

# *Expanding the generative space*

Terence Broad

Creative AI meetup  
March 2025

# About me

AI artist (2015 - Present)

PhD in Generative AI, Goldsmiths (2018-2024)

Senior Lecturer, UAL Creative Computing Institute (2022 - Present)

*Expanding the Generative Space: Data-Free  
Techniques for Active Divergence with Generative  
Neural Networks*

Terence Broad

A dissertation submitted in partial satisfaction  
of the requirements for the degree  
Doctor of Philosophy

Department of Computing  
Goldsmiths, University of London

2024

# Autoencoding Blade Runner

Remaking Blade Runner with an artificial neural network

London Creative AI meetup #1, 2016

LOS ANGELES  
NOVEMBER, 2019



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What was located as infringing content:

Blade Runner

<http://vimeo.com/167838700>  
<http://vimeo.com/167792183>

Friends

<http://vimeo.com/164596865>  
<http://vimeo.com/166772819>  
<http://vimeo.com/166750512>  
<http://vimeo.com/163885283>  
<http://vimeo.com/167567391>  
<http://vimeo.com/167570293>  
<http://vimeo.com/166046378>

Lucifer

<http://vimeo.com/164910483>  
<http://vimeo.com/165318559>  
<http://vimeo.com/164667655>  
<http://vimeo.com/164257403>

## A guy trained a machine to “watch” Blade Runner. Then things got seriously sci-fi.

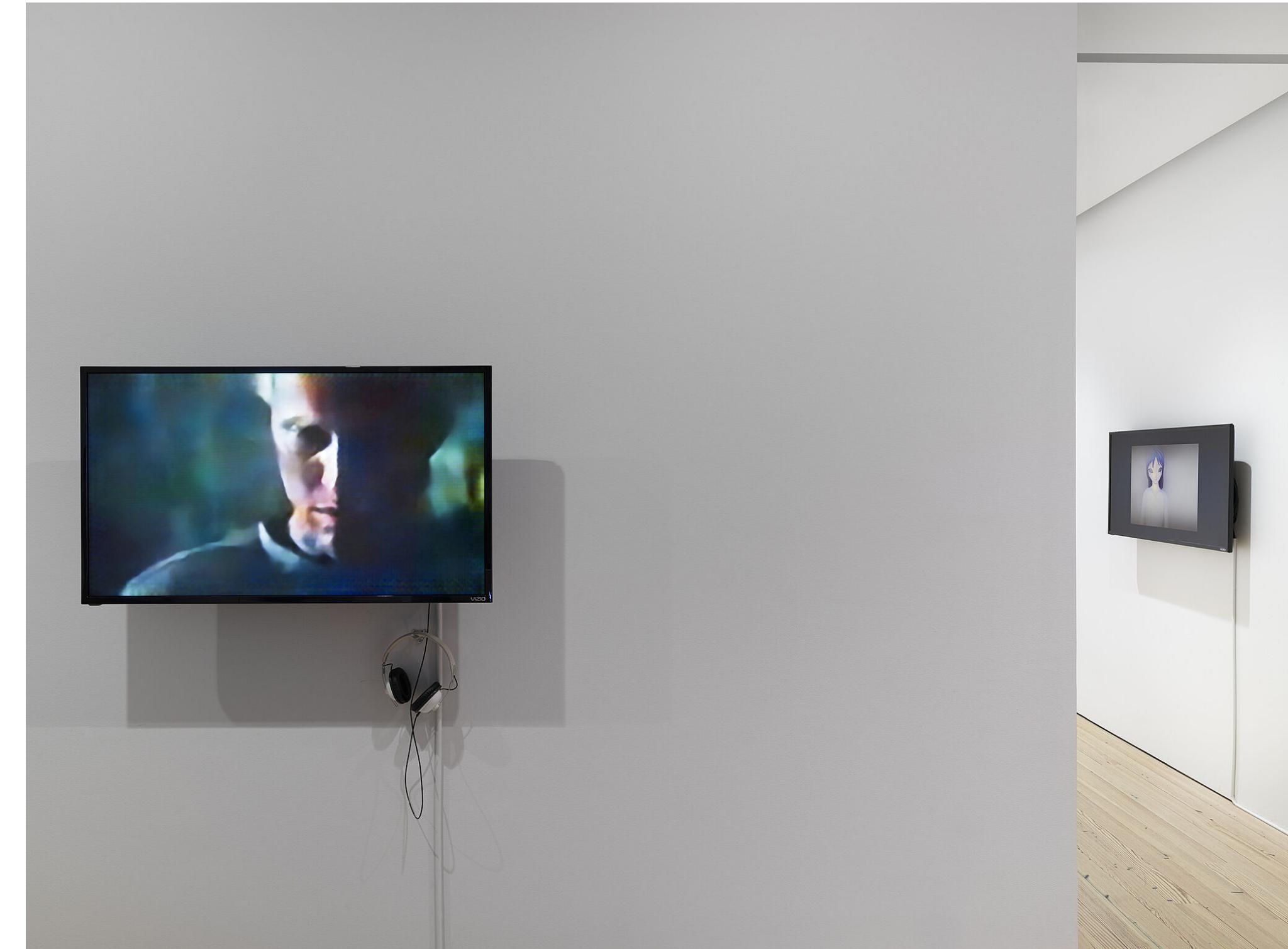
by [Aja Romano](#)

Jun 1, 2016, 5:00 PM GMT+1



*Aja Romano writes about pop culture, media, and ethics. Before joining Vox in 2016, they were a staff reporter at the Daily Dot. A 2019 fellow of the National Critics Institute, they're considered an authority on fandom, the internet, and the culture wars.*

# DMCA takedown notice from Warner Brothers & resulting press coverage



Dreamlands: Immersive Cinema and Art, 1905–2016,  
Whitney Museum of American Art, New York  
2016-17

"The generated version of Blade Runner lacks [...] visual fidelity [such] that it appears only to be swirling, impressionistic blobs of color. [...] In a situation like this, when all the input data can be assimilated into a single "work" **for the purposes of copyright law**, it seems plausible to deem the model derived from these data **a derivative work**."

Sobel, Benjamin LW. "Artificial Intelligence's Fair Use Crisis." *Colum. JL & Arts* 41 (2017): 45.



Backlash against generative AI from creative industries

How to train a generative model without imitating data?

How to train a generative model without

imitating  
pastiching  
mimicking  
parrotting  
copying  
stealing  
modelling

data?

Three experiments from my PhD research:

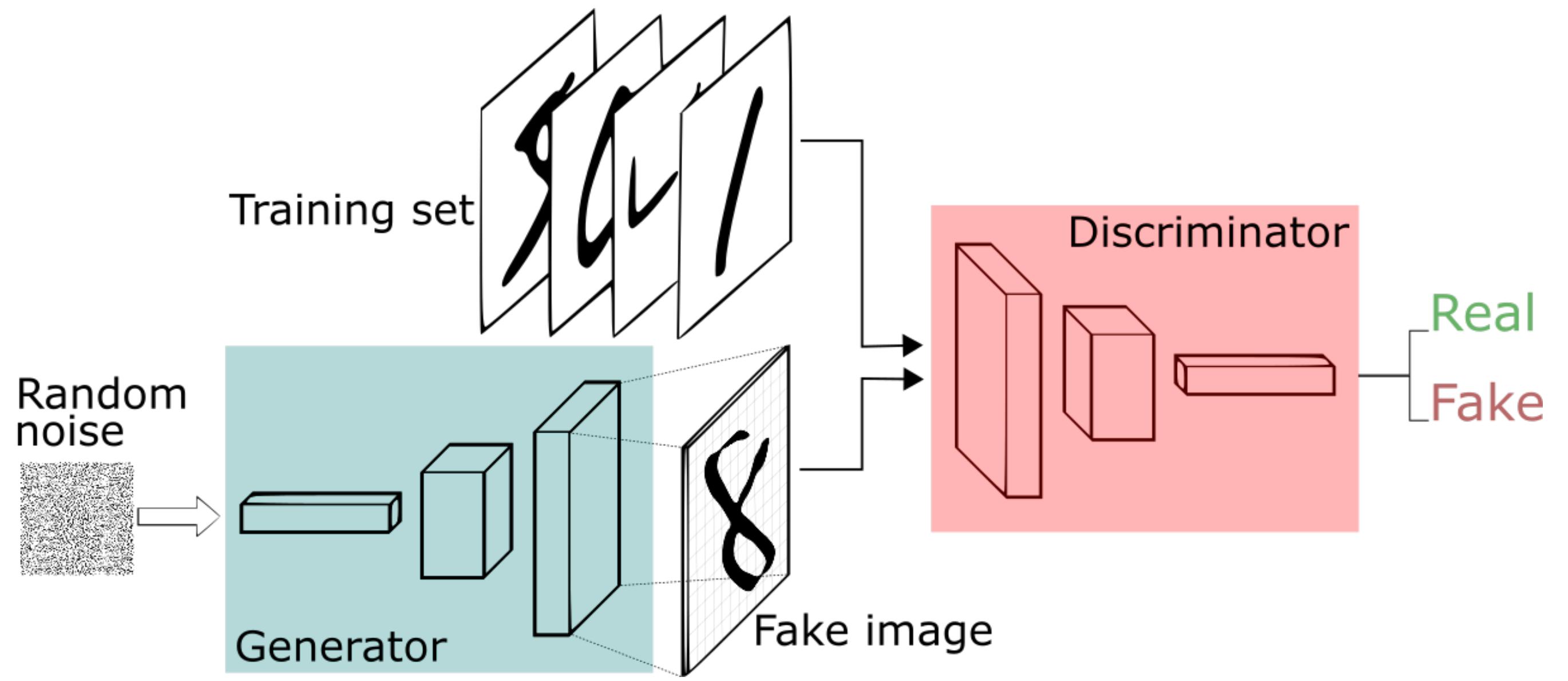
***Training without data***

***Divergent fine-tuning***

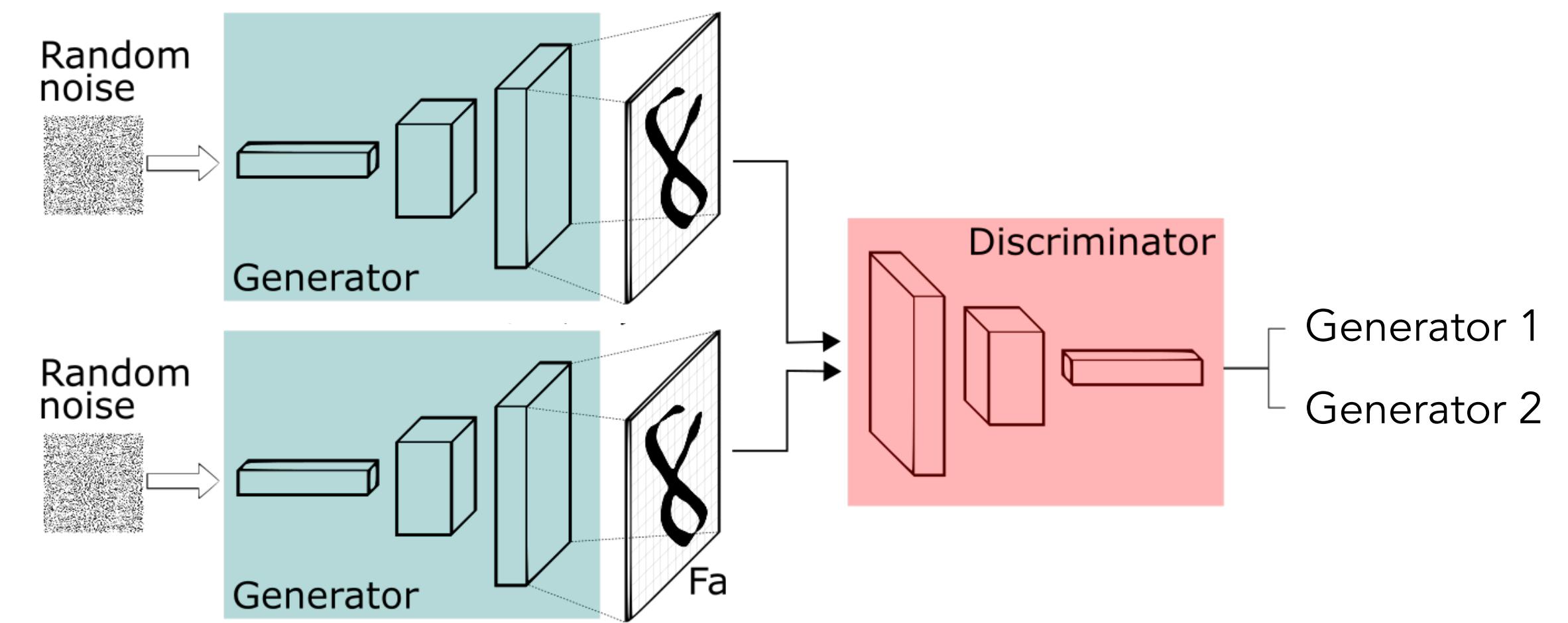
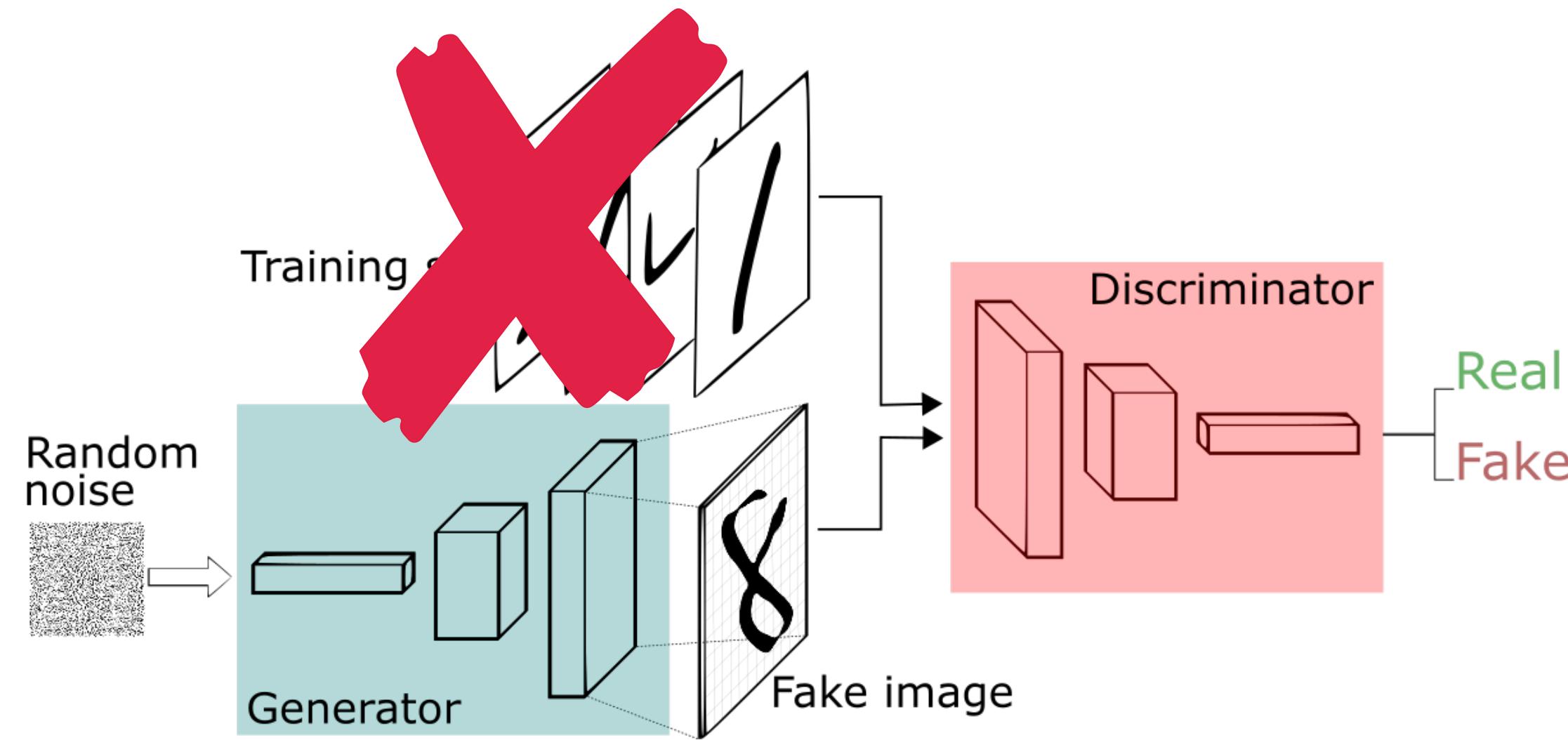
***Network bending***

