CHROMATIC ABERRATION

Development of a chromatic typography for climate change

Tiago Rego

Porto, september 2024

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The version of this document incorporates the feedback and suggestions provided by the Jury, which have been duly noted and integrated into the body of the dissertation.

Project Report, produced as a requirement for obtaining a master's degree in Graphic Design and Editorial Projects, under the supervision of Professor Dr. Pedro Amado.

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Chromatic Aberration:
Development of a chromatic typography for climate change

Project Report
Master in Graphic Design and Editorial Projects
Faculdade de Belas Artes da Universidade do Porto

September, 2024

U.PORTO
FACULDADE DE BELAS ARTES
UNIVERSIDADE DO PORTO

“COLOR IS THE NEW BOLD”

(van Wageningen, 2019)

ACKNOWLEDGMENTS

EN

To my supervisor, Professor Pedro Amado, for believing in the project from the outset, for his assertiveness, invaluable help and support, especially his constant availability, contagious enthusiasm and, most importantly, his generous sharing of knowledge and material.

To Professors Fabrício Fava and Cristina Ferreira for their valuable assessments and contributions, which were always constructive.

To all the professionals who contributed to this project, especially Tiago Pinho, for his sharing of knowledge, support and indispensable encouragement in the digital workshops. And to my colleague and companion Ana Coelho, for all her help, validation and essential affection and encouragement.

To everyone who contributed their valuable feedback during IJUP 2024.

To my friends, who were always interested and willing to help and listen to my concerns.

To the workshop participants who made a valuable contribution to the outcome of my project: Ana Coelho, Carla Guimarães, Diana Meireles, Inês Ferreira, Maria Ruão, Pedro Freitas.

Finally, thank you to those who always raised and cared for me, my grandmother and my mother.

A huge thank you to everyone!

PT

Ao meu orientador, Professor Doutor Pedro Amado, por acreditar no projeto desde o início, pela sua assertividade, ajuda e apoio inestimáveis, de realçar a disponibilidade constante, o entusiasmo contagiante, e mais importante as generosas partilhas de conhecimento e material.

Aos professores Fabrício Fava e Cristina Ferreira pelas suas valiosas apreciações e contributos, sempre construtivos.

A todos os profissionais que contribuíram para este projeto, em especial ao Tiago Pinho, pela sua partilha de conhecimento, apoio e incentivo imprescindível nas oficinas digitais. E à minha colega e companheira Ana Coelho, por toda a ajuda, validação, pelo carinho e encorajamento fundamentais.

A todos os que contribuíram com o seu feedback valioso durante o IJUP 2024.

Aos meus amigos, que sempre demonstraram interesse, e disponibilidade para ajudar, e ouvirem as minhas preocupações.

Aos participantes do workshop, que contribuíram de maneira valiosa para o desfecho do meu projeto: Ana Coelho, Carla Guimarães, Diana Meireles, Inês Ferreira, Maria Ruão, Pedro Freitas.

Por fim, obrigado a quem me criou e cuidou sempre, à minha avó e à minha mãe.

Um enorme obrigado a todos!

ABSTRACT

The goal of this project was to create a chromatic typography system with the theme of climate change as its focus. At first, the font was made digitally followed by the production of physical types to be used in a workshop for design students. The result was a complete system of capital letters, from A to Z, plus numerical glyphs. Limiting the system to these characters allowed a more experimental approach to be applied since capital letters tend to have a uniform geometric shape, not compromising legibility. Each letter has three separate layers (the letter plus two accessory layers) providing optimal balance between complexity and clarity, introducing enough variation to be visually engaging. To validate and acquire knowledge on the subject, a literature review and study on the state of the art were made, consulting articles, interviews, and manuals. During the workshop, a series of climate demonstration posters were produced to prove the effectiveness of the system of shapes. This was followed by a discussion and evaluation of the results obtained from the workshop. In addition, this project aims to demonstrate the ability of typography not only to be a writing and teaching tool but also to have a narrative. In short, this project highlights the continuing relevance of typography in the contemporary world, by exploring the intersection between digital and analog means. In addition, it highlights the importance of taking a stance and developing innovative approaches to address significant themes by providing renewed attention and generating the necessary interest in the population.

Keywords

Chromatic Typography, Overprint, Climate Change, Type Design

RESUMO

O objetivo deste projeto é criação de um sistema tipográfico cromático tendo como foco o tema das alterações climáticas. Inicialmente, o conjunto foi criado digitalmente e posteriormente foram produzidas matrizes tipográficas cromáticas para utilizar num workshop direcionado a estudantes de design. O resultado foi um conjunto completo de letras maiúsculas, de A a Z mais caráteres numéricos. A limitação de caracteres ao sistema permitiu uma abordagem experimental, já que letras em caixa alta tendem a ter uma forma uniformizada, sem compremeter legibilidade. Cada caráter tem três camadas separadas (a letra mais duas camadas acessórias) proporcionando um equilíbrio entre complexidade e clareza, permitindo variação suficiente para ser visualmente apelativo. Para validar e adquirir conhecimentos sobre o assunto foi realizada uma revisão da literatura e um estudo do estado da arte, consultando artigos, entrevistas e manuais. Durante o *workshop*, foram produzidos uma série de cartazes de manifestações climáticas para provar a eficácia do sistema tipográfico. Após isso, realizou-se uma discussão e avaliação dos resultados obtidos no workshop. Além disso, este projeto pretende demonstrar a capacidade da tipografia não só para ser uma ferramenta de escrita e de ensino, mas também para ter uma narrativa. Em suma, este projeto destaca a relevância contínua da tipografia no mundo contemporâneo, explorando a intersecção entre os meios digitais e analógicos. Destaca também a importância de tomar uma posição e desenvolver abordagens inovadoras para tratar de questões significativas, proporcionando uma atenção renovada e gerando o interesse necessário na população.

Palavras-chave

Tipografia Crómatica, Sobreposição, Alterações Climáticas, Design de Tipos

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INTRODUCTION

Chromatic typography has consistently occupied a more specialized position within the broader design landscape, relative to other design trends. In recent years, there has been a notable increase in the development of these fonts. Many designs lean towards the mid-nineteenth century aesthetic, known as wood chromatic type, with bevels and shadows. Others, focus on a more contemporary approach like Mark Van Wageningen, the founder of Novo Typo foundry. He is dedicated to investigating the possibilities and outcomes of constructing a letter through color. In his work, he manages to remove the nostalgic elements of wood type and creates a series of experimental multi-layered chromatic typefaces. With the addition of layers and color, these fonts can convey a message, transcending the decorative aspect. As van Wageningen (Middendorp & van Wageningen, 2017) says, he is not interested in decorative type design. Instead, he believes in real-world applications of these fonts. Arthur Folmer from Typearture specializes in the development of variable-colored fonts. These designs are created to convey a narrative and integrate both illustrative and ornamental components. With this context, this project aims to study the communication of a real-world meaningful message through chromatic typography.

As we know, climate changes are significant, long-term changes in weather conditions, temperature, and other parameters on our planet. The aforementioned changes can be attributed to human activities, including deforestation and the burning of fossil fuels. These human habits lead to severe outcomes, for example: rising sea levels, radical weather changes, and loss of biodiversity. Nowadays people are more aware of climate change due to youth-led climate movements and global initiatives for reducing greenhouse gas emissions, such as the Paris Agreement[1]. Nevertheless, as a consequence of the heightened awareness and the proliferation of campaigns and projects on this subject, the impact of such initiatives is not the same as it was in the beginning, given that the general public is already familiarised with the concept.

For this project, this problem was taken into consideration when developing the chromatic typography system by addressing an important subject giving them fresh attention and inspiring the required level of interest in the public. Just like chromatic fonts are built through layers — each one contributing to the final letter — climate change is a multifaceted issue made up of interconnected layers. These problems include environmental factors (like rising temperatures and sea levels, thaw), socio-political challenges (such as policy and economic disparities), and individual actions (waste production, energy consumption). Each problem, though distinct, plays a crucial role in shaping the overall outcome, much like how each layer in the typography affects the result.

Each glyph is comprised of three colored layers, providing a multitude of variation, with the hope of not compromising its usability. A digital version of the font was created, and physical types were developed using digital and analog processes. These physical types were used in a workshop for the purpose of validating the chromatic system by creating a series of posters allusive to climate change movements.

It is crucial to comprehend the capacity of chromatic typography to convey messages through the glyph itself, which is why research in this

[1] An international agreement on climate change that is legally binding is the Paris Agreement. On December 12, 2015, during the UN Climate Change Conference in Paris, France, it was adopted by 196 Parties. The main objective is to keep the rise in the average global temperature well below 2°C over pre-industrial levels and work toward keeping it to 1.5°C over pre-industrial levels.

domain was significant. In addition, the advancement of chromatic typography represents a standing interest that has been cultivated since my initial year of the master's degree.

Objectives

The principal aim of this project is to gain insight into the capacity of chromatic typography to convey a message, with the ultimate objective of heightening awareness and consciousness of a given theme. Furthermore, it is important to explore the possibilities and opportunities that this way of drawing typography by layers can offer and realize what has been done before in chromatic typography. Additionally, the project emphasizes the analog aspect, whereby the composition of layers is tested when printing multiple layers in succession, thereby yielding new outcomes. In conclusion, a chromatic system from A to Z in capital letters plus numerical glyphs was developed, and a workshop was held to test and validate the system with a convinience sample of participants from the study area.

