Jun 25th, 9:00 AM

Towards a heuristic model for experiential AI: Analysing the Zizi show in the new real

Drew Hemment
University of Edinburgh, United Kingdom

Martin Zeilinger
Abertay University, United Kingdom

Matjaz Vidmar
University of Edinburgh, United Kingdom

Jake Elwes
Artist

Holly Warner
University of Edinburgh, United Kingdom

See next page for additional authors

Citation

Authors

Drew Hemment, Martin Zeilinger, Matjaz Vidmar, Jake Elwes, Holly Warner, David Sarmiento, and Robin Hill

Towards a heuristic model for experiential AI: Analysing The Zizi show in The New Real

Drew Hemment[a,*], Martin Zeilinger[b], Matjaz Vidmar[a], Jake Elwes[c], Holly Warner[a], David Sarmiento Pérez[a], Robin Hill[a]

[a]University of Edinburgh, UK
[b]Abertay University, UK
[c]Independent Artist

*corresponding e-mail: drew.hemment@ed.ac.uk

Abstract: Based on the rapid pace of evolving creative practice in AI arts, we identify and respond to an urgent need to develop frameworks for analysing the critical dimensions (including social/political) of this emerging field. This paper offers a comprehensive case study of The Zizi Show, by Jake Elwes, developed as part of The New Real and Experiential AI programme at the Edinburgh Futures Institute within the University of Edinburgh. Based on this case study analysis, we propose the structuring of distinct project characteristics into four categories (socio-cultural and institutional aspects; technology and media; experience and affect; and audience and impact) which form the basis for a heuristic model. The statements/descriptors collected in each category serve to capture creative and design strategies that can lead design processes from cultural and technological perspectives, enable projects' cross-examination and evaluation and surface blindspots in the creative process.

Keywords: AI art; artificial intelligence; heuristics; experiential AI

1. Introduction

Artificial intelligence (AI) and machine learning (ML) technologies have come to play major roles in virtually all areas of contemporary life. Here we explore how design research can understand and facilitate the experiments of digital artists working with 'socio-cultural AI' (Feher and Katona, 2021), equip cultural organisations to work with new and emerging technologies, and engender substantial contributions to the formulation of visions concerning the future potential of AI, as well as to emerging critical perspectives on the limits of such technologies.

To contribute to practice and research in the emerging landscape of 'cultural AI' (cf. du Sautoy 2019; Manovich 2019; Miller 2019) we here develop a formal model to characterise important threads in current artistic uses of AI technologies, and to foreground commonalities across a spectrum of existing AI art projects. This is offered as an analytic device, to support

design research, and art and technology practice, within this rapidly evolving field of AI arts. It serves to identify and inform creative and critical strategies employed by artists and creative producers working with AI, in the ever-changing contexts of technological innovation, hardware improvements, and shifting public imaginaries of AI.

The dynamism and fluidity of this emerging field is such that comprehensive overviews of the artistic exploration of AI will always remain incomplete and partial. Likewise, in-depth analysis of individual AI art projects becomes outdated quickly, and can not be considered as representative of emerging trends and techniques within the field. Core values remain but a rigid taxonomy of AI art – for example concerning thematic focus, datasets used, required hardware, machine learning protocols, or exhibition formats – is limited in its applicability and lifespan. An adaptive and agile approach is therefore required accompanied by a more open ontology.

Our interest here is in informative strategies scaffolded by prior experience of the opportunities and potential pitfalls of digital arts production and reception. These informative strategies guide development and practice in the data arts, and we see the potential for these to be translated, situated and built on in other projects and arts domains. We reflect on past collaborative work to identify categories that articulate and distinguish such strategies. Using these categories we can then map and understand both the practices and works they give rise to. They enable us to question and explore the interplay between theoretical concepts and case studies.

Thus, we develop here a '*heuristic model'*, understood as a framework that outlines a set of AI art project characteristics to be identified with the goal of arriving at 'good enough' interpretations, evaluations, or analyses of AI art projects. This work forms a part of our wider effort to develop frameworks, methods and tools for transdisciplinary practice between art, society and technology (Hemment, 2020; Hemment et al, 2022a). It will inform our future research, in which we will develop a set of strategies for use in the design of AI art programmes and has contributed to ongoing evaluation of audiences' experiences of AI art.

2. Background

The New Real, a research initiative of the University of Edinburgh in partnership with the Alan Turing Institute and Edinburgh's Festivals, aims to support design research and creative practice investigating the opportunities and challenges of AI. Based within Edinburgh Futures Institute and Edinburgh College of Art at the University of Edinburgh, the research group conducts research on AI futures, science, art, and ethics through collaborations with artists, festivals, and the AI research and development community. It develops and evaluates design frameworks and tools, and has built on and extended the Open Prototyping framework (Hemment, 2015; Hemment, 2020; Hemment et al, 2020) to bring together cross-disciplinary communities around shared problems and creative goals.