## **Experiment 1:**

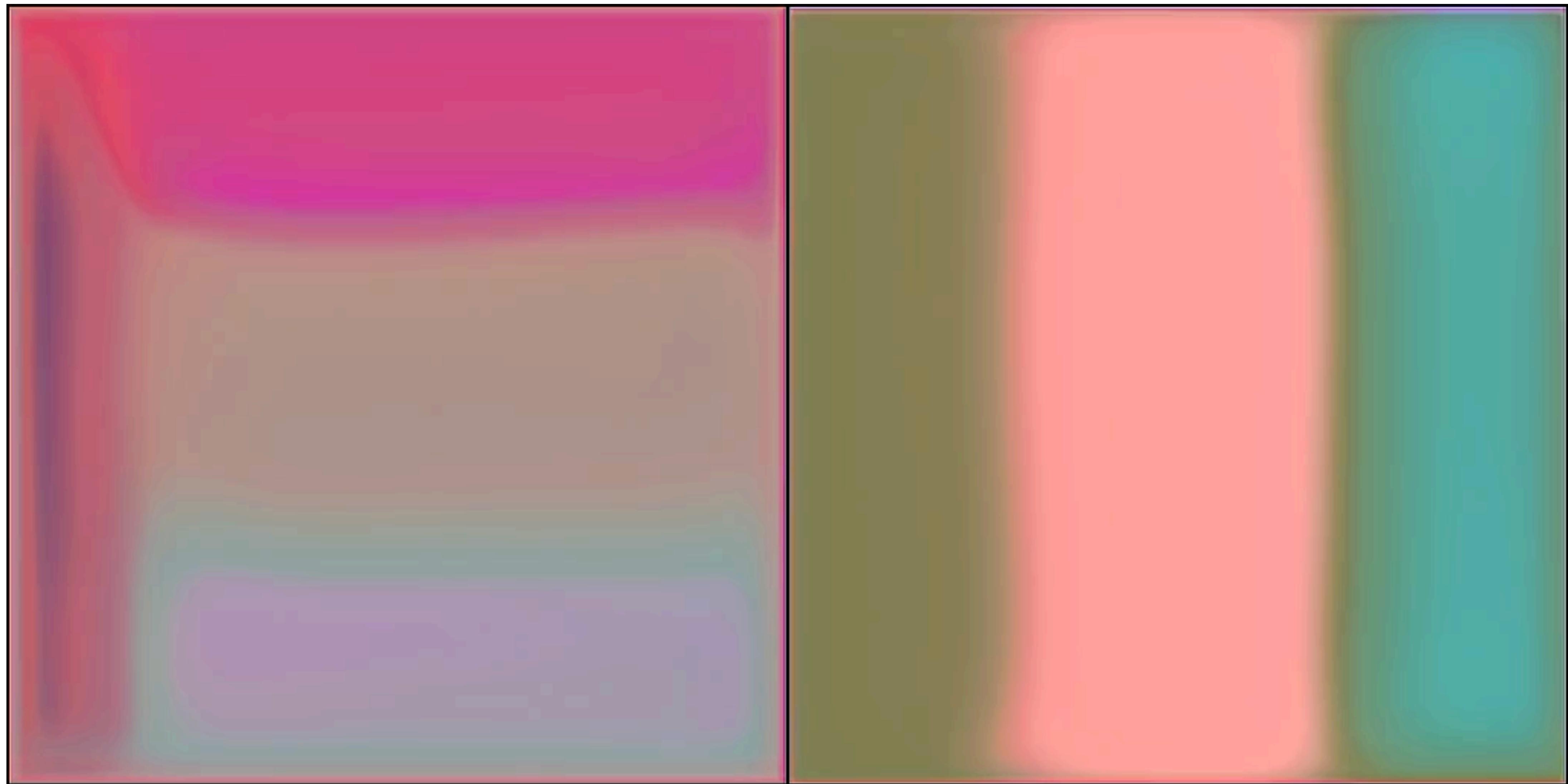
Can you train a generative neural network without data?



## Generative Adversarial Networks (GAN)



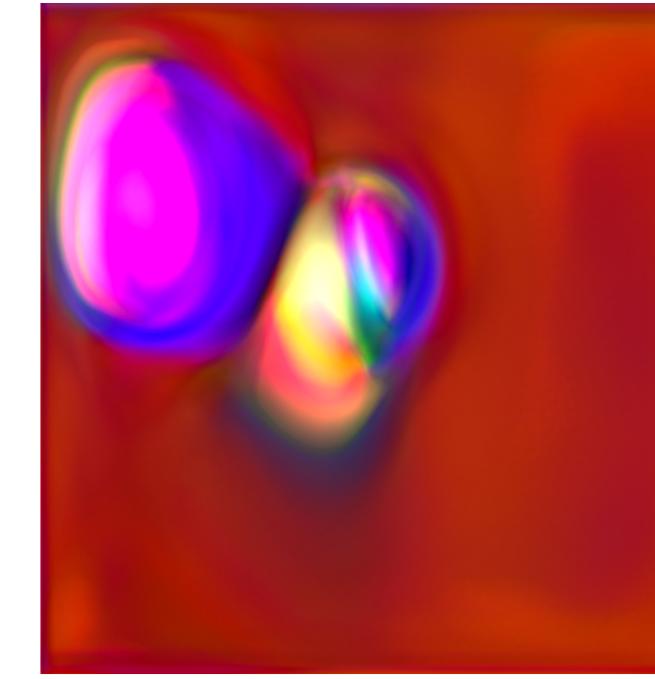
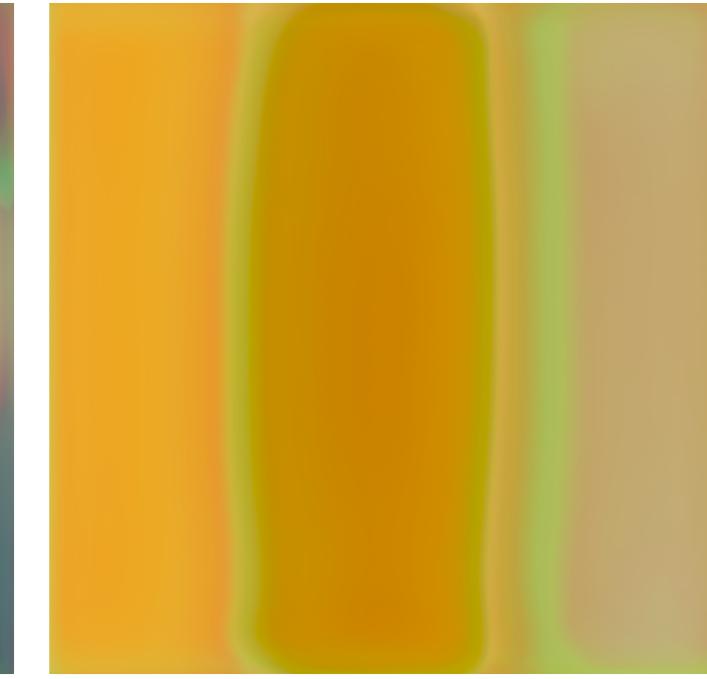
Replace the training data with another generator



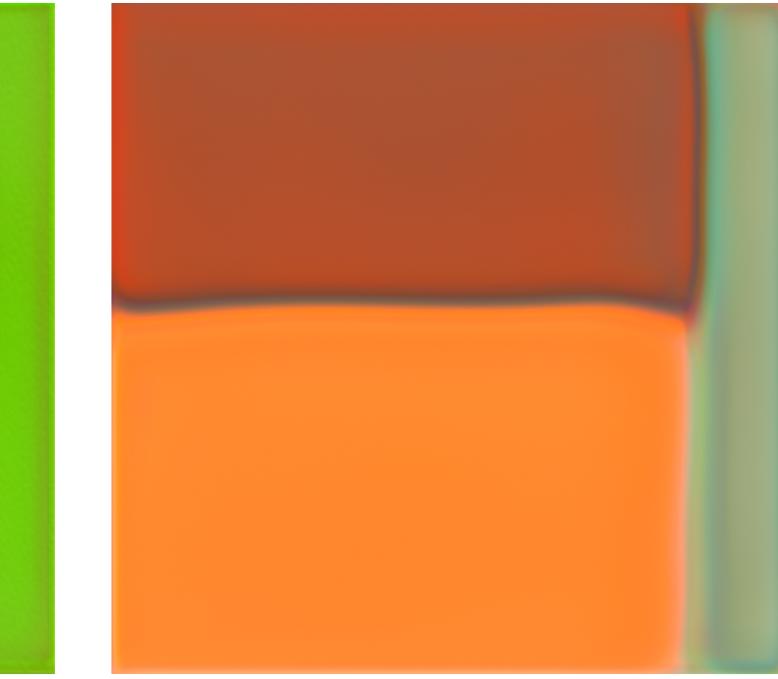
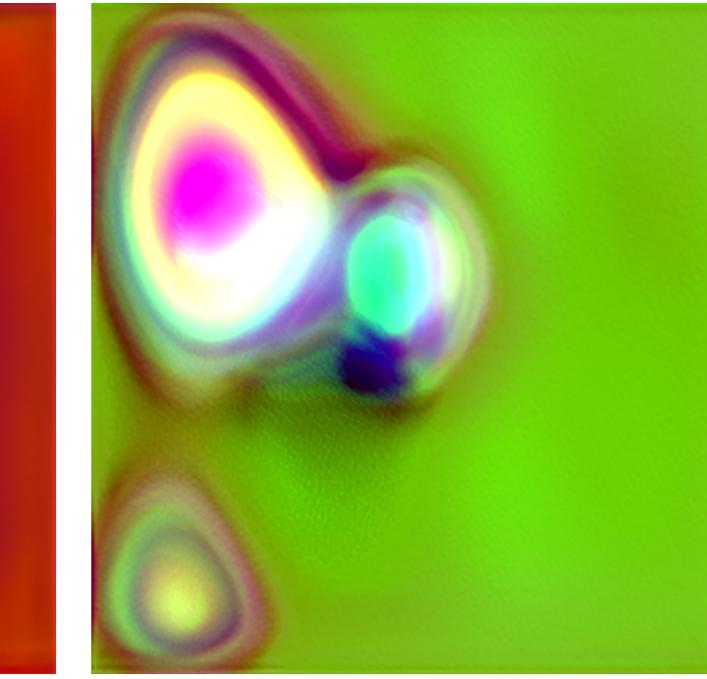
(Un)stable eqilibrium 1:1 (2019)



