Humans of Uncanny Valley | 2022

Humans of Uncanny Valley is an exhibition by interdisciplinary artist **Darren** TYNAN and **Digital Penetration**, the solo electronic project of **Sage J** HARLOW. The exhibition consists of computer-generated digital images, video animations, writing, and soundscapes that explore the concept of the uncanny in digital media spaces created with machine learning technology.

Spectrum Project Space

Opening: 9 March 2022 5pm - 7pm
To be officially opened by Associate Professor **Lyndall** ADAMS
Exhibition dates: 10 Mar - 7 Apr 2022
ACDC Floor Talk: 23 Mar 2022 12.30 - 1.30pm
Gallery opening hours: Tuesday to Friday 10am - 4pm
Building 3, 2 Bradford St, Mount Lawley

ECU Galleries acknowledges the traditional custodians, the Whadjuk Noongar people, and elders past, present and emerging. We pay our respects for the great privilege of living, making and researching on these unceded lands.

LITTLE CREATURES Fitzgerald PHOTO ECU Galleries AUSTRALIA ECU EDITH COWAN UNIVERSITY

Research Statement

Masahiro Mori's uncanny valley hypothesis describes the relationship between the human-like appearance of an object and the emotional response it produces. Affective responses such as unease and eeriness can arise when replicas and representations of humans appear or behave in non-human ways (MacDorman & Chattopadhyay, 2016). Exploring this phenomenon in a machine learning art space, Tynan curated images of synthetic human faces created using Nvidia's StyleGAN2, a Generative Adversarial Network or GAN (Karras et al, 2020). This form of generative image modelling is a zero-sum game of unsupervised machine learning in which a discriminator and a generator compete against each other to produce highly realistic images. A generator's role is to produce fake data that is recognised as plausible by a discriminator, which assesses the fake data for realism according to the training inputs. A GAN could be described as a kind of "peer review process" (Altavilla, 2017) for data forgery. The basic premise is that a network is trained to examine patterns in a large dataset, with the intention to generate new data with the same characteristics as the data it was trained on (Wood, n.d., Rayne, 2021; Vincent, 2018; Karras et al, 2020). In this case Flickr-Faces-HQ was used, an image dataset of 70 000 human faces collected under permissive licenses (Rougetet, n.d). To create morphing video portraits of human-like faces, Tynan animated the latent space of images produced by Nvidia's StyleGAN2. Latent space, which remains 'hidden' until it is extracted by an algorithm, is a "representation of compressed data in which similar data points are closer together in space" (Tiu, 2020). Human facial features, learned by a GAN, were extrapolated and controlled to produce new synthetic facial data in the form of digital images.

The audio component of this exhibition was created using the raw material of freely available field recordings sourced from The Internet Archive (https://archive.org/). The field recordings were time-stretched, to the length of the video work and layered. In one piece, peaks in EQ were added to each layer that drift through the frequencies, adding a generative element to the user's experience of the audio texture. In another, extreme EQing was used to obscure some aspects of the source material. These processes resulted in a sense of familiarity in some of the sounds, an experience of uncanniness in some that sound not-quite-right and the familiar sense of audio gone wrong with those that are stretched to the point of glitch. These artifacts, while in some sense 'mistakes', have become a ubiquitous part of electronic music, referencing the materiality of recorded sound and the familiarity of 'error'.

Photorealistic computer-generated imagery contributes to the eroding distinction between reality and fiction in digital media spaces. Images of human faces produced by GANs could be described as uncanny in their ability to provoke feelings of

eeriness when a viewer recognises their ‘almost perfect’ human likeness. There are numerous hypotheses for the uncanny valley effect. The perceptual mismatch hypothesis suggests that negative experiences of a stimulus are caused by “an inconsistency between the human-likeness levels of specific sensory cues. Clearly artificial eyes on an other- wise fully human-like face—or vice versa—is an example of such inconsistency” (Kätsyri et al, 2015, p. 7).

The technical limitations of generative adversarial networks are improving rapidly, resulting in reliable state-of-the-art methods for producing high resolution synthetic images (Karras et al, 2020; This person does not exist, n.d.). As Smith & Mansted point out, GANs have been democratised and are easily accessible. They can “compete over thousands, or even millions, of cycles, until real and counterfeit outputs can’t be distinguished” (2020). Despite this, some images of human faces produced by GANs are, at present, characterised by perceptual mismatch phenomena such as dreamlike backgrounds; asymmetrical clothing features, patterns, and textures; anomalies in dental features; indeterminate ‘blocky’ typographical features and symbols on clothing; inconsistent specular highlights in pupils and irises; and detached hair that appears to merge with backgrounds (Hartman & Satter, 2020). Other perceptual mismatch characteristics explored in this exhibition include heterochromatic eyes; unusual skin textures; blurry or melted asymmetrical earrings (Smith & Mansted, 2020); warped and irregular shaped pupils; painterly textures on skin; halo effects around hair (Rayne, 2021); and partially formed glasses and accessories. GANs can also produce conjoined faces; skin merged with accessories and clothing; peripheral malformed subjects that appear to be missing facial features; and fleshy limb-like appendages in backgrounds.

