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# The Kolam Point Lattice for playful typographic systems

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**Abstract**: This paper presents the Kolam Point Lattice system for structuring typefaces, derived from a 5,000-year-old art of making sacred geometric floor drawings, practiced by the Dravidian women of South India. In it, a designer uses a point lattice formed by a regularly spaced array of points and a line that circumnavigates, ropes in, or connects the points to draft characters, as an alternative to using the orthogonal grid. First, I show how the Kolam point lattice system is used to construct characters, including construction principles, types, and uses. Second, I show that this system offers a whole alternate universe of typographic possibilities that are not apparent when designers use a series of constraining straight lines to play with type. The wide array of reference points gives a flexible structure to the Kolam point lattice, encouraging experimentation with shapes to create typefaces that are expressive, responsive, and dynamic.

***Key words: Kolam, type making booklet, play, design education, grid system, playful typeface design, system design, Indian craft.***

## 1. Introduction: Design in India

Traditional Indian design thinking is rooted in the concept of *Kala*. Singanapalli Balaram (Balaram, 2011) and H. Kumar Vyas (Vyas, 2000) describe the term *Kala* as the unified concept of all human arts, skills, sciences, and techniques. Balaram writes in his book, *Thinking Design*, "[i]n the West, design emerged as a reaction to mass production, but in India, the story is quite different. The Indian tradition always held art and craft as one unified whole. In the classical Indian Language Sanskrit, there is only one word Kala covering both." Before independent India was influenced by the Industrial Revolution in the late 1940s and early 1950s, the artisan was the innovator, creator, producer, and distributor of a product. In the late 1950s, the Indian government invited Charles and Ray Eames to recommend a training program in design that would serve as an aid to the small industries. On Eames's visit to India, they explored problems of design, conducted studies and discussion, and made their recommendations in a document called *The India Report* (Charles Eames, 1958), (Ray Eames, 1958). The report advocated the setting up of an indigenous

design legacy that involved applications of modern disciplines and old traditions to meet the challenges of contemporary India. Based on this report, The National Institute of Design was established in 1961 in Ahmedabad; it was followed by the IDC School of Design in 1969, and the National Institute of Fashion Technology in 1986.

Over the past few decades, the European school of thought that separates fine arts and crafts and machine-made objects has deconstructed the concept of Kala and distanced the traditional design ethos present in India's three-millennia-old design heritage from its contemporary design values. The primary focus of graphic design education in India is based on modernist and post-modernist principles, but these design movements were born out of cultural and technological influences in the Western world and did not evolve around the Indian user's needs, behaviors, or values. Scholars are defining Indian design pedagogy by looking at the needs of an Indian market and the social, economic, and political influence on design with a single goal: How do we define Modern Indian Design and its roots?

The New Wave of Indian Type Design includes contributors like the *Indian Type Foundry* co-founded by Satya Rajpurohit that designs and distributes multilingual fonts for both Indian and the global market and the *Ek Type Collective* by Girish Dalvi producing type families like Anek and Mukta that support multiple Indian + Latin scripts. Many independent typeface designers like Kimya Gandhi and Chandni Poddar are making incredible work inspired by Indian visual culture and languages. *Matra Type* by typeface designer Pooja Saxena focuses on design for Indic scripts, notably Devanagari, and studying typographic visual languages from India and offers workshops on Indian street lettering.

