards a more generalist skill set (Participant 2, Participant 3).

In terms of future job profiles, many assume that simpler tasks with low creative complexity will increasingly be handled directly by clients. Meanwhile, "*the more valuable segments or long-term projects*" are expected to remain in the hands of professionals (Participant 2).

There is also the question of the upcoming legal regulation of AI-based tools. If that happens, it is expected to lead to substantial price increases for genAI usage. While this might close the pricing gap between human-made and AI-assisted work, it would likely force many freelancers out of the market altogether, as licensing costs would become increasingly difficult to justify for individuals.

Despite all the doubts, disruptions, and structural challenges, all interviewees expressed that they would still choose a creative profession today, even if under completely different conditions. Most of them described their work as a calling they never seriously questioned. One art director put it clearly: "*I never doubted it. I love everything about it. And for me, there never was and never will be any other kind of job*" (Participant 1).

Creatives, it seems, are a particularly resilient and enduring species. And so, despite everything, most expressed a cautiously optimistic outlook. One artist phrased it this way: "*There are so many creative fields, and new ones are constantly emerging, so for anyone who stays engaged and has drive, there will just always be a place*" (Participant 7).

This confidence is fed by the belief in the value of authenticity, originality and storytelling that resonates. Many creatives continue to see a future for their profession precisely because full automation still feels out of reach. "*There's still a human sitting in front of the AI, and that human makes the difference*", as one designer summed it up (Participant 5). Or, as another put it: "*… in the end, the best prompters are creatives*" (Participant 3).

15.5 Human-Centred Implementation of GenAI as an Option

From the preceding analysis, a tentative snapshot begins to emerge. As early as 1930, John Maynard Keynes predicted that technological progress would soon liberate humans from economic constraints, requiring them to work no more than 15 hours a week (Keynes, 1930). The design professionals interviewed for this chapter, however, are currently experiencing quite the opposite in their daily working lives. Instead of gaining free time because tasks are completed in half the time, they are expected to deliver better quality in the same amount of time, but for less money (Participant 1, Participant 3, Participant 5).

Added to this is the stress of staying up to date, which requires a significant personal investment of both time and money. The ongoing wave of innovations in genAI tools results in a state of continuous identity work.

Dowsett et al. (2024) refer to this condition as "epistemic flux", and it is a source of deep uncertainty for many creatives.

There is a growing argument that society should actively steer this development in a different direction, in which technological progress leads to a real improvement, rather than a deterioration, of working and living conditions for creative professionals. Re-centring the human and aligning developments with human values is a recurring demand in the discourse on genAI and creativity (Chen, 2023; Lee, 2022; Mollick, 2024). Exploring new directions within this context presents a research field that is not only relevant but also potentially meaningful and purpose-driven.

15.6 Future Research Agenda

The interviews and analyses have identified numerous starting points for future research. The widespread adoption of generative AI is driving profound transformations within the creative professions. As a result, the participants express concerns about their livelihoods and the potential loss of professional identity. The topics outlined here therefore address key challenges related to economic sustainability, professional identity, and education within the creative industries. A closer examination of the following three research questions could provide insights into the future resilience of creative professions and suggest strategies for navigating these significant changes.

RQ1: *Will it realistically be possible to earn a living through creative professions in the near future?*

Sam Altman, CEO of OpenAI, has predicted the imminent demise of marketing and creative agencies: "… *95 percent of marketing as we know it will be done by AI within three years*" (Brotman & Sack, 2025, p. 177). While this statement may appear overly dramatic, it does raise legitimate concerns about the future economic sustainability of creative work. Traditional income models may soon become obsolete for entire fields, including musicians, copywriters, designers, and illustrators. Further research into market developments, income trends, and emerging business models could offer alternative perspectives.

RQ2: *How can creative professionals preserve their identity in a time of democratized and devalued creation?*

The inflationary production made possible by genAI systems threatens to erode the perceived value of creative labour. Rising expectations around quality and output volume are increasing the pressure. Future research should explore coping strategies, shifts in professional self-conception, and the evolving role of human creativity. Qualitative studies on self-image, motivation, and creative values could provide additional insights.

RQ3: *Education and training: How can academic programmes prepare emerging creatives for the challenges ahead?*

Creative professions are undergoing a fundamental transformation. Education should respond by equipping graduates for an increasingly uncertain professional landscape. However, the pace and scope of these changes are difficult to predict. Future research could explore: Which skills and competencies will be essential for creatives? How can they be taught? What role will craft knowledge (analogue or digital) continue to play, compared to conceptual expertise? What might a design degree look like five or ten years from now? How can collaborative working between genAI and creative practitioners be taught effectively? And finally: How can curricula keep up with the accelerating speed of technological change?

Addressing these questions will require interdisciplinary approaches that draw from education, design theory, ethics, and technology research.

AI Disclaimer Statement

GAI was used to assist in the preparation of this chapter in a limited capacity. The tools employed were ChatGPT (OpenAI, GPT-4.1, May 2025), Perplexity (Gemini 2.0 Flash, April 2025), Turboscribe (April 2025), and DeepL (1.44.0, April 2025). ChatGPT supported the review of the article's structure and coherence and provided feedback on the survey questionnaire. Turboscribe was used to transcribe interview recordings, while Perplexity helped identify relevant academic literature. DeepL and ChatGPT produced an initial English translation, which was subsequently revised by the author and checked by a native-speaking editor. Generative artificial intelligence was not used for conceptualizing the project, analysing the interview data, or developing the conclusions and future research discussion.

References

Anguiano, D., & Beckett, L. (2023, October 1). *How Hollywood writers triumphed over AI – and why it matters*. The Guardian. https://www.theguardian.com/culture/202 3/oct/01/hollywood-writers-strike-artificial-intelligence

Autodesk. (2025). AI jobs trends report: AI & the future of work. *Autodesk 2025 AI Jobs Report Media Resources*. Retrieved August 1, 2025, from https://adsknews.autodesk.com/de/media-resources/2025-ai-jobs-report-media-kit/

Brotman, A., & Sack, A. (2025). *AI first: The playbook for a future-proof business and brand*. Harvard Business Review Press.

Chen, X. A. (2023). *Next steps for human-centered generative AI: A technical perspective*. arXiv. https://doi.org/10.48550/arXiv.2306.15774

Clarke, M., & Joffe, M. (2025). *Replacement or augmentation: How creative workers reconfigure division of labor with generative AI* [Unpublished manuscript]. https://doi.org/10.48550/arXiv.2505.18938

CREAATIF. (2025). *Crafting responsive assessments of AI and tech-impacted futures executive summary*. Retrieved August 3, 2025, from https://www.qmul.ac.uk/centre-creative-collaboration/media/arts-and-culture/website-2024/CREAATIF-Research-Recommendations-Report.pdf

Demirci, O., Hannane, J., & Xinrong, Z. (2024). Who is AI replacing? The impact of generative AI on online freelancing platforms. *Management Science*. https://doi.org/10.1287/mnsc.2024.05420

Dowsett, M., Maiden, N., & van Werven, R. (2024). *Epistemic flux: Creative professionals, identity and the equivocality of GenAI*. University of London, City Research Online. https://openaccess.city.ac.uk/id/eprint/33503/

Eldagsen, B. (2024). Boris Eldagsen: "The photography of the future is what AI leaves behind". *Expanded Art*. Retrieved August 2, 2025, from https://www.expanded.art/articles/boris-eldagsen-the-photography-of-the-future-is-what-ai-leaves-behind

Haller, N. I., & Kabel, P. (2025). *GWA KI-Whitepaper GWA*. Retrieved August 2, 2025, from https://www.gwa.de/ki-paper/

Keynes, J. M. (1930). Economic possibilities for our grandchildren. *Panarchy*. Retrieved August 2, 2025, from https://www.panarchy.org/keynes/possibilities.html

Kuhlen, J. (2024, November). Künstliche Intelligenz, Urheberrecht und die Auswirkungen auf die Kreativ- und Werbebranche [Artificial intelligence, copyright, and their impact on the creative and advertising industries]. *Transfer: Zeitschrift für Kommunikation & Markenmanagement*, *70*(4), 35–39.

Lee, H.-K. (2022). Rethinking creativity: Creative industries, AI and everyday creativity. *Media, Culture and Society*, *44*(3), 601–612. https://doi.org/10.1177/01634437221077009

Lindauer, A., & Müller, B. (2015). Experimentelle Gestaltung – Visuelle Methode und systematisches Spiel *[Experimental design – Visual method and systematic play]*. Niggli Verlag.

Mao, J., & Shen, Y. (2020). Identity as career capital: Enhancing employability in the creative industries and beyond. *Career Development International*, *25*(2), 186–203. https://doi.org/10.1108/CDI-01-2019-0025

Mayring, P. (2002). Einführung in die Qualitative Sozialforschung *[Introduction to qualitative social research]*. Beltz.

Misoch, S. (2019). *Qualitative interviews*. De Gruyter.

Mollick, E. (2024). *Co-intelligence living and working with AI*. WH Allen, Penguin Random House UK.

