Typography and Children
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Visual Cryptography in Typography

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Abstract: Typefaces as much as a puzzle to solve, as they are a message to read. This research explores how typography can exist in the grey area of legible and unreadable, allowing the message to reveal only when paid attention to it. Using various techniques of visual cryptography, these typefaces serve as an intersection of design, art, play, sculpture, environment, and logic.

Key words: Cryptography, Visual cryptography, Pareidolia, Secret Message, Puzzle, Perception, Cipher, Geometry, Illusion, Optical Art, Legibility, Readability, Patterns, Tessellation, Sculpture, Art, Play, Tactile

1. Cryptography

Some knowledge is sacred, only for the chosen few. Information like private messages, company secrets, passwords are all safe and secure because of cryptography. Cryptography is the practice and study of techniques for secure communication between the sender and receiver. Simply put, it is about sharing messages in a secret manner. This age-old study's application can be seen in use from the times of Julius Ceasar (Fig. 1) to modern day electronic encryptions for safe and secure transactions.

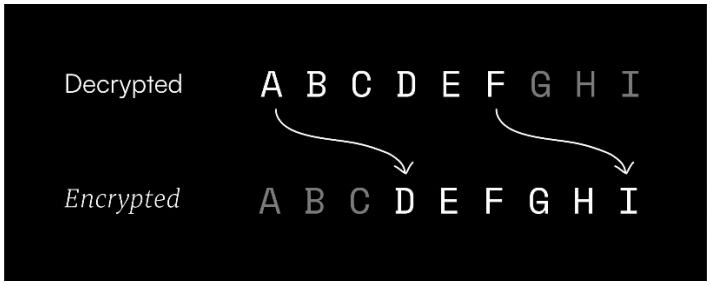

Fig.1

2.1 Visual Cryptography

One of the techniques of encrypting messages is visual cryptography. As the name suggests, messages are encrypted in a visual format such as images and typography. One of the best-known techniques involves breaking an image into parts, so that only someone with all the parts can decrypt the image (Fig. 2).

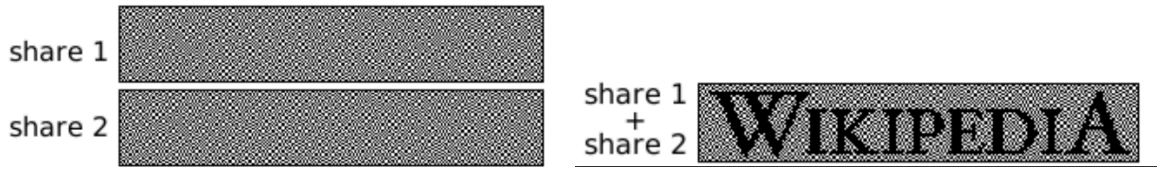

Fig. 2

Some techniques also use typography as a tool, such as:

2.2 Turing Fonts (Fig. 3)

Like Caesar cipher, characters of these fonts are unordered on purpose. These fonts mainly exist in the digital world, when one wants to publish something sensitive and do not want to be indexed by search engines like Google. (This is not the actual font; it is the technique's name. Link to the fonts attached in the References section)

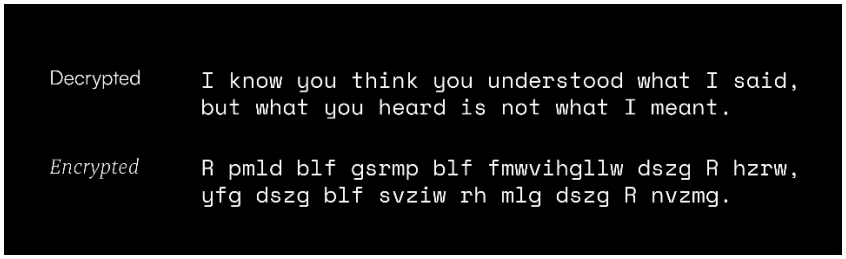

Fig. 3

2.3 Bacon Cipher

Bacon Cipher involves the usage of two typefaces. Each character of the decrypted message is replaced with 5 characters to encrypt it. Like binary has 0 and 1, this cipher have typeface A and typeface B. The character 'a' will be written in 5 characters of typeface A. For 'b' it is 4 characters of typeface A and 1 character of typeface B and so on (Fig. 4). Also, to keep in mind that the actual content of the encrypted message is not essential to the cipher, it is the usage of typefaces. Fig. 5 have lyrics of the song I just want to say I love you by Keith Rogers in the encrypted format. When decrypted it says "you are not my type"