## 2. A Dravidian Woman's Tradition: A Designer's Typographic Tool

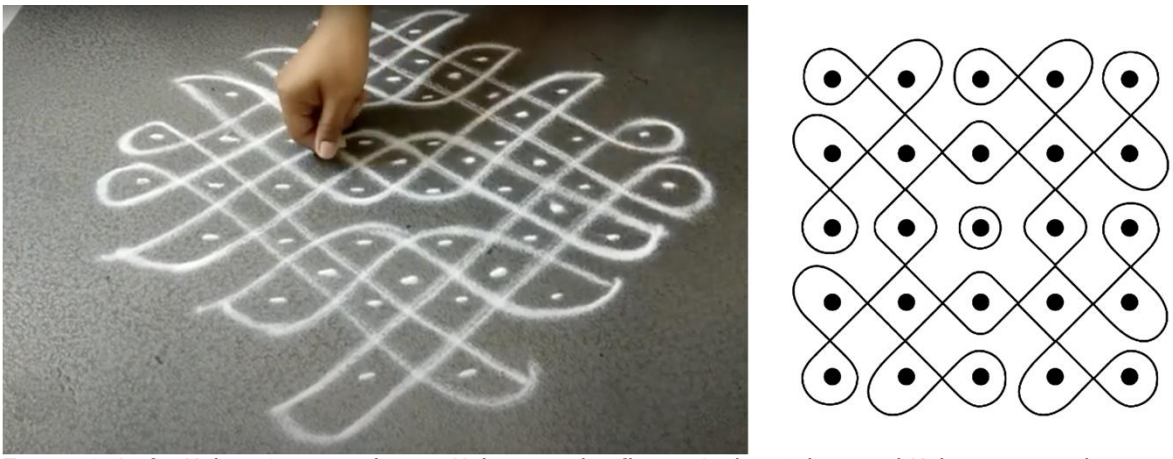

Figure.1 (Left) Kolam Artist making a Kolam on the floor, (Right) A digitized Kolam vector drawing.

A Kolam drawing is a geometric pattern made at the threshold of a house. It symbolizes a sacred diagram meant to invite deities, ward off negativity, and meditate (Nagarajan, 2019). Millions of Dravidian women in Tamil Nadu draw Kolam drawings every day before dawn and dusk, using finely ground white rice powder or paste (called Kolapodi in the Tamil language). The rice on the floor invites birds and insects for a feast, encouraging a harmonious coexistence. Recursive in nature, Kolam drawings often begin with a point and enlarge into intricate geometric patterns (Figure. 1).

Kolam drawings are solely made by women, where artistic skills are passed on from mother to daughter in a mentor-mentee model of creative practice. Expressing their ideas by making art every day is a life-long pursuit for the Kolam artists. Women come together to create an intimate space where they share artistic knowledge, keenly play with locally found natural materials to make tools and colors, sing folk melodies, perform rituals, and hone skills to establish an artistic practice. This creative process culminates in a female-specific canon of Dravidian women's heritage of creative methods, visual style, materials, and symbolism that is shaped through lived experience. Through this research, I look inward into the design ethos and tools present in Indian arts and crafts and present its application in contemporary design practice. The paper introduces the Kolam Point Lattice for playful typographic systems—a framework of points used to structure letters. The point lattice system can be used as a visual organization tool in graphic design and functions as a more efficient system for drafting geometric, organic, and complex fonts, than an orthogonal grid. It allows designers to use a wide array of reference points to make customized geometric and free flowing shapes in various scales on the same lattice, thereby allowing more control over the resulting proportions of a character.

As a design educator and graphic designer, I am challenged with sharing graphic design history, methodology, and tools with students that are not confined to the Western design heritage of the Industrial Revolution. This research would help design students and professionals in India learn about structural thinking from their design heritage and understand the socio-cultural context specific to the evolution of the point lattice system derived from Kolam drawings. By dividing the page into culturally familiar geometric ratios, designers develop visual sensibilities relevant for communicating with an Indian audience.

## 3. Methods

### 3.1 Ethnographic Research Method: Primary Data Collection

The study uses ethnographic research methods, such as participant observation, semi-structured interviews, and archival resources, carried out through fieldwork in Mahabalipuram, Tamil Nadu and in New Delhi, in India. I collected hundreds of Kolam drawings through primary resources, such as the Kolam artists' personal drawing diaries, as well as Kolam drawings made on roads in local neighborhoods of Tamil Nadu and Delhi and drawing books on Kolam patterns found in local markets. Kolam drawings are more than just a collection of geometric patterns. The socio-cultural context in which Dravidian women draw Kolam drawings was studied to understand the significance of the drawing process itself, including the symbolism associated with the repeating shapes, such as points and lines, used in Kolam patterns. This data was published in *The Kolam Drawing: A Point Lattice System* in Design Issues by The MIT press in July 2022 (Sarin, 2022).

### 3.2 Formal Analysis Method

I identified the lattice's function in guiding patterns made by Kolam artists and conducted a formal analysis of the compositional properties of Kolam drawings. I completed a formal investigation into the use of the point lattice system in structuring characters used to create expressive typographic systems. Together, these analyses revealed a highly efficient framework for structuring form that can guide customized, geometric, and curved characters through an array of points.

## 4. The Kolam Point Lattice for playful typographic systems

The Kolam point lattice is used as a framework consisting of a lattice of points that are connected or circumnavigated by lines to construct typographic characters. In the following section, I discuss the point lattice system basics to share a visual and verbal vocabulary of terms and set expectations for how the system functions.

### 4.1 System basics

The point lattice system can be studied as a set of points distributed over a two-dimensional plane (Figure. 2).

