Esch – Numerical Typography

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- ▶ A shared fact of these sets is the care with which their members have so often been drawn

A B C D E F G H I J K L M N O P Q R S T U V X Y Z

𝔄 𝔅 ℭ 𝔇 𝔈 𝔉 𝔊 ℌ ℑ 𝔍 𝔎 𝔏 𝔐 𝔑 𝔒 𝔓 𝔔 ℜ 𝔖 𝔗 𝔘 𝔙 𝔛 𝔜 ℨ

А Б В Г Д Е Ё Ж З И Й К Л М Н О П Р С Т У Ф Х Ц Ч Ш Щ Ъ Ы Ь Э Ю Я

Figure 1: The Latin alphabet in double-struck (top) and Fraktur (middle),

and the Cyrillics in Libertinus Serif (bottom)

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▸ esch–using $\tanh(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}$ to map $\mathbb{R} \to [-1, 1]$–thus targets a continuous alphabet
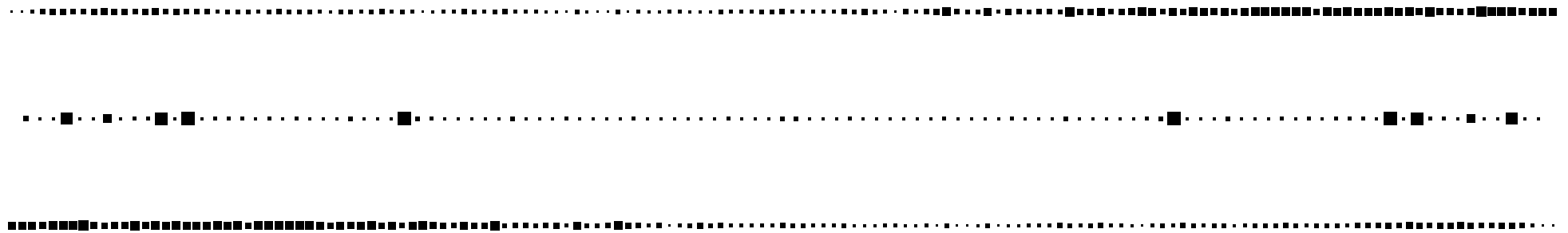
Figure 2: Three strings (or vectors) of varying length typed in esch

3 | ... and strings thereof...