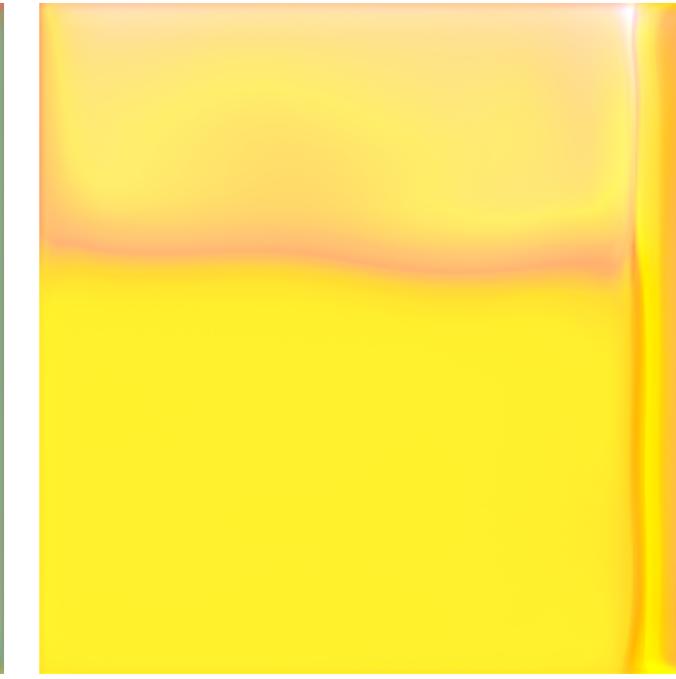
(un)stable equilibrium 1:1



(un)stable equilibrium 1:3



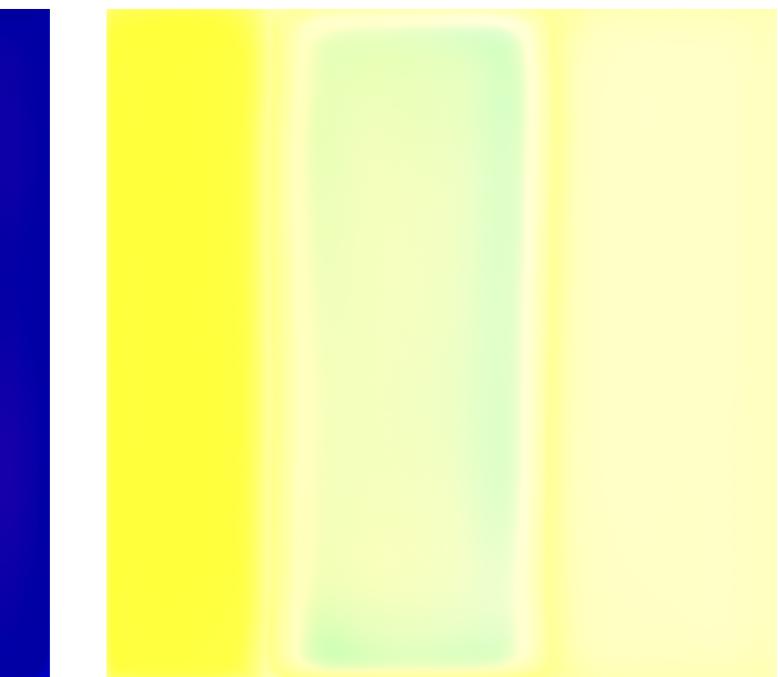
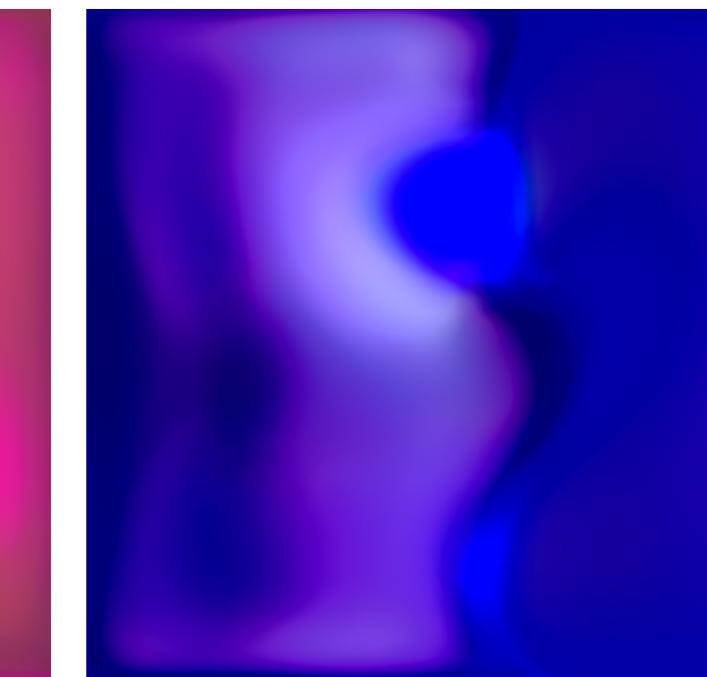
(un)stable equilibrium 1:5



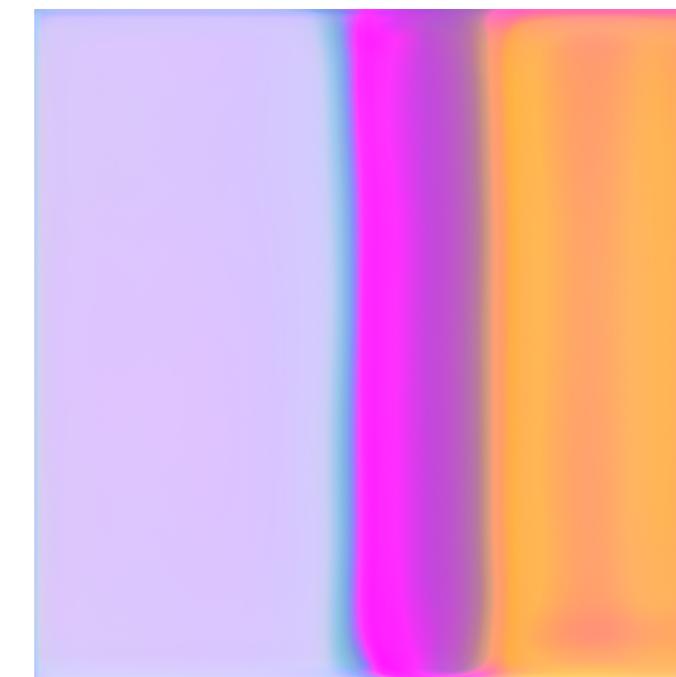
(un)stable equilibrium 1:2



(un)stable equilibrium 1:4

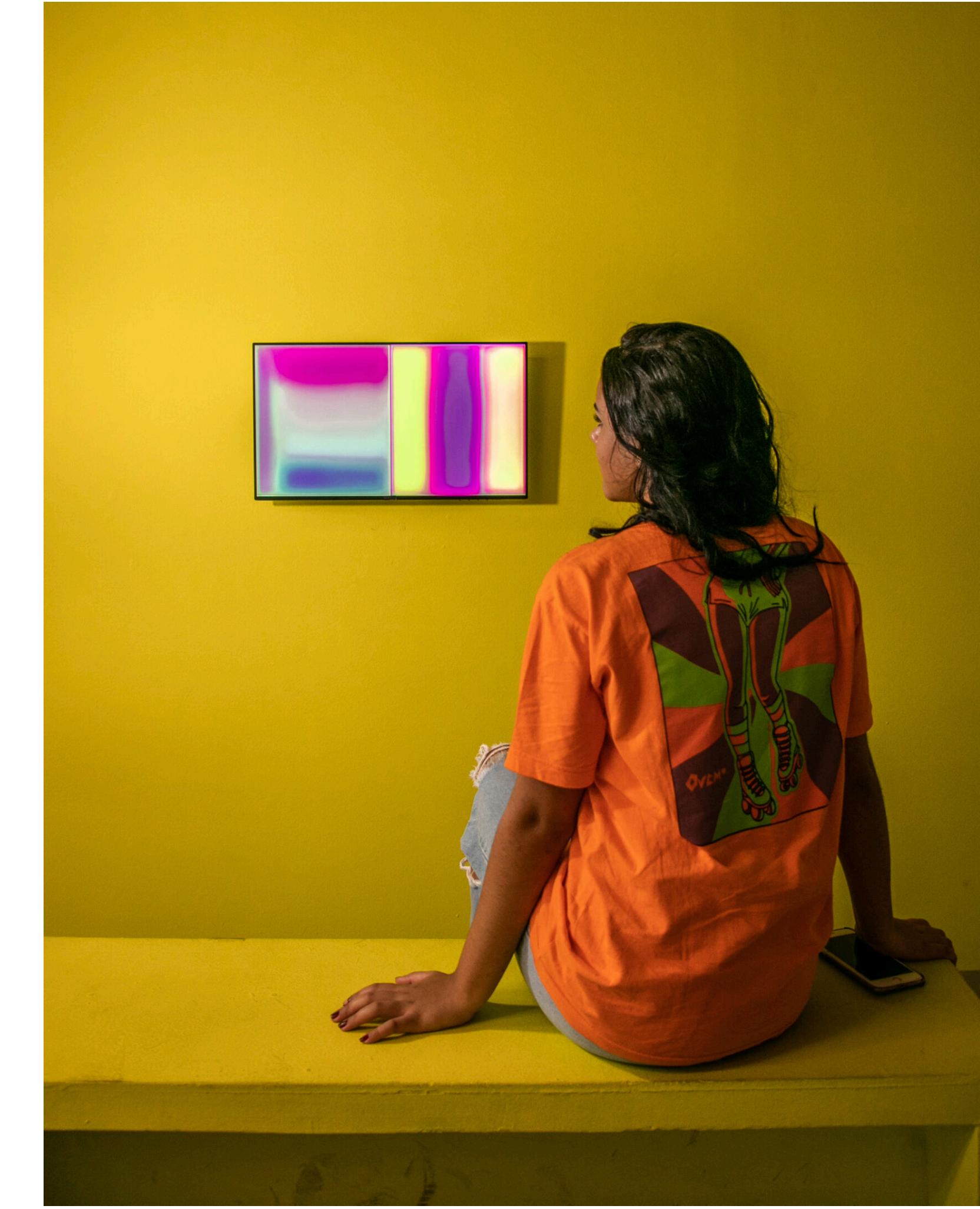


(un)stable equilibrium 1:6





*the depot\_digs,  
London, 2021*



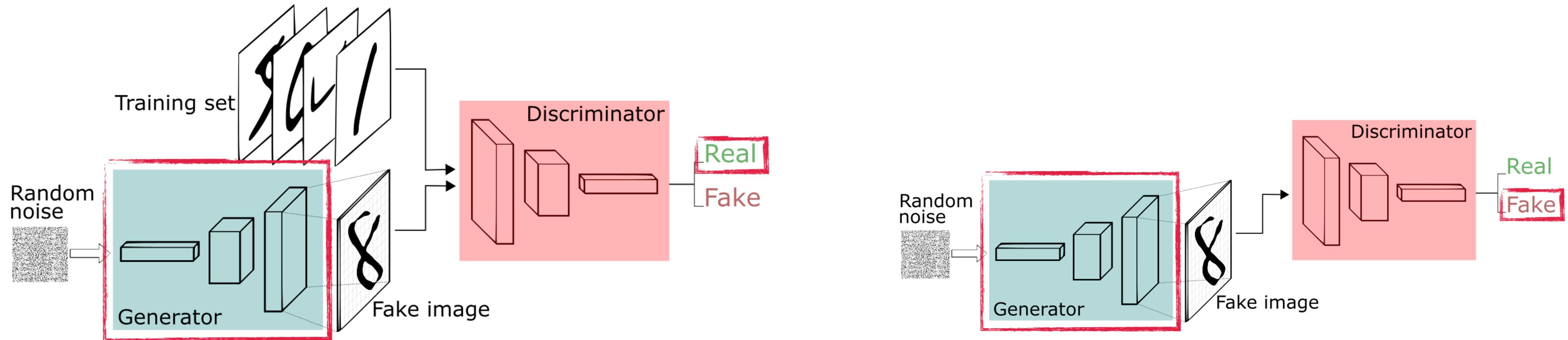
*FILE Festival,  
Sao Paolo, 2022*

## **Experiment 2:**

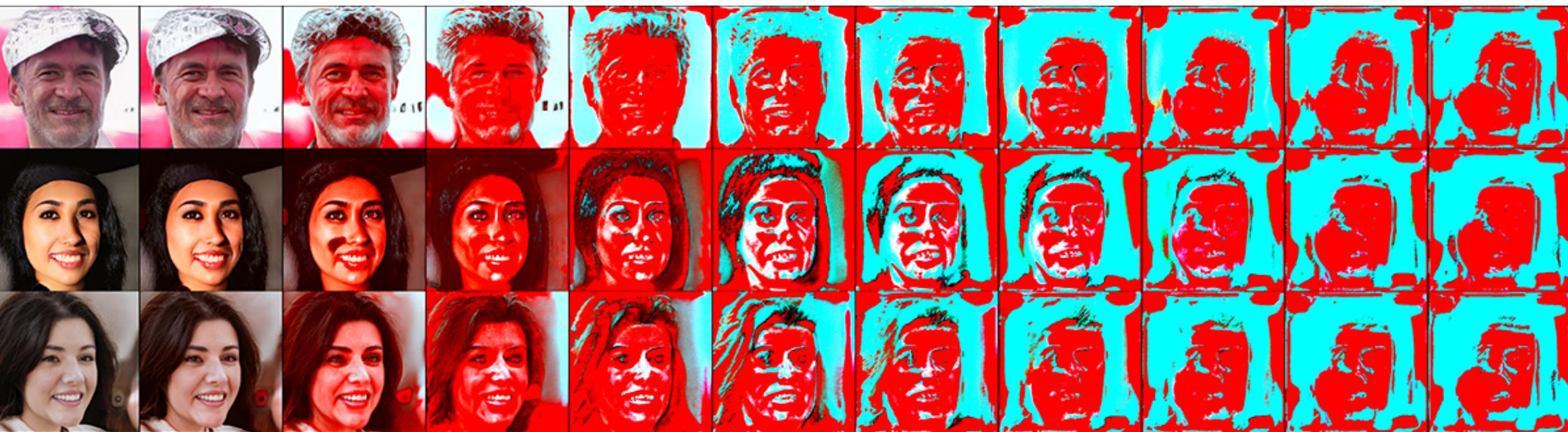
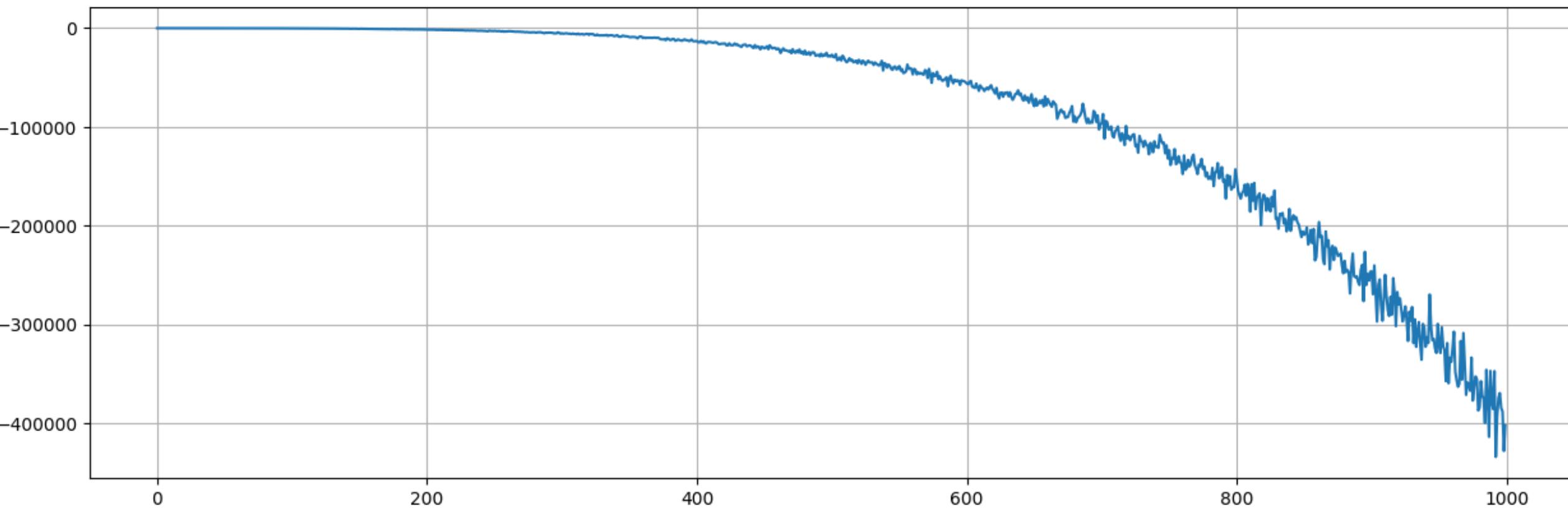
Can you fine-tune a generative neural network using other networks?