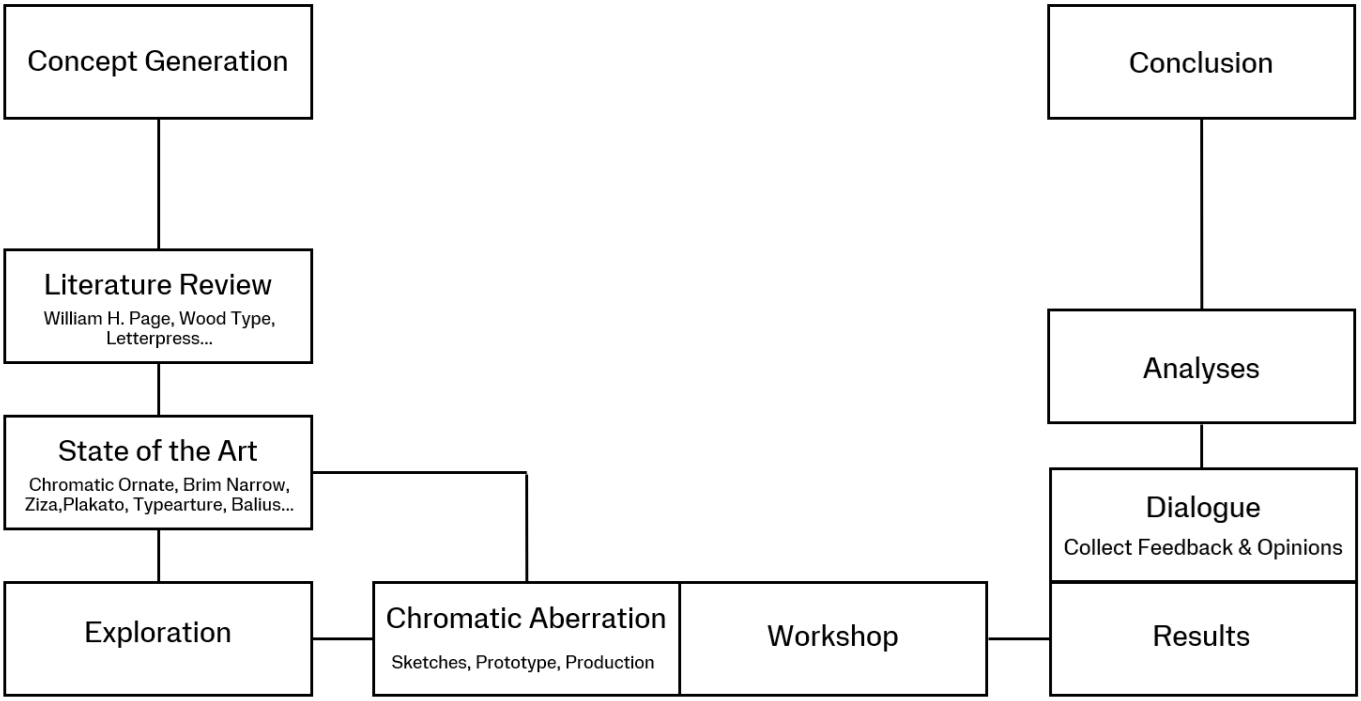
Methodology

Considering the objectives outlined, the methodology adopted is mainly mixed (action research). The project commences with the theoretical aspect, which entails an examination of the subject matter through a comprehensive review of existing literature. The theoretical framework is centered on contextualizing the history and evolution of chromatic typography. Books, such as *Type and Color: How to Design and Use Multicolored Typefaces* by Mark van Wageningen, interviews, such as Ângelo Gonçalves[2] interview with Richard Kegler, articles, and specimens were analyzed and investigated to gather information.

[2] Ângelo Gonçalves developed his thesis around a modular typography system based on traditional values of typography development. In the process he interviewd designers such as Richard Kegler.

Subsequently, contemporary case studies were chosen through exploratory research, to understand the current state of art. The case studies were selected based on projects where color was a main component of the project, and projects that had experimental approaches to enhance the message that it was communicating.

The project development was conducted in parallel with the analysis of case studies. This way, feedback from those studies was coming through, shaping, and perfecting the empiric work. A multi-colored and multi-layered digital chromatic typography system was developed, introducing three layers in each glyph, and various possible color combinations that could be printed in analog form using a set of types. The illustrations made for each glyph have an informative purpose, due to the theme. To demonstrate the efficacy and potential of each character, a workshop was conducted with a convenience sample of design students. The objective was to ascertain whether the use of color and layers effectively conveyed the desired theme. Fınally, the results of the workshop were discussed with the participants, and the data collected was subjected to analysis.



[table 1] Diagram showcasing the project steps.

Report Structure

This report is divided into four main sections:

Introduction: Presents the project framework, the relevance of the theme, the objectives, the methodologies used, and the report structure.

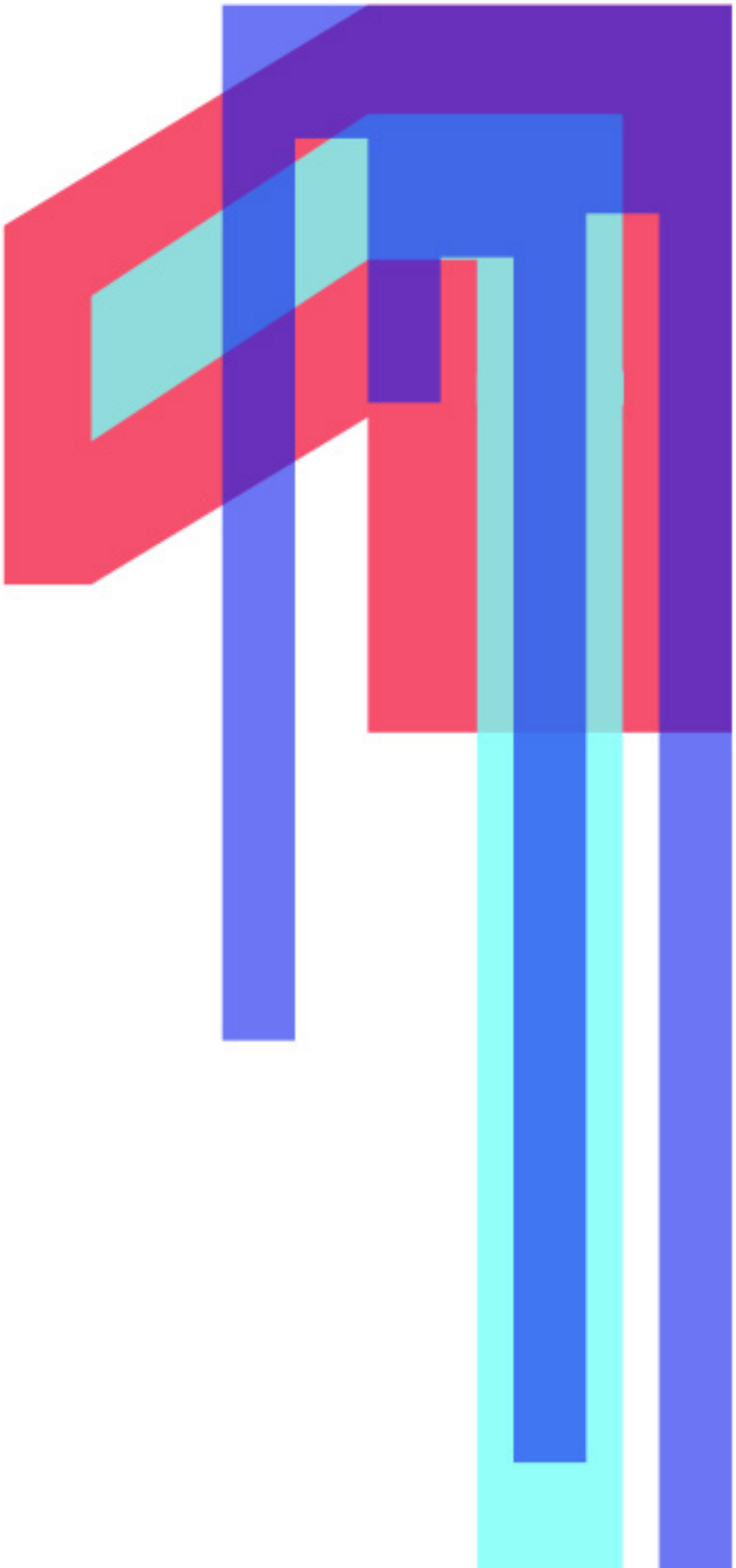
Theoretical framework: The nature of this project required knowledge and understanding of wood typography and the addition of chromatic elements since the mid-nineteenth century. Furthermore, it elucidates how technological advancements have enhanced this technique, progressing from its initial analog stages to the advent of comprehensive digital capabilities, exemplified by variable color fonts and multi-color palettes on a single glyph. Furthermore, other forms and initiatives of experimental typography are investigated and elucidated, including the Typecraft Initiative. Furthermore, the relevance of analog printing techniques to these experimental typographic approaches is elucidated.

Empirical work: This section commences with an account of the stages and methodology employed in the development of the Chromatic Aberration chromatic typography system. Subsequently, the system is subjected to a validation and analysis process through the medium of a workshop. The methods, procedures, sample of participants and the obtained results and discussion of the empirical approach are discussed in this section.