▶ Stack esch strings to represent matrices...   image("figs/nanda_y.svg", width: 80%),)
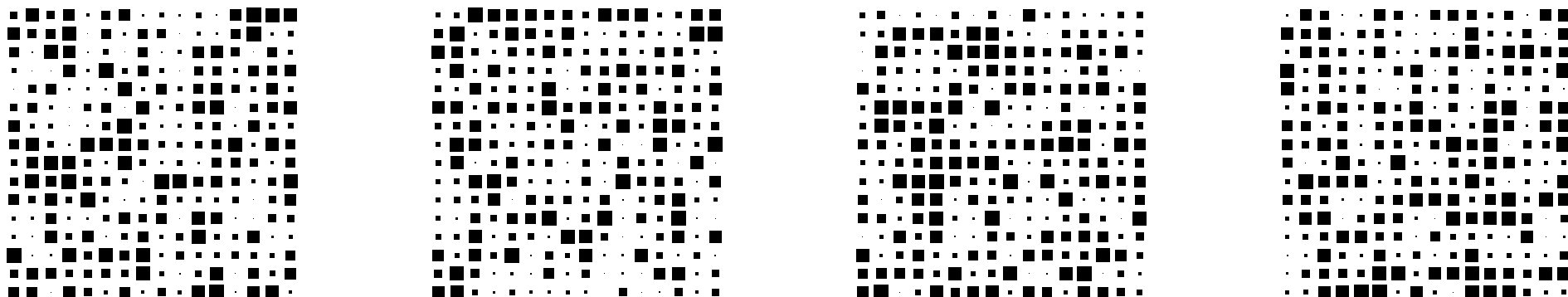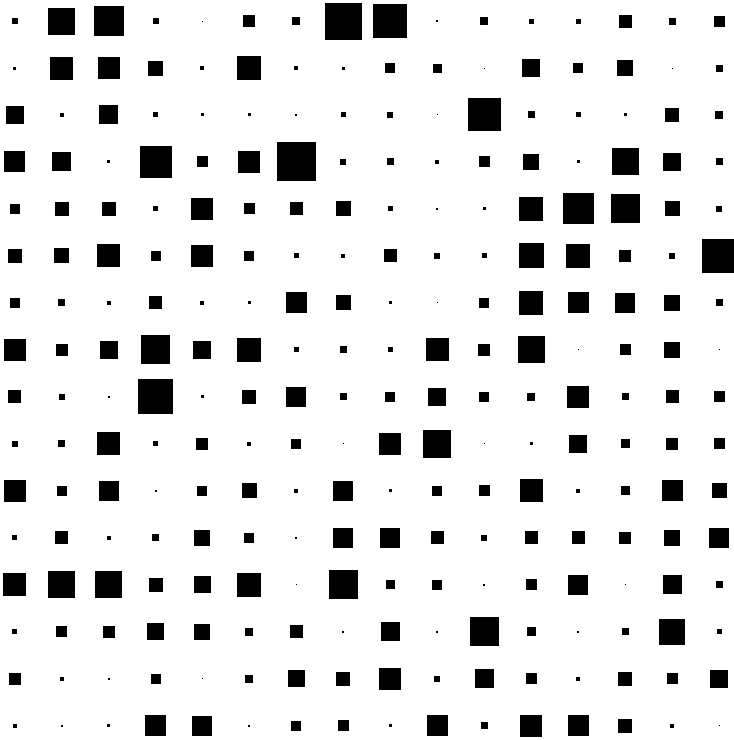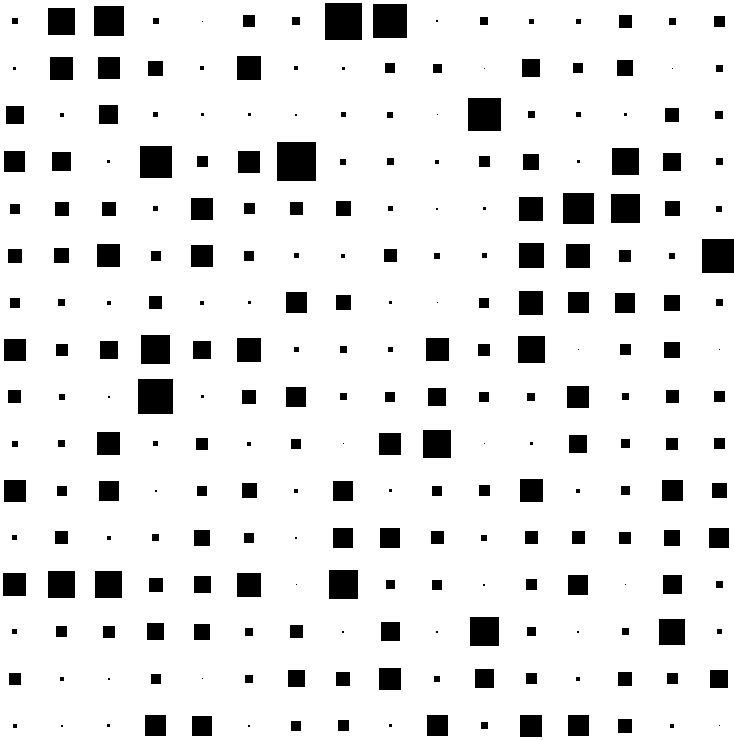
Figure 3: Four 16 × 16 uniformly random matrices

4 | ... and strings thereof

Figure 4: 16 × 16 × 80 tensor (last dim. temporal)

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▸ Show training dynamics in deep learning...