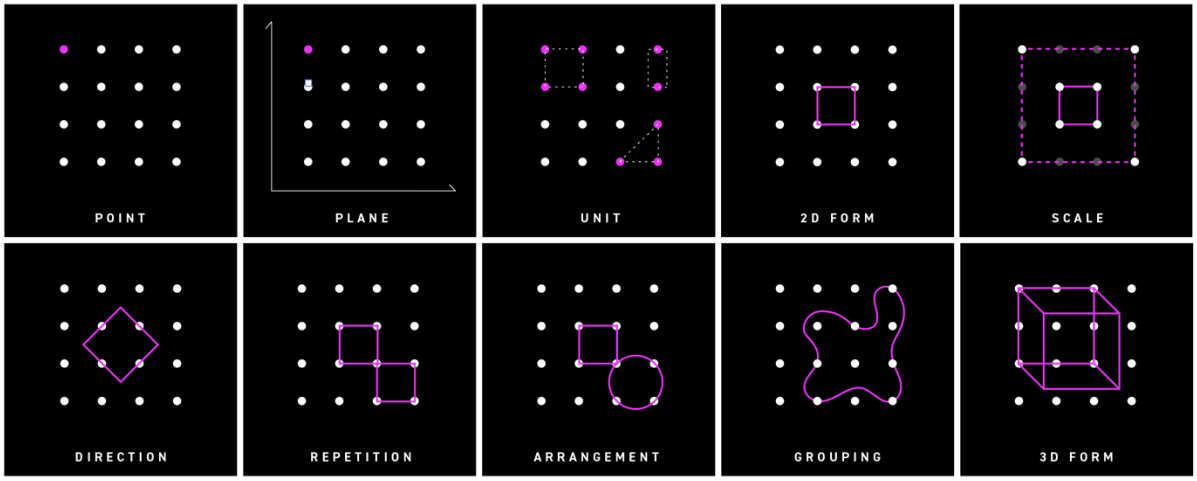


Figure.2 The Kolam Point Lattice System Basics.

Point: A point indicates a position and has no length or breadth. It multiplies at equally spaced intervals in x and y directions to form a lattice.

Plane: A plane is a flat, two-dimensional surface that extends infinitely far. The point lattice lies on an xy-plane used for the construction of two-dimensional forms that can sometimes also engender illusionary three-dimensional forms.

Unit: A group of points used to create the smallest shape in a composition is called a unit. A unit may contain two or more anchor points that are usually placed together in a cluster and are used to structure the shape.

2D Form: Two-dimensional form can be constructed on the lattice by connecting or circumnavigating points with a straight or curved line.

Scale: A shape can be proportionately scaled using the same mid-point and a similar set of lattice points.

Direction: The orientation for a shape can be changed by rotating it, while keeping the same mid-point and anchor points used in a different orientation.

Repetition: A shape can be repeated to create a set of identical shapes by using a similar set of anchor points on the lattice.

Arrangement: Two or more shapes can be constructed on the lattice, using the same number of anchor points, resulting in an arrangement or composition.

Grouping: A free-flowing form can be constructed by grouping different shapes into one big shape or by drawing a continuers stroke of line moving on and around the lattice points.

3D form: The point lattice exists in a two-dimensional plane, but it can be used to structure three-dimensional forms, where the sense of volume is illusory.

**4.2 Construction basics**

The characters used in a typeface can be understood as a collection of shapes working in harmony to represent ideas through language. As most designers realize the vision for a typeface by drawing out basic shapes, it is important to understand lattice construction principles and techniques for drafting geometric shapes. These basics can be applied to the process of developing new concepts for typefaces on the lattice.

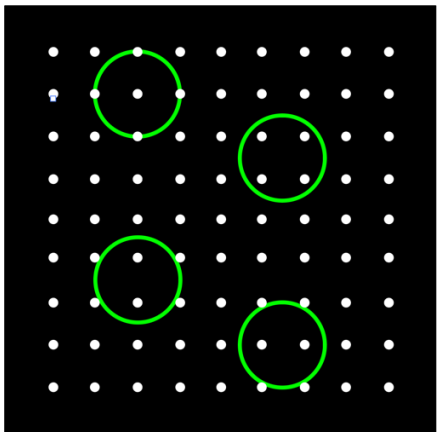

Figure.3 Construction techniques using lattice anchor points.

Construction techniques with anchor points: A set of lattice points connected or roped in by a line to construct a shape are called anchor points. There are multiple ways to structure a shape with anchor points. In Figure.3, a circle is drawn in four ways, including connecting four points, enclosing four points, enclosing two vertical points, and enclosing two horizontal points. Once a designer determines a technique for making a shape with points, the same technique must be used to create all other shapes in the same composition to maintain consistency. A designer can choose a construction technique based on ease of use, type of composition, and personal preference.