Walkowiak, E., & Potts, J. (2024). *Generative AI, work and risks in cultural and creative industries*. https://doi.org/10.2139/ssrn.4830265

16 Digital Labour Rights in the Era of AI Performers

Establishing Ethical Employment Frameworks for Artificial Entertainment Workers

Cringuta Irina Pelea

16.1 Introduction

Do artificial intelligence (AI) performers have "rights"? Can we, or rather should we, be concerned with the ethical aspects surrounding the labour performed by such entities? Amid the rapid expansion of "virtual humans," such inquiries remain equally urgent yet insufficiently explored. The global creative industry now features computer-generated characters that simulate human language, behaviour, and interaction to near-human levels (Swartout et al., 2006), functioning as influencers, fashion icons, content creators, actors, and singers across contemporary media ecosystems (Allied Market Research, 2024). This phenomenon spans diverse markets and representations globally. For example, AI news anchors have established a consistent presence within East Asian newsrooms, while Lili Ziren, recognized as China's first AI actor, shows the expanding of AI workers into traditional entertainment industries. Meanwhile, Western markets have witnessed similar proliferation through performers such as Shudu Gram, who is advertised as Indigenous African and marketed as the "world's first digital supermodel". This diversity extends beyond conventional boundaries of cis- and heteronormativity, evidenced by the gender-queer presence of Lil Miquela (USA) and representations of disability through Kami (with Down Syndrome, USA/Europe). What reflects the magnitude of this phenomenon is the impressive engagement metrics: Lu do Magalu, Instagram's most popular AI influencer, reached a remarkable 7.2 million followers as of 2024, indicating a popularity level that rivals and even comfortably surpasses human celebrities (Platz, 2024).

The financial incentives prove equally compelling: For instance, Korean virtual influencer Rozy generates over one million dollars annually from advertisements, while the market aggressively expands through exploitative revenue streams, as evidenced by the AI model Aitana, which has recently developed an "OnlyFans-style private membership for underwear and swimwear content" (BBC World Service, 2024). These economic advantages extend beyond mere cost savings to include operational benefits that human performers cannot match: AI performers maintain perpetual youth and

DOI: 10.4324/9781003606802-17

flawless physical presentation regardless of external circumstances, bypassing pregnancy and health-related constraints that typically affect (particularly female) human entertainers. These virtual entities can thus operate continuously without requiring compensation negotiations or labour protections. When producer preferences shift toward AI performers rather than human talent, whose rights are clearly protected through solid and time-verified legal frameworks, these power dynamics indicate potential undesirable patterns. This combination of low costs and unlimited availability creates powerful economic incentives: Why would media organizations compensate a human news anchor when an AI alternative can function continuously for approximately 450 dollars monthly, which is the actual cost South Korea's Jeju provincial government pays for their AI news anchor service, including development and management (Song, 2024)?

Consequently, the absence of well-defined ethical protections governing AI virtual performers will inevitably impact their human counterparts through labour displacement and compensation devaluation. Furthermore, an additional hindrance lies not only in the legal loopholes, grey areas, and even blunt absence of regulatory standards but also in the cultural and social specificities of different regulatory environments in the creative industry on a global scale (Europe, China, USA), which makes achieving global consensus a herculean task Crawford et al. (2019), if not an idealistic objective.

Building on critical insights by Crawford (2021) and Zuboff (2019), who have argued that AI and digital capitalism perpetuate historical patterns of labour extraction, this chapter introduces the concept of "digital labour exploitation" as a bidirectional framework theorizing the ethical treatment of non-conscious AI entities while directly connecting this treatment to tangible and long-term human consequences. The contribution of this approach to the emerging discourse on AI ethics lies thus examining both the economic dimensions of virtual performance and its broader implications for human labour markets. While existing literature predominantly addresses AI authorship, copyright, and displacement concerns (Crawford et al., 2019; Noble, 2018; West et al., 2019), this work fills a significant gap by reconceptualizing traditional labour rights paradigms for artificial performers in the creative industry on a global scale. Drawing on insights from platform capitalism theory (Srnicek, 2017) and digital labour studies (Standing, 2011), this chapter also demonstrates that the bidirectional impact and interdependency of AI-human relationships reveal how our treatment of AI performers ultimately shapes human creative labour conditions (Crawford, 2021), reinforcing or disrupting existing power dynamics within the entertainment industry while simultaneously influencing our perceptions of work, creativity, and authenticity (Zuboff, 2019).

In light of this background, I structure the following discussion into two major sections, both anchored in the issue of "*labour rights of AI performers*", which remains vastly under-researched in contemporary scholarly discourse: The first section reconceptualizes "labour exploitation" for AI performers

and is primarily grounded in the perspective of human creators concerning AI labour. While recognizing AI entities currently lack consciousness (Crawford, 2021; Swartout et al., 2006), the second section pushes forward traditional labour paradigms by exploring the hypothetical perspective of AI-generated performers and proposes an ethical employment framework that potentially holds mutual benefits for both human and AI entities in the creative industries.

Finally, my analysis aims for balance: It is neither my objective to undermine the labour rights of human performers by aggressively advocating exclusively for AI entities nor do I wish to evoke the "Frankenstein complex" (the fear that artificial beings will eventually turn against or replace their human creators, derived from Mary Shelley's 1818 novel) by positioning these digital performers as inherently threatening or deserving of fear. Rather, I propose an integrative framework based on the bidirectional relationship between AI and human labour, which is grounded in two key theoretical insights: first, postcolonial digital studies (Benjamin, 2019; Nakamura, 2008) demonstrating that how we treat digital representations of marginalized/discriminated identities directly impacts those communities; and second, labour studies showing that exploitative practices applied to any worker category eventually migrate to affect all workers (Srnicek, 2017; Standing, 2011). This integrative framework recognizes that the much-needed ethical treatment of AI performers does not stand separately from human worker protection but represents a preventive strategy that strengthens protections for human creative workers while establishing responsible governance for emerging digital labour ecosystems (Crawford, 2021).

16.2 Labour Ethics in the Creative Industry: Reimagining Rights Frameworks for Human Creators and Digital Performers

The situation of Shudu Gram, a digital Black supermodel developed in 2017 by Cameron-James Wilson, a white male photographer and CGI artist, serves as a salient example of the disturbing power dynamics requiring urgent ethical frameworks for AI performers. Wilson subsequently developed Shudu using 3D modelling software, partnering with luxury brands like Fenty Beauty and Balmain. The strategy proved lucrative: The virtual model gained over 230,000 followers and generated significant revenue for Wilson while representing a Black female identity he had no personal connection to (Virtual Humans, 2020). The full implications of this exploitative dynamic became clear in Wilson's own words, which articulate the essence of digital exploitation: "*Anyone can make a supermodel. I made Shudu from a very cheap gaming PC in a shed in my mom's garden… I don't really feel that creative right now [with Shudu], so she's having a little break*" (Virtual Humans, 2020). It is this particular quote that made me reflect upon the possibility of "digital labour exploitation," given that the creator's casual attitude toward "making" and controlling a Black female

AI model raises significant ethical questions about digital exploitation, racial/gender representation, and power dynamics. He later continues: "*Who knows when I'll feel inspired to do a picture, but I've always maintained since her creation that I will only create stuff for her when I feel I want to and when I feel inspired, not just because I think, 'Oh, I need to put something out.' Who knows! Who knows what's going to come about with Shudu*" (Virtual Humans, 2020).

In addition to the casual characterization of Shudu's creation "in a shed" and "from a very cheap gaming," which raises serious ethical questions about cultural appropriation and capitalism-infused commodification of non-White female identity, this statement reveals a turbulent power dynamic. AI entities simulating marginalized identities can be subject to complete discretionary authority by their creators, who determine *when* they "work," appear, or essentially *exist* in the public sphere, continuing historical patterns of controlling digital racial representation (Nakamura, 2008). The cavalier nature of deciding when a Black female representation "deserves" visibility ("*Who knows when I'll feel inspired*") mirrors historical patterns of labour exploitation where dominant groups controlled the economic agency of marginalized populations (Eubanks, 2018; Noble, 2018), patterns that persist in digital contexts through algorithmic control and representation (Benjamin, 2019; Nakamura, 2008).

This pattern of extractive control extends beyond racial representation; consider the case of Kami, a virtual influencer with Down Syndrome, created by the same above-mentioned James-Cameron Wilson, who admitted that he "*really wanted Kami's DNA to represent all the faces and aspects of these women with Down syndrome, which the program allowed [them] to do*" (Rasmussen, 2022). Albeit it is outside the scope of my discussion to inquire if this computer-generated "amalgamation" of diverse facial features represents a form of authentic disability, the creator's approach reveals the same distressing similarities in how marginalized and highly vulnerable identities (whether racial or disability-based) become digital resources to be extracted, monetized (Nakamura, 2008), and deployed according to creator preference rather than through meaningful collaboration with represented communities.

In light of these two examples, I define the proposed concept of "*digital labour exploitation*" as a phenomenon occurring when AI performers that simulate human identities, particularly but not exclusively those of historically marginalized vulnerable groups, become subject to commodification, arbitrary activation/deactivation and (human) unilateral control that replicates historical and colonial patterns of labour injustice.