The group has advanced a novel research theme, Experiential AI, first introduced in 2019 with an article in AI Matters (Hemment et al, 2019). This investigates the role of design and cross-disciplinary creative and critical practice in i) supporting the creation of artistic works using machine learning algorithms and robotics, and ii) inspiring new concepts and paradigms on ethical and responsible AI. The AI Matters article set out the group's intention to use design to bring artists and scientists together in order "to dispel the mystery of algorithms and make their mechanisms vividly apparent" (*Ibid.*). The overarching hypothesis for the Experiential AI research is that art and tangible experiences can mediate between computational technologies and human comprehension. The theme has been further elaborated (Hemment et al, 2022a), with the intention that AI systems become more explainable and accountable to the people whose lives they affect, and to foster critical literacy concerning the underlying technologies.

In 2020, when, for the first time in 73 years, the Edinburgh's summer festivals were cancelled due to the Covid-19 pandemic, The New Real launched a programme to address a pressing need to support the festival community's transition to digital formats, with a specific focus on efforts to advance AI art and related curatorial practices. The cancellation of 'on-the-ground' festival events catalysed an inevitable transition, in mainstream festival production, towards curating and showcasing digital new media content in new online formats, and The New Real reported on case studies of critical AI art (Hemment et al, 2022b) and launched two art commissions with Edinburgh international Festival, as pilot research interventions to explore the collaborative space for transformative Experiential AI.

One of the two pilot projects launched by The New Real was The Zizi Show (2020), by Jake Elwes. Below, we develop a more detailed case study of this work and extrapolate from that, as well as our prior work (Hemment et al, 2022a; 2022b), to build our heuristic model.

> "The Zizi Show (2020) is a deepfake drag cabaret, a virtual online stage hosting a groundbreaking new show with a twist. It features acts that have been constructed using deepfake technology, learning how to do drag by watching a diverse group of human performers. The Zizi Show dissects one of the dominant myths about AI, the notion that 'an AI' is a thing we might mistake for a person.
>
> The bodies in the show have been generated by neural networks trained on a community of drag artists who were filmed to create training datasets at a London cabaret venue closed during COVID-19. During each act audiences are invited to interact with the website and play with which deepfake bodies perform which songs. At times this breaks down when the A.I. tries to conceive impossible positions or combines multiple different queer identities; it can even reveal the skeleton tracking the deepfake is built on. The deepfakes were created collaboratively in celebration, resisting the exploitative and oppressive nature of deepfakes. The Zizi Show constructs and then deconstructs a virtual cabaret that pushes the limits of what can be imagined on a digital stage." (Elwes, 2020)

Drew Hemment, Martin Zeilinger, Matjaz Vidmar, Jake Elwes, Holly Warner,
David Sarmiento Pérez, Robin Hill

3. Methodological approach

We build on a detailed case study (Yin, 2009) of The Zizi Show to propose a heuristic model helpful for analysing the ways in which AI and data-based art-works, including the creation of works, engage audiences through hybrid and online cultural experiences. The model is further underpinned by insights from our prior work on frameworks and case studies (see Table 2).

Within the design and human-computer interaction community, 'heuristics' are understood as general principles for designers, the most widely cited case being Jacob Nielsen's usability heuristics (Nielsen, 1994), which builds on earlier work by Nielsen and Molich (1990). Crucially, they are understood as broad 'rules of thumb' rather than specific guidelines. A 'heuristic evaluation' (Nielsen, *Ibid*.) compares a user interface design against such a set of principles, generating insights to inform continued design. This is beneficial as a quick and adaptable method, but is dependent upon the knowledge and experience of the researcher or designer, and may generate relatively superficial results unless conducted in a systematic way (usability.gov, n.d.).

Philosophers of science have framed the use of heuristics as "epistemically productive", as, though

> "models are just inert in the perspective of a direct empirical significance but they play
> a "causal" role in generating it: scientific models can be empirically false, but they are
> not fictions, instead they are knowledge-enhancing devices, which play an important
> role in reaching empirically fecund knowledge." (Magnani, 2015, p.43)

In this paper we advance a 'heuristic model', not a set of specific design principles after the fashion of Nielsen, but as a set of classifications or labels that can be used as dimensions for design process development and post-production analysis. Bringing heuristics a step closer to its understanding in computer science, a rule or function to inform the search for a solution which makes it faster or even possible (Russell and Norvig, 2021). In short its function is heuristic in its most etimologic sense: to discover.