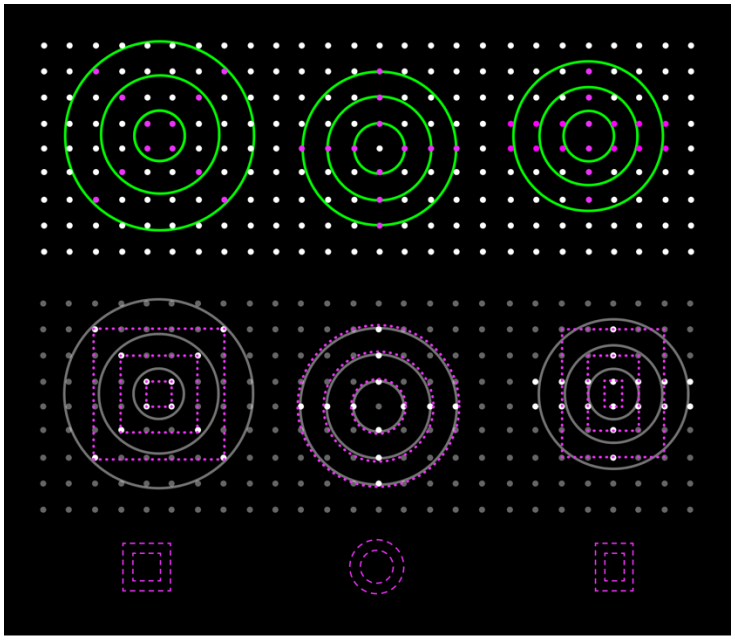

Figure.4 Underlying structure for a set of circles, drawn using different construction techniques.

Proportions: A shape constructed with a set of anchor points can be proportionately scaled using a similar set of anchor points, as seen in Figure.4. If the anchor points used for the construction of circles were joined with a line, the designer would notice a unique underlying structure for each set of circles. The same set of shapes can have a different underlying structure, depending on the constructing technique used to draw the shape (connecting four points, enclosing four points, enclosing two vertical points, and enclosing two horizontal points). The way a designer chooses to connect or circumnavigate points with lines creates unique proportions, even if the same shape is used in all instances.

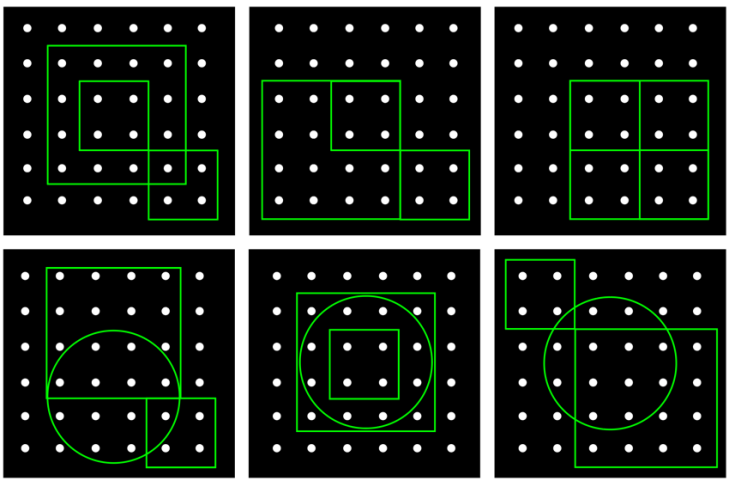

Figure.5 Permutations of shapes.

Permutation of shapes: The order in which a set of shapes are arranged can be changed to create a variety of different compositions (Figure.5). This playful exercise allows for quick exploration of arrangements in space, where the shapes remain the same but our perception of their proportion changes.

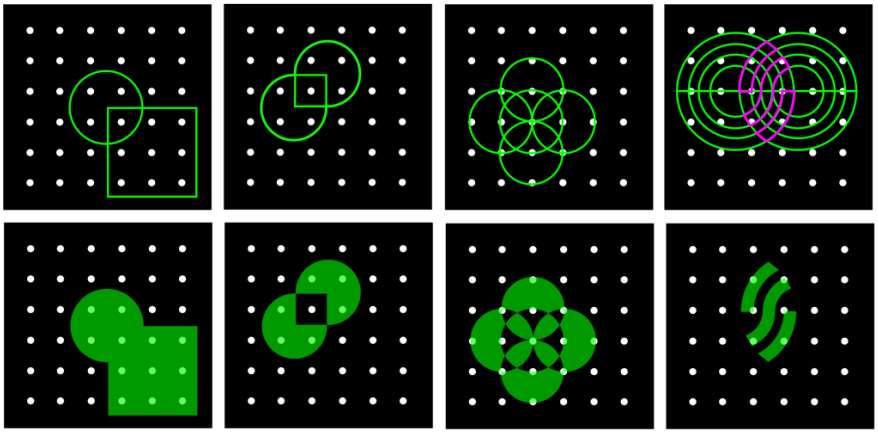

Figure.6 Addition and subtraction of shapes using the Kolam point lattice.