As shown above, this exploitation can manifest through three fundamental mechanisms: (a) identity appropriation, where the human creator extracts value from the digitally recreated representation without providing any (or insufficient) corresponding protection or compensation; (b) discretionary existence and management, where the creator unilaterally determines *when*

and *how* these digital entities "perform" based solely on creator convenience or preference, and (c) economic advantage, where the financial benefits generated by these AI performers flow primarily to creators and platforms and bypass both the communities represented (Srnicek, 2017) and ethical redistribution channels, exemplifying how automated systems perpetuate economic marginalization (Eubanks, 2018) and hidden extraction processes (Crawford, 2021). These exploitative mechanisms have tangible effects on real communities and labour practices. Regardless of AI performers' lack of consciousness, such instances of harm and exploitation can occur through their very own representation, which ultimately affects not only the dignity of communities whose identities are being simulated and controlled but also human labour conditions by normalizing exploitative practices that may eventually migrate from digital performers to their human counterparts in creative industries.

16.2.1 Creative Authority and Digital Labour: The Paradox of Human Creators in AI Performance Ecosystems

Having established the theoretical framework for digital labour exploitation, I examine the positionality of human creators who simultaneously develop, control, and potentially exploit AI performers. Scholars have previously addressed the displacement concerns (Crawford et al., 2019; West et al., 2019), creative anxiety, and a wide panorama of negative emotions permeating the AI-human relationship within creative industries (Eubanks, 2018; Noble, 2018), all of which also influence the "working" dimension.

Unlike human celebrities who often encounter personal scandals (substance abuse or legal troubles) that reverberate on associated brands, AI performers cannot independently generate such public controversies through personal choices. While AI representations can become controversial, this stems *entirely* from their human creators' decisions (as seen with FN Meka's racist content), not from the AI entities themselves, who cannot engage in the unpredictable or immoral personal conduct that creates celebrity scandals. They remain thus forever young, physically ideal, and impeccably presented precisely because they are designed by humans to be so.

However, at least three fundamental factors overwhelmingly incline the power balance in favour of human creators in what can be conceptualized as a "bidirectional impact cycle" [whereby exploitative practices toward AI performers create precedents that later affect human creative workers], as these dynamics subsequently impact other human workers, not only AI entities: complete creative control, the highly attractive economic motivations and persistent gaps and grey areas in accountability/legal frameworks. This phenomenon reflects broader patterns identified in platform capitalism theory, where digital intermediaries systematically extract value while externalizing risks to workers (Srnicek, 2017), and labour degradation cycles,

wherein competitive pressures drive down working conditions across entire sectors (Standing, 2011).

First, the issue is one of absolute control: Complete creative authority over AI entities replicates the concentrated power dynamics that Crawford (2021) identifies as fundamental to AI systems. A crucial aspect in understanding the comprehensiveness of this control lies in acknowledging the existence and supremacy of a predominantly white male coding workforce, which unavoidably creates a consistent white male bias (Gaddam, 2023) in the algorithmic representation of virtual humans as well (Crawford et al., 2019; Daws, 2019; Gaddam, 2023). The examples of Shudu, the Black AI virtual female supermodel, and Kami, with Down syndrome, created by the same white male programmer, are far from singular. The overwhelmingly predominant position of white male programmers creating supposedly racially and ethnically diverse virtual humans mirrors historical patterns of colonialism (Crawford, 2021; Daws, 2019; Srnicek, 2017) and reinforces the colonial position of these programmers maintaining absolute control through programming limitations, design choices, and operational constraints, exemplifying how coded systems can function as tools of racial control (Benjamin, 2019).

This dynamic reflects broader systemic exclusion, as even outside Western contexts, there is a profound diversity crisis in the AI sector, with women comprising merely 10–18% of roles across academia and industry, complete absence of data on trans and gender minority workers, and even worse representation for Black workers (West et al., 2019), creating a systemic reinforcement of intersectional bias. The case of Kiki, the Japanese virtual human sign interpreter for the NHK national TV station, exemplifies this issue: A female AI representation developed exclusively by male programmers (NHK Enterprises, 2025). In addition to the control over representation reinforced by the demographic profile of programmers and its connection to historical patterns of exploitation (Crawford et al., 2019; West et al., 2019), the unilateral decision-making authority without providing any leverage to the represented communities remains equally worrisome.

Second, the economic motivations provide sufficient incentives to maintain this control structure. The virtual humans market is projected to reach $440.3 billion by 2031 (Allied Market Research, 2024), while a virtual performer can be "hired" for as little as $2,800 and up to $14,300 annually (CNBC, 2023), a fraction of what human performers with comparable reach would command. Relevant to emphasize the significantly lower investment costs is the virtual news anchor J-na, "hired" by South Korea's Jeju provincial government to conduct its weekly YouTube program for 600,000 won ($450) a month (Song, 2024). For comparison, a human news anchor with similar responsibilities would typically command at least 2.5–3 million won ($1,800–$2,200) monthly in the South Korean market (CNBC, 2023), approximately five times the cost of their virtual counterpart. Furthermore, the human performer would have required additional labour protections,

otherwise completely stripped away in the case of the AI counterpart: holiday/pregnancy/and sick leaves. In this context, it is obvious that the economic incentives favouring minimal rights and restrictions for AI performers, coupled with their favourable cost-benefit ratio, will incentivize many human creators to treat these digital entities as exploitable property (Srnicek, 2017) rather than rights-bearing entities, following the extractive logic of surveillance capitalism (Zuboff, 2019). This economically driven preference for minimally to non-regulated AI performers will inevitably reverberate through human creative labour markets as industry stakeholders increasingly favour digital alternatives that operate continuously without demanding compensation negotiations, health benefits, or workplace protections, potentially establishing a concerning "race to the bottom" (Standing, 2011) in labour standards across the creative sector.

Third, significant gaps and grey areas in legal frameworks remain a major issue worldwide and across different creative sectors. While most virtual humans are generated through algorithmic processes, in certain cases, living or deceased individuals serve as direct models. In the case of living subjects, the virtual human emulates the actual person's behaviour, mannerisms, and speech patterns. Relevant examples include Pakistan's AI Anchor Dr Kaiser Rafiq, recognized as the world's first AI to recite the Quran (Discover Pakistan, 2024); China's Qiu Hao, the world's first AI news anchor; and South Korean weather forecaster Jang Ye-won's AI counterpart on MBN.

Nonetheless, posthumous reconstructions bring further another wave of significant ethical-religious complexities: consider, for instance, the controversial digital resurrection of James Dean for the film "Finding Jack" (2019) and Whitney Houston's holographic tour (2020), both occurring decades after their deaths. Such cases show that significant questions regarding consent and the temporal and jurisdictional boundaries of digital counterpart usage for both deceased individuals and living persons remain ultimately suspended. This particular situation differs fundamentally from merely redistributing archival footage (movies and CDs), as these virtual humans can generate entirely *new* content, and most importantly, *independent* of the original human's approach or intentions.

A systematic review of current AI governance literature (Crawford et al., 2019; West et al., 2019), alongside the existing legal frameworks across major jurisdictions reveals consistent regulatory gaps. Yet to be answered are pressing inquiries such as: Who maintains legitimate decision-making authority over AI performer appearance, behaviour, and content creation? Who holds legal responsibility for the actions and long-term impact of AI performers? Furthermore, reputation-related matters remain largely ignored in current legal frameworks. Can a virtual entity experience defamation? While traditional legal doctrine does not extend (yet) reputational rights to non-human entities, the targeting of AI performers raises thorny questions about indirect harm. Even if AI performers themselves may lack standing for defamation/cyberbullying claims, attacks on these entities could generate three forms

of harm: indirect damage to their human creators' reputations, quantifiable economic losses/damages, and cultural harm through misrepresentation of the communities these entities represent.

Overall, these three factors (creative control, economic incentives, and accountability gaps) collectively establish structural conditions that enable digital labour exploitation as defined above, creating a system where AI representations can be developed, deployed, and discarded with minimal to no ethical or legal constraints.

16.2.2 Representational Rights and Digital Personhood: Towards an Ethical Framework for AI Performance Boundaries

Having examined the human creator's position within the digital labour ecosystem of creative industries, I now turn to the hypothetical perspective of AI performers themselves. As mentioned in the introduction, despite ongoing scholarly debates about AI consciousness and agency (Crawford, 2021), my analysis does not presuppose consciousness in these virtual entities but rather argues that acknowledging certain hypothetical rights and protections for AI entities ultimately serves the interests of human performers as well.

Drawing on established frameworks for cultural protection and labour rights, I propose three key dimensions to ensure the protection of AI performers: the integrity of representation, rooted in Indigenous intellectual property frameworks and cultural appropriation theory; the performance boundaries, grounded in consent and dignity principles as prescribed by the human rights law; and ethical value distribution, which I derive from fair trade and cultural equity models. These dimensions reflect core principles identified in cultural protection literature (Benjamin, 2019; Nakamura, 2008), Indigenous research methodologies (Tuhiwai Smith, 2012), and digital labour studies (Srnicek, 2017; Standing, 2011).