Workshops, interviews and conversations informed the curatorial analysis of The Zizi Show, establishing a co-operative research enquiry (Heron and Reason, 2001) by professional artists and arts, informatics, and social science scholars. The artists were collaborating with the research team on an Experiential AI enquiry, and the research team (or a subset thereof) participated in the development of the artistic works (in a curatorial and production capacity). The cross-disciplinary work consisted of an investigation of concepts and definitions in the collaborative projects; the artists' creative process, including their work with machine learning algorithms and data; the artists' project concepts and the expectations of artists and researchers before and after the interactions took place. A case study database was created that recorded linking questions, the data, and its subsequent analysis. The descriptors drawn on for the development of the heuristic model outlined in this paper are derived from a curatorial and collaborative process between the authors that informed the analysis of the Zizi show. The development of the heuristic model is additionally informed by prior analysis

and research on AI driven art further addressed in both academic outputs (Hemment et al, 2022a) and reports (Hemment et al, 2022b; Hemment et al, 2022c).

In order to develop our model, we structure distinct characteristics of the AI art project into four categories using labels that are sufficiently detailed to address the interplay between the various case studies and the theory without being fixed and final. The objective is to segment and analyse the conceptual structure within the emerging practices of the artist, and/or of the cross-disciplinary creative group that participated in the process, where the specific focus is to scaffold delight and critical literacies within the works. This provides the basis for an analytic device – the 'heuristic model' – that complements and extends our Open Prototyping and Experiential AI frameworks, which in turn underpin systematic development of the model and its wider application.

We go on to propose how the heuristic model can be further developed to facilitate developing strategies and recommendations for curators, artists, researchers, and festival organisations in programme and business development, especially around devising business and engagement models. One potential application of the model is as an aid enabling strategies from data arts to be tailored and situated for organisations newly producing online experiences. Here, it is presented as a tool to help arts practitioners and cultural organisations work with AI artworks and systems for the first time, as a part of a transition towards networked, online cultural and business models following the Covid-19 pandemic.

Ours is a heuristic approach in a double sense: we identify and categorise simple but effective strategies in the AI arts; and we do so through labels that themselves are effective, but are not presented as a comprehensive taxonomy. We aim to develop this model as a tool through which future instances, in other contexts, can be envisioned and evaluated. Moreover, the heuristic model also provides a tool through which these strategies can be embedded in festival organisations. It then becomes a tool both for surfacing strategies as well as for the design of novel cultural forms and formats, including pandemic-resilient services and experiences for a world recovering from Covid-19.

Developing a flexible and dynamic heuristic model has significant benefits over the formulation of rigid and fixed taxonomies of AI art on the basis of specific characteristics that will inevitably vary from one project/artwork to the next. A major strength of this approach is that the model can be underpinned by qualitatively different yet complementary categories capable of accommodating wide-ranging, diverse projects.

The model is built on descriptors for 'The Zizi Show' which are derived from a curatorial analysis, informed by a co-operative research enquiry (Heron and Reason, 2001), that form four distinct categories. It is then aligned with previous insights from case studies and frameworks in The New Real body of work.

Drew Hemment, Martin Zeilinger, Matjaz Vidmar, Jake Elwes, Holly Warner,
David Sarmiento Pérez, Robin Hill

4. Results

The process started by studying The Zizi Show, documenting and reflecting on commonalities, differences, overlaps and tensions between the artists' and researchers' framings and understandings of key concepts, as well as expectations and conceptualisations of artists and researchers. This study was based on conversations with Jake and the other involved artists, curators, technologists, and audiences that contributed to the work, as well as a research workshop which involved Jake and a cross-disciplinary group of researchers in structured discussion responding to a series of statements and questions. Resulting in a curatorial analysis that offers an in-depth description of The Zizi Show and its broader artistic project (Zizi).

Box 1.   Curatorial Analysis of The Zizi Show.

The Zizi Show is part of a collection of works by Jake Elwes exploring the intersection of AI and drag performance, collectively known as The Zizi Project (2019-ongoing). Running alongside the development of this body of work, Elwes participated in cooperative research with the Experiential AI group. The first iteration of this body of works, titled Zizi - Queering the Dataset (2019), was commissioned as a practice-based component of the research, and presented as part of Elwes's "Preternatural" exhibition that was curated by Hemment. Next was the intermediary work (ongoing) "Zizi and Me" followed by "The Zizi Show" during which Elwes deepened their collaboration with members of the drag and LGBTQ+ communities.

In its initial phase, a key aim for Elwes was to critique biased assumptions concerning gender identity that may be encoded in training datasets commonly used for AI-based image-generation (see Elwes, 2019; Hemment, 2019; Zeilinger, 2021: 137-141). The oeuvre revolves around the generation of gender-fluid, androgynous drag characters and performers through ML, and the creation of hybrid environments for performances that play on the idea that drag performers can collaborate with AI-generated 'deep fake' drag artists.