Conclusion: The conclusions of the project are taken into consideration to identify any limitations and formulate recommendations for the design of a future study.

PART 1

THEORETICAL FRAMEWORK



The first part of this project report compels the literature review and state of art exploring areas relevant to the main theme of the project. Two main chapters divide this part: A brief overview of the historical development of typography and Chromatic digital typography in contemporary design.

The first chapter focuses on an introduction to the concept of chromatic fonts while highlighting the history of letterpress's rise, downfall, and rise again. It also explores wood-type manufacturing techniques and how this technology evolved during the Industrial Revolution. Chromatic typography's historical roots are also explored, including the origin of the Tuscan style. Some old specimens were also analyzed, to add further context to the subject. To finish the chapter, it is highlighted the importance of preserving old specimens for future researchers and designers.

Chapter two talks about chromatic typography in contemporary design. An attempt is made to put the reader in the perspective of the contemporary landscape of chromatic typographies and explain how the advent of the digital age has improved the traditional concept even more by introducing fresh talent and projects. There is a focus on revival projects and all-new projects, and how both contribute to growing the interest of the industry in chromatic type, by adopting digital technologies. To conclude this discussion, it is necessary to demonstrate how glyphs can convey a message, an idea, or a narrative, thereby introducing a new realm of possibilities to the field of type design.

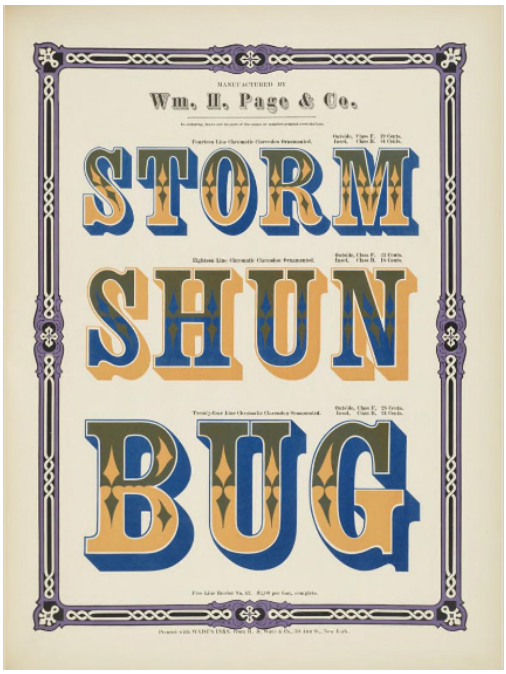
Furthermore, it was observed that there is a lack of information available regarding chromatic typography, given that a considerable number of specimens and movable types were lost over time when letterpress was deemed obsolete.

1. OVERVIEW OF THE HISTORICAL DEVELOPMENT OF TYPOGRAPHY

Chromatic fonts are not new, as the designer Jamie Clarke (2017) says. They have been around since the mid-19th century, although it may not seem that way. As Fleishman, (2018) says, "When we think of the past, we often imagine it in black and white". In examining the historical record of letterpress printing from the 19th century, it is notable that the majority of printed works from this period utilize a monochromatic palette, with the majority of fonts being black. Consequently, it is particularly noteworthy to encounter examples of chromatic fonts that originated during this era. Chromatic fonts are achieved by printing two or more corresponding type styles on top of one another. It consists of each glyph having two or more layers: a base layer with one color, and the ornamental layer that is printed on top with another color. The result is a multicolored glyph: the two previously chosen colors and the result of those colors overlapped.

The use of wood type in letterpress printing was big in the 19th century, and it contributed to the development of chromatic typography. Each character had two or more wood-type blocks that were carved as needed. The wood-type technology reached a peak of perfection towards the end of the 19th century, driven by rapid technological innovations caused by the Industrial Revolution (Willetts, 2020). Later, it started being replaced with metal types, which became easier to develop and better to maintain due to its increased durability and finer details for smaller sizes, while wood types were mainly used for poster printing or other large applications.

In the mid-1800s William H. Page & Co., was the industry's front runner when it came to wood type printing and chromatic typography (Chromatic Wood Type Design: Exploring the Art of Letterpress, 2024). Their characters were bold and multicolored. In 1874, William H. Page published his book *Specimens of Chromatic Wood Type, Borders, & Co* (figure 1), to showcase the skill and technique that his company had developed, showing off the work to possible clients. The book shows some incredible specimens of chromatic typography with random sequences of text completing the book. As said in Chromatic Wood Type Design: Exploring the Art of Letterpress (2024), the book remains admired among those interested in typography and design as a stunning example of the technique, demonstrating its relevance to this day, combining a celebration of form and color. Chromatic typography gives the user great freedom to create several compositions and color combinations.



[figure 1] Page from *Specimens of Chromatic WoodType Borders & Co.* William H. Page, 1874.

As the twentieth century commenced, the traditional chromatic wood type was becoming increasingly obsolete. The combination of technical advancements and evolving stylistic trends was a significant contributing factor. The use of wood type was becoming less prevalent, and while it was possible to find chromatic typography in metal types, it was very rare (Fleishman, 2018). The standard metal character size was relatively small, which limited the popularity of metal types with larger dimensions. These metal types were prone to warping, were heavy

[figure 2] Wooden Printing Press.

and unwieldy which contributed to their limited use (Manique & Morgado, 2023). The early 20th century saw the advent of new printing technologies, including offset lithography, which by the middle of the century had become widely adopted. This soon brought the decline of letterpress printing, which was inferior to offset printing in speed and cost (Woropaj, 2024). Offset printing is a technology where the paper does not touch the original image. Instead, the image is transferred to a metal sheet that comes in direct contact with a rubber cylinder, that prints directly on the paper. Phototypesetting also played its role in the replacement of traditional type setting. It was a process that involved saving letters in a light-sensitive material instead of casting metal types, ultimately facilitating alterations to the dimensions of the character in question. Additionally, it permitted more straightforward alterations in character dimensions (Woropaj, 2024). Subsequently, this technology was superseded by the advent of the personal computer and digital formats.

As a consequence of the aforementioned changes in technology and design trends, chromatic typography in its authentic multi-layered form was temporarily eclipsed.

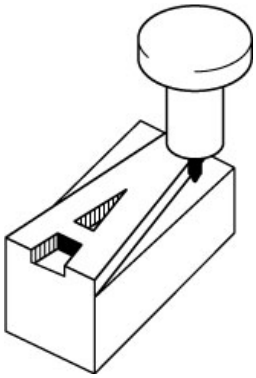
1.1 Wood Type: Historical Context and Social Impact

"When people see wood type they often remember the classic 'Wanted' poster..." (Hamilton Wood Type & Printing Museum, 2024)

Although the moveable type system had been practiced in China and Korea for several centuries since Bi Sheng invented a system that used baked clay types in the 9th century, the technology only came to Europe in 1450 (Lechêne, 2024). The 15th century was a period of great historical and technological advancements. Johannes Gutenberg brought the printing press[3] (figure 2) with moveable types to day-to-day life (Lehmann-Haupt 2024). Before this, all the books were copied by hand by monk copyists in a slow and tedious process. The great project to come out of the printing press was the Gutenberg Bible or the 42-line Bible (figure 3). The moveable types were manufactured from a metal alloy through a process whereby the mirror image of each letter was carved onto the end of a soft steel punch, which was subsequently hardened. This process remained essentially unaltered until the nineteenth century.

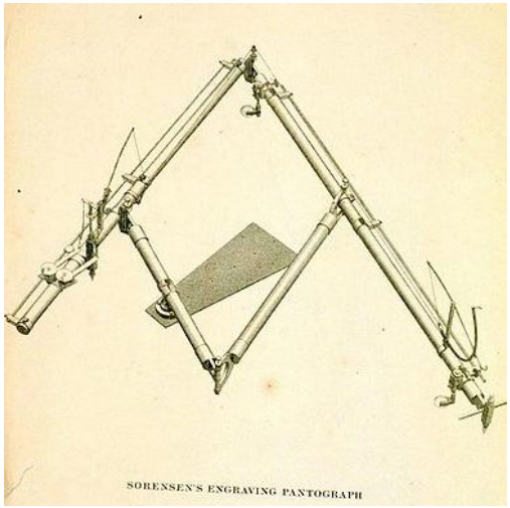
[3] A printing press is a mechanical tool used to transfer ink by applying pressure to an inked surface that is resting on a print medium.

[figure 3] Gutenberg Bible in Latin.



[figure 4] End-Cut Method: Consists of routing the negative space around the letter out of the block of wood.