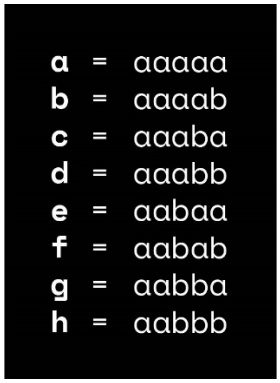

Fig. 4

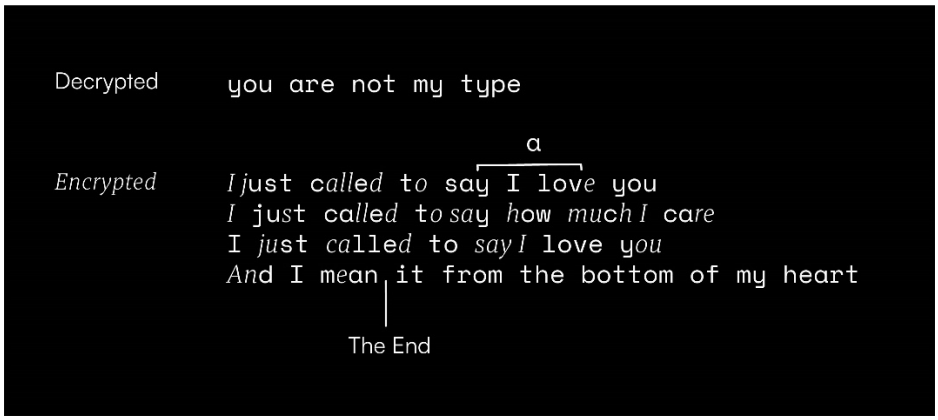

Fig. 5

It is interesting to see how human nature of saying something and meaning something else finds its way into our visual techniques of communication.

2.4 Printer Steganography (Fig. 6)

Printer Steganography is a technique in which secret yellow dots are printed on paper encoding the details of the device that page was printed from.

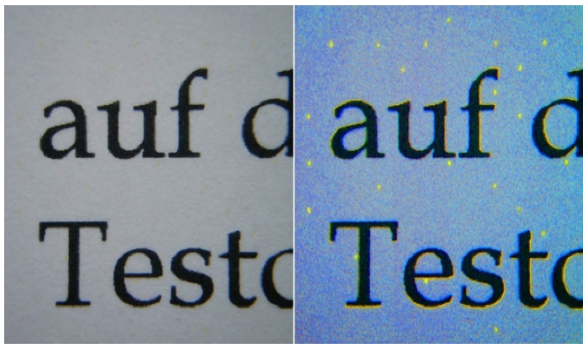

Fig. 6

2.5 Pigpen Cipher (Fig. 7)

Pigpen Cipher is all about replacing characters with symbols. It is the most common cipher used as kids to communicate.

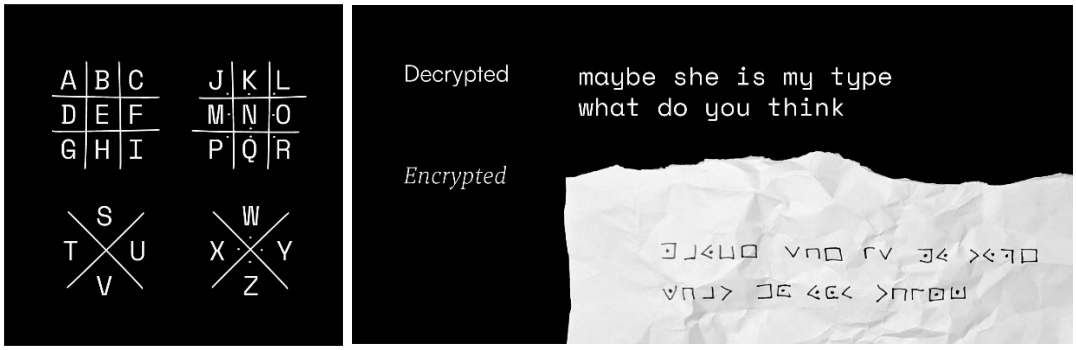

Fig. 7

And sometimes it is the plain old handwriting of doctors that can do the trick (Fig. 8).

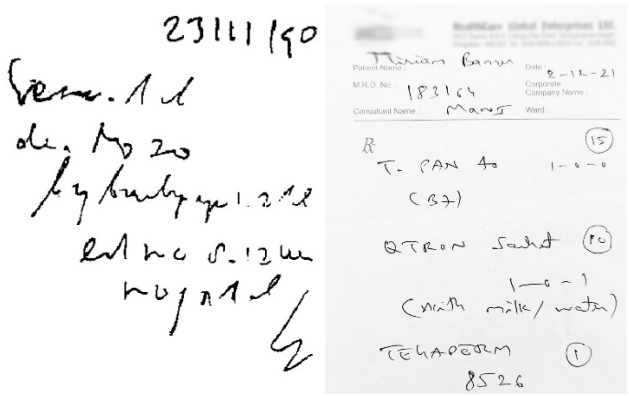

Fig. 8

3.1 Visual Cryptography in Typography

This study is an exploration of how typography can facilitate visual cryptography. The result of this ongoing research are typefaces that are as much as a puzzle to solve, as they are a message to read. In plain sight these typefaces might look like random patterns but when looked closely they reveal the hidden message they carry.