In video outputs resulting from that first iteration of the project, generative portraits of fictitious drag artists continuously morphed between recognizable faces and colourful abstraction. This output was achieved through the use of a pre-existing StyleGAN neural network, which had been trained on Nvidia's open source Flickr-Faces-HQ (FFHQ) dataset. The artist then re-trained the system on a new dataset that included roughly 1,000 portraits of drag performers, which had been scraped from various websites and social media profiles. The resulting visual content conveys a strong impression of diversity and difference, as well as a sense of continuity and community across the generated imagery, which continues across The Zizi Project. A key critical position framing this work is that Machine Learning, and more specifically image recognition and generation systems focusing on people, tend to amplify existing biases encoded in the datasets underlying these systems (Crawford & Paglen, 2019). Jake Elwes' project counteracts this tendency by incorporating difference – i.e., portraits of individuals such as drag artists, who are otherwise excluded from the training data – into the model. By doing so, The Zizi Project highlights the lack of diversity and representation in mainstream AI.

The next iterations of the project constitute both a technical and thematic evolution with the creation of Zizi the Drag Performer, a deepfake character produced through StyleGAN and motion capture that started with Zizi & Me as a collaboration between Jake and Drag artist Me. A step in which the audience's desire to see those portraits dance was a key motivator, technology being an enabler or catalyst for the experience as much as a theme. AI becomes a performative tool while being demystified by making evident its limitations and recentering the public discussion from fear to underlying issues on power and policy.

The Zizi Show, which was commissioned for Edinburgh International Festival as a tactical solution to the closing of venues due to COVID19, has added an important dimension to the way in which the work can be experienced. Whereas earlier iterations consisted of video outputs demonstrating the capabilities of the generative system, the current version of The Zizi Show provides a delightful, exhilarating depth of experience. It also critically reflects on anthropomorphised representations of AI, such as the Zizi 'drag performer'. Moreover, through their engagement with drag and LGBTQ+ communities, Elwes' work now provides an environment in which real-life drag performers can contribute using their image and performance to create deepfake counterparts, collectively transforming Zizi into an amalgamation of all their identities. Additionally these collaborations and their in-show presentation exemplify and actualize contesting relationships between data subjects (performers providing their image and movements) and data controllers or outputs, prioritising representation and consent in order to tackle the current exploitation of people by these technologies (Elwes, cf. Burkell and Gosse, 2019).

Drag itself "draws powerfully on playful techniques of imitation, defamiliarization, and mimicry" (Zeilinger, 2021: 139), which can also be understood to frame the functionality of deep fake systems. Among The Zizi Show's key contributions to critical discourse on cultural uses of AI is that it thought-provokingly comments on parallels and contrasts between drag and generative AI systems. While both drag and generative AI "might appear to operate by way of amplifying stereotypes and accentuating difference, drag inherently challenges what generative AI reinforces" (Ibid., 140). Ultimately, Jake Elwes' project achieves a critique of data bias in generative AI systems, while also developing a creative use of AI that aligns with the "fluidity, ambiguity and transition of drag" (Hemment, 2019).

From the co-operative research enquiry and the curatorial analysis of the artwork (see Box 1), reflecting on the research and development journey, we derived a set (38) of descriptors/statements of features, components, characteristics and dimensions of the work (see Table 1). Through light touch coding, we grouped those statements and descriptors with respect to thematic content.

Drew Hemment, Martin Zeilinger, Matjaz Vidmar, Jake Elwes, Holly Warner,
David Sarmiento Pérez, Robin Hill

Table 1. *Summary of empirically derived statements/descriptors used to characterise the Zizi Show and their thematic grouping into the heuristic model's dimensions/categories.*

Descriptors/Statements Captured Through Ideation Process of Zizi Show	Proposed Heuristic Model Grouping/ Dimension
Project positioned as an artwork.	
Experience developed with a concern to increase critical literacy of AI/ML or adjacent topics (e.g., algorithmic bias).	
Project addresses gender and sexual representation bias in ML training datasets.	
Project addresses marginalisation of LGBQT+ and drag community.	SOCIO-CULTURAL & INSTITUTIONAL ASPECTS
The artist participated in a research study during the development of the work.	
Experience not didactic in nature.	
Scale of the project: 3 years development of the Zizi body of work (ongoing at time of writing), 6 months development of discrete, individual artworks within that oeuvre.	
Project uses StyleGAN network architecture.	
Project uses existing model re-trained on a modified dataset.	
Project uses modified version of Flickr-Faces-HQ (FFHQ) dataset, to which an additional 1,000 portraits were added.	
Users interface with the experience in different ways: private user devices, dedicated computer terminals, public screenings or performances.	
Type of data used included video and music.	
Data use is transparent, although underlying dataset is not openly accessible.	TECHNOLOGY & MEDIA
Use of underlying technologies is transparent, in terms of documentation and explanatory supplement materials.	
The output/artwork is dynamic.	
The artwork is interactive.	
The artwork is generative.	
Medium of the experience comprises video, sound and interactive web interface.	
Licences attached to the data included music rights.	
Technical requirements for showing the work: screening or web browser setup.	
Experience focuses on aesthetic experimentation.	
Experience combines sonic, visual, audio-visual, and text-based media.	
Artist has published substantial explanatory materials, and has given public talks explaining the processes informing this AI-driven cultural experience, as a part of the 'artwork'.	