?



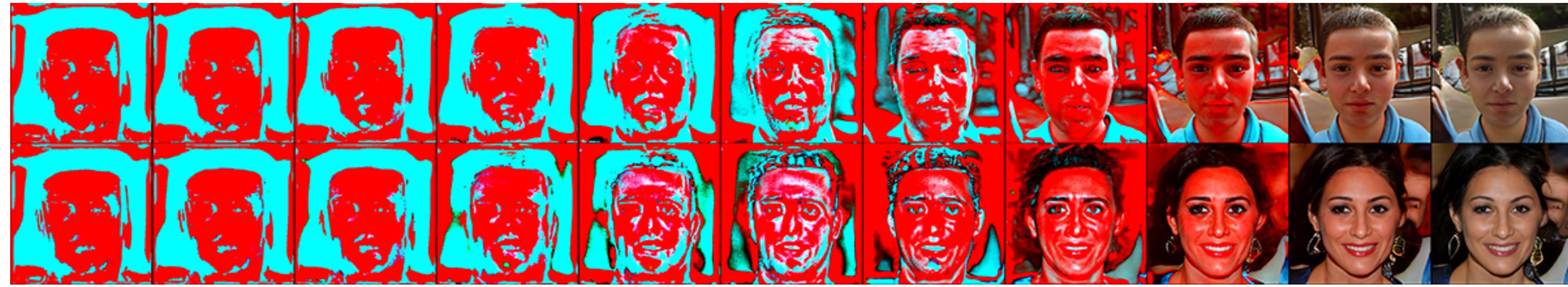
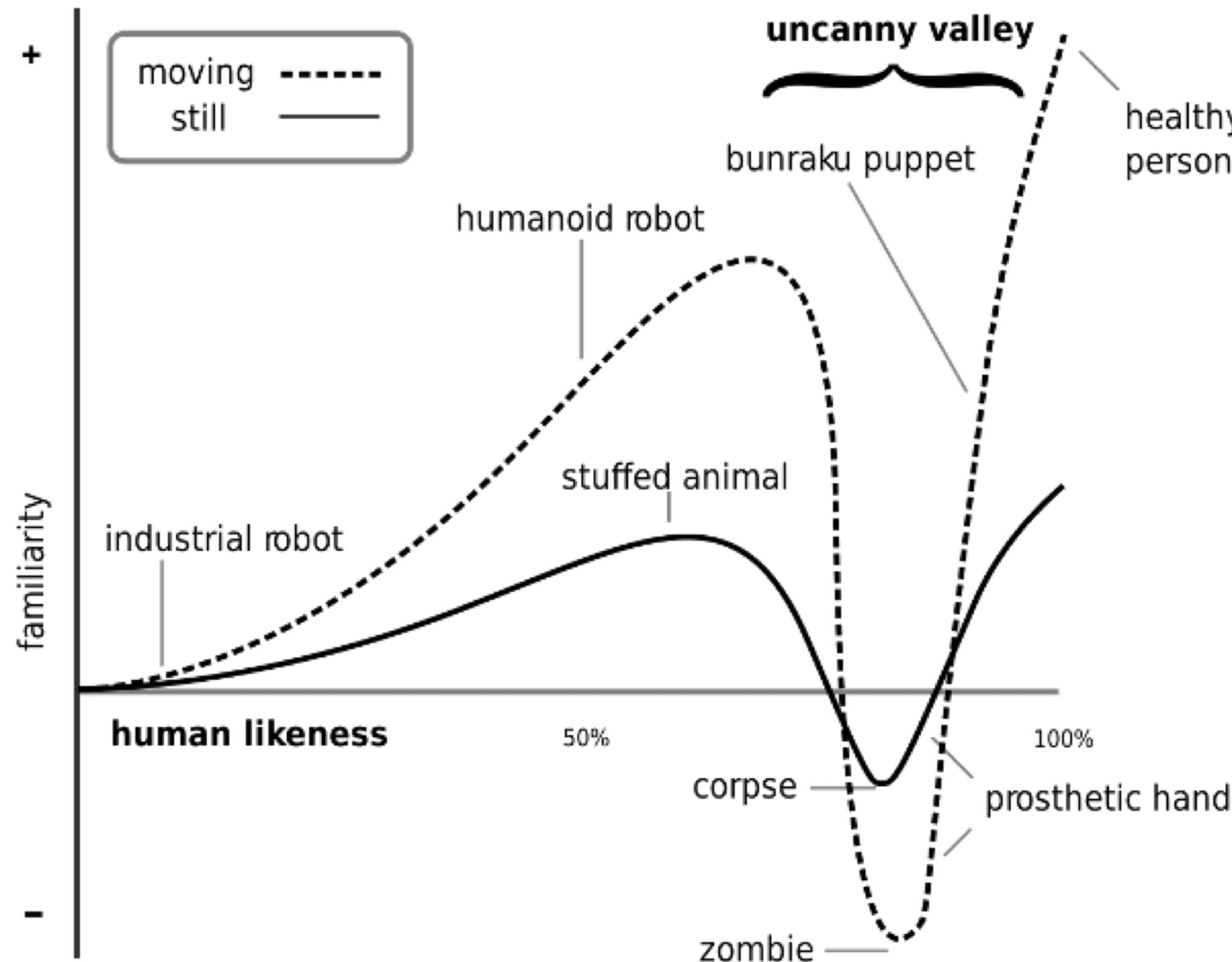
Optimise the generator towards generating 'fake' images instead of 'real' ones



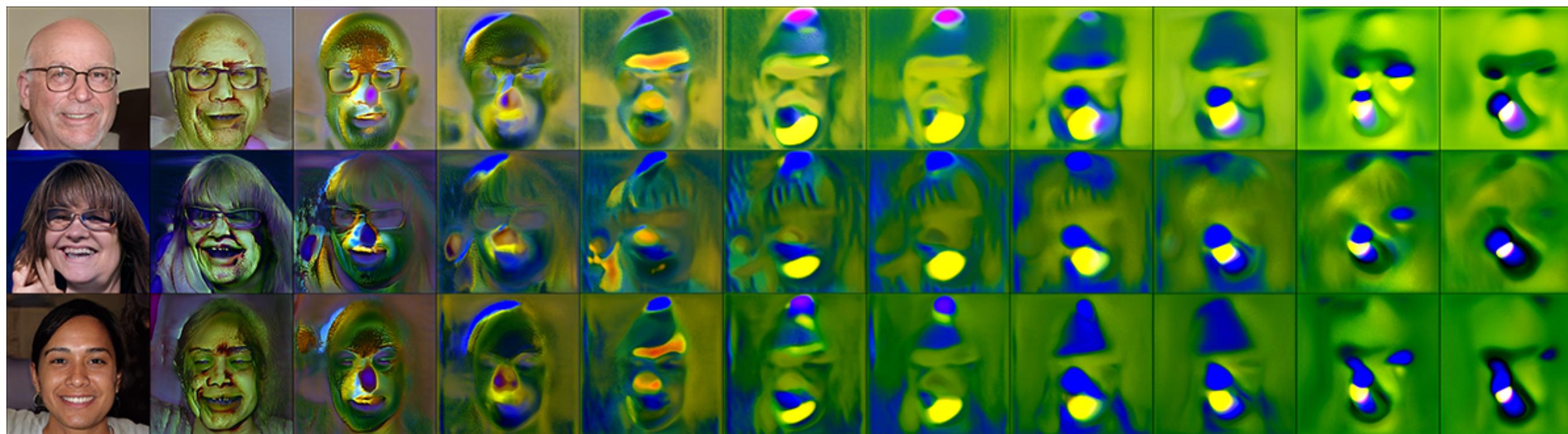
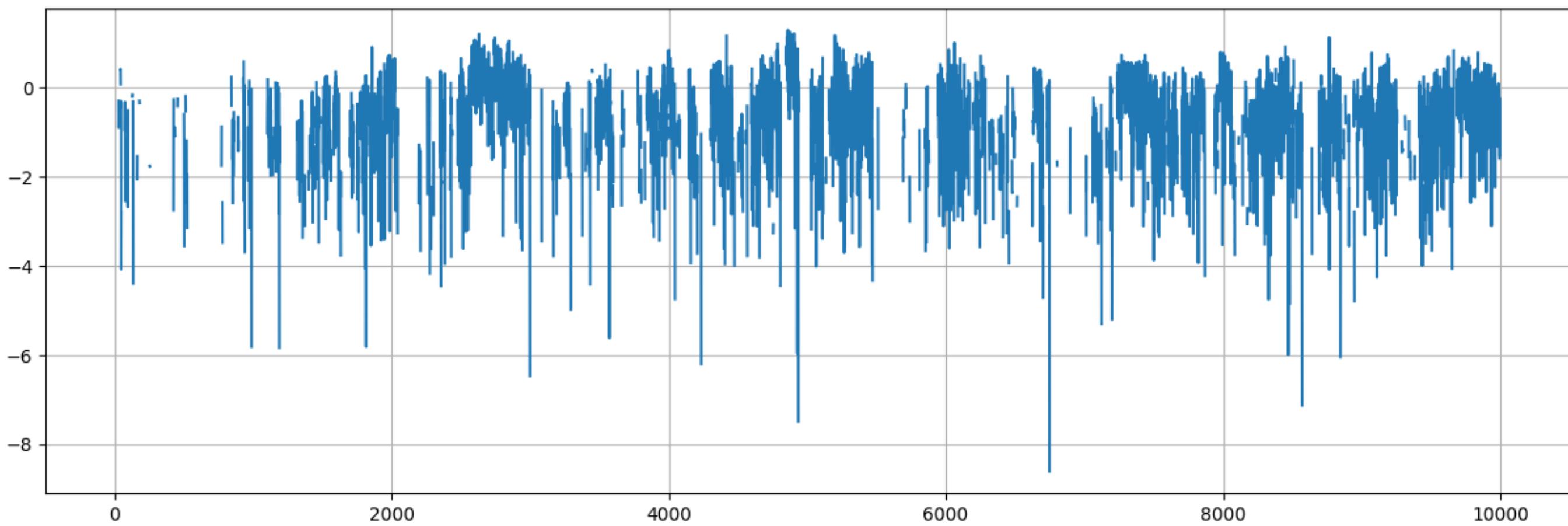
Fine tuning process over 1000 iterations with inverse loss



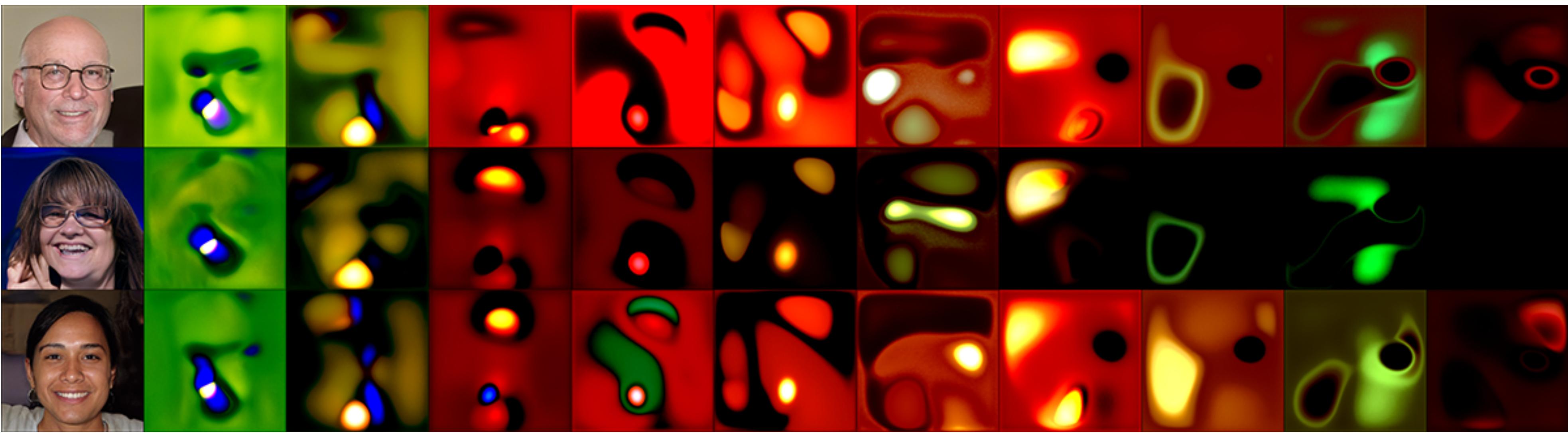
*Being Foiled* (2019)