Such letters have a Pareidolia effect. Pareidolia is one such effect that falls into grey area between the encrypted and decrypted. For example, a cloud might look like dinosaur, or the texture on a floor tile might be perceived as a face. Pareidolia can be used in visual cryptography where the letterforms and typography exist in the grey area of legibility and

unreadable (Fig. 9). By relaxing the constraints of legibility, letterforms were created in a way that requires the reader to pay attention to them.

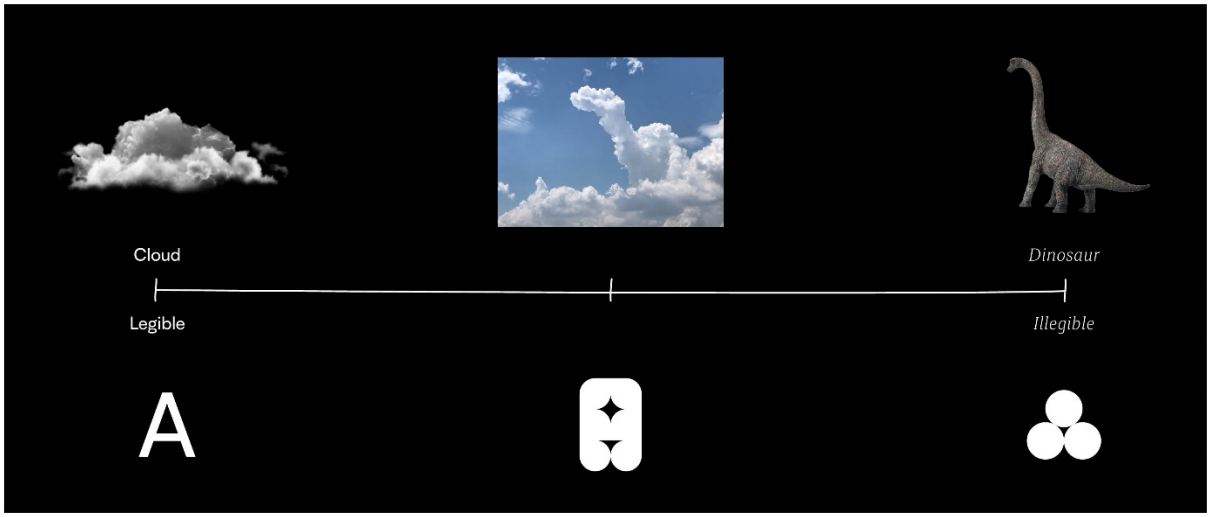

Fig. 9

A programmatic method was used to create these typefaces. As there are 0s and 1s in binary as elements and when a bunch of them put together in a structure i.e., in a line, a code is formed. In a similar way, basic shapes like circles and triangles were used as elements and the structure became the grid using which these shapes were arranged to create letterforms (Fig. 10). Each typeface apart from their cryptic nature has a certain visual flavor and attributes to them.

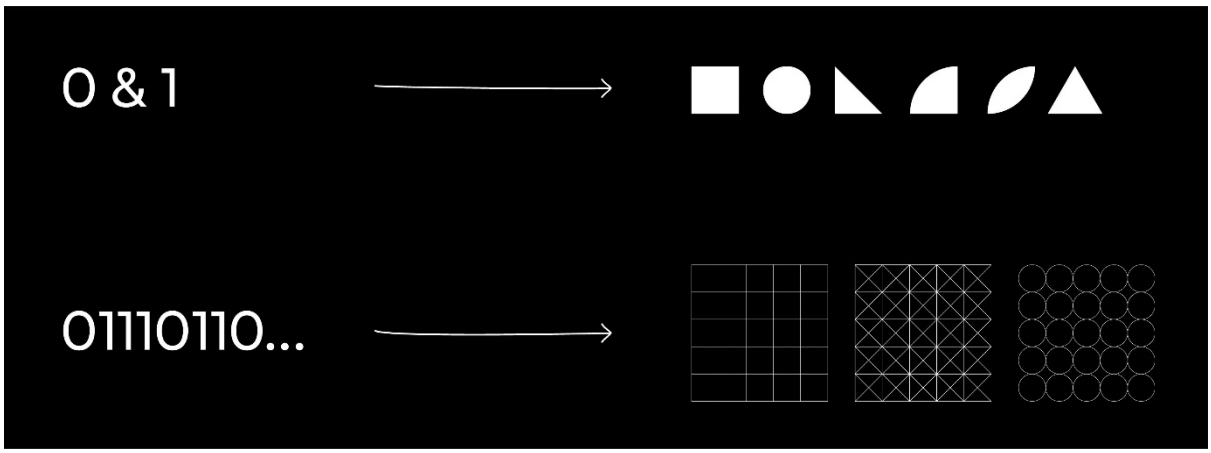

Fig. 10

3.2 Cypher Mono

Cypher Mono is created using this triangle, following a grid created by the shape itself (Fig. 11). It is geometric, techie, hard to read because of its sharp features and when stacked it in a perfect grid, the message sits in plain sight waiting to be understood but is perceived as some coding related graphic (Fig. 12).