Project is not participative in the sense that it does not incorporate user-submitted data. Experience is time-based. The experience is collective. The experience is not site specific. The experience can be either online-based or take place in a gallery, theatre, or similar performance space. Project is suitable for single users/audience members (online experience) and larger audiences (screening, installation). Scale of the experience: presented as part of Edinburgh International Festival, thousands engaged through the web experience or other channels eg social media.	EXPERIENCE & AFFECT
Project targets both a specific audience/demographic (LGBTQ+, drag) and a more general visual and performing arts audience. Project presumes no familiarity with AI/ML on behalf of intended audience. The experience is highly accessible for those with limited technical knowledge of AI/ML. The experience is highly legible across different audiences/demographics. The experience can function as a stand-alone piece without explanatory framing material, but benefits from explanatory framing material. Project gives visual form to gender and sexual representation in ML training datasets. Experience contributes to social/political/ethical commentary and debate. Experience intervenes in power structures. Experience illustrates and deconstructs a common misrepresentation of technology (anthropomorphism).	AUDIENCE & IMPACT

We then looked across our prior work on case studies and frameworks for creative AI to look for tensions and correspondences. This included the Experiential AI framework that built on further case studies and four disciplinary domains: Fairness, Accountability and Transparency (FAccT); explainable AI; AI arts; and experiential learning (Hemment et al, 2022a).

The other case studies are all AI art projects, where data arts practitioners and organisations design digital experiences that simultaneously delight audiences and scaffold critical literacies and further discussed in Hemment et al. (ibid) a parallel outcome of The New Real project. These are briefly presented in Table 2, whose contents are extracted from the aforementioned report, with the addition of 'AI is Human After All' by Anna Ridler and Caroline

Sinders which was commissioned along with The Zizi Show by The New Real for Ars Electronica (2021).

Table 2.   Summary of AI art projects that informed the Heuristic Model

Case Study	Description
Learning To See, Memo Akten (2017, ongoing)	Memo Akten's Learning To See, is a series of interactive installations and moving image works in which artificial but natural-looking images are generated when everyday objects are placed before a camera.
Asunder, Tega Brain (2018)	Tega Brain's Asunder is a three-channel video installation that includes satellite imagery and visualisations of AI-driven climate data modelling.
ImageNet Roulette, Trevor Paglen and Kate Crawford (2019)	Developed as a collaboration between the AI researcher Kate Crawford and the artist Trevor Paglen, ImageNet Roulette presents itself as a simple web interface that invites users to upload a photograph of themselves, which is then evaluated and 'classified' by a neural network trained on the extremely widely used ImageNet dataset.
Wekinator, Rebecca Fiebrink (2009, ongoing)	Wekinator isn't technically an artwork, but rather ML-assisted software designed as a free tool for those with little or no programming experience wishing to create AI-driven instruments, interactive installations, or artworks involving machine visions.
'AI: More than Human' – Focus on Education and Visualisation (2019, ongoing)	large-scale group exhibition addressing itself to mainstream audiences. The exhibition premiered at The Barbican in 2019, and continues to tour to large cultural venues, including the Groninger Forum in the Netherlands (2020), Tate Liverpool (2021), Fernán Gómez Centro Cultural in Spain (2022-2023), and the OCT Art & Design Gallery in China (dates to be announced).
'You and AI: Through the Algorithmic Lens' – Focus on Critical Aesthetics (2021)	curated by Irini Mirena Papadimitriou in collaboration with FutureEverything, and sponsored by the Athens-based Onassis foundation. The event describes itself as a festival featuring an exhibition, online events, and lectures exploring AI in relation to creativity and ethics.

| AI is Human After All, Anna Ridler and Caroline Sinders | An artistic exploration by Anna Ridler and Caroline Sinders of the hidden human labour involved in creating and deploying AI. It responded to the Experiential AI and The New Real artist residency theme of Entanglements – Fair, Moral and Transparent AI, as part of Ars Electronica's European AI Lab. |

That work concluded that legible and creative AI projects need to be open to understanding and intervention at four levels: Aspect, Algorithm, Affect and Apprehension. We found strong correspondence with four emerging themes in the Zizi case study, which we labelled accordingly (see next section).