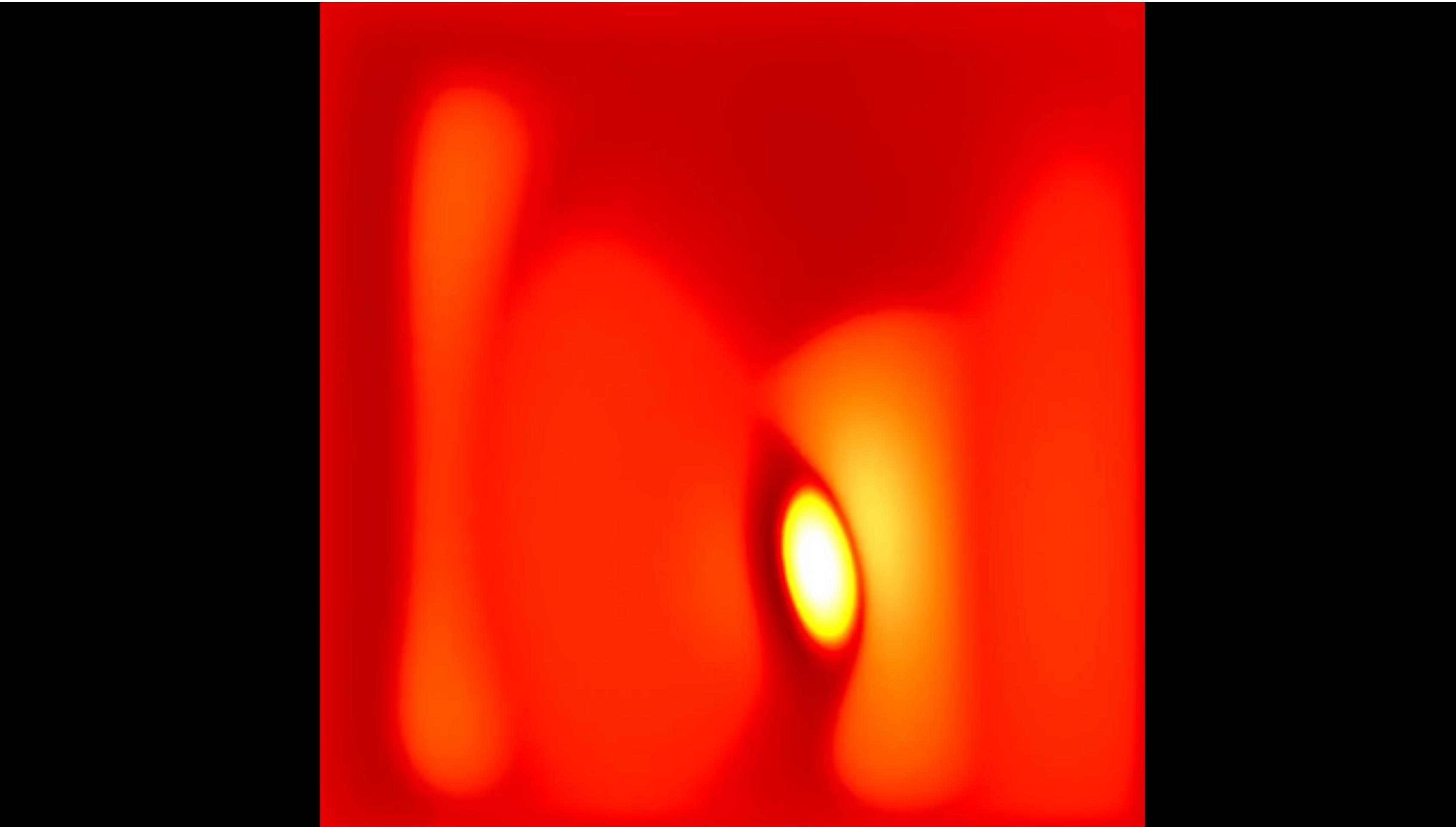
*Traversing the uncanny valley in reverse*



Fine tuning process over 10000 iterations with inverse log-loss



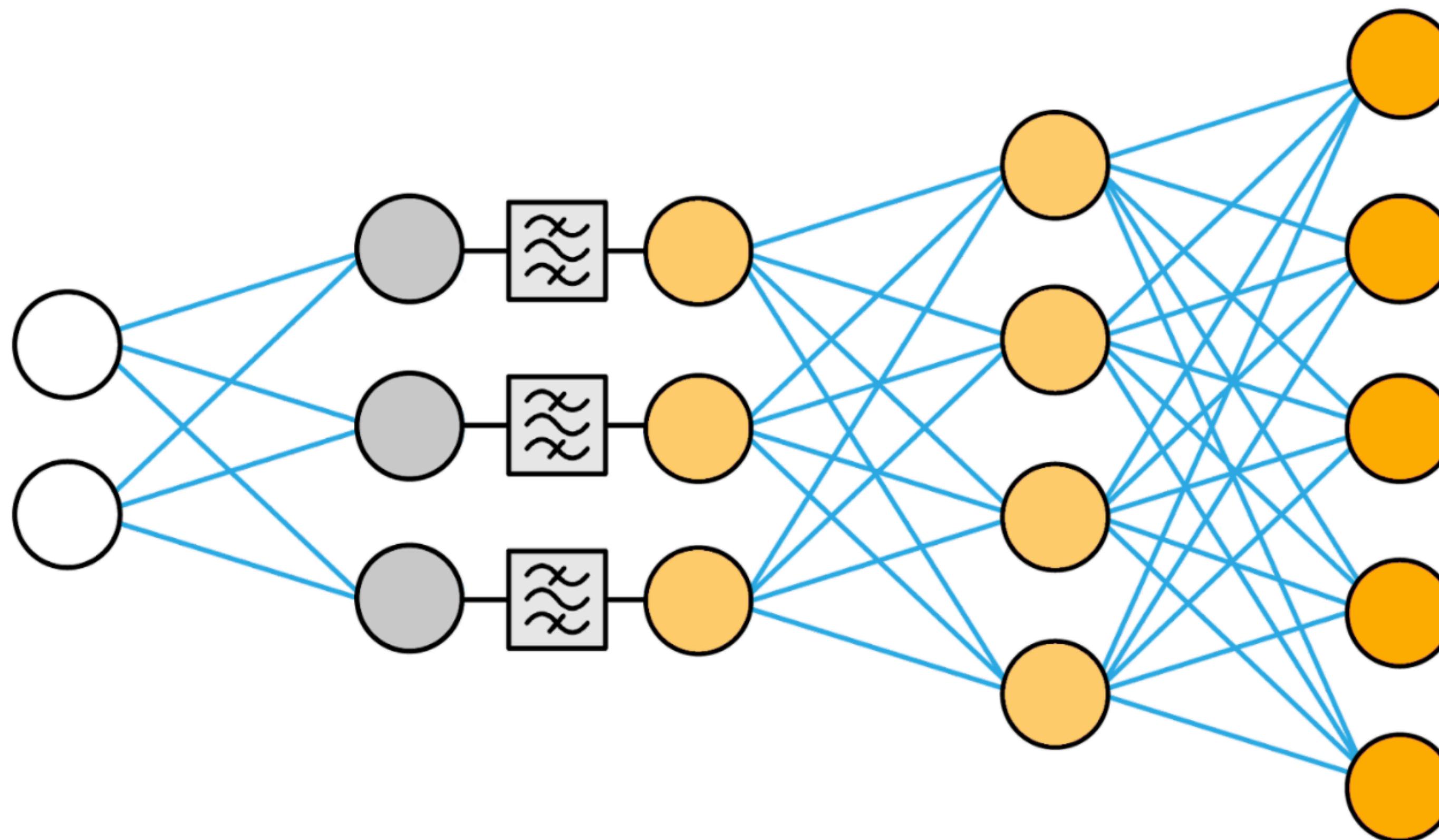
Fine tuning process over 100000 iterations with inverse log-loss



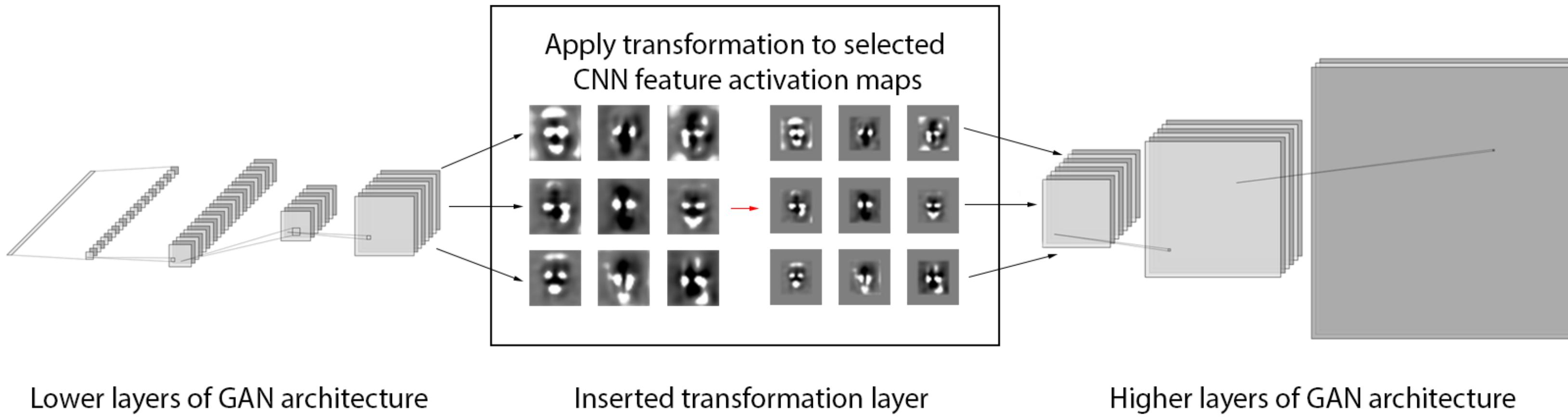
*(un)stable equilibrium 2:1 (2025)*

## **Experiment 3:**

Can you manipulate neural networks after they have been trained?