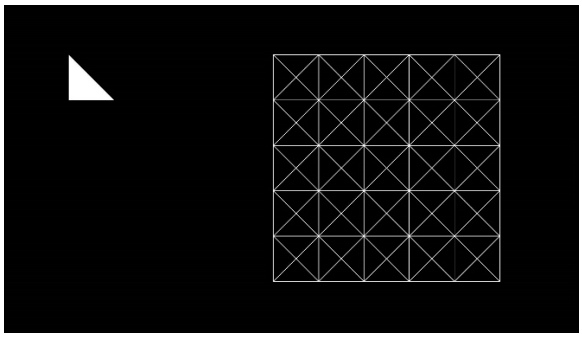

Fig. 11

Fig. 12

Fig. 13 is based on the same grid as Cypher Mono, but with circles. It has always been interesting to use type in a dot grid format, but if the grid changes slightly, it changes the whole dynamic and makes it difficult to read.

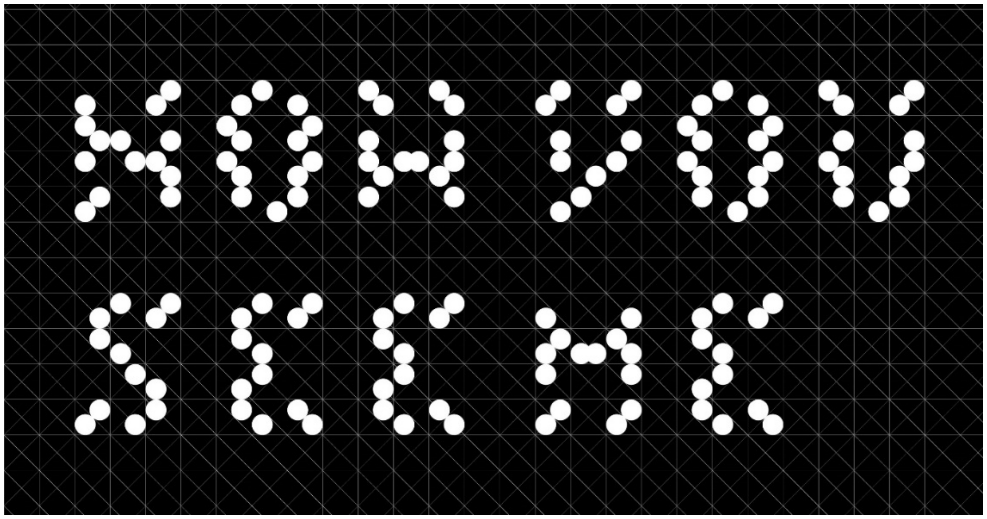

Fig. 13

Next one, again follows the foundation of Cypher Mono, but morphs in a different way. It transitions its features from a geometric, techie feel to a very organic and nature related features. While trying to group these triangles, their roundness was accidentally increased which resulted the forms to change (Fig. 14). This is one of those happy accidents where the second nature of tech reveals itself. Chances of coming across letterforms like this would be extremely less if followed a conventional way.

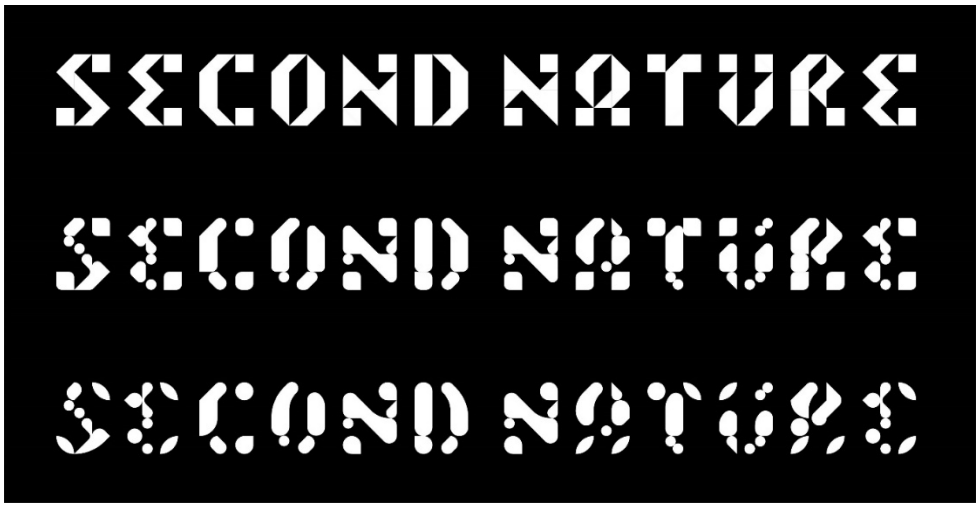

Fig 14.