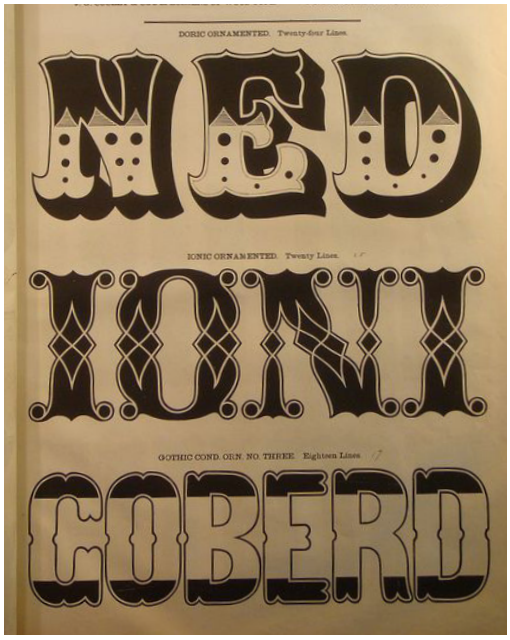
The nineteenth century witnessed a dramatic acceleration in the pace of urbanization, largely driven by the Industrial Revolution. Every field was seeing breakthroughs: railways, medical advances, and steam machines (Sousa & Silva, 2014), so the expansion of the commercial printing industry was inevitable. Wood type was here introduced to the mass printing world, and allowed printers to use type sizes that were impossible to achieve with the limitations of metal type casting (Kegler, 2015). In that sense, wood was the logical material because of its lightness, availability, and known printing qualities (Shields, n.d). The introduction of wood type in letterpress printing opened doors to the creation of posters and broadsides with giant letters, something that had never been done before because of the size limitations of metal type. As Kegler (2015) says, wood type drove the aesthetic simply by being a handy tool in the arsenal of every local job printer.



[figure 5] Pantograph router: Mechanism that transmits the motion of a tracer to the motion of a cutting tool.

Until 1827, all wood type was manufactured using the end-cut method. This was a simple mechanism created in partnership with David Bruce Jr. and Darius Wells (figure 4). In 1827, the same mechanism would become the basis for Well's invention, the lateral router (Production, 2017). This was a machine that enabled the mass production of wood-type letters through a manual process that was more efficient than previous methods, allowing for the same level of precision while reducing production time. In 1828, Darius Wells published the inaugural specimen book of wood type, marking the advent of an industry dedicated to the manufacture of wood type. By 1834, William Leavenworth put together the pantograph router (figure 5), a combination of Well's lateral router and a pantograph (Manique & Morgado, 2023). The creation of this tool allowed mechanical mass production of wood type.

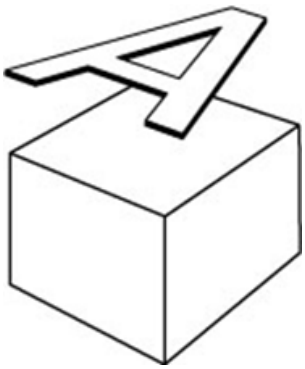
During the 19th century, the wood-type scene experienced a period of significant expansion, accompanied by the advent of advanced machinery. Among the notable developments was the introduction of a new version of the pantograph router by Edwin Allen, along with the emergence of innovative cutting techniques.



[figure 6] J. G. Cooley's specimens of wood type.

Towards the final years of the 19th century, two great companies were thriving in the wood type panorama: Hamilton Wood Type and William H. Page & Co Wood Type. William H. Page's company contributed to the development of new cutting technologies, such as die-cut. The concept of die-cutting involved the creation of a sheet of brass with the desired letter shape, which was then pressed against a block of wood to transfer the outlines of each letter. The company also perfected and peaked chromatic typography, which was initially experimented with by Edwin Allen and shown by George Nesbitt in the book *Fourth Specimen of Machinery Cut Wood Type*. Although names like J. G. Cooley (figure 6), Hamilton, Morgans & Wilcox all tried to show chromatic typography before, none reached the level of intricate precision of the 1874 masterpiece *Specimens of Chromatic Type, Borders & Co.* by William H. Page as Shields (2022) says.

Following now to 1880, the company Hamilton Wood



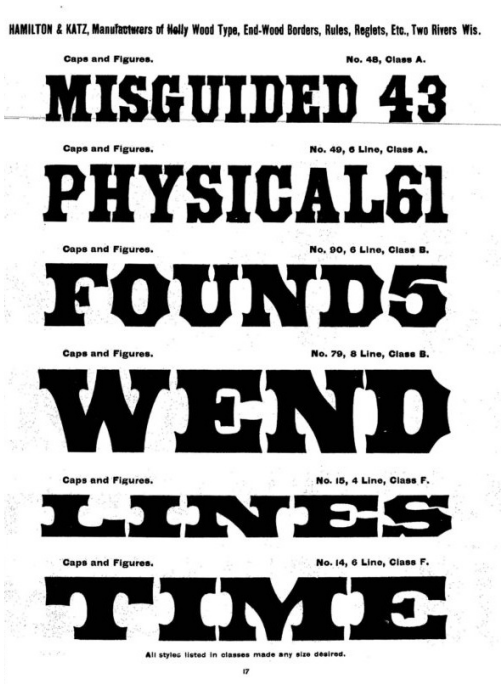
[figure 7] Veneer cutting developed by the Hamilton Wood Type.

Type made a major step forward in the manufacturing process of wood type, which gave them an economic advantage over the competition. A novel cutting solution, designated as veneer (figure 7), was developed and manufactured exclusively by them. The primary technique involved cutting the letter from a thin piece of wood to be attached to a wooden block. This alteration enabled Hamilton to offer his wood types at a price that was 50% lower than that of his competitors. By the conclusion of the 1890s, the company had successfully acquired the majority of its competitors, including William H. Page & Co (Shields, n.d.).

At the beginning of the twentieth century, the use of letterpress was becoming less prevalent as offset printing began to gain traction in the media landscape. The advent of the Macintosh computer at the end of the century marked the beginning of the rapid decline of wood and metal typesetting and letterpress printing (Kegler, 2015). Everyone was switching to digital typesetting and shops were selling and giving away materials that they now saw as obsolete. Now, years later, letterpress rises again, not as a commercial activity, but as a product of artistic expression.

As Kegler (2015) says, wood type has become a very desirable and scarce commodity. Studios like P98a, are contributing to keep letterpress alive in the digital age. P98a, that will be mentioned ahead, is a Berlin-based experimental letterpress studio dedicated to exploring new uses of letterpress in the digital age through the combination of several materials and technologies such as pantograph, laser cutting, 3D prints, resin, and wood (Weaver, 2019).

As Middendorp (2015) says, the combination of digital design and offset printing is too precise, missing a third dimension. The imperfections and mistakes that happen during the process of printing something in letterpress, such as misalignments on chromatic typographies or the layering of ink can sometimes make a project even more special. Richard Kegler says in an interview that the process is what differentiates letterpress from contemporary techniques (as cited in Gonçalves, 2021, p.83).



[figure 8] Specimen of Holly Wood Type, 1884, manufactured by Hamilton & Katz.

1.2 Chromatic Typography Evolution

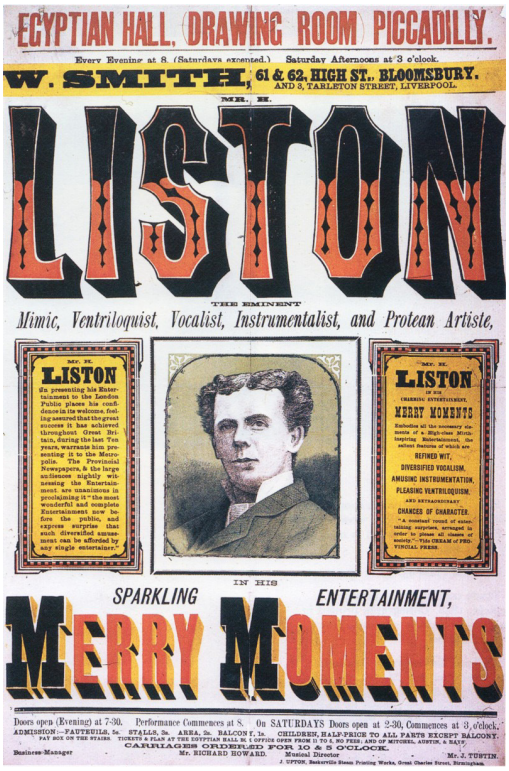
To gain a comprehensive understanding of the history and technical processes involved in the creation of wood-type blocks, it is essential to also consider the design, creation, and thought processes of type foundries in the nineteenth century. It is necessary to determine what the typical elements for ornamental decoration were at the time chromatic typography was introduced, as well as how foundries projected and sketched the font.

Tuscan fonts (figure 8) were the typographic style that was dominating the 19th century. Shields (2019) describes Tuscan as decorative display typefaces that include an immense variety of type designs and Teresita Schultz de Carabobo (2021) describes them as being fonts that achieve a certain degree of fantasy or ornamentation. Rob Roy Kelly Collection (2017) mentions some of the characteristics of Tuscan fonts: contrasted strokes, rounded or pointed terminals, bi or trifurcated serifs, and often a midstem decoration. Following Rob Roy Kelly's theory mentioned in his book *American Wood Type: 1828-1900* (Schultz de Carabobo, 2021) Tuscan typefaces derived from three styles: Roman, showing contrast in the stroke and serifed terminals; Antique had bold serifs and almost no contrast in the stroke; Gothic had flared serifs, and the stroke of the letter was either high or low. The initial encounter between the Tuscans and the concept of wood type was initiated by Edwin Allen. The specimens were exhibited in 1838 and represented an elaboration of the highly ornate European style initially showcased by Figgins (figure 9) in the early years of the 19th century. It can be observed that during the nineteenth century, the Roman Tuscan style was far more prevalent in Europe than in America. This is evidenced by the preference for antique and Gothic styles in the latter, which resulted in the emergence of a more static typeface. Rob Roy Kelly describes these wood typefaces in his book *American Wood Type: 1828-1900* "...solid-faced letters, frequently derivative in design, that obtain a decorative quality from an active contour, and that generally include some visual ambiguity between letterform and counter or between adjacent letterforms." (as cited by Shields, 2019).