5. Building the heuristic model

We have looked at The Zizi Show, and clustered its features and dimensions into groupings, building also on insights from other case studies. We have labelled those groupings to designate key dimensions or characteristics of the case study, and those labels provide four dimensions for the heuristic model: Socio-Cultural & Institutional Aspects; Technology & Media; Experience & Affect; Audience & Impact. Extending from the case study examples, the generalised category definitions are listed in Table 3.

Table 3. Summative descriptions of the heuristic model's dimensions/categories.

Heuristic Model Dimension	Short Summative Description
SOCIO-CULTURAL & INSTITUTIONAL ASPECTS	Concerns the societal and institutional dimensions of the work; the cultural positioning and context for the work; economic, political and legal dimensions; the issues the artist engages in through the work.
TECHNOLOGY & MEDIA	Relates to technical aspects of the AI art projects under consideration (e.g., what type of neural network is used, what training methods are used, or what type/quality/amount of data is being used); how they are staged and realised technically (is the project generative, interactive, etc.); the human and technological components that are connected through the work; how the artist works with technology and data as medium; how technology provides a catalyst for the work.
EXPERIENCE & AFFECT	Concerns the type of cultural experience the project offers and the emotional, embodied or

	cognitive affect for users/audiences; how accessible is the experience; any wrap around activity that forms a part of the work; interpretation materials or activities that accompany it.
AUDIENCE & IMPACT	Addresses the intended audiences and how they are engaged; the outcomes and impacts for participants and stakeholders; does the work have a pedagogic dimension and/or foster critical literacy regarding the technologies used, etc.

These labels can be abbreviated to match four base categories that align with our prior work on Experiential AI: Aspect; Algorithm; Affect; Audience & Apprehension. Building on this more generalised approach, along with supporting case studies, helps to validate the model and its transferability.

Again, it is worth noting that this is not an exhaustive set of categories. There is scope to adjust or expand as necessary to dynamically fit the evolving cultural contexts, artistic practices, and cultural experiences in which emerging AI/ML technologies are being used. If required, additional categories could be added to capture other details and dimensions.

6. Towards an application of the heuristic model as a design tool & future work

This heuristic model will inform our future research, establishing the foundations on which we will continue to develop frameworks, methods and tools for Experiential AI and The New Real. Continuing in this direction, we envision developing easily accessible design resources for cultural practitioners, and also a set of principles and strategies that designers can pick up and use (i.e. 'heuristics' in the sense popularised by Nielsen, *Ibid*.).

Once deployed, the model's categories can accurately delineate elements of an artwork, its underlying concept, or the experience it yields in order to advance artistic and technological development in cultural engagement; which in turn could surface conceptual blindspots that had not previously been considered.

One envisioned application of the model is for cultural organisations to use the categories to structure and organise artistic commissioning, production and distribution processes when working with AI art for the first time. The potential is for the use of this simple heuristic model to generate insights on how technologies and practices in cultural organisations can be re-configured, and the processes by which cultural organisations can commission and present these experiences or services.

Secondly, the model can also be used for analysis and evaluation as it enables higher level insights regarding state-of-the-art uses of AI/ML in cultural contexts, and the identification

of emerging trends. The model is proposed as a dynamic, flexible heuristic tool for evaluating/analysing both existing and envisioned cultural experiences involving AI/ML. Within and across categories, the included terms are designed to produce interesting and insightful counterpoints, contrasts, and correlations with regard to the project(s) under consideration.

Thirdly, the model can be used to reflect, formalise, and build insights on those dimensions and the information gleaned on each project. The model is also a framework for comparative analysis – it enables us to compare the project to other, similar (or very different) projects. Potentially this could take the form of a visual map on which to represent different experiences or projects, an approach The New Real is exploring in the development of a comprehensive toolkit for artists and institutions.

To date, the categories – and the underlying analysis and reflection of AI art projects – have been deployed most extensively to facilitate and strengthen evaluation of their audience's experiences. Here the categories serve to establish the dimensions of a research study, formulating initial research questions already aligned with the characteristics of AI driven cultural projects.

By providing an initial set of theoretical categories and labels for coding, the heuristic model can set the direction for curatorial practice and interpretation of artistic works, increasing the chances of it being successful by establishing a starting point much more advanced into the research process. This helps accommodate variance in individual researchers' experience and the potential lack of interdisciplinarity knowledge required for evaluating projects that are natively drawing from very disparate fields.

In qualitative analyses heuristics serve to label and explore the data in a more expeditious manner but also as initial themes for a thematic analysis. Even if these themes and labels evolve and change according to the specific project they serve as a common language and way of comparison with other cultural endeavours, which can at the same time serve as reference as well as sources of secondary data and validation. A heuristic, rather than taxonomy, standarizes without normativizing.