3.3 Circus Mono

As shown earlier (Fig. 2), breaking a message into parts can encrypt it, this technique acts almost like a tool that can be used to create letters. This one has square and circle as its elements and a square grid as its structure (Fig. 15). Its rounded nature provides its whimsical and fun visual attributes along with the primary cryptic nature. For example, Fig. 16 has a Dr. Suess's quote in Circus Mono.

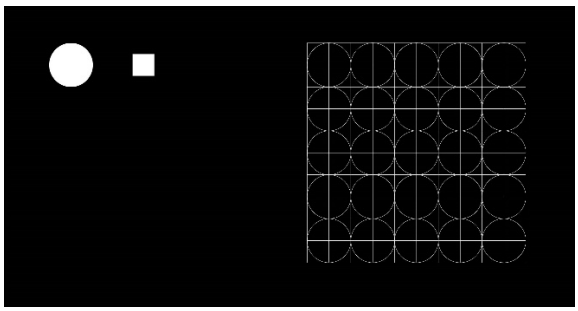

Fig. 15

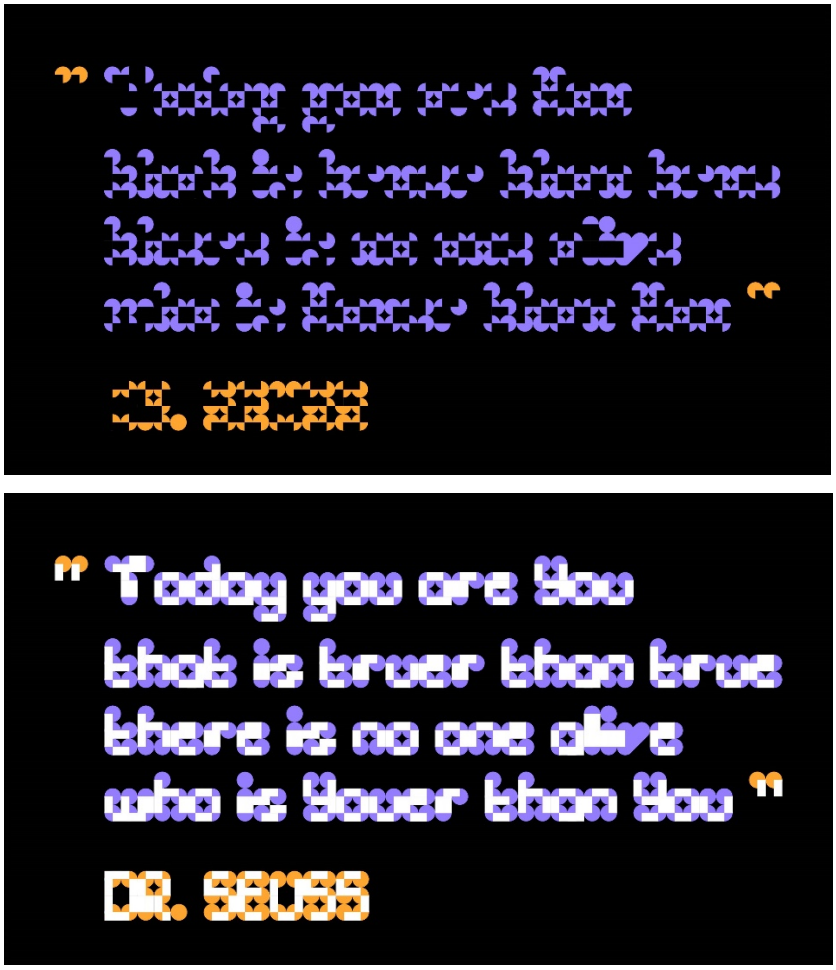

Fig. 16

While exploring grid and shapes, it was discovered that the less no. of shapes used in creating the letterforms, the more difficult it is to read the letter. Like seeing an image in HD vs an image in less pixels (Fig. 17). One can interpret the image if one already has seen it multiple times, or the case of letterforms, read them multiple times.

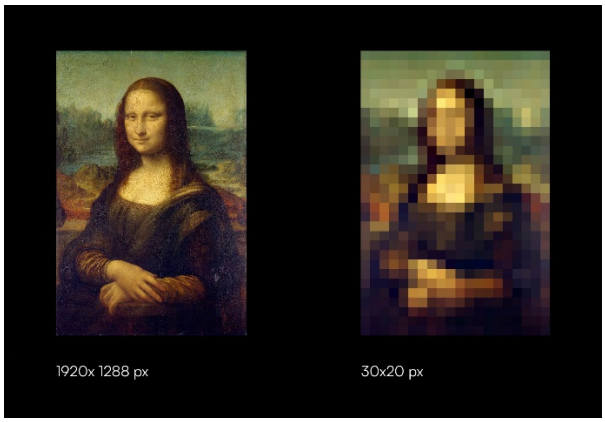

Fig. 17.