**Network bending** — inserting controllable filters into pre-trained networks



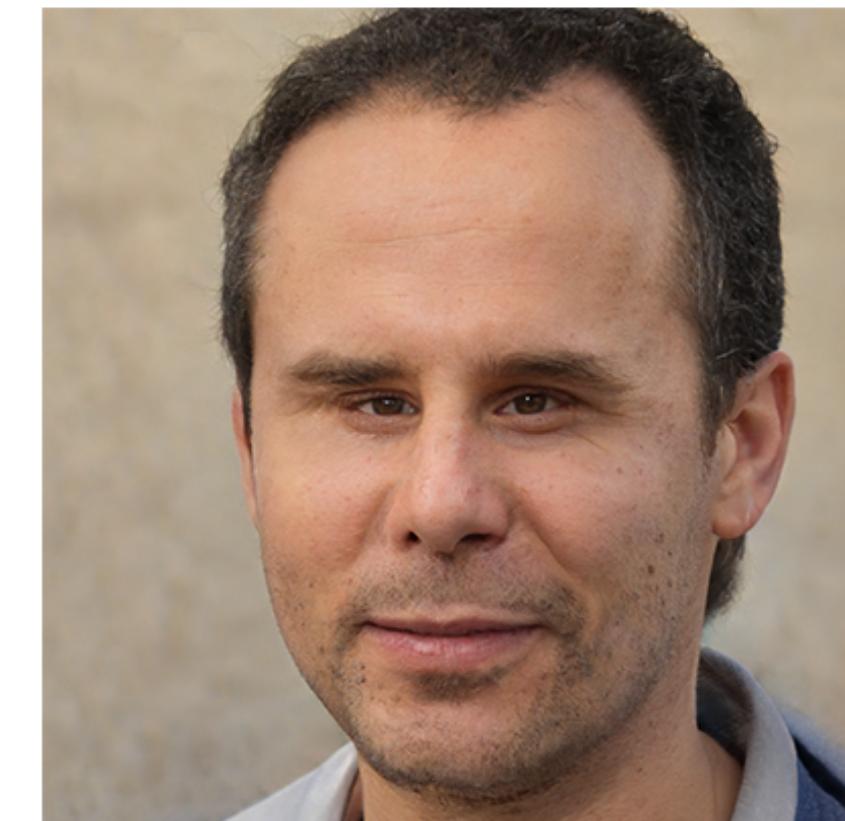
Lower layers of GAN architecture

Inserted transformation layer

Higher layers of GAN architecture

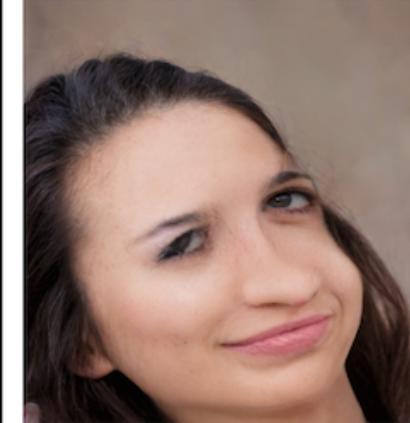
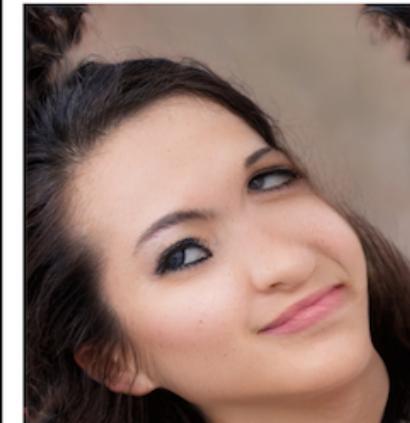
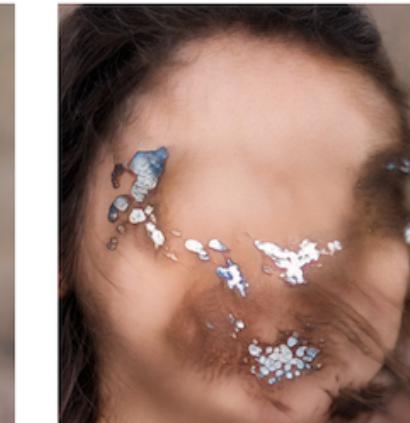
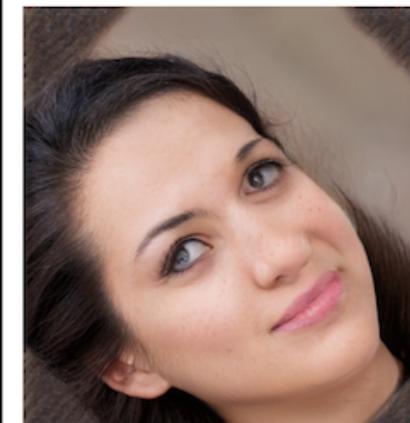
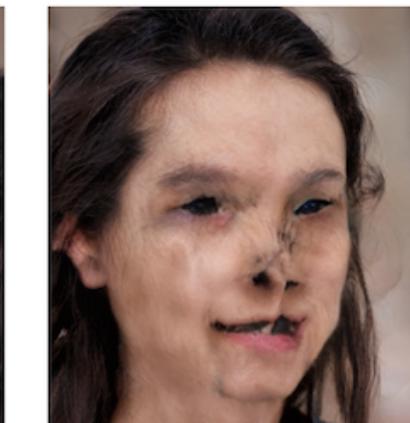
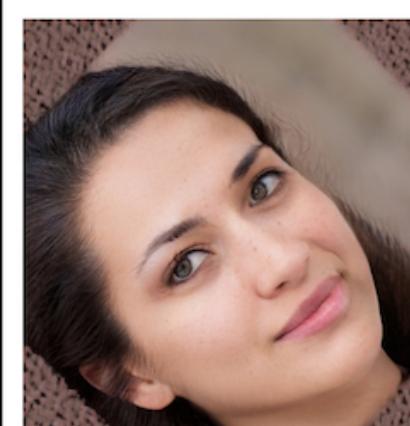
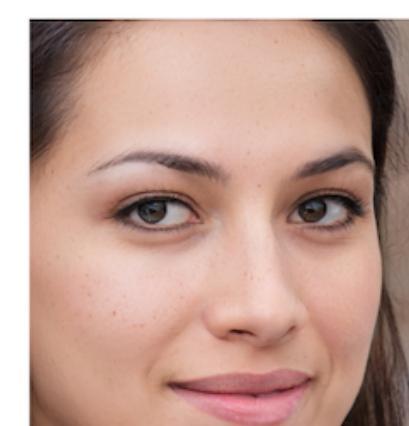
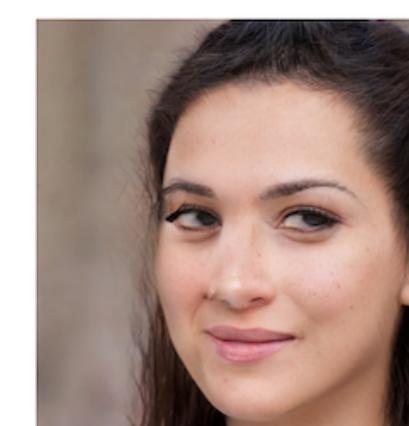
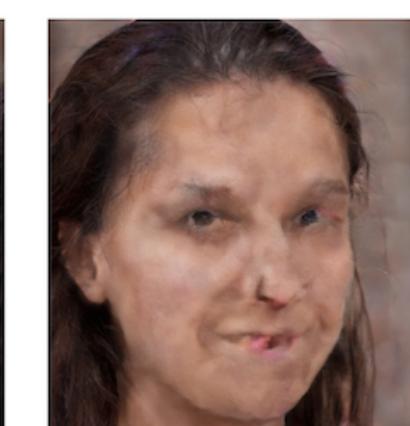
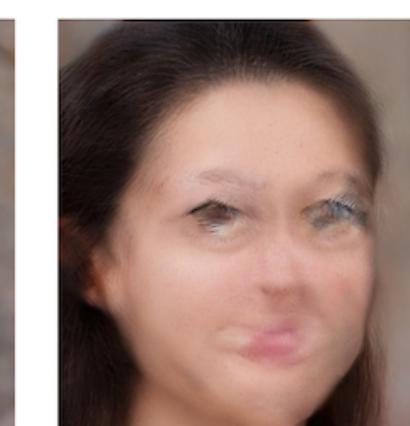
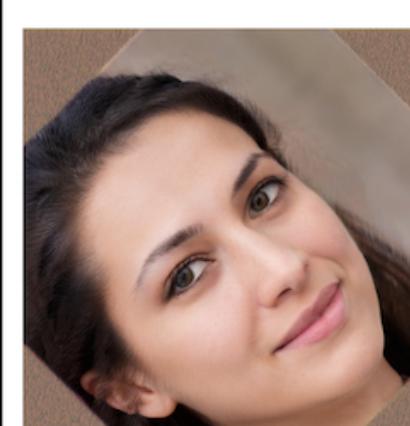
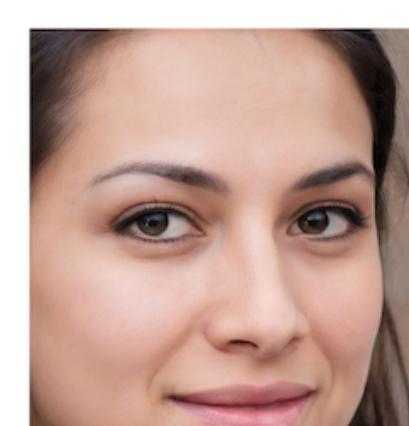
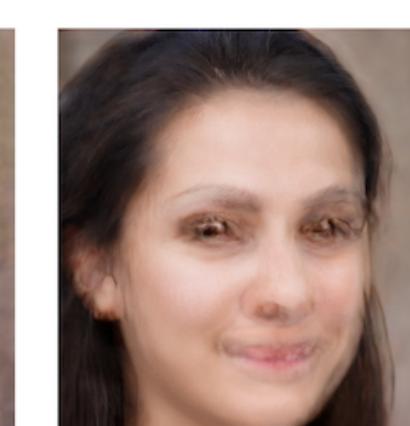
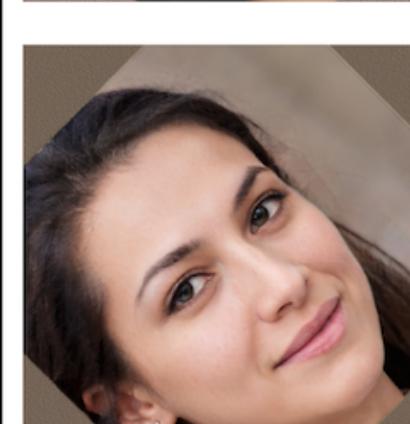
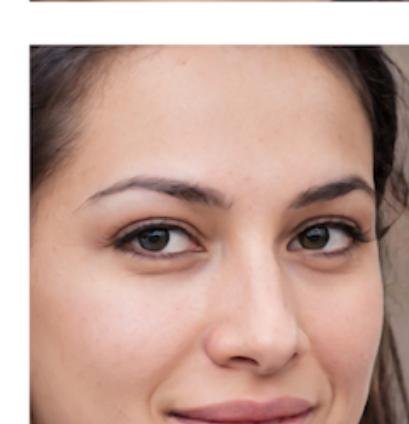
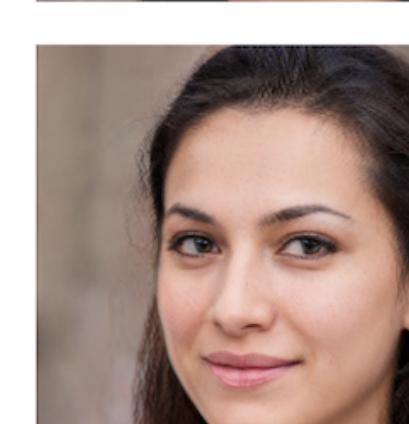
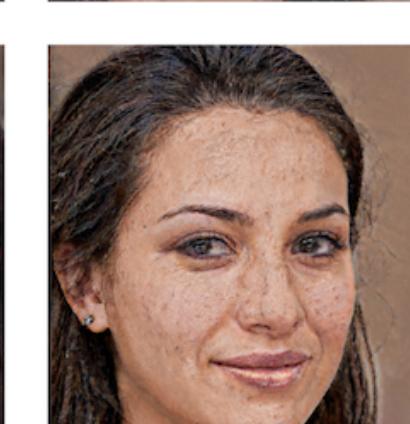
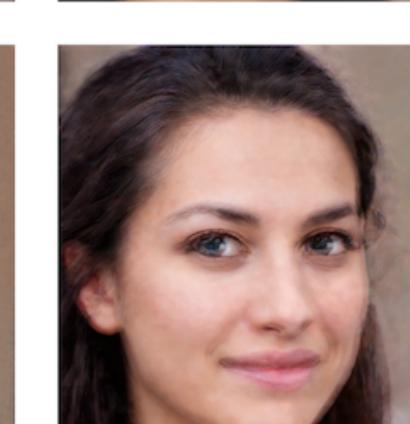


Unaltered Result



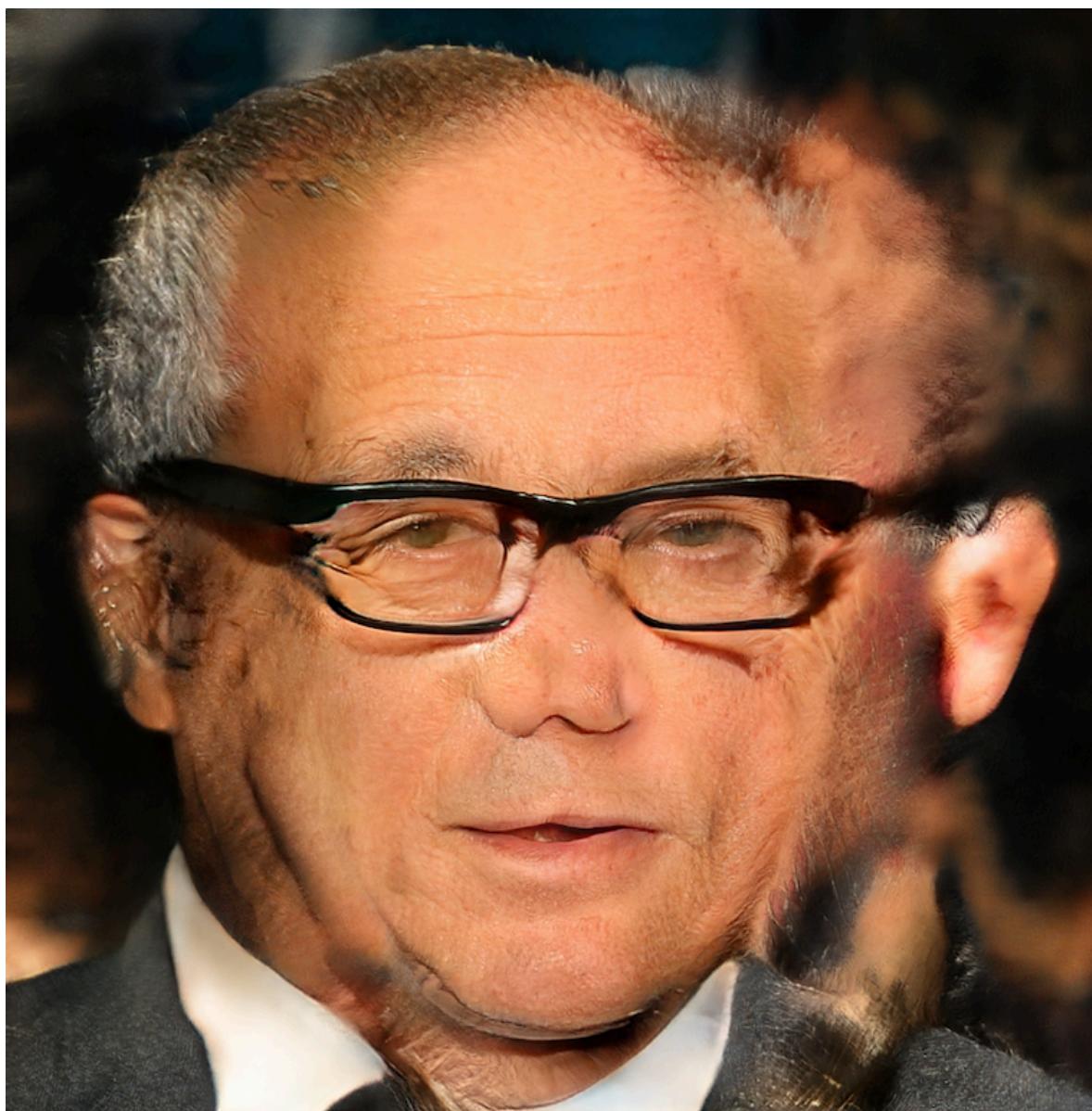
Manipulated Result

***Network bending in styleGAN2***

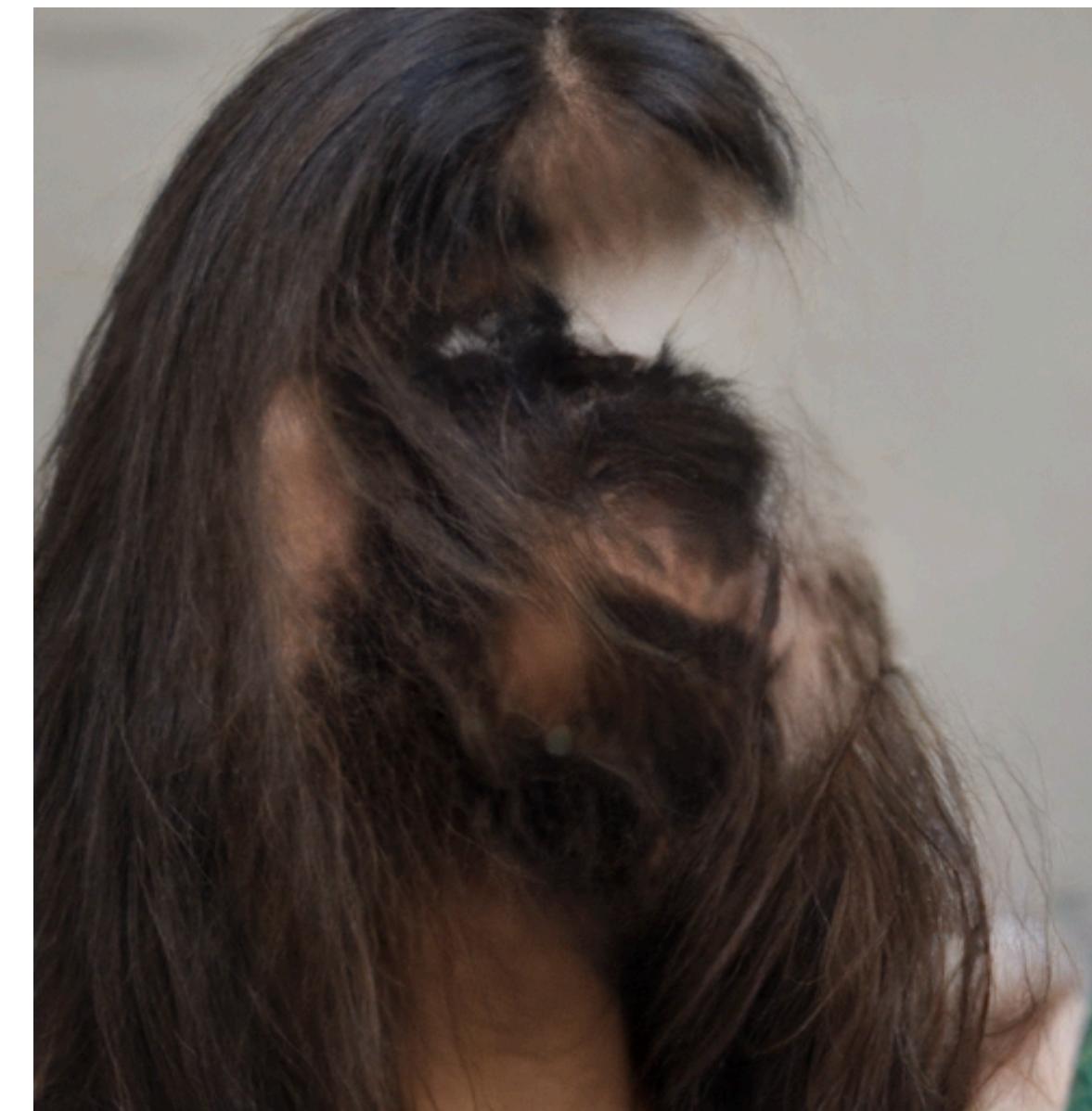
Layer	Rotate	Scale	Flip horizontal	Binary threshold	Dilate
2					
4					
6					
8					
10					
12					