For quantitative approaches, even computerised ones that can be integrated with the many web analytics tools available, they serve as an ontological basis. For example, this model could serve to design feedback forms and very short, non-intrusive, questionnaires in digital experience. Another potential use is in a word frequency analysis, establishing categories and the base for dictionaries or ontologies.

Ultimately the model as presented in this paper is a tool for exploration through description and categorisation, making cultural and artistic experience calculable (Callon & Muniesa, 2005) so they can be researched, compared, evaluated and designed. But it does not calculate, evaluate or assign value by itself. The flexibility and admittedly openness of its categories make it intentionally unfit for any scoring or measurement of the degree to which the artwork is Experiential AI; it does not seek to establish any borders for the field.

Drew Hemment, Martin Zeilinger, Matjaz Vidmar, Jake Elwes, Holly Warner,
David Sarmiento Pérez, Robin Hill

Finally, the heuristic model proposed here is designed to help understand both existing and envisioned AI art projects from a wide range of perspectives, including those of the artist, the curator, the developer, or those interested in understanding accessibility and audience appeal of AI-driven cultural experiences. The objective, in other words, is to facilitate new insights on elements of the AI-driven artwork, or its underlying concept, or the experience it yields.

7. Conclusion

The New Real initiative and Experiential AI research group has highlighted a need for frameworks and tools to understand and inform practice in the emerging area of AI arts. This research is intended to facilitate the transition to new cultural, social, and economic models in the festivals and cultural sector following the Covid-19 pandemic.

As part of a broader enquiry in scaffolding delight and critical literacies in emerging AI art, this paper proposes a heuristic model, derived on the basis of the categorisation of descriptors/statements collected during analysing the Zizi Show case study. We offer four thematic categories - Socio-Cultural & Institutional Aspects ('Aspect'); Technology & Media ('Algorithm'); Experience & Affect ('Affect'); Audience & Impact ('Audience and Apprehension'). The resulting heuristic model is intended for those involved in planning and developing AI art and other forms of online/hybrid experiences, and to those who wish to analyse or evaluate such projects.

We recognise the need for further, and collective, evolution as well as additional validation. However, the heuristic model has been since deployed within the Open Prototyping framework for new cultural experiences within The New Real and Experiential AI programme, and the preliminary results show that the categories, as well as their functional role, strongly resonate with engaged stakeholders (artists, curators, technologists, producers, process designers, managers), an are proving useful in ongoing evaluation of audiences' experience as well as the design process of upcoming artistic works.

We envisage further exploration and refinement of the descriptors in addition to packaging the validated model into an easily accessible toolkit for wider use in design processes and cultural production. We also welcome engagement around the conceptual and functional design of the heuristic model and the future toolkit, and its application in the design and analysis of a wide variety of creative processes and works. We anticipate new AI art projects arising that will expose gaps, and the analytic power of our approach resides in the functional application of the model, the model itself is an evolving part of the iterative process.

delivered in partnership with Alan Turing Institute and art and culture festivals, supported by funding from Engineering and Physical Sciences Research Council, Arts and Humanities Research Council, Scottish Funding Council, Creative Scotland, and the Data-Driven Innovation Programme.

8. References

Burkell, J., & Gosse, C. 2019. Nothing new here: Emphasizing the social and cultural context of deepfakes. *First Monday*, 24(12). https://doi.org/10.5210/fm.v24i12.10287

Callon, M., & Muniesa, F. (2005). Economic markets as calculative collective devices. Organization Studies, 26(8), 1229–1250. https://doi.org/10.1177/0170840605056393

Kate Crawford and Trevor Paglen, "Excavating AI: The Politics of Training Sets for Machine Learning (September 19, 2019) https://excavating.ai

Elwes, J. 2019. Zizi. Artwork. Online documentation accessed November 17, 2021. https://www.jakeelwes.com/project-zizi-2019.html

Elwes, J. (2020). The Zizi Show. Online documentation accessed April 4, 2022. https://www.jakeelwes.com/project-zizi-show.html

Feher, K., and Katona, A.I. 2021. "Fifteen shadows of socio-cultural AI: A systematic review and future perspectives." *Futures* 132. Accessed 22 November 2021, https://www.sciencedirect.com/science/article/pii/S0016328721001269

Hemment, D. (2015). Open Prototyping Alpha. FutureEverything. www.futureeverything.org/news/open-prototyping-alpha (Accessed March 2022).

Hemment, D. 2019. Preternatural: An Exhibition of Works by Jake Elwes. Edinburgh Futures Institute. Accessed November 17, 2021. https://efi.ed.ac.uk/wp-content/uploads/2019/09/Preternatural_Curatorial_Statement_2_August_2019.pdf

Hemment, D., Aylett, R., Belle, V., Murray-Rust, D., Luger, E., Hillston, J., ... & Broz, F. (2019). Experiential AI. *AI Matters*, 5(1), 25-31.