With the process of subtraction, unification, intersection, inverse of intersection and union of intersections, exploration led on to creating 8 sets of Circus Mono (Fig. 18).

Fig. 18

As seen in Fig. 19 all the characters are the letter ‘o’. If further explored with line width and outlines, with a bunch of permutation and combination one can end up with a lot more styles (Fig. 20). Most importantly, all these characters are not some random forms assigned as ‘o’, they follow a certain logic and reasoning in their appearances.

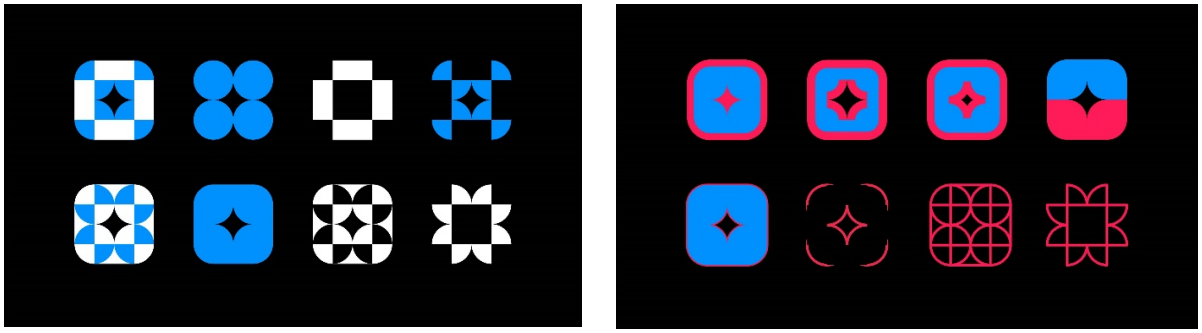

Fig. 19 and 20

3.4 Strings Mono

Strings Mono is inspired by optical illusions. It uses two complex forms (90 and 45) and a square grid (Fig. 21). Again, when stacked together they feel like an optical art pattern (Fig. 22). When converted into outlines, it can also be used as a variable type, where the variation lies in the no. of lines (Fig. 23).