**Layer-wide**



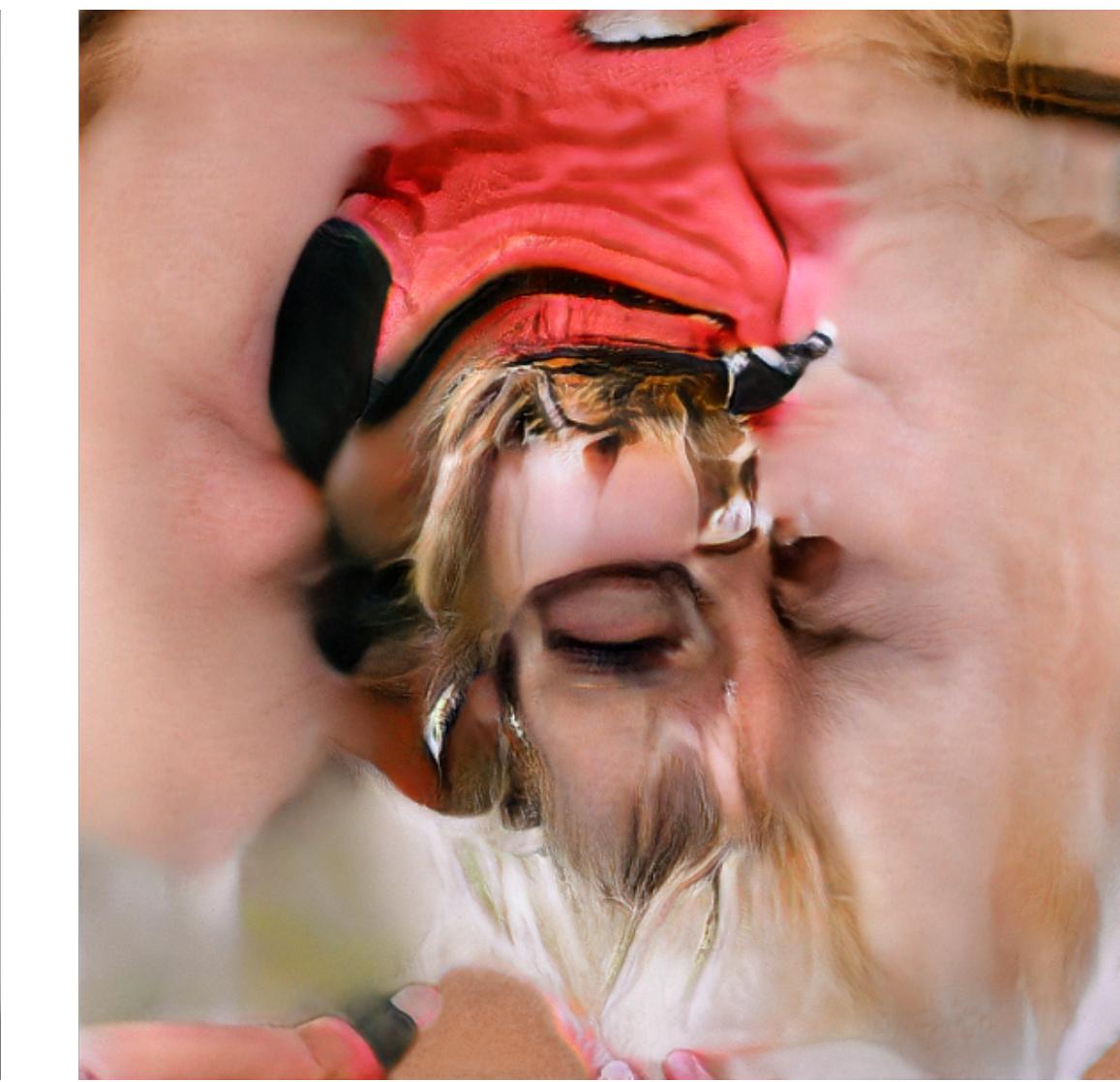
**Random**



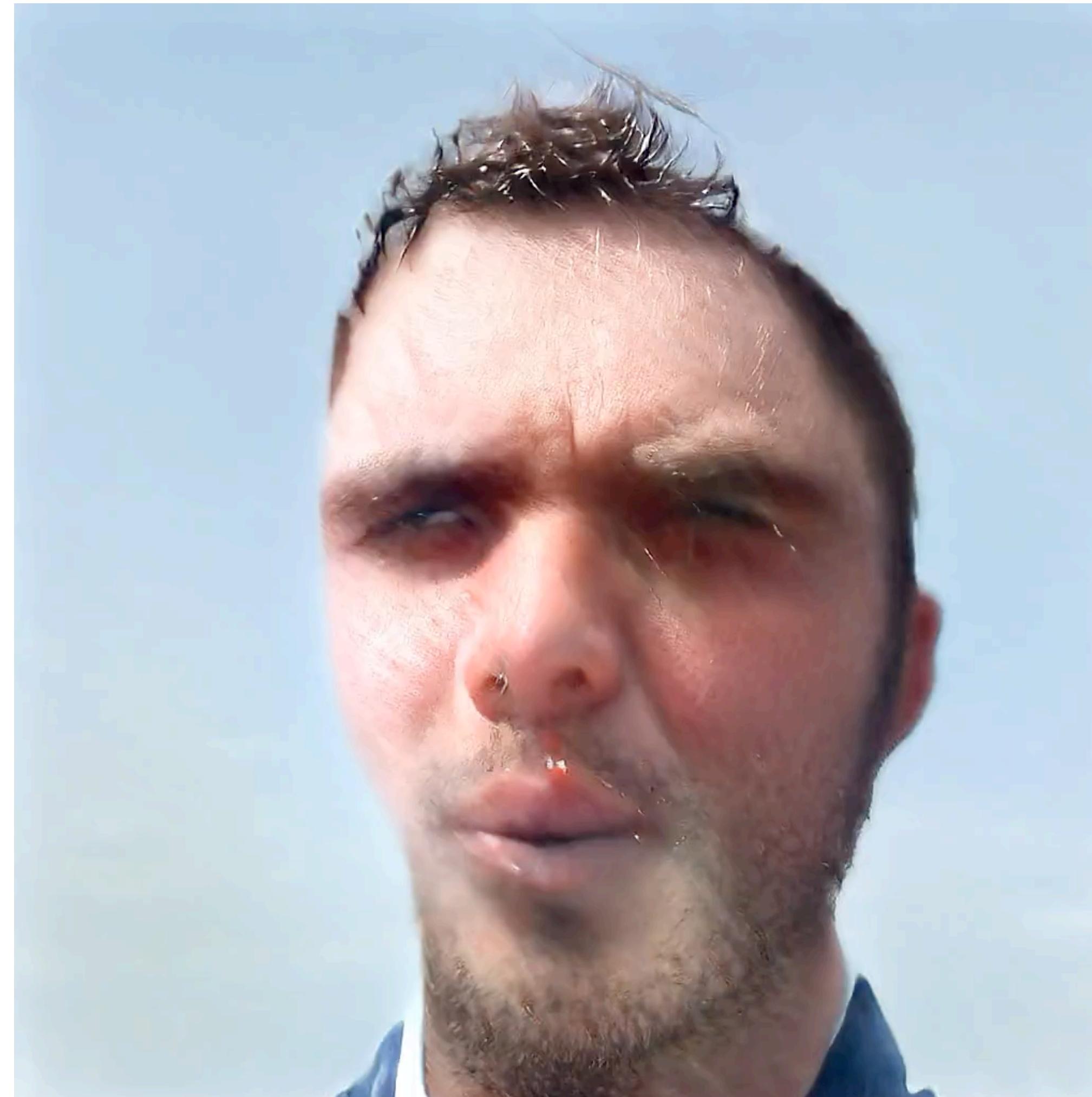
**Cluster**



**Combination of all  
transform types**



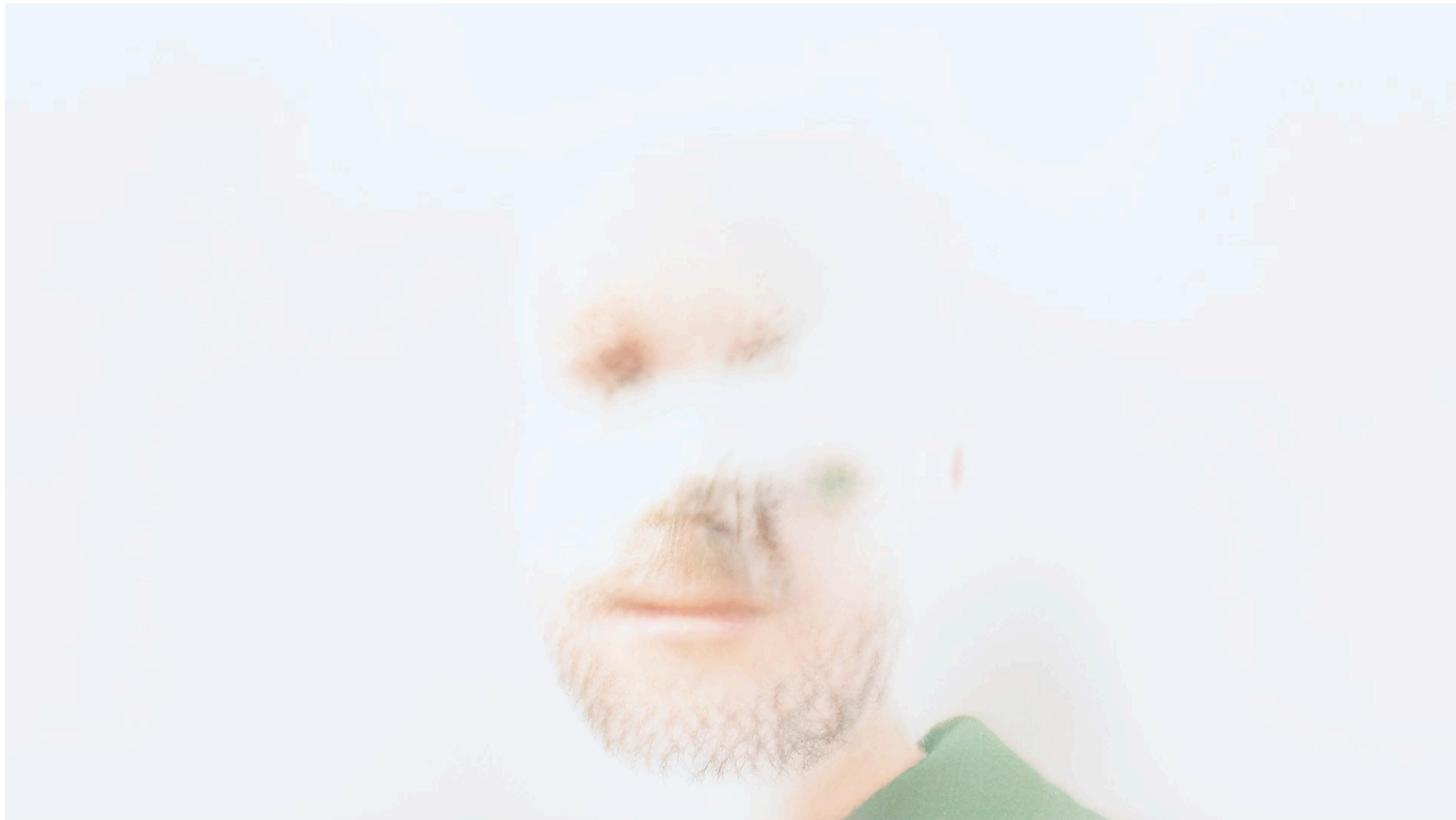
Teratome (2020)



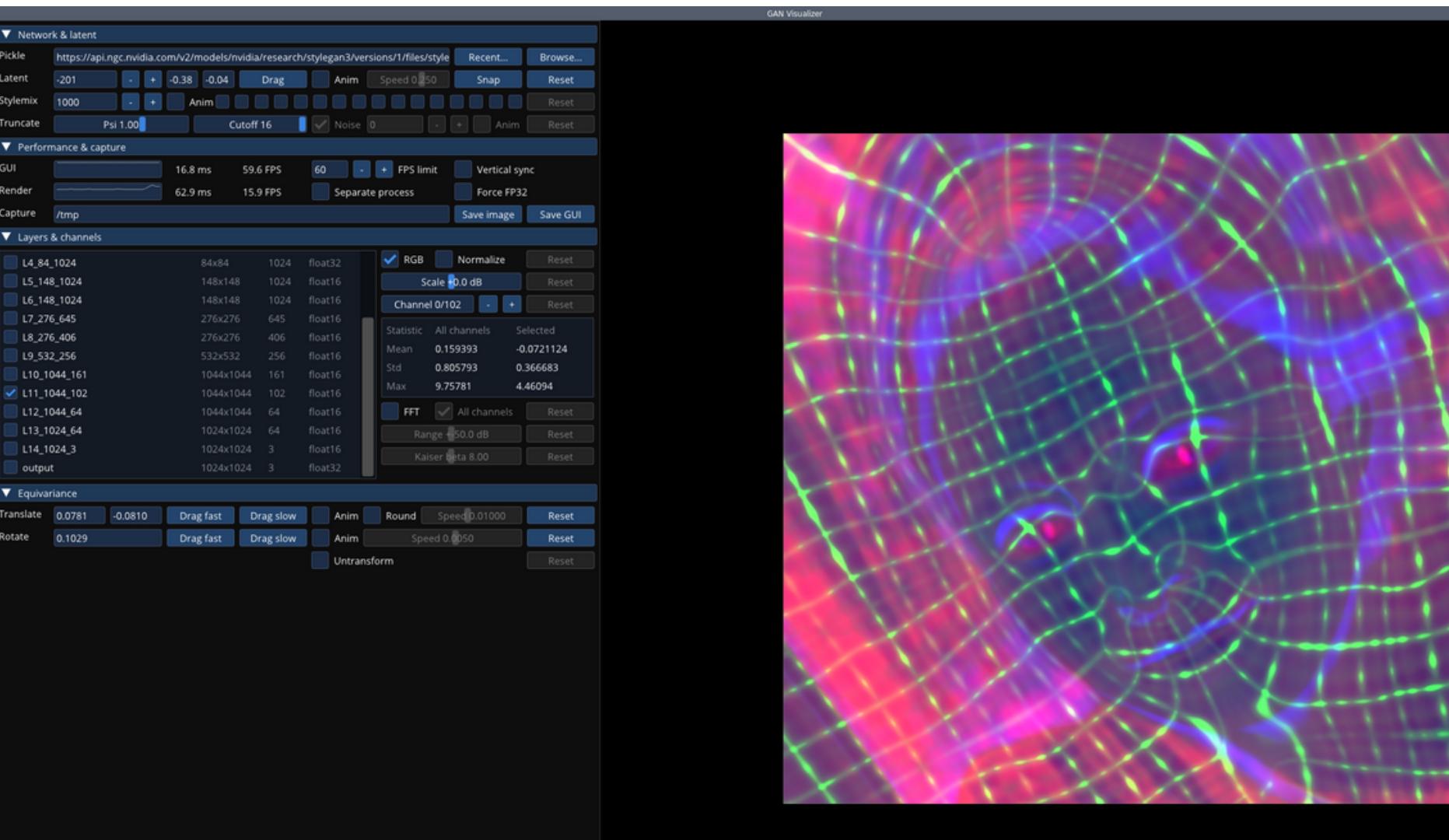
*Selfie experiment (2020)*

**Working with AI art sometimes feels like gazing into a pond of water — we are not sure what we will get as a reflection. [...] Looking into a still pond, we see a clear, gently blurred version of ourselves staring back at us, while turbulent waters return mere rippled echoes of our shape [...] Working with AI has the potential to change too, as the technology becomes more predictable and controllable, rendering blurry reflections, distorted forms and uncertain outcomes a thing of the past.”**