The digital images, videos, and soundscapes in *Humans of Uncanny Valley* were created to explore these uncanny qualities. As machine learning models become increasingly sophisticated, the inability to distinguish between real persons and their replicas may become a commonplace aspect of digital media produced with machine learning technology. In this regard, humans will become absolved from the uncanny.

References

Altavilla, D. (2017). NVIDIA just made the face of AI a little less uncanny in the valley. Retrieved from https://www.forbes.com/sites/davealtavilla/2017/10/30/nvidia-just-made-the-face-of-ai-a-little-more-uncanny-in-the-valley/?sh=214fe81c45ef

Hartman, T., & Satter, R. (2020). These faces are not real. Retrieved from https://graphics.reuters.com/CYBER-DEEPFAKE/ACTIVIST/nmovajgnxpa/

Karras, T., Laine, S., Aittala, M., Hellsten, J., Lehtinen, J., & Aila, T. (2020). Analysing and improving the image quality of StyleGAN. Retrieved from https://arxiv.org/abs/1912.04958

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(390). 1-16. doi: 10.3389/fpsyg.2015.00390

MacDorman, K.F. & Chattopadhyay, D. (2016). Reducing consistency in human realism increases the uncanny valley effect; increasing category uncertainty does not. Cognition, 146. 190-205. doi: 10.1016/j.cognition.2015.09.019

Rayne, E. (2021). Uncanny valley? Look deep into the eyes to tell if it's a deepfake. Retrieved from https://www.syfy.com/syfywire/look-deep-into-the-eyes-to-tell-if-its-a-deepfake

Rougetet, A. (n.d.). Flickr-Faces-HQ Dataset (FFHQ). Retrieved from https://www.kaggle.com/arnaud58/flickrfaceshq-dataset-ffhq

Smith, H. & Mansted, K. (2020). Weaponised deep faces. Retrieved from https://www.aspi.org.au/report/weaponised-deep-fakes

This person does not exist. (n.d.). Retrieved from https://thispersondoesnotexist.com/

Tiu, E. (2020). Understanding latent space in machine learning. Retrieved from https://towardsdatascience.com/understanding-latent-space-in-machine-learning-de5a7c687d8d

Vincent, J. (2018). How three French students used borrowed code to put the first AI portrait in Christie's. Retrieved from https://www.theverge.com/2018/10/23/18013190/ai-art-portrait-auction-christies-belamy-obvious-robbie-barrat-gans

Wood, T. (n.d.). What is a generative adversarial network? Retrieved from https://deepai.org/machine-learning-glossary-and-terms/generative-adversarial-network

Artist Bios

Darren TYNAN is an interdisciplinary artist, researcher, and educator from Perth, Western Australia. He has exhibited work in solo and group exhibitions and collaborated with artists in Australia and abroad. Tynan's research interests include Anthropocene studies, eco-horror, glitch art, aleatoric composition, and applications of machine learning in digital media. As an artist, Tynan uses chance-based processes and explores technical malfunction as a mode of creativity. He has recently incorporated machine learning technology into his artistic practice, such as generative adversarial networks, text-to-image generation, and autoregressive language models.