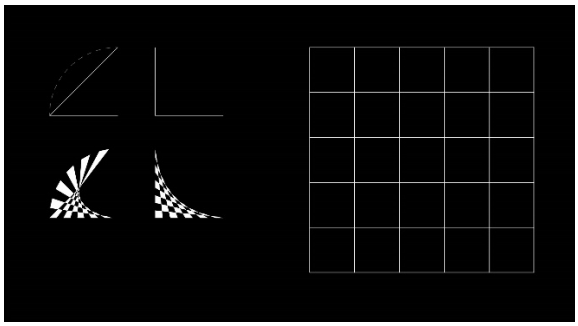

Fig. 21

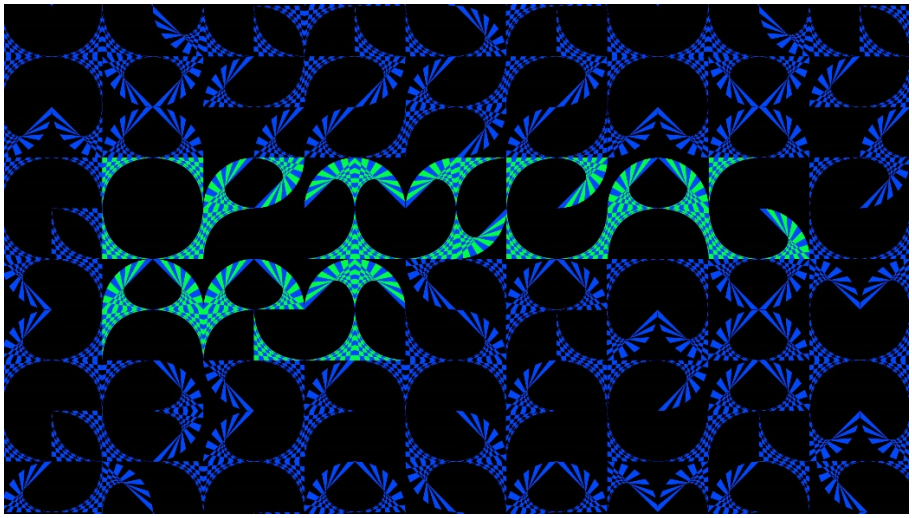

Fig. 22

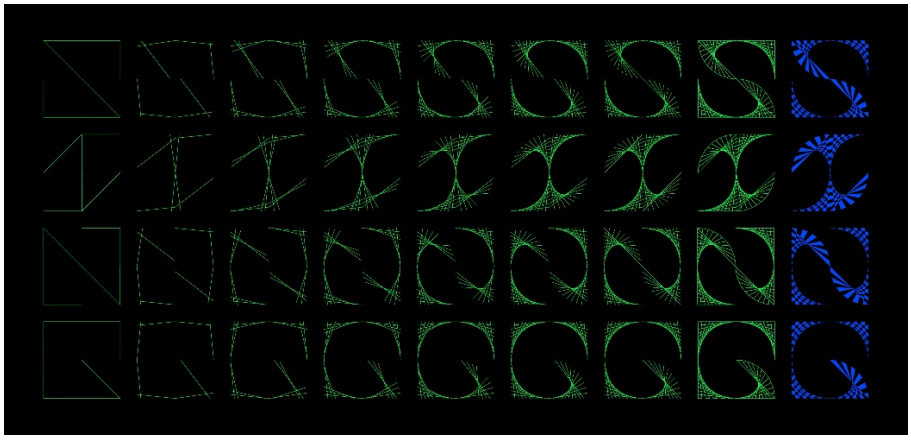

Fig. 23

4. As, these typefaces are morphed and often broken into pieces to encrypt a message the applications of these typefaces also bridge the physical and digital world, making a message more interactive to read. These typefaces can exist in the real world in vivid ways. For example (Fig. 24), a magazine can release one half of a coupon code on their social media and the other half to their subscribers in print. The reader will have to match the patterns on the screen with the print one to reveal the code. Acting as an easter egg, it will ignite curiosity to the ones who are not subscribers and serve as an interactive element for the subscribers.

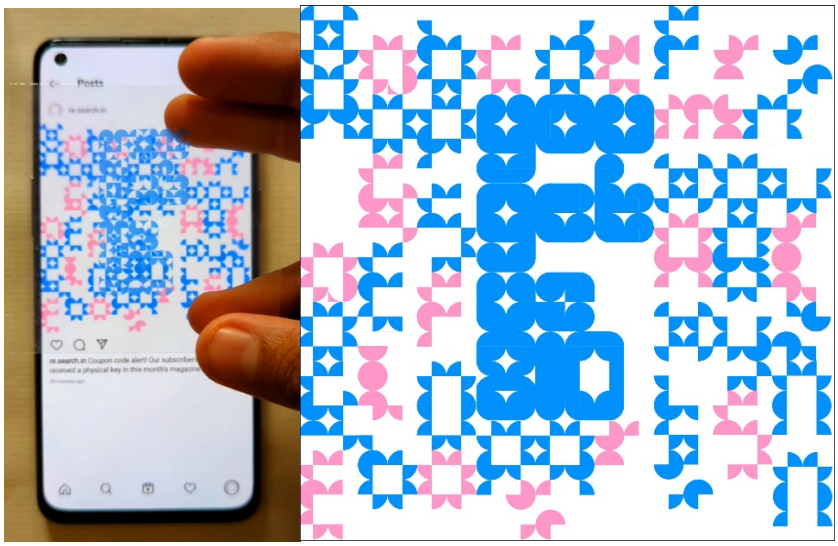

Fig. 24

They can also act as a password painted directly on the walls of a secret underground location (Fig. 25). Only the observant enough can get in.

Fig. 25

Another great usage would be using tessellations. A play of light, shadow, motion, scale, tactility happens when typography is merged with tessellations. In Fig. 26, the letter ‘S’ is mapped onto wobbling cubes of Heinz Strobl. Fig. 27 shows the alphabet ‘A’ made with ridges. As the ridges of the negative space which creates the ‘A’ are facing in the opposite direction, a contrast of light and shadow occurs. These low-fidelity prototypes with the correct materials and mechanics can be scaled up for real-world surfaces and architectural purposes.