Addition and subtraction of shapes: Two or more identical or different shapes in any scale can be combined to create a large shape. The overlapping area between shapes disappears when the shapes are combined, leaving behind an outer outline. Subtraction or exclusion can also be used to create complex shapes that present a visual relationship between positive and negative space, creating dimensions of foreground and background. As another approach, new shapes can be drawn over intersecting lines without using addition, subtraction, or exclusion (Figure.6).

### 4.3 How to make a typeface using the Kolam point lattice?

This section emphasizes shifting the rules of play in type design. By changing the tools we use to construct characters for typefaces, we can open ourselves to news ways of understanding typographic possibilities that are not apparent when designers work with a series of constraining straight lines in a grid.

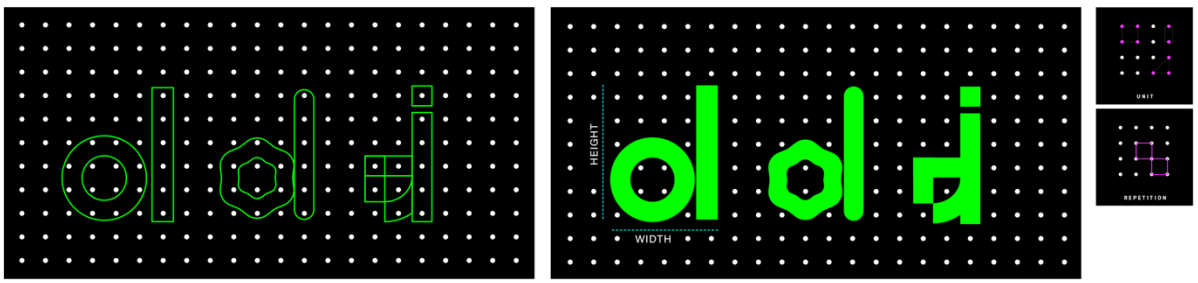


Figure.7 The Kolam Point Lattice used for drafting geometric, curvy, or modular characters.

Body: Most ideas for typefaces begin on the sketch book with basic shapes, as a designer drafts the vision for a typeface. Using any of the construction techniques presented in *4.2 Construction techniques with anchor points*, the Kolam point lattice can be used to draft geometric, curvy, or modular fonts. The space occupied by each shape in the character can be measured in points. In Figure.7, for the geometric ‘d’, the outer circle of the bowl has 2x2 vertical points and 2x2 horizontal points while the inner circle occupies 2x2 square points. The body of the character has proportions of 5 points (w) x 6 points (h).

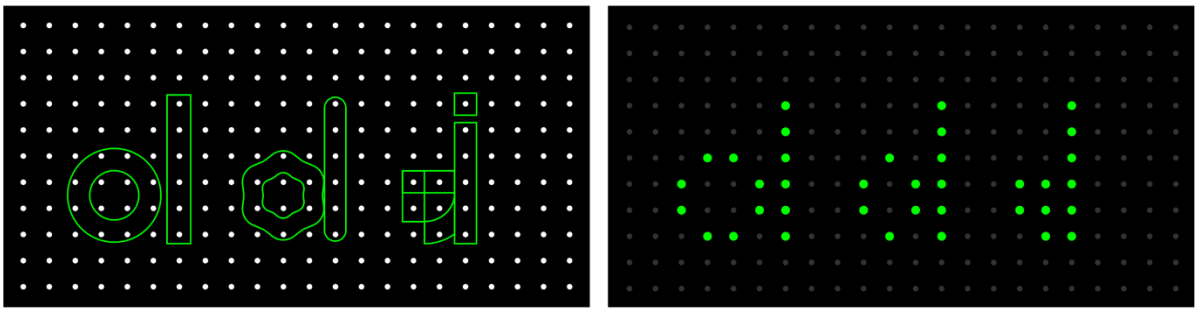

Figure.8 Anchor points used to draft the letter ‘d’.

Unlike the grid, space is not divided and measured in square modules but is outlined with points. The anchor points used to draft a character adapt to the shape of the character (Figure.8).