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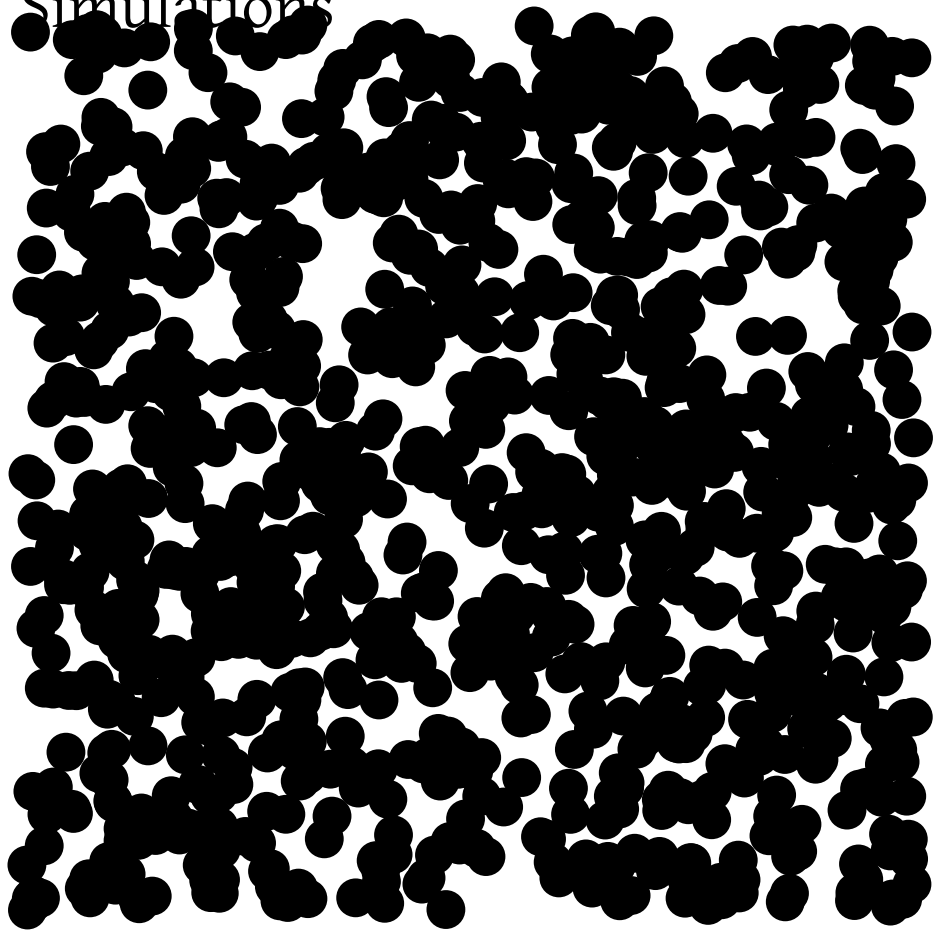- ▸ Show training dynamics in deep learning...
- ▸ ... and whatever else

5 | Meshes

▶ Allow for arbitrary positions of points

▶ Figure 5 shows fMRI (brain scan) data [1], [2]

Figure 5: fMRI data

Figure 6: $\sim U(0,1) \rightarrow\sim U(0,1)$ simulated in Parabellum [3]

▸ Fix sizes and animate positions

References

[1] A. T. Gifford et al., "The Algonauts Project 2023 Challenge: How the Human Brain Makes Sense of Natural Scenes," no. arXiv:2301.03198. arXiv, Jan. 2023.

[2] E. J. Allen et al., "A Massive 7T fMRI Dataset to Bridge Cognitive Neuroscience and Artificial Intelligence," Nature Neuroscience, vol. 25, no. 1, pp. 116–126, Jan. 2022, doi: 10.1038/s41593-021-00962-x.

[3] T. Anne et al., "Harnessing Language for Coordination: A Framework and Benchmark for LLM-Driven Multi-Agent Control," IEEE Transactions on Games, pp. 1–25, 2025, doi: 10.1109/TG.2025.3564042.