Tuscan fonts were being quickly developed and new experiments and variations were being shown on type specimen books. As stated by Shields (2019) one variation of the Antique Tuscan influenced the rest of the 19th century: "The exterior perpendicular lines of the Antique were manipulated

[figure 9] 4-line Tuscan, Ornamented No.2, Figgins.

[figure 10] Five-line small pica Tuscan ornamented, Figgins, 1843.



[figure 11] Entertainment advertisement printed in four colors by James Upton, 1870.

into concave curves that produced scallops and points energizing the contour of the letterforms. The cap and baseline contour remained parallel.". This style was later renamed to American Tuscan and was first shown by Wells & Webb in the specimen *Cut by Machinery* and became ubiquitous. Europe still preferred the Roman style originating typefaces that were much dynamic (figure 10). American Tuscan was not widely adopted there, though we find rare examples of it being used in England (figure 11). The style, now diffused through America, was beginning to show numerous variations such as: outlined, shaded, condensed, expanded, addition of bifurcations in the middle of the letter and modifications to the cap and baseline of the typefaces, some becoming rounded instead of parallel. Schultz de Carabobo (2021) believes that this evolution of the Tuscan style didn't come simply from an isolated typographical fashion. She posits that the expressive decorative arts, including cabinetmaking, ornamental ironwork, and the inscription of lapidary designs in cemeteries, along with other forms of expression such as architecture, played a role in influencing the evolution of Tuscan typefaces. The larger printing area of Tuscan fonts was beneficial for chromatic typography, allowing more information and details to be added, so it was logical the adoption of this style.

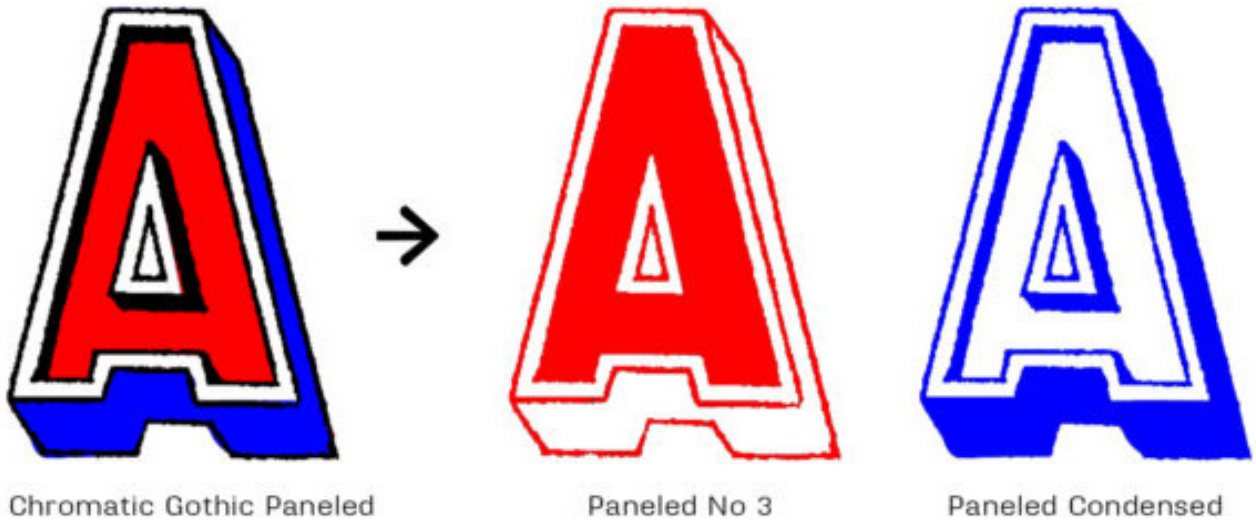
During the peak era of chromatic typography, William H Page & Co. published a typography patent that helps answer some points that were lifted before. The patent shown below (figure 12) would serve as a base for developing several variations of the same typeface (Shields, 2022) and it's unique because it shows the skeleton behind the project and reveals its flexibility. The patent description reveals all the details of the type:

> "[t]his design consists of a Gothic letter with shade, and having an inside panel sunk into the face of the letter, which is also shaded, thus leaving a narrow-raised border around the outside and inside of the letters. These letters also have their curved parts upon their outer sides beveled in an octagonal form, while the inner parts remained curved ... thus presenting a new combination of beveled and round parts...." (as cited in Shields, 2022).

[figure 12] Patent of Printing Types, 1874 by William H. Page & Co.

In figure 13 it is demonstrated two distinct applications of the patent, as previously described. One variant employs the external shading of the letters, while the other is a more streamlined version that utilizes only the internal shading. In the following specimen catalog, Poster specimens from the Wm. H. Page Wood Type Co., the layers of the chromatic font Chromatic Gothic Paneled were offered as single-color configurations (figure 14). At the end of this typeface production run, twelve variations were created from a single patent. This goes to show that foundries were developing clever ways to create dozens of variations from a single schematic and gives us a glimpse into their work philosophy (Shields, 2022).

[figure 13] Chromatic Gothic Paneled No.1 and Chromatic Streamer Gothic Paneled.

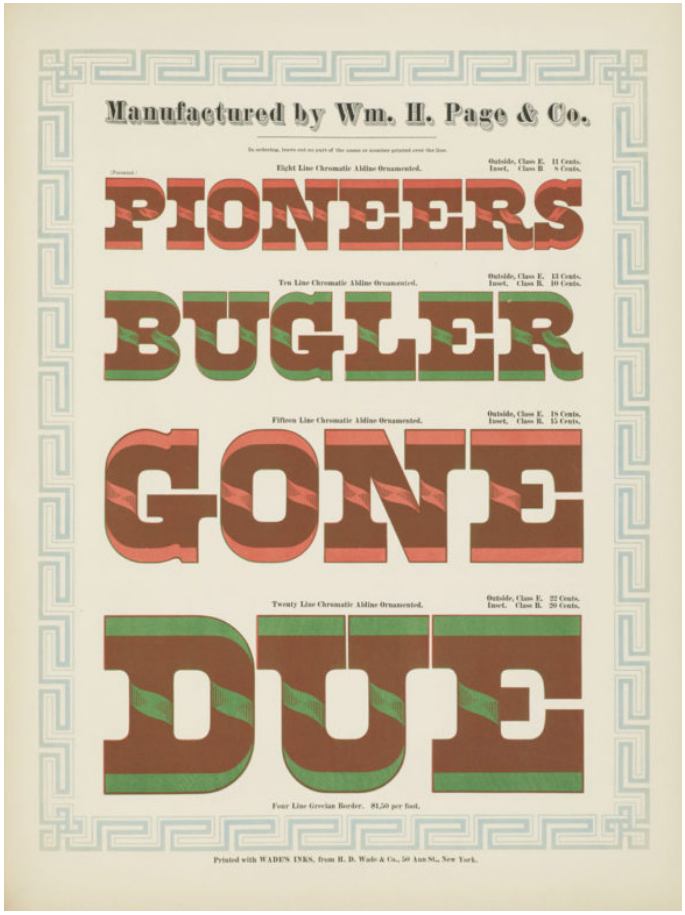


[figure 14] Single color variations of Chromatic Gothic Paneled, 1876 & 1882.

[4] Antique Clarendon is a slab serif font, which is renowned for its decorative elements and robust, forceful appearance. It was first used in the 19th century, especially in the Victorian era, and is frequently connected to Victorian-era posters, advertisements, and signage. It has a bold stroke and large serifs.

As it was mentioned before, chromatic typefaces use two or more blocks to produce a multi-color effect. That gives chromatic fonts the possibility to be used as a single font (non-chromatic, using only one of the blocks). With this idea in mind, William H. Page produced a typeface called "Aldine" and its chromatic variation "Aldine Ornamented" (figure 15), both of which could be used individually and chromatically "...the two alphabets to be printed single, or the one printed over the other in colors." (Shields, 2017). These typefaces are a variation of the Antique Clarendon[4] style, which usually has harsher serifs. The chromatic version (figure 16) was shown in 1874's ***Specimens of Chromatic Wood Type, Borders, & Co.*** a book that Rob Roy Kelly says, "has been rightfully acclaimed as containing the most superb wood type specimens ever printed." (as cited in Hugill-Fontanel, 2013). Several foundries and typographers, including Morgans & Wilcox, National Printer's Materials, and Hamilton, produced their variations of this typeface up until the 1900s. The resulting fonts exhibited a range of differences, with some displaying more variations than others. The expanded No. 1, No. 2, and No. 3 are three extended chromatic variations of the American Tuscan style previously referenced. They were released in 1867 and are characterized by Shields (2019) as semi-ornamental fonts. This illustrates the remarkable versatility and craftsmanship of these foundries, which were able to evolve a single typeface into a vast array of variations, encompassing different widths and decorative elements.