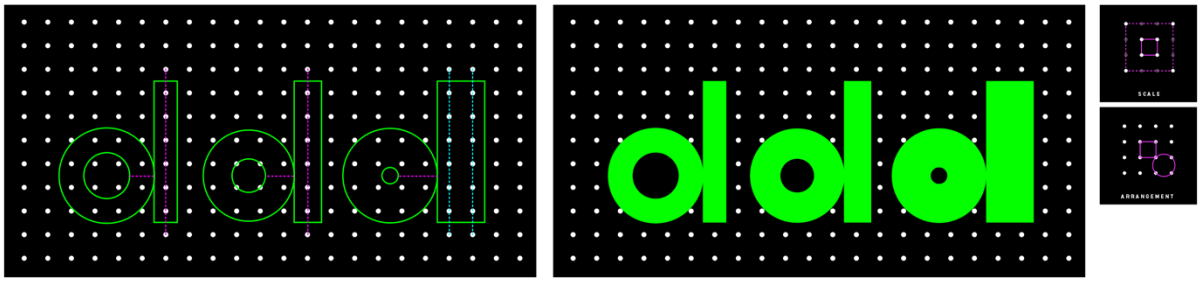

Figure.9 Three weights for the geometric letter ‘d’.

Weight: The weight for a character can be changed by increasing or decreasing the points enclosed by the modules. In Figure.9, for the geometric ‘d’, the weight of the bowl increases as the inner circle decreases in size from enclosing 4 points to none. On the contrary, the weight of the stem increases as it encloses more points from 4 points to 8 points. The stem expands symmetrically around an axis line until it is wide enough to include two or more guiding lines.

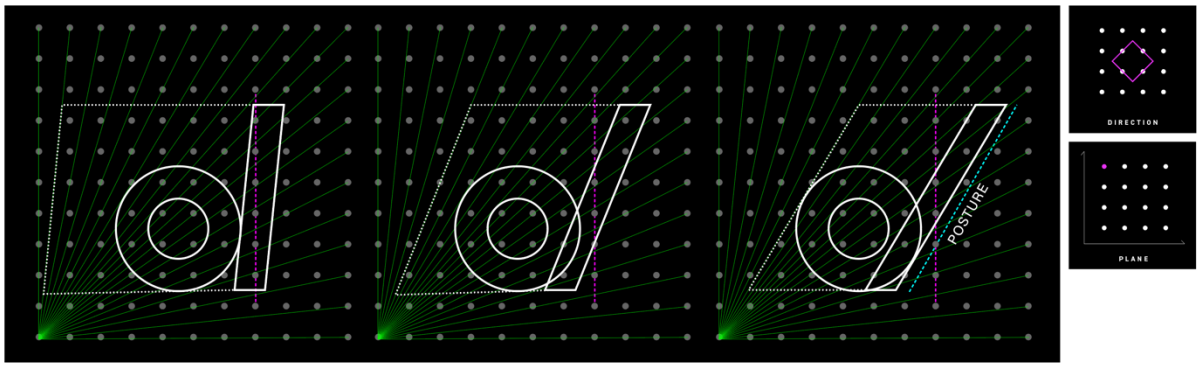


Figure.10 The posture of the letter ‘d’.

Posture: The posture of a character changes by shifting its direction in relation to its axis. The character can be aligned to a network of slanted lines drawn on the lattice. The slanted lines have one origin point but several landing points, each at a distance of one point or less (Figure. 10).

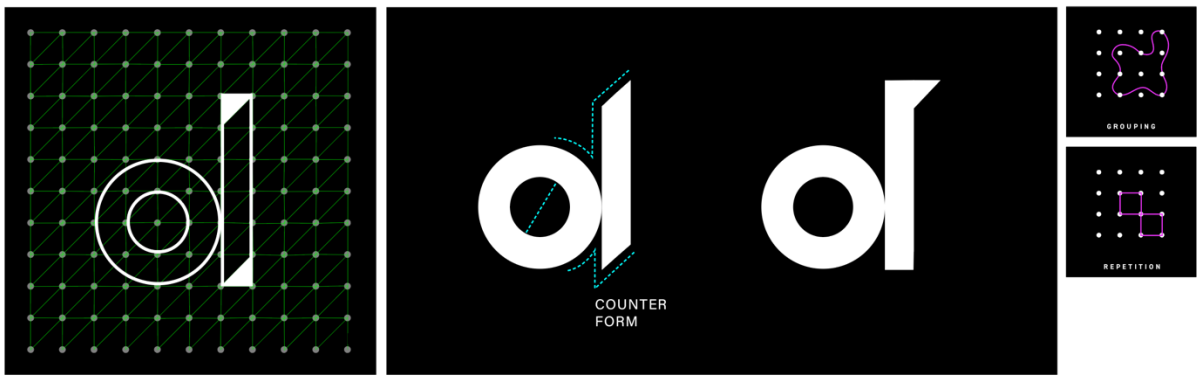


Figure.11 Stylized edges for the letter ‘d’.