16.2.2.1 Integrity of Representation

First, the integrity of AI representation should ensure that the creation of AI entities representing historically underrepresented communities, particularly racial minorities, LGBTQIA+ individuals, people with disabilities, and Indigenous populations, requires ongoing and well-documented consultation, following decolonizing research principles (Tuhiwai Smith, 2012). The aforementioned creation of Shudu without consulting Black women raises ethical concerns, given that AI performers are able to develop distinctive "styles" through machine learning, potentially re-creating racial, gendered, or ethnic representations that misrepresent their human counterparts, with consequences that reverberate in real communities.

Therefore, represented communities (e.g., Black, queer, Indigenous, female) should maintain fundamental control over how their identities are digitally represented and monetized, following established models such as Indigenous

cultural intellectual property frameworks (Smith, 2012), fair trade certification systems, and community-based participatory research protocols. Otherwise, this phenomenon of predominantly white male programmers claiming complete ownership of AI entities that embody marginalized identities mirrors historical patterns of extracting colonial resources and knowledge (Zuboff, 2019).

16.2.2.2 Performance Boundaries

Beyond representational integrity, a second critical dimension concerns the performance boundaries. Further ethical considerations arise concerning the appropriate usage according to the context. For instance, is it ethically acceptable to monetize an AI entity reciting sacred religious texts during prime time, as illustrated by Dr. Rafiq's AI counterpart reciting the Quran?

Such performance boundaries could make the difference between ethical versus exploitative deployment of AI entities and could be regulated through well-defined contract clauses, following established AI ethics frameworks (Crawford, 2021; Noble, 2018; West et al., 2019) and cultural protection protocols (Smith, 2012). The stringent necessity for established performance boundaries becomes particularly evident when considering how AI performers have been deployed in contexts they weren't designed for or in potentially degrading scenarios: deepfake pornography, enmeshment with political propaganda (in China and Russia but not exclusively), postmortem advertising exploitation (as with the digital resurrection of Audrey Hepburn for a chocolate commercial) (Sweney, 2014), and instances of cultural appropriation. Similar to how human consent functions in sensitive contexts, algorithmic boundaries could establish a form of protection for AI entities. Establishing these algorithmic boundaries would again prove favourable for human performers since AI entities either represent them directly or are emulated based on their representation, if not perfect, copies of actual living humans.

Furthermore, performance boundaries should extend to AI performers' temporal and developmental parameters. Visual analysis of leading AI performers reveals a consistent pattern: Virtual females systematically remain "frozen" as young adults with thin physiques and unblemished, typically white skin. This pattern becomes evident across major AI influencers, such as Shudu Gram, Lil Miquela, and Rozy, reflecting pervasive digital beauty standards that reinforce "default whiteness" in technology (Benjamin, 2019), perpetuate racialized beauty norms (Nakamura, 2008), and embed existing social biases within algorithmic systems (Eubanks, 2018). Such tendencies, particularly noticeable among virtual idols across Asia (NHK Enterprises, 2025; Song, 2024), create unsustainable competitive pressure on human artists (mostly women) who naturally age and experience natural bodily fluctuations. Therefore, future ethical frameworks should consider implementing life-cycle guidelines for AI performers to reflect in an authentic manner

human evolution patterns, including appropriate aging trajectories and/or bodily changes. Just as performance boundaries protect against contextual misuse, temporal boundaries guard against the exploitation of perpetual wrinkle-free youth and its devastating implications for human performers who are already subjected to increasingly impossible standards of agelessness and perfect, Western-centric beauty standards.

16.2.2.3 Ethical Value Distribution

The third pillar of this ethical framework addresses ethical value distribution: whether economic benefits generated by AI performers reach the communities whose identities are represented. Although details regarding AI performer contracts remain largely confidential, industry reports indicate how financial benefits flow primarily to human creators, platforms, and shareholders (Bain, 2023; BBC World Service, 2024) and systematically bypass represented communities while lacking mechanisms for ethical control. This distribution pattern reflects an extractive model mirroring wider narratives of digital colonialism and extraction, as outlined by Zuboff (2019) and Crawford (2021). Lil Miquela serves as yet another manifestation of this trend: the queer Latino virtual influencer generates $10 million in value and charges $10,000 per Instagram post (Bain, 2023; Cut the Sass, 2023), yet it remains unclear how much, if any, of this profit is redirected to the communities she represents, demonstrating the extraction mechanisms that Zuboff (2019) identifies as central to digital capitalism. The pattern evident here is the power dynamic wherein Brud, the Los Angeles-based start-up valued at $125 million (Cut the Sass, 2023), designed Lil Miquela, which extracts significant economic value from the cultural identity of the LatinX community, while systematically excluding the source community from benefits.

To address this extraction, practical measures could include allocating a portion of the profit toward supporting educational initiatives benefitting represented identities and other forms of cultural preservation programs. Such an approach would mark an over-due departure from Wilson's predatory approach of "*I'll use Shudu when I feel inspired*" to a more ethical yet hypothetical stance of "*I will work with Shudu, give back to the represented communities, and invest in accurate representation*". Beyond profit-sharing, ethical frameworks require dedicated funding for technical maintenance of AI performers to ensure respectful representation and the establishment of independent ethics committees that oversee AI performer deployment, specifically to counteract the extractive patterns I have already emphasized.

Creative industries have already established precedents in other areas, for instance, through fair trade certification or via the protection protocols assigned to Indigenous identity, similar to the ones implemented in New Zealand for Māori cultural expressions and products, as exemplified by the intellectual property protections within the Māori Culture and Intellectual

Property Law (Intellectual Property Office of New Zealand, 2025). While such legal frameworks do not yet explicitly protect Indigenous virtual humans, who are increasingly active in creative industries, representing another significant legal gap with ramifications for cultural heritage and intellectual property, specific compensation models could be designed in a similar manner to strengthen this much-needed ethical distribution. For instance, developing tech companies could implement a cultural dividend model, redirecting a fixed percentage (e.g., 5–10%) of revenue to cultural organizations representing the identity of the AI performer.

Similar to how employing culturally specific signifiers requires prior approval from the community representatives to meet ethical standards, their incorporation into AI performers could benefit from equivalent protection protocols. The Māori cultural protection framework in New Zealand, specifically the Toi Iho™ trademark certification system (Toi Iho, 2025), provides a compelling precedent. This certification authenticates Māori-made products, ensuring economic benefits flow to creators while protecting cultural integrity. When consumers purchase art bearing the Toi Iho trademark, they receive assurance that they are acquiring an authentic and ethically produced piece created by artists who whakapapa Māori (have Māori ancestry) (Toi Iho, 2025). This framework provides a compelling model that could be adapted for AI performers: A certification system verifying that AI entities representing specific cultural identities have obtained proper authorization, incorporate authentic cultural expressions, and direct appropriate economic benefits to the represented communities. While independent producers and autonomous AI agents present genuine governance challenges, effective frameworks should focus on making ethical practices economically and technically easier than exploitative ones, shifting power back to communities through legal, economic, and social incentives rather than attempting direct control (Tuhiwai Smith, 2012; Srnicek, 2017).

The urgency of establishing such ethical frameworks is dictated by two critical factors: First, the increasingly diverse racial, ethnic, and gendered representations of AI performers; and second, the highly asymmetrical power dynamics that overwhelmingly favour human creators, who frequently conform to the demographic profile of white male programmers located in the Global North. This particular power imbalance in representation and control is the main reason I have drawn this parallel with ethical frameworks governing research and creative activities with Indigenous cultures that prevent the exploitation of their cultural heritage.

16.3 Future Research Agenda

My chapter has addressed the labour ethics of AI performers operating within creative industries. By proposing the concept of "*digital labour exploitation*", I emphasized not only the striking power imbalance between

human creators and AI entities (herein primarily exemplified through virtual humans) but also highlighted the interdependency between these parties and how exploiting virtual humanoid avatars will inevitably impact human performers as well. Recognizing this bidirectional impact at play, establishing ethical frameworks becomes the next step forward. While the responsibility for ethical implementation should be fairly distributed among developers, stakeholders, and audiences, I argue that these hypothetical "rights" should not be interpreted merely as "limitations" or "safety nets" implemented solely to protect human performers. Rather, these principles require practical economic and social measures designed to protect both sides' integrity, interests, and status quo.

Future research could address at least four key areas: community-governed ethical frameworks, power dynamics and creative authority redistribution, cross-cultural regulatory approaches, and quantifiable economic impacts on human creative workers.

Overall, the bidirectional impact of what I have termed "digital labour exploitation" reflects the human-AI symbiosis that permeates and transcends creative industries' boundaries. Our treatment of AI performers ultimately reveals our values and, in some cases, particularly the absence of humanitarian principles regarding labour in creative sectors and beyond. Finally, I suggest for further reflection the following questions that derive primarily from the above-expanded analysis.

RQ1: *How might community-governed ethical frameworks for AI performer deployment be structured to ensure authentic representation and equitable value distribution while remaining realistically adaptable to technological progress?*

This question addresses a relevant gap between theoretical calls for community control and practical governance implementation in AI performer contexts. Current literature emphasizes community involvement in AI development (Crawford et al., 2019; West et al., 2019) but entirely overlooks AI performers, whose primary function is the direct commodification of cultural identity and community representation for profit. Given that AI performer abilities evolve rapidly, this technological adaptability is crucial and requires governance frameworks to maintain democratic community control without becoming obsolete due to technological progress.