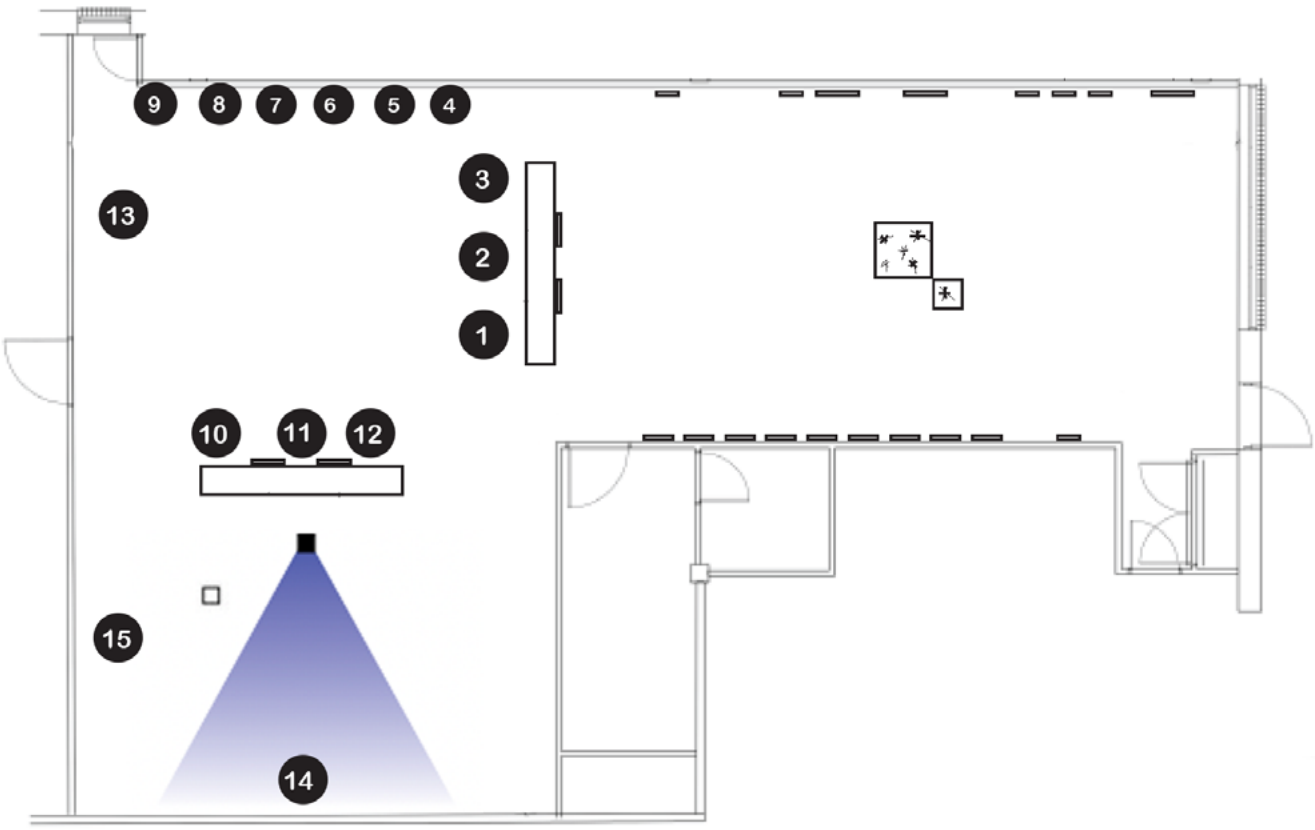
www.darrentynan.com

Digital Penetration, the solo electronic project of **Sage J HARLOW**. Sage is an established vocalist in the improvised and exploratory music scene in Australia, performing under the moniker Sage Pbbbt. In 2019 she graduated from WAAPA with a PhD entitled: 'Giving voice to the extra- normal self with the extra-normal voice: Improvised exploration through the realms of shamanic chaos magick, insight meditation and gender performance.'

Digital Penetration is her solo electronic project exploring sound collage, industrial music, samples and loops, ritual, drone, dada, silence(s), dark ambient, discordianism, chaos magick, feminism and trans & queer theory & praxis. Digital Penetration self-released 17 albums between 2001 and 2005 and the project restarted in 2018 after a re-immersion in the work of early electronic musicians.

https://sagepbbbt.com/digital-penetration/

https://digitalpenetration.bandcamp.com/



1 Darren Tynan, **Humans of Uncanny Valley – Untitled 1,** 2021, digital print, 61 x 61 cm. NFS.

2 Darren Tynan, **Humans of Uncanny Valley – Untitled 2,** 2021, digital print, 61 x 61 cm. NFS.

3 Darren Tynan, **Humans of Uncanny Valley – Untitled 3,** 2021, digital print, 61 x 61 cm. NFS.

4 Darren Tynan, **Humans of Uncanny Valley – Untitled 4,** 2021, digital print, 61 x 61 cm. NFS.

5 Darren Tynan, **Humans of Uncanny Valley – Untitled 5,** 2021, digital print, 61 x 61 cm. NFS.

6 Darren Tynan, **Humans of Uncanny Valley – Untitled 6,** 2021, digital print, 61 x 61 cm. NFS.

7 Darren Tynan, **Humans of Uncanny Valley – Untitled 7,** 2021, digital print, 61 x 61 cm. NFS.

8 Darren Tynan, **Humans of Uncanny Valley – Untitled 8,** 2021, digital print, 61 x 61 cm. NFS.

9 Darren Tynan, **Humans of Uncanny Valley – Untitled 9,** 2021, digital print, 61 x 61 cm. NFS.

10 Darren Tynan, **Humans of Uncanny Valley – Untitled 10,** 2021, digital print, 61 x 61 cm. NFS.

11 Darren Tynan, **Humans of Uncanny Valley – Untitled 11,** 2021, digital print, 61 x 61 cm. NFS.

12 Darren Tynan, **Humans of Uncanny Valley – Untitled 12,** 2021, digital print, 61 x 61 cm. NFS.

13 Darren Tynan, **Wall of GAN,** 2022, 136 digital prints, 15 x 15cm. NFS.

14 Darren Tynan (video) and Digital Penetration (sound), **Humans of Uncanny Valley – Version 1**, 2021, 21 minutes.

15 Darren Tynan (video) and Digital Penetration (sound), **Humans of Uncanny Valley – Version 2**, 2021, 6 minutes.