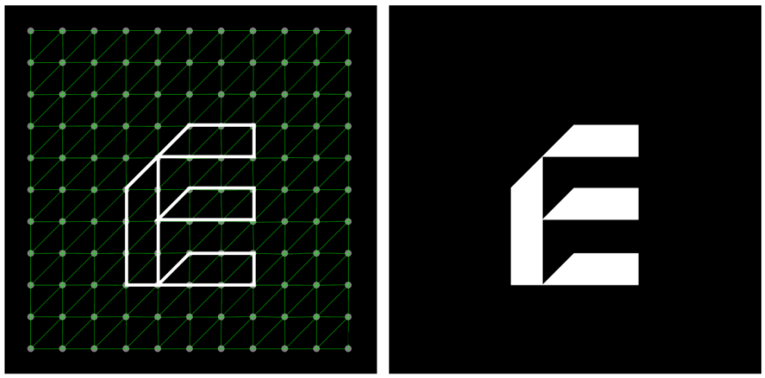

Figure.12 Stylized edges for the letter ‘E’.

Edge: Many types of patterns can be created on the lattice by connecting the points. The edge of a character can be stylized by taking snippets from the patterns. In Figure. 11, the

geometric ‘d’ transforms into an angular ‘d’ by slicing the edges based on a triangular pattern. By adding a triangle, a serif ‘d’ is generated. This parameter helps define the counter space around the character and affects the legibility, rhythm, and style for a font.

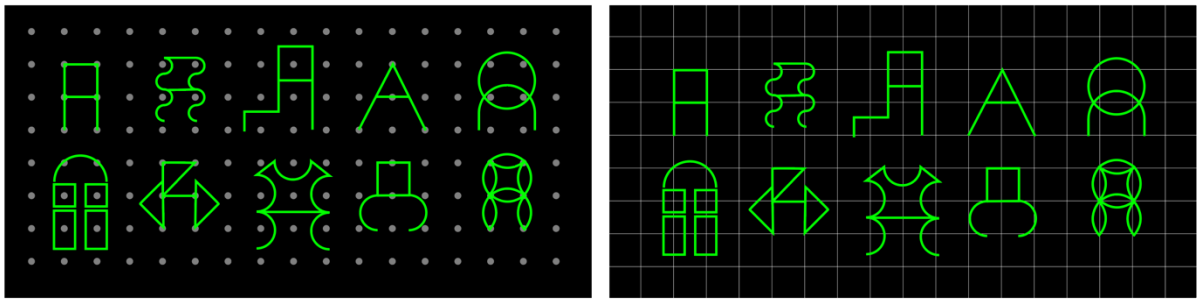

Figure.13 Experimentation with the letter ‘A’.

Playful and expressive fonts: The open and fluid lattice framework of a wide array of reference points, where points can be connected or navigated with a line brings flexibility to the font-making process as designers don’t have to adhere to the strict limitations of an orthogonal grid structure. This encourages experimentation with form and sparks imaginative, expressive, and playful characters (Figure. 13). The lattice supports and adapts to fonts of any shapes, sizes, and personalities. A designer has the freedom to imagine and create ideas for new fonts by simply breaking out of a system of lines used to guide form and instead use a set of points to define their own parameters and components for a visual system of characters.

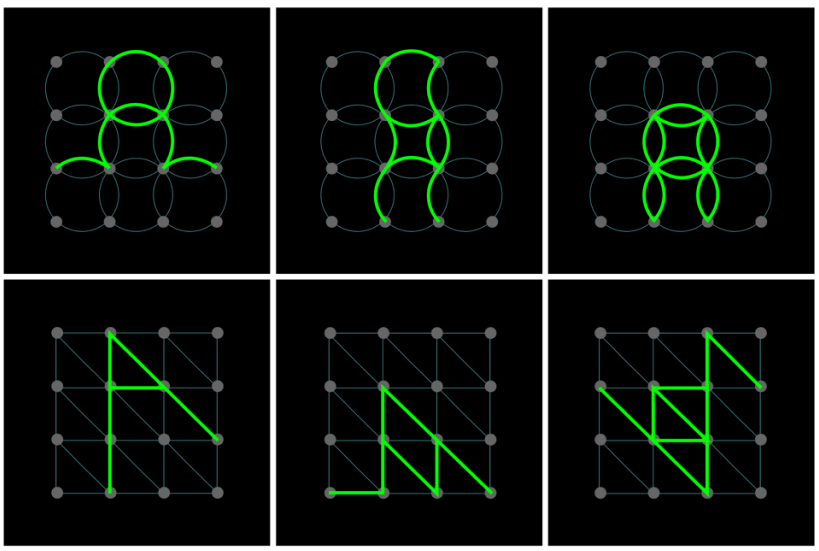

Figure.14 The letter ‘A’ created on lattice patterns.