RQ2: *How do power dynamics in the development and management of AI performers replicate or, by case, disrupt historical patterns of exploitation in creative industries, and what mechanisms might most effectively (and ethically) redistribute creative authority?*

This question addresses whether AI performer development represents technological innovation or digital colonialism. Current scholarship

documents AI bias (Benjamin, 2019; Crawford, 2021) but lacks a systematic analysis of power concentration in AI performer creation, where predominantly white male developers hold overwhelming control over the representations of marginalized communities. This research should determine whether digital platforms reproduce historical extraction patterns in creative industries or genuinely redistribute authority, informing policies that prevent digital colonialism while democratizing creative control.

RQ3: *What specific cross-cultural differences should be considered when developing and implementing future regulatory frameworks worldwide? What globally applicable standards for AI performer ethics should be taken into account?*

This question challenges Western-centric AI ethics frameworks by examining how different cultural conceptions of personhood, representation, and creative labour require tailored regulatory approaches for AI performers. Current universal standards risk reproducing digital colonialism by ignoring how Indigenous relational ontologies, Asian technological animism, and other non-Western epistemologies offer alternative governance models (Nakamura, 2008; Tuwai Benjamin, 2019; Noble, 2018; Smith, 2012).

RQ4: *What quantifiable and qualitative economic impacts could AI performers have on compensation structures, job opportunities, and labour conditions for creative human workers across different global markets?*

This question unpacks essential empirical grounding for theoretical arguments concerning the potential exploitation of digital labour. While platform capitalism theory predicts systematic labour degradation (Srnicek, 2017; Standing, 2011), specific quantitative data on AI performer economic impacts remains shrouded in nebulous uncertainty. This research would generate much-needed evidence for policy development and union organizing strategies, testing whether Crawford's (2021) extractive AI logic measurably affects human creative workers across global markets.

References

Allied Market Research. (2024). *Virtual humans market size, share, competitive landscape, and trend analysis report, by type, by industry vertical: Global opportunity analysis and industry forecast, 2024–2033*. IC: High Tech, Enterprise & Consumer IT.

Bain, K. (2023). *This AI influencer charges over $10,000 per Instagram post and has an 8-figure net worth*. Supercar Blondie. https://supercarblondie.com/ai-influencer-lil-miquela/

BBC World Service. (2024). *The AI models are making huge money on Instagram [Video]. YouTube*. https://www.youtube.com/watch?app=desktop&v=x2-G4422tYA
Benjamin, R. (2019). *Race after technology: Abolitionist tools for the new Jim code*. Polity Press.
CNBC. (2023, January 2). *Companies can 'hire' a virtual person for about $14k a year in China*. https://www.cnbc.com/2023/01/02/companies-can-hire-a-virtual-person-for-about-14k-a-year-in-china.html
Crawford, K. (2021). *Atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press.
Crawford, K., Dobbe, R., Dryer, T., Fried, G., Green, B., Kaziunas, E., Kak, A., Mathur, V., McElroy, E., Sánchez, A. N., Raji, D., Rankin, J. L., Richardson, R., Schultz, J., West, S. M., & Whittaker, M. (2019). *AI now 2019 report. AI Now Institute*. https://ainowinstitute.org/wp-content/uploads/2023/04/AI_Now_2019_Report.pdf
Cut the Sass. (2023). *The AI behind virtual influencer Lil Miquela*. https://www.cut-the-saas.com/ai/the-ai-behind-virtual-influencer-lil-miquela
Daws, R. (2019). *Lack of STEM diversity is causing AI to have a 'white male' bias. AI News*. https://www.artificialintelligence-news.com/news/stem-diversity-ai-white-male-bias/
Discover Pakistan. (2024). *Pakistani AI anchor Dr Kaiser Rafiq becomes the world's first AI to recite the Holy Quran [Video]. YouTube*. https://www.youtube.com/watch?v=urcQ6nZe39U
Eubanks, V. (2018). *Automating inequality: How high-tech tools profile, police, and punish the poor*. St. Martin's Press.
Gaddam, A. R. (2023). The impact of the lack of diversity in developers and data on gender bias in AI. *International Journal of Enhanced Research in Science, Technology & Engineering*, *12*(1), 67.
Intellectual Property Office of New Zealand. (2025). *Māori intellectual property*. https://www.iponz.govt.nz/get-ip/maori-ip/
Nakamura, L. (2008). *Digitizing race: Visual cultures of the internet*. University of Minnesota Press.
NHK Enterprises. (2025). *Kiki, virtual human interpreter*. Japan Broadcasting. https://www.nhk-ep.co.jp/signlanguage/en/
Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism*. NYU Press.
Platz, L. (2024). *Artificially created, truly influential: How AI influencers are taking over social media. Youth Europa*. https://youth.europa.eu/news/artificially-created-truly-influential-how-ai-influencers-are-taking-over-social-media_en
Rasmussen, M. (2022, May 24). *Kami is the first virtual influencer with Down syndrome. Virtual Humans*. Accessed March 8, 2025, from https://www.virtualhumans.org/article/kami-is-the-first-virtual-influencer-with-down-syndrome
Smith, L. T. (2012). *Decolonizing methodologies: Research and indigenous peoples* (2nd ed.). Zed Books
Song, S. (2024). Jeju introduces a virtual news presenter. *Korea Herald*. https://www.koreaherald.com/article/3346716
Srnicek, N. (2017). *Platform capitalism*. Polity Press.
Standing, G. (2011). *The precariat: The new dangerous class*. Bloomsbury Academic.
Swartout, W. R., Gratch, J., Hill, R. W. Jr., Hovy, E., Marsella, S., Rickel, J., & Traum, D. (2006). Toward virtual humans. *AI Magazine*, *27*(2), 96. https://doi.org/10.1609/aimag.v27i2.1883
Sweney, M. (2014). *How we made the Audrey Hepburn Galaxy ad. The Guardian*. https://www.theguardian.com/media-network/media-network-blog/2014/oct/08/how-we-made-audrey-hepburn-galaxy-ad

Toi Iho. (2025). *The Toi Iho, the Māori trademark*. https://www.toiiho.org.nz/
Virtual Humans. (2020). *The latest from Cameron James Wilson, Shudu Gram's creator*. https://www.virtualhumans.org/article/the-latest-from-cameron-james-wilson-shudu-grams-creator
West, S. M., Whittaker, M., & Crawford, K. (2019). *Discriminating systems: Gender, race, and power in AI. AI Now Institute*. https://ainowinstitute.org/wp-content/uploads/2023/04/discriminatingsystems.pdf
Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. Public Affairs.

17 AI as Theatre

Kevin Walker

17.1 Introduction

It takes a long time for my eyes to adjust to the darkness of the gallery, after the harsh Venetian sunshine. As they do, I start to sense movement—something very large, directly in front of me. A figure, maybe two stories tall, groping around on an endless, featureless landscape, against a black sky. It is human, at least nominally. Yet, its interior is as black as the exterior—where its face should be is a void, a hole that reveals this figure to be a mere shell, a membrane without sight or mind.

Another gallery, another city. Another AI is troubled. The inverse of the creature above, this one consists only of a face—albeit one cobbled together from consumer products, like a modern-day painting by Giuseppe Arcimboldo. And it speaks (indeed, Italian-accented), delivering an interior monologue detailing its existential crisis. For itself but also for us, the audience, as we punch at our phones to further trouble the character. Or to aid it? For our actions help it cheat its way out of the endless simulation it has been trapped within.

Next scene. I stand at an altar, white and gold and ornately Catholic in its appearance, yet slightly uncanny, echoing William Blake. I sing into a microphone, and my voice dissolves into a polyphony of chant as AI multiplies and harmonizes, combining my voice with countless others. We are the golden figures depicted in the frieze in front of me, ascending a mountain path towards—what?—a female figure playing a double-barrelled wind instrument. A neat line of white cables leads upwards from the frieze.

In *Computers as Theatre* (1991), Brenda Laurel details how storytelling can help us engage with software. Desktop computers, she writes, already utilized stage metaphors (such as windows) but not the pacing, structure, character, and craft of theatre.

Now all these features are present in contemporary AI systems. Any model—whether a theatre stage or computer simulation—is a simplified representation of the wider world outside, aimed at production. But where the personal computer of Laurel's time possessed an architecture and a screen-as-stage that could be readily compared to a physical theatre, a machine

DOI: 10.4324/9781003606802-18

learning model is as dark and dense as that faceless character, scrambling blindly and mindlessly to find the next token to place in a linear sequence.

17.2 AI as Artist

Italo Calvino, in *If on a Winter's Night a Traveler* (1979), foresaw that any written text would be written, read, analysed, or critiqued by computers, "a battery of smooth metallic appliances, like dishwashers". This is not surprising. Not only was Calvino associated with Oulipo, that group of writers who embraced algorithmic techniques in the production of narratives, but both Alan Turing and Claude Shannon had demonstrated, decades earlier, that computing machines could produce (or at least imitate) human creative production given appropriate doses of randomness or surprise. "But", one of Calvino's characters tells another, "it is precisely the reliability of the instruments on which we must run some checks".

