

# Generation of a Multi-pictorial Script

**Haytham Nawar**

Assistant Professor of Design and Director of the Graphic Design Program  
The American University in Cairo

haytham.nawar@aucegypt.edu

## **Abstract**

The ability to express our thoughts is a very powerful tool in our society. Being able to write is more difficult than being able to read, and this applies specifically to alphabetical languages/scripts. From a personal experience, being able to write in Latin/Arabic/Chinese is a lot more difficult than just being able to read them and requires a greater understanding of the language. We now have machines that can help us accurately classify images and read handwritten characters. However, for machines to gain a deeper understanding of the content they are processing, they will also need to be able to generate such content. The next natural step is to have machines draw simple pictures of what they are processing, and develop an ability to express themselves. Seeing how machines produce drawings may also provide us with some insights into their learning process. In this project/paper, a machine will be trained to learn pictographic scripts by exposing it to a database of selected ancient and modern pictographic scripts. The machine learns by trying to form invariant patterns of the shapes and strokes that it sees, rather than recording exactly what it sees into memory. This is a simulation of how our brains operate. Afterwards, using its neural connections, the machine would attempt to write something out, stroke-by-stroke. A technique that could be applied and used on different platforms, opening the door for a language or means of communication for the future.

## **Generated Pictographic Language**

In the light of the concept of machine learning, the prospect of generating a novel language becomes a certain scenario. Relying on pattern

recognition and the theory that computers can learn by merely being exposed to data, without the necessity of being programmed to perform specific tasks, machines can indeed offer mankind a newly developed language (writing system) that is conceived from its processed language(s).

After becoming exposed to a set of characters and/or symbols, a machine becomes capable of independently adapting, learning from acquired computations to produce reliable, repeatable results on a very large scale as it weaves the similarities amongst the data it has been exposed to.

## **Project Concept**

The pictography existing in all early scripts of mankind is a crucial cornerstone in the theoretical argument of universal iconography common to all writing systems. The fact that all independently derived writing systems came to be as arrangements of pictograms before their evolution into sophisticated forms, serves as evidence of the significant iconographic nature of the very notion of writing.

In light of what has been raised and examined above, the aim of my project revolves around the basic idea of introducing a designed pictographic generative language utilizing machine learning. The machine would be exposed to a database of vector-based ancient pictographic scripts, ranging from Sumerian Cuneiforms, Egyptian hieroglyphs, Dongba and Nsibidi symbols, Aegan script, to Chinese characters. By forming consistent patterns of the shapes and strokes it processes, the machine utilizes its neural connections in attempting to

produce new pictographic characters, stroke by stroke, onto a digital screen.

Ultimately, by recognizing and grouping similar patterns and pinpointing the similarities amongst these scripts in relation to style of strokes, complexity of figures, and proportions, the machine becomes capable of generating a firsthand pictographic language reflecting the homogenous characteristics of each of the writing systems, combined. Writing systems created civilizations; hence, the final result produced would serve as a unique investigation of the existing, yet unconsciously neglected, relations among the diverse cultures of many civilizations.

	1208	1209	120A	120B	120C	120D	120E	120F
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
A								
B								
C								
D								
E								
F								

Fig 1. Cuneiform Script characters.

	131C	131D	131E	131F	1320	1321	1322	1323	1324	1325	1326	1327	1328
0													
1													
2													
3													
4													
5													
6													
7													
8													
9													
A													
B													
C													
D													
E													
F													

Fig 2. Hieroglyphic Script characters.

## References

1. Ethem Alpaydin, *Machine Learning: The New AI*. MIT Press, 2016.
2. "A Book from the Sky 天书 Exploring the Latent Space of Chinese Handwriting." *A Book from the Sky 天书*, Genekogan, [genekogan.com/works/a-book-from-the-sky/](http://genekogan.com/works/a-book-from-the-sky/).
3. L. Bloomfield, *Language*. (University of Chicago Press: Chicago, 1958).
4. W. Chafe, *Meaning and the Structure of Language* (University of Chicago Press: Chicago, 1970).
5. "大卜口 MI · Design." Recurrent Net Dreams Up Fake Chinese Characters in Vector Format with TensorFlow | 大卜口, Studio Otoro, 28 Dec. 2015. [blog.otoro.net/2015/12/28/recurrent-net-dreams-up-fake-chinese-characters-in-vector-format-with-tensorflow/](http://blog.otoro.net/2015/12/28/recurrent-net-dreams-up-fake-chinese-characters-in-vector-format-with-tensorflow/).
6. Golan Levin, et al. "Alphabet Synthesis Machine - Interactive Art by Golan Levin and Collaborators," Golan Levin and Collaborators, 2001, [flong.com/projects/alphabet/](http://flong.com/projects/alphabet/).

7. Bing Xu, et al. *Tianshu: Passages in the Making of a Book* (Bernard Quaritch Ltd., 2009).

### **Biography**

Nawar is an artist, designer, and researcher who currently lives and works in Cairo. He is Assistant Professor and Director of the Graphic Design program, Department of the Arts at the American University in Cairo. He is the founder and Artistic Director of the Cairotronica, Cairo Electronic, and New Media Arts Festival. Nawar received his Ph.D. from the Planetary Collegium, Center for Advanced Inquiry in Integrative Arts, School of Art and Media - University of Plymouth. He is a Fulbright alumni. Since 1999, he has participated in several international exhibitions, biennales, and triennials, the latest of which was Venice Biennial in 2015. Nawar won awards and acquisitions nationally and internationally in Algeria, Bosnia and Herzegovina, China, Cyprus, France, the US, among many others.