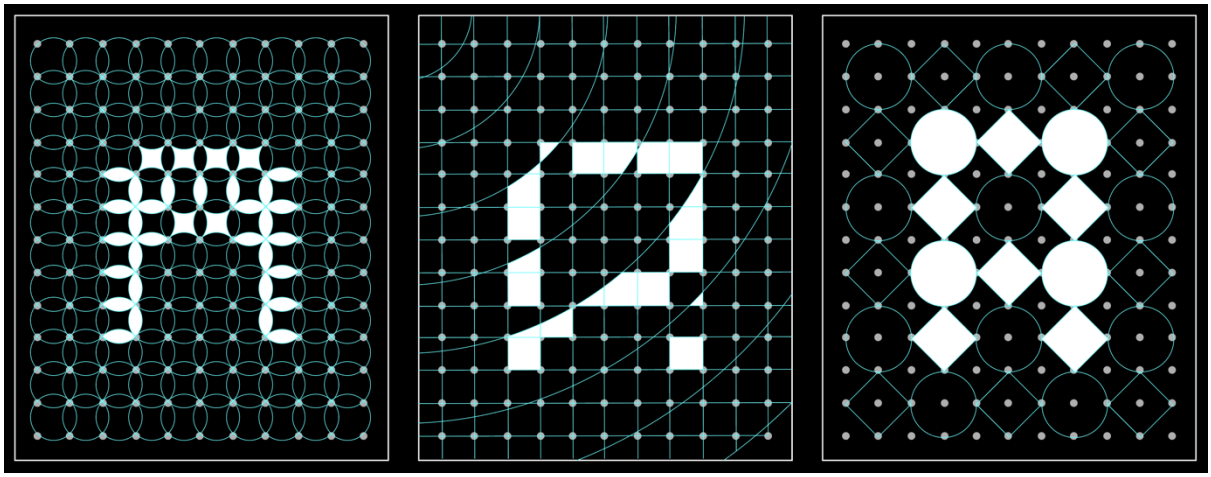

Figure.15 Examples from the typographic booklet showing the letter ‘A’, created by filling pattern modules.

Typographic Booklet: A quick method to explore new outlines for fonts is to draw geometric or organic patterns on the lattice and use overlapping, intersection, and interwoven shapes to create characters (Figure. 14). This paper is accompanied by a typographic booklet, compiled with a series of 21 patterns made with interlaced points and lines that work as a compositional support for drafting characters (Figure. 15). The booklet can be used by design educators as a tool to encourage learning by playing, as students create new concepts for typographic systems. It can also be used by professional designers as a tool to sketch, explore, and generate visual drafts for typographic characters. The example shows the making of the letter ‘A’ by filling the modules in the pattern.

## 5. Conclusion

From the rigid structure of a modernist grid to the responsive grid made of screen pixels, designers make use of a grid as a tool to construct and design typefaces. Over the past two centuries, graphic designers have continually experimented with many systems of proportions, culminating in the use of several types of grids (Samara, 2005), (Grünberger, 2019), (National park Service, 1978). And yet, we see limited educational models for independent visual organization systems in graphic design that have existed or evolved outside the influence of automation, and that present us with alternative ways to draft typefaces.

What happens when we redefine the conditions with which we construct typefaces and how does that influence its body, posture, counter form, scale, contrast, weight, and proportion? Can the tools we use to draft type characters play a role in the conception of the typeface

and guide its form? If the relationship between a letter and the framework used to construct the letter is an intimate one, what happens when we begin to explore alternatives for the construction framework and let that be a source for new typeface ideas? This paper is a step towards exploring and answering these questions.

The Kolam point lattice system can be used as a visual organization tool in type-making—one that presents designers with a new way to draft typefaces and opens a world of typographic possibilities when compared to a grid of its size. The fluid nature of the negative space between points is the real space for exploration and imagination - while the lose but cohesive framework of points provides just the right amount of structure; together these aspects of the Kolam point lattice create space for endless exploration of ideas.

In the West, historians credit designers, such as Josef Müller-Brockmann (Müller-Brockmann, 1996), Emil Ruder (Ruder, 2009), and Karl Gerstner (Gerstner, 2019), with inventing and popularizing the grid as a means of structuring graphic compositions. But they are overlooking the fact that Dravidian women have been using a system of points and lines to structure their compositions for millennia.

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