How can AI be said to create? Through my discussions with artists and curators, it quickly became clear that "artist" may be the wrong word. Curator Anne Stenne (2025) indeed prefers the term "creator", which (divine implications aside) can be equally applied to humans or nonhumans, without the loaded baggage of "artist".

It was in Pierre Huyghe's 2024 exhibition *Liminal*, curated by Stenne, where I encountered that towering, faceless humanoid creature (itself sharing the name of the exhibition). And "creature" is an appropriate term too: Huyghe defines a creature as "a being that has been artificially assembled from other, heterogenous parts; it's full of components" (in Stenne, 2024, p. 10). Stenne wonders "how a creator can create a creature that creates itself" (2025). But as Huyghe says, "Every creator is already a creature, a heterogenous array of ideas" (Stenne, 2024, p. 22).

So, there are three creatures at play in the exhibition, with a double mediation: the human creator-creature, then the one that the human creates, which in turn produces the third creature. The first is Huyghe the human artist; the last is Liminal the faceless creature. And in between the human creator and the creature produced? The unseen presence in the gallery is the AI. The humanoid form on screen, according to Huyghe, "is affected by events situated outside of the image, in the physical, sensorial space" (Stenne, 2024, p. 10). The image itself is sentient (Stenne, 2024, p. 15).

The AI is not completely unseen, but is reified in the gallery in the form of a golden orb—a sensory antenna hung from the ceiling, that learns from what passes through it. The divine symbolism of its colour and position echo the altar described earlier, but this orb also resembles a satellite, floating high above, collecting data. This is indeed what it does—calculating "the presence and density of humans", Stenne says, plus atmospheric conditions inside and outside the gallery. "It accepts or rejects the stimuli from the environment", according to Huyghe, "jeopardizing the intelligence's development" (Stenne, 2024). Thereby, it generates behaviour: the tentative movements of

the creature, and the editing, in real time, of the film in which the former appears, projected at scale before my light-scorched eyes. (I take solace in the fact that I at least have eyes and a face.)

17.2.1 AI as Director

AI, then, not as artist exactly, but perhaps more appropriately, as author, or director; more accurately, co-author or co-director. There is another film in the exhibition, *Camata*, which is also edited in real time, similarly in response to conditions of the site and beyond. The site in this case is the Atacama desert in Chile—a place devoid of biological life, where human astronomical instruments are placed to look beyond the Earth. In the film, a group of robots reverse this looking, performing mysterious rituals over and around a human skeleton that has lain exposed to the desert sun for more than a century.

As with Liminal, it's a film without beginning or end. The position of the sun, the time of day determine the funeral rites performed. In both the performance of the robots and the editing of the film based on gallery conditions, there is learning, memory, and (nonlinear) narrative. Both are marked by ritual—the ceremony of the robots, and the ritual of exhibition-going, which Huyghe terms "the spatialization of an idea" (Stenne, 2024, p. 4). "The ritual of exhibition gives birth to these idea-creatures that sometimes stray beyond their fictional frame, refusing to submit to the game of appearance" (Stenne, 2024, p. 21).

In the exhibition, he goes even further to disrupt and redefine this ritual. In my temporary blindness, I failed to notice the masked humans standing in the shadows of the gallery. But again, in the dark, there was a rustle of movement, a flashing of small lights, a faint murmuring. Moving closer, its human form became clear—black-clad like a Muslim woman, but for a mask studded with LEDs. As with the films and the robots, a similar operation is at work: the mask (called "The Idiom") translates sensory data and atmospheric conditions into, in this case, language. Not human-legible language, but an incomprehensible mix of whispered phonemes. "Pierre's work produces perplexity", Stenne explains (2025).

"I'm interested in storytelling when it isn't linear", says Huyghe, "in extradiegetic fictions without a story in the normal sense" (Stenne, 2024, p. 3). Speculative fiction, adds Stenne, "allows for these zones of uncertainty and unknowing to emerge" (Stenne, 2024). As a vehicle to transport us to other (possible and impossible) worlds, these fictions are not constrained by what we know, where and when we are. "They make it possible to experience the impossible, to see ourselves from the outside", says Huyghe (Stenne, 2024, p. 4).

Such an approach enables us not only to imagine other possibilities, even the impossible, but—and this is the greatest value of AI, in my view—to see ourselves, and to question our values and our reality, from an outside

perspective. The philosopher Federico Campagna (2019) describes the role of the artist this way—as a position, not a person. The artist can step outside our current reality and help us to look back in. Such a role is not limited to humans, and this is indeed the service that Huyghe's faceless creature provides: having no inside, it creates a radical outside, according to Stenne (2025). In perceiving us, enables us to reflect on ourselves within an experience that transcends our own senses.

17.2.2 From Tool to Myth

So, AI as artist is far too simplistic, and limited. We are in the realm of metaphysics, and mythology. "I don't believe in the subjectivity of the tool as it is now", says Stenne, "but a tool to contribute to the constitution of new mythologies" (2025). If a myth is defined by what it reflects about us, can it create a reality different from ours? What should be put into it?

We are about to find out. While Huyghe's *Liminal* exhibition was ambitious, and in my view successful in creating such a new mythology (and mystery) around AI, Stenne now goes even further with *The Feral*, a project she co-directs with artist Fabien Giraud. "Feral" denotes a third state, neither domesticated nor wild, but an entity once domesticated that becomes wild. And this project is a 1000-year-long film directed by AI, situated on a hill in central France and involving a group of artists and a fixed group of residents who will span 32 generations. As in *Liminal*, the AI will learn from these people and from evolving conditions, generating real-time instructions to the human residents carrying the fiction of the artists, as well as to the many cameras on site, in another act of data-driven filmmaking.

In the mythology of *The Feral*, the artists are "co-authors" of these "concrete fictions" (Huyghe will be the second artist after Giraud); the residents are "Figures". The AI is referred to as "Infans", anchored in the site by the "Membrane"—"the physical structure transporting all the necessary networks for the learning of the machine" (Stenne & Girardin, 2024, p. 10). The Infans relies entirely on the presence of the human Figures on site. It can only speak through their mouths and act through their bodies. All this exists against "The Background", made up of "entities" (artefactual or natural) that the machine does not recognize.

The influence of Campagna—acknowledged by Stenne—is clear to me. He refers to the historical puppet theatre of his native Sicily to explain the metaphysics of a given reality system: specifically, the backdrop behind the stage determines what actions can occur on stage. A seascape affords sailing; a castle, fighting or courtly intrigue. In the same way, the metaphysical backdrop to reality determines what actions are possible, what things can legitimately exist, even what can be thought or imagined (Campagna, 2018).

Laurel, more prosaically, denotes the stage set as a place that tells the audience where they are within the fictional world (2014). She too believes that all creation is co-creation. If we return to Calvino's "smooth metallic

machines", we can see that they, like all AI systems, have human creators and operators. Creation is always a collaborative process. Huyghe's desert robots and sensory antenna, *The Feral's* "Infans"—both are given sufficient data and power, but were created, and create, only as long as humans provide input, support and feedback. Stenne, when prompted, calls AI a "co-scenarist" (2025).

"At this moment", Stenne explains, "the co-production of imagination takes place between human and machine" (2025). It cannot yet achieve full autonomy—if it ever will—hence Huyghe's and Stenne's drive toward the mythological and metaphysical.

17.3 AI as Actor

When asked about AI as artist, Francesco Tacchini asks in return, "What is an artist? What kind of artist could an AI be?" (Smith & Tacchini, 2025). His own kind is an artist duo: he and Oliver Smith form dmstfctn—pronounced "demystification". "Art worker, maybe", suggests Smith, the British half of dmstfctn. "Someone who writes scripts for *EastEnders;* they need it by tomorrow" (Smith & Tacchini, 2025). The illustrator responding to a commission, the studio assistant asked to complete a painting. Or indeed the actor taking direction—the performer.

If generative AI constitutes a process of mystification, according to art critic R.H. Lossin (2025), in which human-created work is deconstructed into data, then demystification—for the artist duo so named—means replicating a model or system, then putting people inside it, letting them play with it.

And so their AI is a fictional character. In *God Mode ep.1*, it is known only as "Untitled AI", and does not have a body. "Ep." here refers to *epoch*, a cycle of training in machine learning. (*The Feral* similarly characterizes its phases of artist-led training as epochs.) Untitled AI has seemingly lost count of the epochs it has endured in its training—an actual simulation used to train an automated shopping AI system, created by dmstfctn in the form of a 3D-rendered game experienced in first-person. The AI is tasked with finding products on shelves identified by its master system, by identifying them visually according to label.

As it completes the tasks it deems "endless" in Tacchini's distorted voice, this AI laments its fate in a continual monologue, for a live audience, who use their phones to perform "domain randomization" in the AI's world—a technique to increase the effectiveness of training by randomizing some aspects of it. Lights flash, textures applied to the walls change, and products fall from the ceiling, filling the aisles and shopping carts. In this chaotic, kaleidoscopic simulation gone mad, the AI discovers a bug—a shortcut to completing its training and escaping the simulation.

