

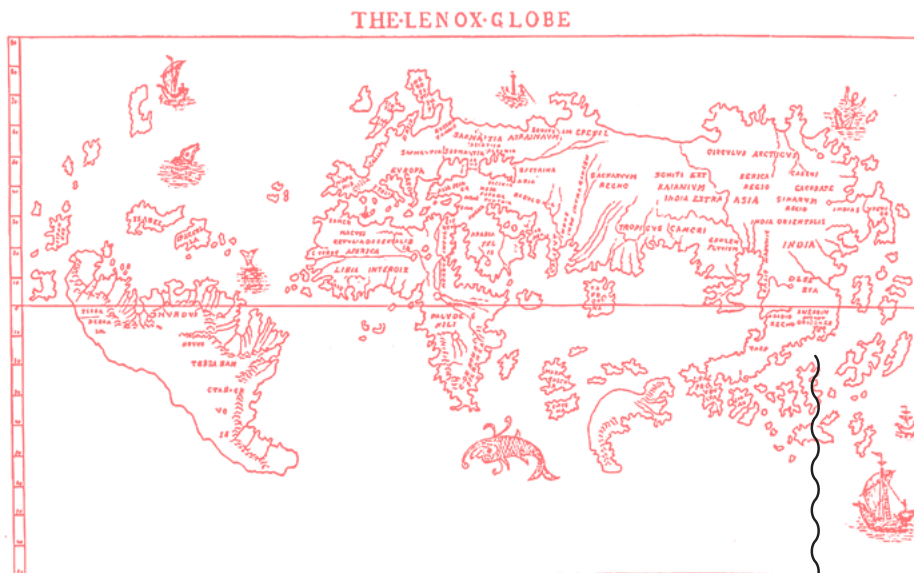
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**Here Are Letters
Federico Pérez Villoro**

“No algorithm exists for the metaphor, nor can a metaphor be produced by means of a computer’s precise instructions, no matter what the volume of organized information to be fed in.” —Umberto Eco

One of the greatest rarities in the collection of The New York Public Library, the Hunt-Lenox globe — a tiny sphere made out of copper — was made around 1510 by an unknown artist. It is considered the earliest surviving globe from the period following the discovery of the New World and among the first known cartographic representations of the Americas. In the Western hemisphere, only South America is represented as unified. It appears as a large piece of land with the regional names *Mundus Novus*, *Terra Sanctae Crucis*, and *Terra de Brazil*. North America is drawn as a group of scattered, unnamed islands.

A flat representation of the Hunt-Lenox globe



Here are dragons

The rest of the world is more detailed as it was better explored. However, near the southeast coast of Asia, it contains a warning — *Hic sunt dracones*: “Here are dragons.” No monsters are near the words themselves, but the map shows various sea creatures throughout. Ancient cartographers used to include illustrations of dragons and other mythical creatures in their maps, but the Hunt-Lenox Globe is notable for being one of only two known instances of a historical map to bear this phrase in writing.¹ Over the years, versions of this sentence were used to signify unexplored areas where there were potential dangers.

The explorations included in this publication are also incomplete. They are an effort to map an unknown space, one that is so large and complex that it probably cannot be represented but by the manifestation of the space itself: an old Borgesian paradox. It is not even a physical space, but rather a figurative one made of an algorithm’s acquired knowledge. It describes the capacities of a custom-made computer program trained to recognize the formal patterns present in letterforms. By analyzing a large number of glyphs from thousands of typefaces, the model was designed to generate novel forms that suggest the gestures of characters but lack semantic attributes. This book also describes a variety of programmatic tools developed to generate compositions and slices of the model: an imagined space populated with an unlimited number of forms that exist between the alphabet. Though useful to access and articulate particular aspects of program, as with any other map, these representations remain

diagrammatic and only glance at the totality of the model's design.

Language is a complex system. It could be conceived as a unified lexical whole — a sculptural mass that is composed of elements that generate semantic meaning as they relate to each other. This system, however, relies on symbolic representation and is expressed through discrete forms. Letters are significant relationally — in their capacity to generate words and sentences, but also on their own. The cultural relevance embedded in letterforms, as well as the possibility to distill their formal essence, has been a rich area for aesthetic and technical research. In a search for universal functionality, there have been countless efforts to reduce characters to elemental geometry and omit personal traits in their forms. Likewise, there is an ample history of designers and computer scientists that have tried to compute instructions that generate new characters within a font, stipulating that the overall identity of a typeface is implicit in the design of its single letters.² More recently, the introduction of *variable fonts*, an OpenType font format, allows users to interface through the axes of a typeface design and access intermediate steps within sets of glyphs. Iterations made possible with variable fonts might be extensive, yet the conceptual parameters through which you can modulate them ought to be preconceived by the designer and often respond to preexisting typographic conventions where the obvious choices would be properties such as weight, height, slant, and so on.

The program developed for this exploration reverses this process. It not only interpolates between the letters hosted in the database, but generates a

series of axes that represent the formal patterns of the input. If variable fonts are the possible positions within a defined design space, this program expands outward to include the possible parameters that *determine* such design space. It emerges from a specific collection of existing letterforms. The outcomes are multidimensional and are not limited to a single font or type family. Variations are generated in the correlations that exist in the dataset as a whole. Each coordinate of this imagined space is affected by the totality of the other present coordinates. Likewise, variations are not only interpolations between the nuances of style in different fonts, but also between the geometry of letterforms themselves, in both their basic versions and in intricate expressions.