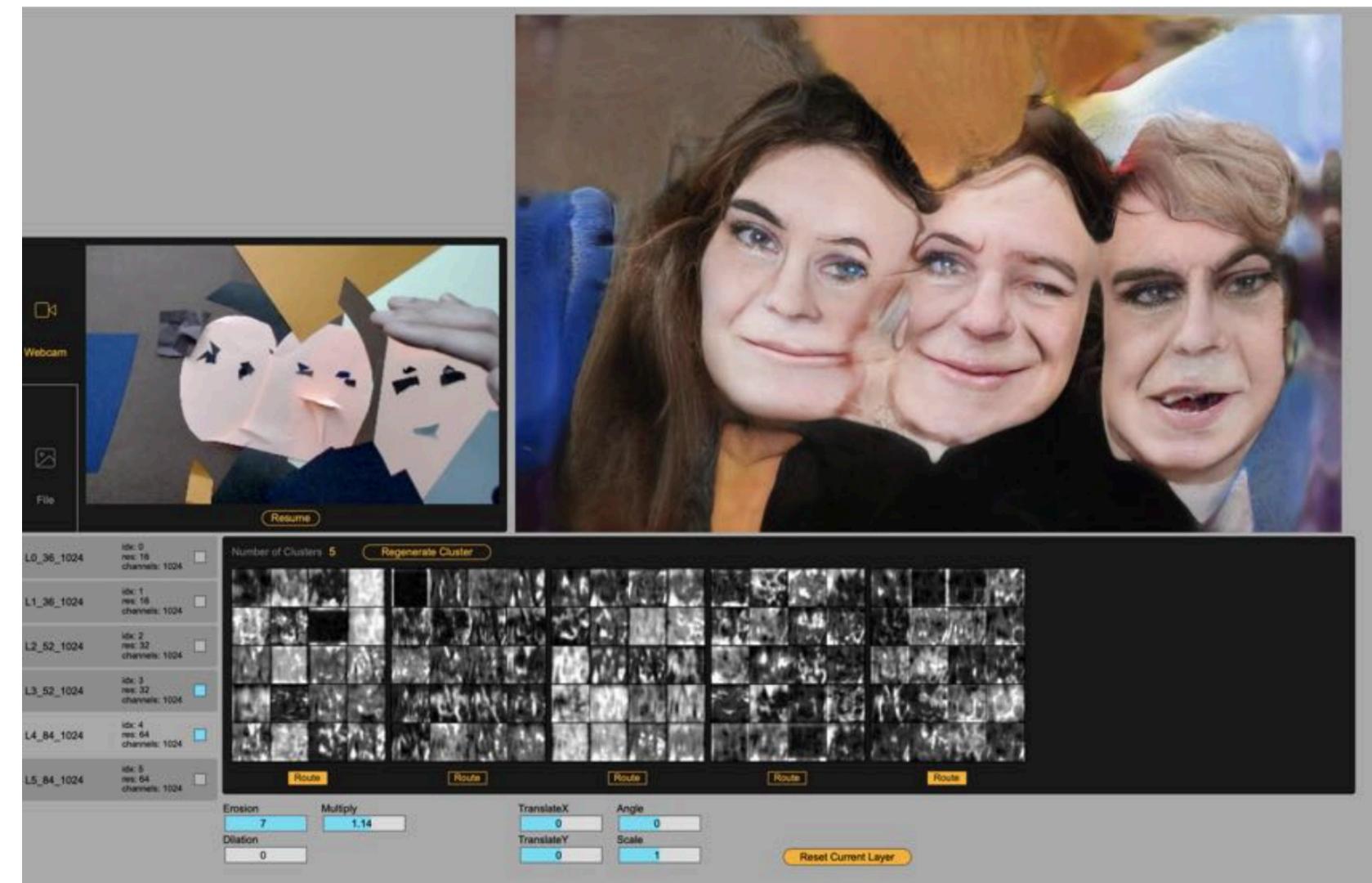
Reflections in the water — curators notes for Feral File,  
Luba Elliott 2021



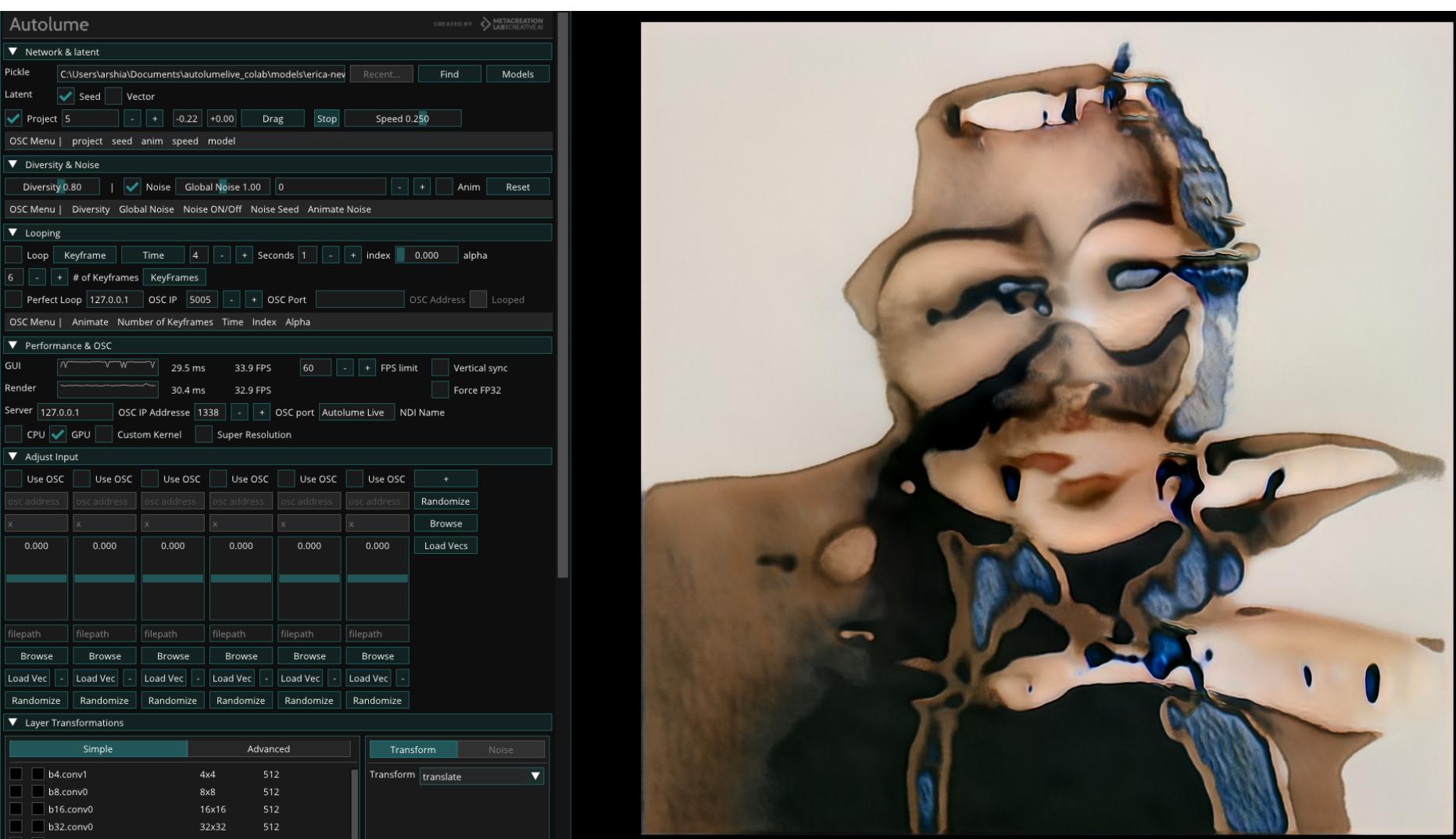
*Fragments of self (2021)*



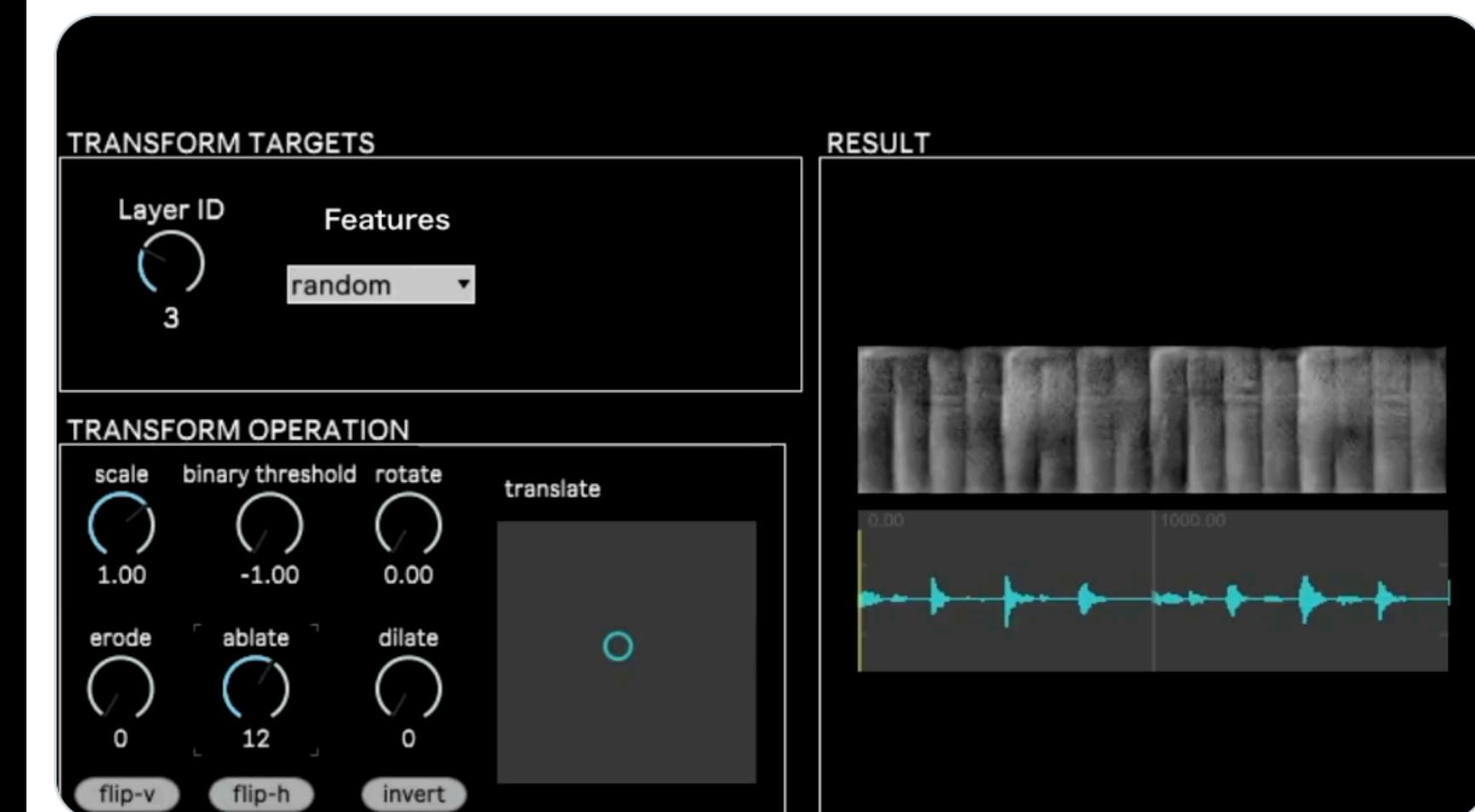
**StyleGAN3 visualiser**  
NVIDIA



**StyleGAN-Canvas**  
Shuoyang Zheng



**Autolume**  
Simon Fasier University



**LoopGAN interface**  
Nao Tokui



Beyond prompts  
(Network bending stable diffusion)  
Garin Curtis



Diffusertrack  
(Network bending riffusion)  
Dan Hearn



Brave  
(Network bending RAVE)  
Daniel Manz

 [acids-ircam / torchbend](#) Public

<> [Code](#) (●) [Issues](#) (Pull requests) (↻) [Actions](#) (Projects) (🛡) [Security](#) (⌞) [Insights](#)

🕒 main Branch 0 Tags Go to file <> Code

 **acids-ircam** Create README.md 26d9c07 · 3 months ago (🕒) 3 Commits

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 README.md Create README.md 3 months ago

📄 README ⚖️ License ⋮

# torchbend

`torchbend` is a library grounded on `torch.fx` focused on generative neural networks analysis and creative bending. This library allows you to:

- [✓] extend the tracing abilities of `torch.fx` with augmented parsers and proxies
  - dynamic parsing (wrapping un-traceable functions, shape propagation)
  - tracing torch distributions (currently implemented : `Bernoulli`, `Normal`, `Categorical`)
- [✓] easily parse and analyze model's graphs
- [✗] bend model's weights and activations
- [✗] adapt the library to specific generative models, and provide handy interfaces for python notebooks
  - [✗] handful classes for image, text, and sound
  - [✗] panel implementation for real-time bending

**Torchbend library (coming 2025)**

By taking data-free approaches we can ***expand the generative space*** of generative neural networks beyond what is possible with imitation based learning

By ***actively diverging*** from data we can open up new creative possibilities that are not derivative on the creative labour of others

Taking a ***hacking*** approach to generative AI, artists can create artworks that reveal unseen aspects of these models processes and give offer artistic approaches to explainability in AI

Link to slides:



Thanks for listening

<https://terencebroad.com/>

[terry.m.broad@gmail.com](mailto:terry.m.broad@gmail.com)