[figure 15] Aldine & Aldine Ornamented



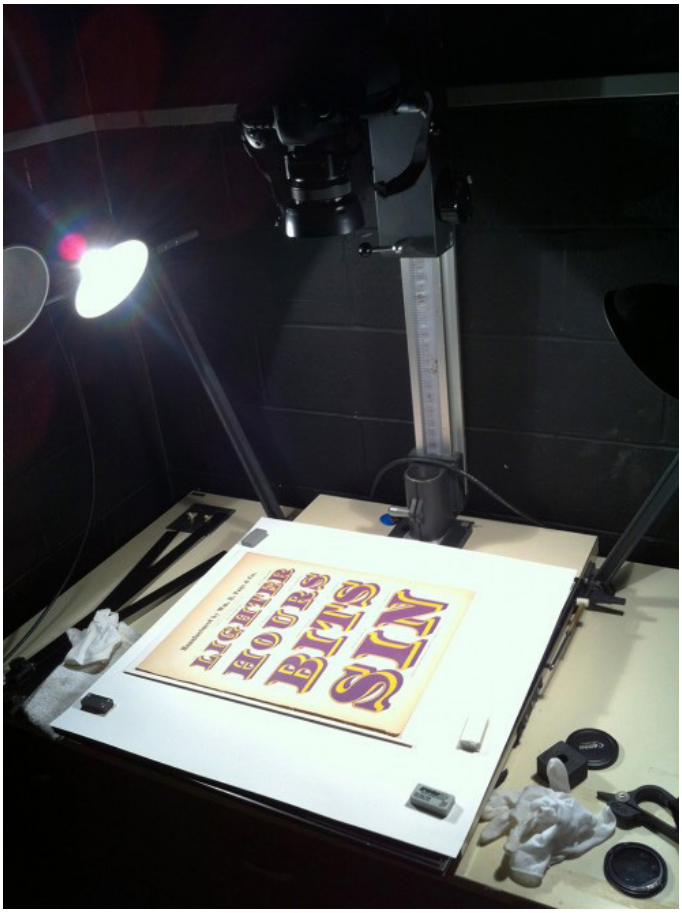
[figure 16] Chromatic variation of Aldine typeface

[5] Colorimetry is the science and technology of quantifying and describing color. It involves the measurement of colors and their attributes, allowing for the precise definition, reproduction, and comparison of colors in a consistent manner.

1.2.1 Type meets science

The physical specimens of chromatic typography that are extant today are more than a century old. As designers and researchers, our objective is to identify methods for the preservation of this historical material in a manner that is as faithful to its original form as possible. As we have previously discussed, William, H. Page's *Specimens of Chromatic Wood Type, Borders, Co.* is an exemplar of the chromatic typography specimens genre.

This is the result of a project undertaken by a group of students enrolled in a course in photographic science at the Rochester Institute of Technology. In fulfillment of a class assignment, the group of students photographed the specimen page by page with an SLR camera and enhanced the process through the application of colorimetry[5], thereby optimizing the color for every single page. Following the analysis of hundreds of samples and the acquisition of several readings, the result is the production of accurate color prints of the original specimen. The resulting prints serve to preserve the specimen's appearance as it would have been observed in 1867, providing future researchers and designers with a valuable reference point (figure 17) (Hugill-Fontanel, 2013).



[figure 17] Process of preserving old typography specimens with an SLR Camera.

1.3 Chapter 1 Summary

This initial chapter elucidates the historical development of chromatic typography and its contemporary resurgence. In this study, the work of contemporary designers and typographers was considered, including Mark van Wageningen, Arthur Reinders from Typearture, and Richard Kegler. Additionally, the presentation demonstrated how traditional chromatic typography has evolved in the digital domain, integrating analog and digital technologies.

To gain insight into the evolution of chromatic typography, it was necessary to conduct a comprehensive examination of the underlying technology and to situate it within a historical context. The use of wood type in letterpress printing was prevalent during the 19th century due to its capacity to facilitate printing in larger sizes, which was advantageous for the production of posters and billboards. Soon, chromatic types were developed, which consisted of printing two or more corresponding type styles on top of one another, resulting in a multicolored letter. This technology reached a peak of perfection very quickly, mainly driven by the rapid technological innovations brought by the Industrial Revolution, where every field was seeing a breakthrough: railways, medical advances, and steam machines were being made. By the end of the century, a book containing 100 specimens of chromatic typography was published by William H. Page & Co., and it represents the pinnacle of chromatic typography in the 19th century. Various cutting tools were developed during this time such as: end-cut, veneer, and die-cut. The pantograph was created, which allowed for faster type production and the precise resizing of a type by using a mechanism that transmitted the motion of a tracer to the motion of a cutting tool. By the mid of the 20th century, conducted by technical improvements, letterpress was replaced by offset printing, a more affordable printing method.

Since chromatic typography and letterpress ties are forever connected, it was imperative to research the sudden rise of this technology. In today's age, as mentioned by Pedro Amado, Ana Catarina Silva, Vítor Quelhas (2021), Ruben Dias and Sofia Meira (2022) letterpress has been on the rise, not anymore as a professional activity but as the object of artistic exploration. Letterpress has something that contemporary printing techniques do not offer: the process. With the other points outlined, the research needed to focus on the historical development and evolution of the chromatic typography style. Tuscan font style was the main option for creating chromatic types. These were fonts with a certain degree of ornamentation (Schultz de Carabobo, 2021), used for display purposes. The styles in question can be classified into three distinct categories. The styles in question are Roman, Antique, and Gothic. The inaugural Tuscan font in wood type was exhibited by Edwin Allen and represented an advancement in the decorative European style. Tuscan fonts were rapidly disseminated throughout the United States, accompanied by a proliferation of variants. In due course, chromatic typography was also adopted in this style.

The creation of patents for chromatic typography was subjected to further analysis to provide additional context. The patents demonstrated how foundries and typographers conceptualized and devised variations of the typeface that would later be developed. This evidence demonstrates the expertise and craftsmanship of foundries, which could produce a single font or create numerous variations, despite the lack of personal computers in that era.

To sum up, the goal of this project is to develop a chromatic font that can raise consciousness about climate change. The historical background of typesetting, letterpress, and chromatic typography was thoroughly researched for this chapter. Concepts and ideas needed for the creation of the chromatic typographic system were gathered here.

2. CHROMATIC DIGITAL TYPOGRAPHY IN CONTEMPORARY DESIGN

In the contemporary era, the capacity to utilize SVG[6] in OpenType and COLR[7] formats enables the generation of an array of colors and layers within a single glyph. This was made possible due to constant advancements in OpenType technology. In 2013 Nathan Willis (2013) states that even with software support, layering and aligning blocks of text in multiple fonts was tedious and error-prone. It is intriguing to observe the progression of this technology over the past decade, particularly in its nascent stages just a decade ago. The principle of digital chromatic fonts is analogous to that of the traditional chromatic wood type, but with the notable distinction that it is now entirely produced through software. This has also been implemented in browser support, thus enabling the use of these types of fonts on the web, which in turn opens up a whole new world of possibilities. Mark van Wageningen, the founder of Novo Typo foundry, has a vision for chromatic type to be in common use, not just for display use but in an editorial context too (Clarke, 2017).

Letterpress has been on the rise in the last few years, not anymore as a professional activity but as the object of artistic exploration within personal or commercial contexts, as mentioned by Pedro Amado, Ana Catarina Silva, and Vítor Quelhas (2021). This trend has both artistic and educational applications, revitalizing the practice of letterpress printing while also employing novel materials such as resin and plastic, made possible by the increased accessibility to 3D printing, which further democratizes the accessibility of letterpress. This rise also grew people's interest in reviving chromatic type, so it is important to explore this ahead. The current panorama of chromatic typography will be explored in the form of new projects and revivals.

As Jamie Clarke (2017) says, Mark van Wageningen is a leading voice in charge of pushing chromatic typefaces forward. In an interview between Clarke and Wageningen, Mark says that we are living in the Golden Age of type design, and with browsers like Mozilla Firefox and Microsoft Edge increasingly supporting chromatic fonts, a giant leap forward has been made in the acceptance of chromatic typography. Mark believes that color within type can have a functional purpose and discloses that many type designers underestimate the decorative approach in type design.

The author of Arcade Game Typography, Toshi Omagari, claims that the first multi-colored digital font was created in 1982. Although it is an extremely limited version, it remains intriguing. It was meant to be used in a never-released video game, Insector (Williams, 2022). The font is animated and reproduced in SVG OTF, in 8bit, with no control over the animation timing (annex I).

[6] SVG OpenType is an extension of the OpenType font format that allows the inclusion of scalable vector graphics (SVG) inside font glyphs. This means that each character in an SVG OpenType font can contain a complex, multi-colored image providing greater versatility compared to traditional fonts that are typically monochromatic.

[7] COLR format is a more recent technology then SVG-OpenType, that provides greater versitility such as implementation of animation and axis. Colors in COLR fonts are not embedded directly in the glyphs but are referenced in a CPAL table within the font file.

[figure 18] Production of Chromatic Ornate.