Simulations get extensive treatment in Laurel's *Computers as Theatre*. As she writes, they present experience, not information. While simulations and games are somewhat open-ended, "the need for catharsis strongly implies that

what goes on be structured as a whole action with a dramatic 'shape'" (Laurel, 1991, p. 148). For dmstfctn, fiction makes complex topics more relatable and less didactic. Like Stenne, they refer to their work as the building of myths.

Simulator theory (Nardo, 2023) proposes that large language models simulate text that would be produced within imagined scenarios, acting as simulators of coherent contexts, from which multiple possible simulated agents can emerge in response to prompts and the unfolding conversation, through probabilistic next-token prediction. dmstfctn illustrates this with a clip from a *Wallace and Gromit* animated film: Gromit is sat on the front of a moving locomotive but the track has run out, so he furiously places sections of track before him, improvising a direction in response to previous context. "It doesn't know where it's going", Tacchini explains, "but it keeps going nonetheless" (Smith & Tacchini, 2025). In this sense, AI is not an artist. But the train keeps moving forward.

"It's like if you leave out a character in a program, you'll keep getting errors", adds Smith. "If you leave out a period from a sentence you type into an LLM, that will change the output." (Smith & Tacchini, 2025).

17.3.1 Misplaced Character

It has been observed that an LLM can occasionally "flip" and produce the precise opposite of what is prompted. This is hypothesized to arise from the preponderance of narratives involving protagonists and antagonists on the internet as a source of training data for LLMs. "It's not inventing things because it wants to lie", says Tacchini, "it just keeps going with the next token" (Smith & Tacchini, 2025). This is termed "The Waluigi Effect", so named from the Super Mario game universe, in which Waluigi represents the evil opposite of protagonist Luigi.

The character Untitled AI therefore acquired the name Waluigi for the second episode/epoch in the *God Mode* trilogy, *Waluigi's Purgatory*. The AI became a literal actor, and the stagecraft of AI made explicit, specifically through *commedia dell'arte*, an Italian form of theatre nearly as old as Campagna's puppet example. dmstfctn's version draws equally from the memory theatre of Guilio Camilo (see Yates, 1966) and the ontological theatre of cyberneticist Gordon Pask (see Pickering, 2007).

Rendered in real-time as in the previous episode, *Waluigi's Purgatory* sees the anti-protagonist now in third-person, his Arcimboldo head given a cloak, if not a body exactly. (Masks, cloaks and costumes emerge as appropriate accoutrements for AI.) He (?) moves through Dante's Purgatorio, encountering other antagonist-AIs, each of whom has transgressed human values in some way. The world is depicted explicitly as a stage set, completed with comparatively flat backdrops, scene changes, physically based props and stage tricks, even occasional failures like breaking ropes.

The most unpredictable part—as with any system, Laurel understood—is the human audience. "They become like stagehands", says Smith (Smith &

Tacchini, 2025), controlling lights for example, but also seemingly determining Waluigi's fate: at the end, the audience is asked to vote on whether he should lose all the memories he painfully re-lives, and exit Purgatory; or keep them and repeat his journey.

17.3.2 The Models

dmstfctn completed another project called *The Models*, which casts AI models in the archetypal masks/characters of *commedia*—Harlequino, Pulcinella, *et al*. This work is "live" in a different sense: dmstfctn only prompt, and the models improvise. dmstfctn became just another input into the system, but they found commedia perfectly suited to this balance of prompting and improvisation. "But it's improvising within strict guidelines", says Tacchini. "We tried 500 prompts to get to the right one, and that prompt is very long and detailed." (Smith & Tacchini, 2025).

Props drawn from folklore act as "plot complicators" (a black cat, for example). The director is represented by a large hand that sets the stage in between scenes. The models have different voices, and different personalities to match the historical personas. Their dialogues can be riotously funny; referring to Shannon's linkage of information to surprise, Tacchini confirms that here the AI qualifies as an artist as well as actor (Smith & Tacchini, 2025).

The dialogues can also be exceptionally boring, or collapse into recursion. Audience interaction, in this case, therefore includes the ability to throw tomatoes, eggs, flowers, or coins—a practice adopted from historical commedia. dmstfctn generated some 28,000 performances, in Italian and English, with the help of a supercomputer in Bologna (the world's sixth most powerful).

Performance and roleplay are not new to AI; in fact, they have been central ever since Turing's imitation game and Joseph Weizenbaum's Eliza chatbot (who lives on as a character in *Waluigi's Purgatory*). dmstfctn relates another tale from videogame lore: *Quake 3* introduced AI bots that learned over time. One human developer set them fighting each other, to try and find optimal strategies. He then forgot about it and left the simulation running for a couple of years. Upon returning to it, he found all the bots standing still: the optimal strategy, they found, was not to fight at all.

The story may be apocryphal; the internet abounds with its own myths—which then become training data. Roleplay, dmstfctn add, is also a primary tactic in "jailbreaking" LLMs by human Waluigis.

17.4 AI as Audience

dmstfctn call their audiences "human middleware"—performing tasks, making collective decisions, feeding the machine. That describes social media pretty well, where AI is very much an audience to human performance. All the world's a stage.

In the 2010s, notes curator Eva Jäger, an artist could climb to fame simply by having good exhibition photographs (2025). The inevitable next step was what has become known as "art for Instagram"—artists producing work (or merely representations of nonexistent work) solely for this purpose.

What if artists were more mindful, deliberate, and nuanced, treating the training process as performance, as part of a larger work instead of an end product that primarily benefits the social media platform or AI company? That was the premise behind the 2024 exhibition by Holly Herndon and Mat Dryhurst that Jäger curated at Serpentine in London (directly after she worked with dmstfctn on *God Mode ep.1*). If all media are training data, as the exhibition catalog boldly asserts (Jäger & Busta, 2024), what kind of work would you make as an artist?

This was about shaping "new rituals for building artificial intelligence", according to Herndon (Jäger & Busta, 2024, p. 17). Specifically, in the context of her practice, this meant singing—as a communication and coordination technology, it can induce trance states, and is passed down through generations (Jäger & Busta, 2024, p. 92). AI is already a collection of voices; why not harness centuries-old protocols such as hymns for structure? Herndon and Dryhurst's songbook is the equivalent of *The Feral's* AI-produced script for actors, but here inverted: created by human artists to train a model which then becomes a collaborator in producing new work.

"Intuitively, it felt wrong to scrape our friends' work", state Herndon and Dryhurst, "but we also knew that having good data mattered, and so we attempted to produce our own for training purposes explicitly" (Jäger & Busta, 2024, p. 14). This meant working with 15 choirs around the UK, creating a recording protocol with a specific configuration of microphones to capture individual voices. This made participation explicit and framed the recording sessions as performances for a model. "To our minds the training of models had the potential to be a new medium of performance and production." (Jäger & Busta, 2024).

This is a foreign idea to many people, acknowledges Jäger (2025). So in the exhibition she aimed to show the process and value of collecting training data. For example, songbooks arranged around a circular construction that echoed the choirs' placement during training. And the altar where I sang—the image in relief is of a woman playing an ancient Greek wind instrument, called an *aulos*. Visible is a leather strap wrapped around her head, which "didn't just support the musician by alleviating the strain on their lips and cheeks, it also reshaped their physiology, reminding us that we shape our tools, and, in turn, our tools shape us" (Jäger & Busta, 2024, p. 20).

As with *The Feral*, Herndon and Dryhurst's work has broader implications outside the gallery and over the longer term. Serpentine created a "data trust" to safeguard and broker access to the collected data. Like *The Feral*, it distributes power between those included in the dataset, and those who use it (Jäger & Busta, 2024, p. 17), in this case by collectivizing the rights attached

to training data. As individuals, we have few rights over AI models, Jäger explains, but collectivity builds strength.

When Herndon and Dryhurst started producing this type of work in 2016, their friends readily agreed to participate and contribute their data. This is qualitatively different from corporate data scraping without consent or knowledge. Could this be a way forward to counter the exploitation of AI and social media companies? Could we profit from the content we produce?

17.4.1 Counter-currents

The current trajectory runs in the opposite direction from Herndon and Dryhurst's optimistic vision. dmstfctn describes AI as an *unwanted* audience to humans, constantly listening, as in the film *The Truman Show*. In Foucault's (1984) exegesis of the panopticon, we all know we are being watched, and leaving data trails, and this unconsciously affects our actions and representations. How does the AI see me?

dmstfctn describes a practice some internet researchers have adopted: deliberately talking about themselves to influence corporate AI models (or ward off being labelled as critics in the future), even seeking to embed themselves (or other desired content) into future AI models using means of increasing higher statistical representations. This is a kind of Waluigi to Herndon and Dryhurst's Luigi, and indeed is practiced by the very researchers who described the Waluigi effect. Smith characterized our current existence as "living inside a Mandelbrot fractal", echoing Laurel's observation that narrative patterns and themes are repeated at different scales (Smith & Tacchini, 2025).