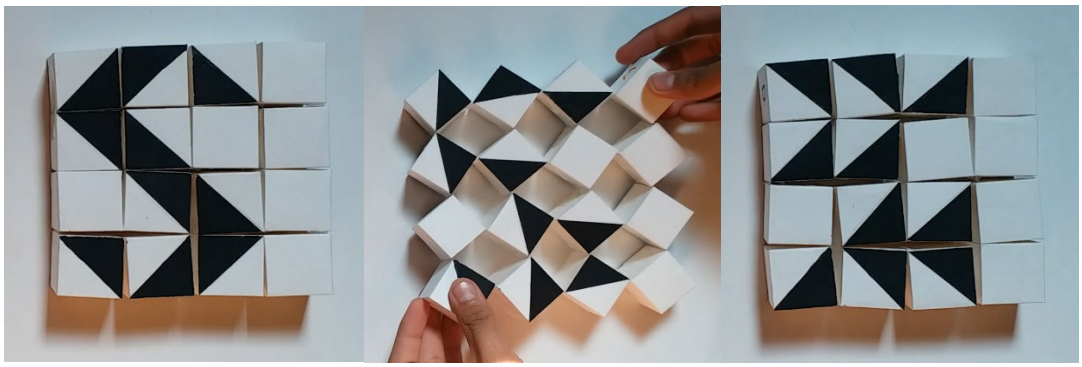

Fig. 26

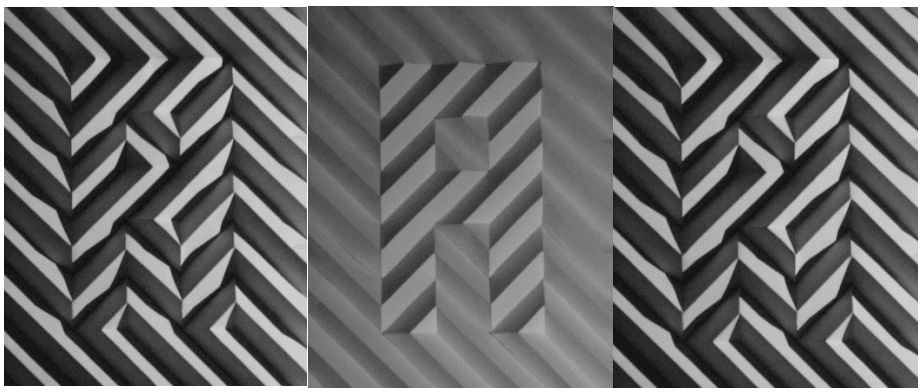

Fig. 27

Like, how a coffee bean from a farm transform into coffee at one’s desk, these patterns go through a series of steps to be decrypted or transformed into letters one can read. One can question, if patterns replace letters to encrypt a message, can they be considered as a script for that language? Across this research many such questions were wondered, some answered, some unanswered and some stupid ones. It is a lot, but it is a start. Nevertheless, the exploration and wondering the endless possibilities of what typography can be, continues to go on.

5. Acknowledgement

To my mentors, Prof. Sambit Kumar Pradhan and Prof. Titu Mili for making me learn and unlearn the ways of typography.

To Mr. Prasad, Ms. Priya, Ms. Swapna, Mr. Shantanu, and Mr. Venugopal, my mathematics and computer science teachers for sharing their immense knowledge of numbers, logic and their connection to everyday world.

6. References

Bacon's cipher, Wikipedia, https://en.wikipedia.org/wiki/Bacon%27s_cipher

Caesar cipher, Wikipedia, https://en.wikipedia.org/wiki/Caesar_cipher

Cipher, Wikipedia, https://en.wikipedia.org/wiki/Cipher

Cryptography, Wikipedia, https://en.wikipedia.org/wiki/Cryptography

Machine Identification Code, Wikipedia, https://en.wikipedia.org/wiki/Machine_Identification_Code

Mathematics of paper folding, Wikipedia, https://en.wikipedia.org/wiki/Mathematics_of_paper_folding

Paraeidolia, Wikipedia, https://en.wikipedia.org/wiki/Pareidolia

Pigpen Cipher, Wikipedia, https://en.wikipedia.org/wiki/Pigpen_cipher

Steganography, Wikipedia, https://en.wikipedia.org/wiki/Steganography

Turing fonts, http://jfmdev.github.io/TuringFonts/

Turing machine, Wikipedia, https://en.wikipedia.org/wiki/Category:Turing_machine

Turing (cipher), Wikipedia, https://en.wikipedia.org/wiki/Turing_(cipher)

Visual cryptography, Wikipedia, https://en.wikipedia.org/wiki/Visual_cryptography

Please note that these references are in relation to part 1 to 3.1. Rest of the paper is a self-exploration of the topic.

7. Imagery References

https://panolam.com/product/falling-triangles/

https://www.vectorstock.com/royalty-free-vector/abstract-striped-blue-color-geometric-triangle-vector-22973506

https://www.britannica.com/biography/Julius-Caesar-Roman-ruler

https://en.wikipedia.org/wiki/Banking_in_the_United_States#/media/File:FirstBankofUS00_crop.jpg

https://dlpng.com/png/1335877

https://mobile.twitter.com/MichaelHeimlich/status/1151543254204243968/photo/2

https://clipartpng.com/?865,big-white-cloud-png-clipart

https://www.wondersandmarvels.com/2012/12/shakespeares-secrets-a-hidden-cipher-in-literatures-greatest-works.html

https://en.wikipedia.org/wiki/File:HP_Color_Laserjet_3700_schutz_g.jpg

https://www.kuwaittimes.com/doctors-scribbles-a-puzzle-only-understood-by-pharmacists/

https://upload.wikimedia.org/wikipedia/commons/e/ec/Mona_Lisa%2C_by_Leonardo_da_Vinci%2C_from_C2RMF_retouched.jpg