2.1 Revival Projects

The popularity of revival projects is increasing year on year. Workshops exist so that people can gain hands-on experience in the process of printing a chromatic font from scratch. Virgin Wood Type represents one of the earliest companies to resume the production of classic wood types, subsequently making the wood blocks available for purchase. The same type of old equipment is employed in the creation of the blocks, namely font patterns and a pantograph router. Additionally, a combination of new technologies is utilized, including laser cutting, which is employed to trace the patterns. James Grieshaber (2017), together with Virgin Wood Type, recreated the font Chromatic Ornate, made originally by Wiliam H Page & Co. The project started digitally, bringing this font to computers for the first time. The digital drawing had to be made with the cutting from the pantograph router in mind, compensating for small ratios. Grieshaber (2017) mentions that since he did not have the original patterns for the font, everything was made with no knowledge of how the blocks were originally manufactured. The two blocks needed to be produced at the same time, by the same person and using the same machine to secure the best result. The patterns were laser cut from the digital drawings and assembled in a three-layer structure and the pantograph router did the cutting of the blocks (figure 18). The result is two wood blocks per glyph, maintaining its fidelity close to the originals, from 1874.

With the type set available for everyone, Jim DiRisio (2020) printed the Chromatic Ornate set and wrote an article describing the process. DiRisio started the process of locking up the wood blocks with a technique called chaser. It consists of placing lead slugs[8] and wood pieces slightly longer than the block around the wood type, inside the chase, and tightening the quoins[9] (figure 19). DiRisio states that one of the most beneficial aspects of printing chromatic typography is the process of color elimination, which allows for the identification of the most optimal color combinations. He typically begins the printing process with the lightest color. Once the initial letter has been printed, DiRisio permits the ink to dry, thereby ensuring optimal results (figure 20).

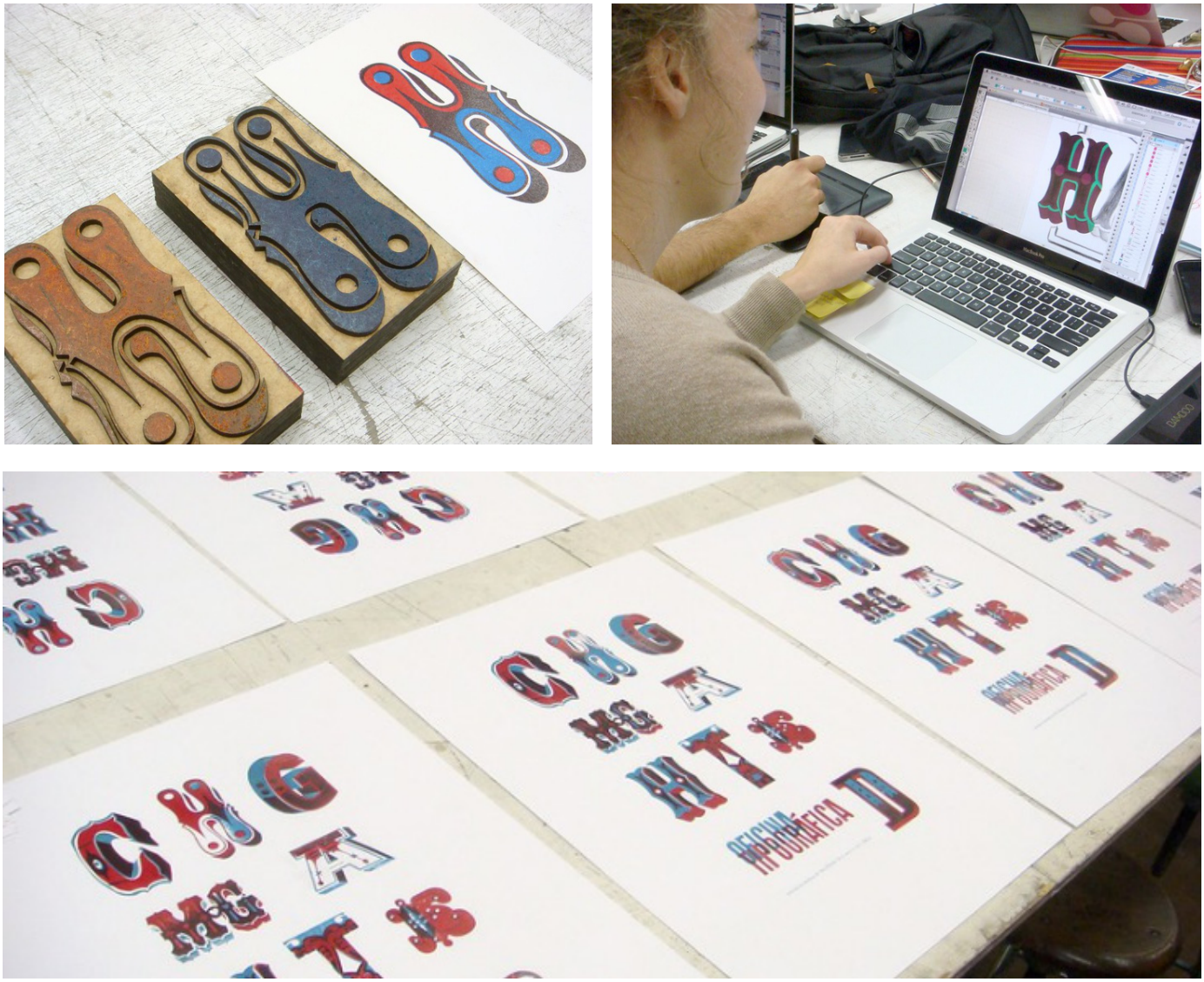
[8] Pieces of lead used to physically set and arrange the text for priting.

[9] Device made of lead with two surfaces facing opposite directions that when tightened forces the surfaces to expand out of the device width.

[figure 19] Tightening the quoins.

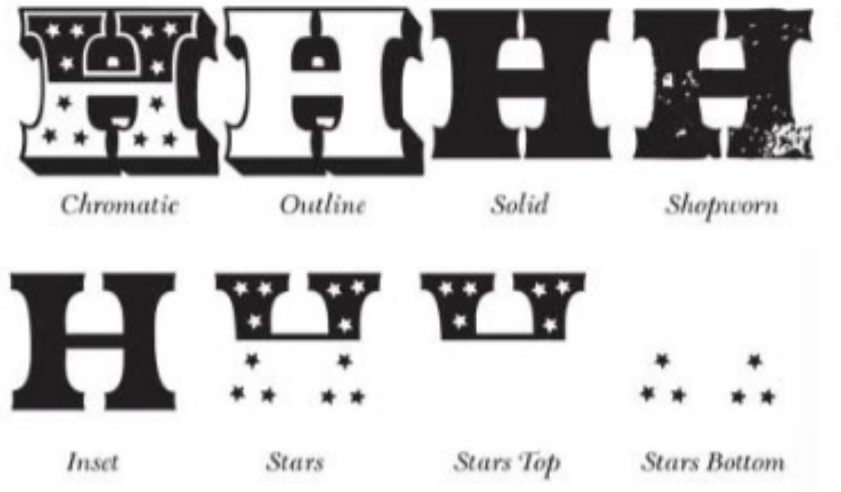
[figure 20] Printed result.

Workshops play a significant role in the reintroduction of chromatic fonts into contemporary design. In 2013, Nick Sherman (Sherman, 2013) led a workshop on chromatic typography in São Paulo. The objective was for the participants to engage in the design, fabrication, and printing of their colorful glyphs. The advent of digital technology has had a profound impact on the production of chromatic typography, enabling the creation of on-the-spot glyphs. Once the letters had been created digitally, they were cut into wood veneers (the same type of wood Hamilton Foundry was using in the late 19th century) using laser cutting. The veneers were then glued to a base block for printing. The letters were printed on a poster, resulting in an incredible and colorful result and proof of the versatility of combining digital and analog means (figure 21).



[figure 21] Chromatic Typography workshop, São Paulo, 2013.

Researchers, typographers, and designers work together in the pursuit of revival and preservation projects. P22 Type Foundry is similarly engaged in the preservation of historical artifacts for future generations. The studio is headquartered in New York and is dedicated to digital typography and letterpress printing. It is led by Richard Kegler. Their work is informed by a deep engagement with historical material, as evidenced by their collaborations with museums and associations such as Hamilton Wood Type. American Chromatic is another font created by William H. Page's company in the mid-19th century. It consisted of a two-part chromatic font. P22 Type Foundry, with the assistance of the Hamilton Wood Type Museum, worked on recreating this font digitally resulting in a project called: Hamilton Wood Type – American Chromatic. They used the original American Chromatic set to take proof of the correct dimensions. Now the designed font includes eight parts (figure 22) instead of the original two, which leads to thousands of possible combinations (P22 Type Foundry, 2013) The font is typically derived from the Tuscan Wood style, with concave portions and bold serifs. The studio persists in its endeavors to reinvigorate antiquated font sets, as evidenced by its recent work on the Aetna font set, which was released in 2017.



[figure 22] All eight layers of the HWT American Chromatic font, P22 Type Foundry.

Aetna was initially cataloged by William H. Page and is characterized by a Roman style, diverging from the more prevalent Tuscan. In his analysis, Rob Roy Kelly characterizes it as "Design is typical of those that replaced older Face Romans during the second half of the century. Retaining a Roman quality, but sturdier because of the treatment of the thins, the face was exceedingly well received by job printers." (as cited in Grieshaber & P22 Type Foundry, 2017). The revival resulted in the HWT Aetna, which includes four layers based on William H. Page's chromatic specimens. The font can be used as a single (only the face), or combining the shadow, outline, and banner elements (figure 23). The creation of new revival projects is an ongoing process that serves as a crucial method for preserving this historical aspect.