Hemment, D. (2020). Reordering the assemblages of the digital through art and open prototyping. Leonardo. 53: 5. Cambridge, MA: MIT Press, 529-536. DOI: 10.1162/leon_a_01861.

Hemment, D., Bletcher, J., & Coulson, S. (2020). Open Prototyping: A framework for Combining Art and Innovation in the IoT and Smart Cities. In Eds. Hjorth, L., de Souza e Silva, A., Lanson, K. The Routledge Companion to Mobile Media Art. London: Routledge, 270-283. ISBN 9780367197162.

Hemment, D., Murray-Rust, D,Belle, V., Aylett, R., Vidmar, M., Broz, F. (2022a) Experiential AI: Enhancing explainability in artificial intelligence through artistic practice. Preprint: www.newreal.cc/publications/experiential-ai-enhancing-explainability-in-artificial-intelligence

Hemment, D., Zeilinger, M., Vidmar, M., Warner, H. (2022b) Illuminating the New Real: Art and critical AI literacies. Preprint: https://newreal.cc/publications/illuminating-the-new-real

Hemment, D., Vidmar, M., Sinders, C., Koppel, K., Warner, H., Hill, R. (2022c) Emerging from the Covid-19 Crisis into the New Real: Scenarios and challenge themes for the festivals sector. Preprint.

Magnani, L. (2015). Are heuristics knowledge–enhancing? abduction, models, and fictions in science. In Heuristic reasoning (pp. 29-56). Springer, Cham.

Manovich, Lev. 2019. *AI Aesthetics*. Moscow: Strelka Press.

Miller, Arthur I. 2019. T*he Artist in the Machine: The World of AI-Powered Creativity*. Cambridge, MA: MIT Press.

Nielsen, J., and Molich, R. (1990). Heuristic evaluation of user interfaces. Proceedings of ACM CHI'90 Conference, 249–256

Nielsen, J. (1994). Enhancing the explanatory power of usability heuristics. Proceedings of ACM CHI'94 Conference, 152–158.

Nielsen, J. (1994; Updated 2020) 10 Usability Heuristics for User Interface Design. https://www.nngroup.com/articles/ten-usability-heuristics (Accessed, 3 December 2021)

Reason, P. and Bradbury, H. eds., (2001). Handbook of action research: Participative inquiry and practice. Sage.

Russell, S., Norvig, P. (2021). Artificial Intelligence: a Modern Approach. Pearson Education. http://ebookcentral.proquest.com/lib/ed/detail.action?docID=6563568

du Sautoy, Marcus. 2019. *The Creativity Code: Art and Innovation in the Age of AI*. Cambridge, MA: Harvard University Press.

Usability.gov (n.d.) *Heuristic Evaluations and Expert Reviews*. https://www.usability.gov/how-to-and-tools/methods/heuristic-evaluation.html (Accessed, 3 December 2021)

Yin, R. K. (2009). *Case study research: Design and methods* (4th Ed.). Thousand Oaks, CA: Sage

Zeilinger, Martin. 2021. *Tactical Entanglements: AI Art, Creative Agency, and the Limits of Intellectual Property*. Lüneburg: meson press. https://meson.press/books/tactical-entanglements/

About the Authors:

Drew Hemment is Chancellor's Fellow and Reader at Edinburgh Futures Institute within the University of Edinburgh, he leads the Experiential AI group, and is PI of The New Real (AHRC, SFC, EPSRC) in partnership with Edinburgh's Festivals and The Alan Turing Institute.

Martin Zeilinger is a Senior Lecturer in Computational Arts & Technology at the School of Design & Informatics, Abertay University. His research interests include digital art, appropriation-based art practices, emerging technologies in contemporary art, theories of cultural ownership and intellectual property.

Matjaz Vidmar is Lecturer in Engineering Management at the University of Edinburgh. He is Co-I on The New Real (AHRC, SFC, EPSRC) as well as leading work on integrating cultural experiences of artificial intelligence with space and satellite data.

Jake Elwes is a media artist. They studied at The Slade School of Fine Art, UCL. Their practice looks for poetry and narrative in the success and failures of machine learning and artificial intelligence systems, investigating and questioning their code and ethics.

Holly Warner is a Postdoctoral Researcher on The New Real programme at the Edinburgh Futures Institute, working on technology transitions within the Experiential AI research group. Her research interests focus on technological futures, AI art, and explainable artificial intelligence.

David Sarmiento Pérez is HCI Research Assistant in The New Real at Edinburgh College of Art. Background in Industrial Engineering, Digital Sociology and User Centred Design. His interests lay in the ethical design of technology through the interplay of humanities, art and tech.

Robin Hill is the Senior Laboratory Manager for the School of Informatics at the University of Edinburgh. He works on understanding the cognitive aspects of information processing with the aim of improving usability and accessibility.