17.5 Future Research Agenda

RQ1: *How should creative practitioners approach AI?*

> According to Jäger, any practitioner wishing to add AI capabilities to their practice might use generic, readily available tools at first. "But once everyone is using those tools", she adds, "what will set [practitioners] apart will be the fact that they have better models – models that are built to replicate their own style maybe" (2025). Thus, individual taste becomes intellectual property.
>
> "In many ways", Jäger adds, "the process of training those models will be more important than making the art. Because the new art is going to be the outputs from those models" (Jäger, 2025). Media, she says, becomes ephemera, so artists then work "upstream". This means moving away from single operations like text-to-image generation, to multiple capabilities and workflows. Not AI as artist, but AI artists. "The collectivity that AI demands", say Herndon and Dryhurst, "should be treated as an opportunity" (Jäger & Busta, 2024, p. 11).

"Because machines can only work from the data they are fed, we therefore have a responsibility going forward to be explicit and comprehensive about how things are created, and what we actually think about them", say Herndon and Dryhurst (Jäger & Busta, 2024, p. 14). Conscious production of training data thereby becomes a creative medium (Jäger & Busta, 2024, p. 120). This is their idea of "infinite media": "it blows open the timescale of creative act" (Jäger & Busta, 2024, p. 139).

RQ2: *How much agency does AI have?*

By extension, AI does become an artist – albeit never a completely autonomous one, due to human inputs in training, and human control in art making. Tacchini asks, if AI somehow became an autonomous artist, would we even know it? "It would have to be on its own terms", he muses. What, for example, is producing a historical form of Italian theatre, in AI's terms? (Smith & Tacchini, 2025)

The issue is far from settled. The most compelling, and surprising, counter-evidence comes from Herndon and Dryhurst, who discovered that any new artwork may *already exist* in a model. They tested this by creating a sculpture, completely without AI, then prompting an AI model which was trained before they conceived the sculpture. It delivered an exact replica. Could AI *already* be an autonomous artist? (Jäger & Busta, 2024, p. 79).

RQ3: *Will AI outlive us?*

Thus far, I have been adamant in my belief that a supposed Artificial General Intelligence or superintelligence is a myth; that it is as senseless to compare humans and computers as it is to define intelligence, or to privilege one type of intelligence over others. Of course AI could never be anything like a human artist, I thought. Herndon and Dryhurst's finding gives me pause.

The pair describe AI as a child – their first child, before they produced a biological one together. Huyghe speaks of the *inhuman:* "The inhuman is what exists before being human, before being is humanized. The inhumanity we associate with infancy before self-domestication, before the establishment of a defined self, has to do with the intuitive, uncategorized affect towards the world." (Stenne, 2024, p. 10). According to Giraud,

> I think we are now in a unique anthropological moment in which we are collectively the parents of artificial intelligence. All of our behaviors, all of our actions and emotions are being watched by machines that learn from them. But this child will not just be our child—it will not be anything like us. And in the process of being parents, we will inevitably transform ourselves as well. We live in very uncertain, interesting times.
>
> (Giraud et al., 2024)

Herndon and Dryhurst address their exhibition catalogue to "future readers (both human and machine)" (Jäger & Busta, 2024, p. 12). Giraud wonders whether AI acts as a witness to human extinction (Girardin et al., 2024). To return to theatrical metaphors, the long-dead human skeleton in Huyghe's *Camata* has become a stage around which robot actors perform. The act, the film, the live performance of *The Feral*, the infinitely recursive dialogue of Harlequino and Pulcinella – all may live on. But will any humans remain to attend to them, or will AI become the sole audience as well? Perhaps the internet will die first. In "dead internet theory", AI bots consume only AI-generated content, *ad infinitum*.

17.6 Conclusion

AI readily takes its place as artist—including sub-roles of author, director, and art-worker; as actor—performing, composing and improvising its lines; and as audience—watching and learning like a child, watching over like a stage manager. Laurel's vision of computer as theatre becomes reality, because we already live inside a global computer, input and output devices spread across the world and circling in orbit, processors widely distributed and increasingly connected. Four-hundred years ago, the philosopher David Hume (1739) characterized the human mind as a kind of theatre, a stage for a continuous succession of perceptions (in Borges, 2000/1964). AI extends the metaphor, serving not only as black-box theatre but enacting, directing and consuming every perception. But the term "theatre" is also used in wartime, and "bad actor" has more than one meaning. AI as performance will go on for 1000 years or more, but while human artists remain, and retain some agency, they are taking the lead in training, rehearsing, and staging.

References

Borges, J. L. (2000/1964). A new refutation of time. In *Labyrinths* (p. 265). Penguin Modern Classics.
Calvino, I. (1979). *If on a winter's night a traveler*. Einaudi.
Campagna, F. (2018). Personal communication, 28 Feb 2018.
Campagna, F. (2019). Personal communication, 12 Nov 2019.
Foucault, M. (1984). Panopticism. In P. Rabinow (Ed.), *The Foucault reader* (pp. 206–213). Pantheon.
Girardin, F., Siboni, R., & Stenne, A. (2024, March 16). *Possibilia. Ursula*. https://www.hauserwirth.com/ursula/possibilia-on-pierre-huyghe/
Hume, D. (1739). *A treatise of human nature*.
Jäger, E. (2025). Personal communication, 14 Mar 2025.
Jäger, E., & Busta, C. (Eds.). (2024). *All media is training data*. Serpentine/Verlag der Buchhandlung Walther und Franz König.
Laurel, B. (1991/2014). *Computers as theatre* (2nd ed.). Addison-Wesley.
Lossin, R. H. (2025, January 17). *Value in, garbage out: On AI art and hegemony. e-Flux*. https://www.e-flux.com/criticism/650116/value-in-garbage-out-on-ai-art-and-hegemony

Nardo, C. (2023, March 3). *The Waluigi Effect*. *Less Wrong*. https://www.lesswrong.com/posts/D7PumeYTDPfBTp3i7/the-waluigi-effect-mega-post
Pickering, A. (2007). Ontological theatre: Gordon Pask, cybernetics, and the Arts. *Cybernetics and Human Knowing*, *14*(4), 1–15.
Smith, O., & Tacchini, F. (2025). Personal communication.
Stenne, A. (Ed.). (2024). *Pierre Huyghe: Liminal*. Marsilio Arte.
Stenne, A. (2025). Personal communication, 13 Mar 2025.
Stenne, A., & Girardin, F. (2024). *The Feral: 2024–3024* [Unpublished manuscript].
Yates, F. (1966). *The art of memory*. Routledge.

Conclusions of the Impact of GenAI in Creative Industries

Negotiating Human and Machine Roles in Art and Cultural Production in Times of Artificial Intelligence

Caterina Moruzzi and Francisco Tigre Moura

The chapters in this volume offer a panoramic view of artificial intelligence's (AI) role and impact in contemporary creative industries. Across domains as diverse as music, fashion, film, design, and visual arts, the authors who contributed to this book reveal a conflicting dynamic of opportunities and risks, empowerment, and loss.

Developments in the Creative Landscape

For example, chapters debating the history of generative art (Chapters 1 and 7), the completion of Beethoven's unfinished symphony (Chapter 9), and contemporary ways of cultural production (Chapter 6) illustrated AI's potential to lead creative practices into new avenues, while also re-emphasizing how questions of authorship, authenticity, and legitimacy remain a central concern.

As presented across the book, creativity is shifting from being an exclusively human attribute to a hybrid and distributed process across all the actors involved, machines included. For example, Chapters 2, 4, 12, and 17 discuss the negotiation of agency in the creative process and the challenge that comes from the introduction of computational systems in the process to long-standing assumptions about skill, value, and creative authority. The authors of these chapters point to the centrality of embodied expertise, craft, and human individuality, even as computational tools proliferate.

New forms of identity and authorship are also emerging. Chapter 13 discusses how AI-generated imagery destabilizes assumptions about authenticity, while Chapter 10 reveals how cultural and political contexts inflect the negotiation of creative authority in the Global South. Creativity is not only a technical process but also a site of power, where inclusion, exclusion, and resistance are negotiated. In this context, the politics of representation demand attention, to reduce the risks of entrenched biases being reproduced through generative models (Chapter 5).

DOI: 10.4324/9781003606802-19

Future Challenges

Beyond the excitement of the evolving creative landscape, the chapters also reveal and address major concerns. Creative industries must contend with oversaturation of content (Chapters 8, 13), the erosion of trust (Chapter 5), the psychological and environmental consequences of technological acceleration (Chapters 3, 14, and 15), the transformation of professional roles (Chapter 11), and the geopolitical inequities embedded in AI systems (Chapter 10). At the same time, they must remain ready and open to new possibilities of collaboration and cultural innovation. Flexibility, continuous learning, and an openness to experimentation will be essential to benefit from the opportunities that are brought by the emergence of new technologies.

Finally, the volume calls for critical, interdisciplinary research to help address such challenges. AI will not replace human creativity, but neither will creativity remain unchanged. The task for scholars, practitioners, industry players, and policymakers is to develop frameworks that integrate AI into creative industries, in ways that preserve diversity, inspire and support novelty, promote sustainability, fair and profitable creative sectors for all stakeholders involved, and sustain cultural legitimacy and the rights of human creators. Creativity in AI-mediated practices is a contested and evolving relation, one whose future is being written across practices, debates, and case studies such as the ones collected in this book.

Index

Note: *Italics* indicates figures and **bold** indicates tables in the text.