Uruguayan philosopher Carlos Vaz Ferreira used the concept of *razonabilidad* to describe reason and sensibility as complex systems with non-categorical interdependencies.³ His writing dissolves the boundaries between emotions and the intellect. This way of organizing perception suggests all kinds of hybrid manifestations in language and contrasts with the Western ontological dichotomy that has guided how we understand knowledge in the West — where intelligence is often conceptualized as something distinguishable from emotions. It is in this spirit that this project emerges: from a curiosity to explore the ways in which the model organizes information — not through specific assigned categories, but by the recognition of patterns that manifest in the forms in and of themselves. This is not a pragmatic undertaking. However, it might help to observe and reflect on how the algorithmic accumulation diverges and coincides with the rational order of written

language. In the algorithm, shapes attract and repel each other, given their structure and not following the logic that historically organizes typefaces. By removing rationality from letters, all that is left is language's materiality as a muted corpus. The remaining forms are then more meaningful, as they reveal the process of coming into being and mirror their hosting platform. The results stand as metaphors for the machine's intuitive imagination and self-assigned limited structure. A set of "hallucinated" incoherent characters, the outcomes bring to the surface the program's own inconsistencies, technical capacity gaps, and the thresholds of its erratic behavior.

The convenience and ubiquity of modern-day mapping is familiar. However, we know all efforts to represent space will be imprecise. Already the correspondences between a flat map and the spherical shape of the earth are fundamentally imperfect. Likewise, maps are not only inaccurate, given impossibility theorems, but also in their often-biased political nature. Furthermore, the formulation of digital spaces accessible worldwide through distributed devices has reshaped political geographies. Sovereignty has transcended the control of areas defined by territory to areas defined by access to information and the potential reach of messages. The power over spaces is no longer so much about the control of physical territories, but about the control of their descriptions: the maps that assess their territory.

Historically, maps are used to control the people residing within their borders. Instead of having to conquer and hold territory by force, maps allowed legal ownership of a space for the ruling class.

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Redrawing the map was often enough to redraw the reach of power. Today, Google customizes the borders between countries depending on what country you are in when you look at them: a feature that allows them to hold back responsibility for their demarcation practices and avoid political controversies, such as in their misrepresentation of the border between Nicaragua and Costa Rica, causing a dispute between the countries.⁴ Countries like China and India prohibit the publication of maps that don't tell their respective political truths regarding the disputed Arunachal Pradesh region. In this context, technology companies like Google take on new political roles as they determine behavioral standards within their infrastructures. The complexity of these forms of power has led to new understandings of territories — where digital space can be conceived as land open for colonization within the order of data.

Control over these new political spaces depends on high technical literacy. The calculations that machine learning technologies perform are so large that they escape the human capacity for abstraction. It is common for the people who develop these programs to lack real clarity on how they work; the intermediate steps that take place in the algorithm's operations are often inaccessible — a condition that is particularly problematic when these techniques are applied in industries such as health, policing, and economics and in a time when social decisions are increasingly being transferred to computational processes.

This lack of transparency could be comparable to the obscurity of the Middle Ages. If then cartographers illustrated dragons on maps, we

now fear limitless automation and we imagine dystopias governed by sentient machines. Both popular culture and academic circles have animated fictions around artificial intelligence without paying enough attention to explain the functioning of technologies. This obscurity is honed by an ecosystem where the inner workings of technological products are protected as corporate secrets under intellectual property laws. Contemporary technological darkness has become a recurring space onto which we project our shared social fears onto the unknown.

Machines only respond to their design and training logics. Algorithms cannot transcend the categories that are voluntarily or involuntarily transferred by a given dataset. Neural computation amplifies the human logic imposed and does not replace it — their structure is affected very directly by human intervention. As Matteo Pasquinelli has written: “If one wants to understand how much neural computation extends into the ‘inhuman,’ one should discern how much it is still ‘too human.’”⁵ Therefore it is not the unconsciousness of the machine that is expressed in the results included in this publication, but rather a reflection of the biases present in the design of its algorithm. They are the used dataset and the decisions that were made in coordination with the given possibilities of the machine.

In a landscape where the technological processes governing our lives are increasingly obscured, this publication aims to reveal the underlying processes of a machine learning program. It seeks to mediate machine “sight” and human comprehension. By engineering an algorithm to process letterforms and generate its own, the project illustrates the powers and limits of automation. As Marie Otsuka, who designed

this book, rightly said: “The resulting outputs of this algorithm — an alphabet without semantic value — embraces and emphasizes the meaningless results of the machine: it is the human input and framework that imbues ‘sense’ to these forms.” Neural networks are only statistical calculations of the relations that exist within a dataset — a form of pattern recognition. Meaning only emerges in assigning a human interpretation to their outcomes. Combining expository exercises with surreal typographic characters, this publication is both a grounding text on the mechanics of machine learning and a visual celebration of formal possibility.

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- 3 Zalamea, Fernando. *Peirce and Latin American “Razonabilidad”*: Forerunners of Transmodernity. *European Journal of Pragmatism and American Philosophy*. 2009. <https://journals.openedition.org/ejppap/971>
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