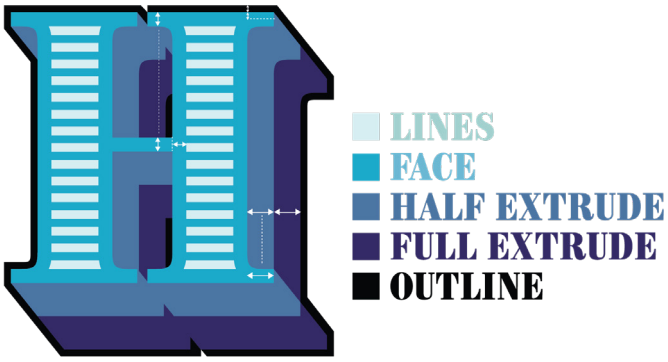
[figure 23] HWT Aetna Streamer layers, P22 Type Foundry.

2.2 Contemporary Chromatic Type

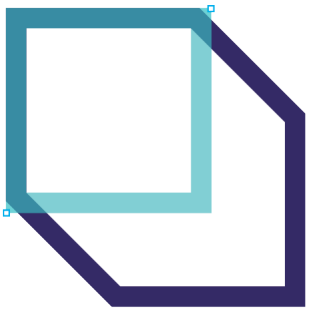
The advent of digital technology has enabled the exploration of novel avenues for advancing chromatic typography, facilitating the development of innovative methods for engaging with letters and storytelling through glyphs. This section will examine these developments in greater detail. Contemporary chromatic type projects encompass a range of approaches, including the creation of fonts based on 19th-century aesthetics, which afford the ability to incorporate more layers and greater creative freedom in overlapping them than was previously possible. Another avenue of exploration is the development of an entirely novel approach to chromatic typography. The corpus of knowledge about chromatic typography is limited, and a considerable portion of its historical record has been irretrievably lost over the twentieth century. Right now, it's a growing niche and in the future, it might have a bigger role "Color will be the new italic; color will be the new bold." (van Wageningen, 2017, p.17).

Jamie Clarke (2016) published his process on creating the font Brim Narrow in 2016. This chromatic font is made up of eight layers, made digitally, which allows for some advantages over the traditional woodcut methods, for example, placing light colors on top of dark ones. It is inspired by the 19th-century aesthetic, as Clarke (2016) says, "...Brim's layer architecture is a digital adaptation, its characters borrow their warm, tactile appearance from wood type from the first half of the 19th century." The difficulties encountered during the development of this typeface provide a reference point for the current project. The principal characteristics of the typeface designed by Clarke are tall letters with a deep 45° extrude that remains behind the subsequent letter, thus enabling the creation of compact interletter spacing (figure 24). When making a chromatic typeface involving many layers, it is important to have size relationships in mind so that proportions and alignments can be at their best. Brim Narrow typeface was projected with those considerations in mind: the half extrude is the same size as the serifs so that the ends align; the full extrude depth is twice the size of the half extrude; the outline is half the size of the serifs (figure 25) (Clarke, 2016). Despite all the considerations and thought that Clarke put into the typeface, the font had to be reconstructed due to the outlines of the face and the outlines of the extruded part not matching. The problem was that when using both the outline of the face plus the outline of the extrude, the corners would not align with each other (figure 26). The solution that Clarke found was to only focus on a full extrude and half extrude outline layer.

[figure 24] Original sketch in Illustrator showing the style combinations.



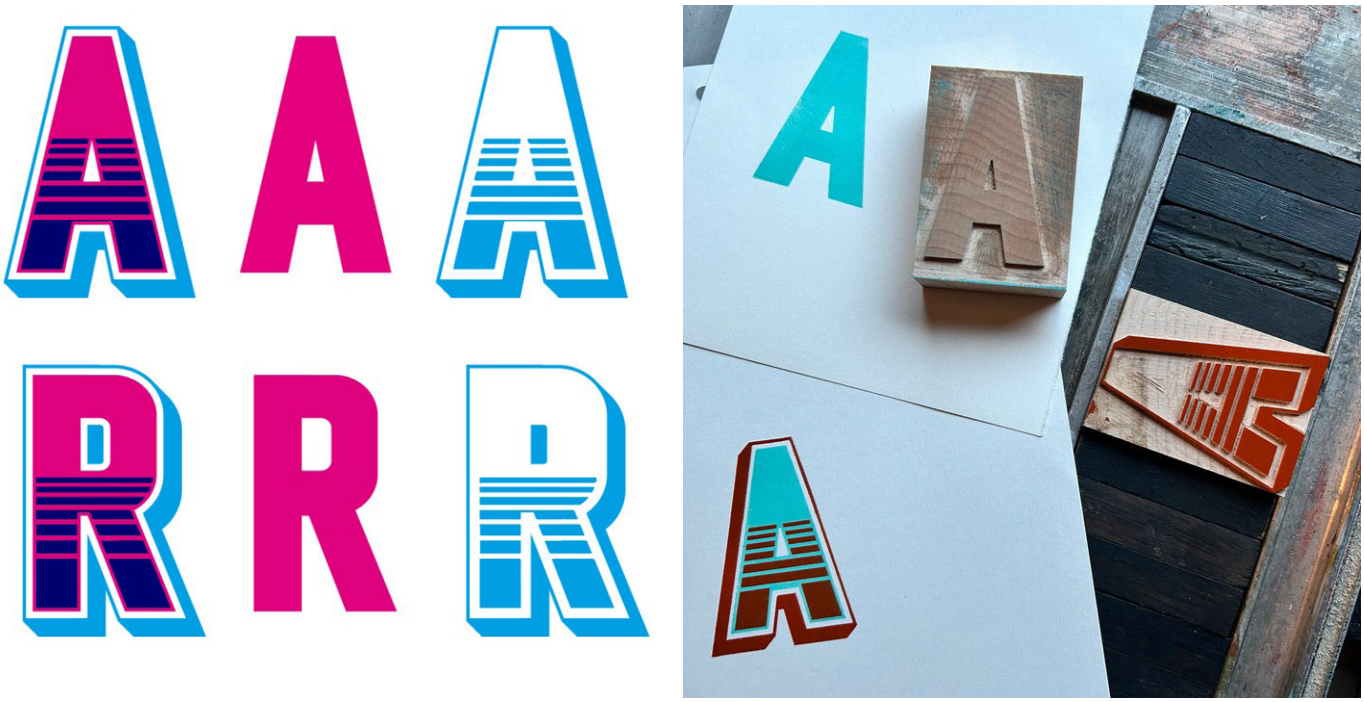
[figure 25] The proportional relationship between the Face and the other layers.



[figure 26] Right angled corner points of the Face offset combined with obtuse angles of Extrude offset.

However, this solution soon led to another problem related to the layer structure. The result was ultimately the most reasonable: merge the extruded layers with the outlines resulting in a half extrude, full extrude, half extrude outline, and full extrude outline layers. The structure of the font enabled greater versatility and a reduction in file size. It was imperative to observe the progression of the design process to anticipate and address potential issues that might emerge during the empirical project. In the description of the final structure result, it is mentioned the font's simplicity, logical usability, and the generation of combinations that Illustrator is unable to replicate in an elegant manner (Clarke, 2016).

Driven by the aesthetic principles espoused by the 19th century, Mark McKellier devised the Stewartby Chromatic font, which features a chromatic palette, a drop shadow, and an inline element. The design of the font is straightforward, comprising two layers. The font's purpose is to be utilized in manual printing techniques, employing the set of 74 blocks produced by McKellier (figure 27). The production of the set is made using a CNC router and traditional woodworking techniques (McKellier, 2024).



[figure 27] Stewartby Chromatic typeface, McKellier.

[10] Check table 1.

Detroit is a contemporary chromatic typeface, containing all-caps letters, designed by Alex Sheldon. Bethany Heck (2017) conducted a review on the Detroit typeface, where she stated this was one of the most robust and versatile chromatic fonts currently available on the market. The typeface is comprised of twelve distinct layers and draws inspiration from the 1960s aesthetic prevalent in diners, grocery stores, and movie theaters, resulting in a tall, rounded, sans-serif font. Detroit typeface's aesthetic is very different from the Brim Narrow font, which inclines its design more to the 19th century. However, Detroit also pulls some characteristics from this era, mainly the vibrant colors (figure 28). The Detroit font is distinguished from other fonts by the extensive range of bevel, inline, and shadow layers[10] it offers, providing designers with nearly limitless possibilities for combination. One peculiarity that the designer did not address is the discrepancy between the alignment of the outline extrude and the outline of the face. (Heck, 2017) This was the same issue that Jamie Clarke was grappling with and was ultimately resolved by combining the two layers. Additionally, the distance between letters is considerable, preventing the extrude layer from overlapping. These are all design decisions that must be made from the start, to mitigate future issues. Heck (2017) states that layering Detroit requires discipline with file management, so it is not a super straightforward task.

[figure 28] Detroit font in use.

Mark van Wageningen's work has shaken off some of the traditional elements of chromatic typography (Middendorp & van Wageningen, 2017). Within the Novo Typo foundry design approach, they consider legibility in contemporary type to be overrated and are influenced by the concept "wrong can be right". During an interview, Mark made an interesting point:

> "A while ago we asked ourselves the question: 'Why do type designers traditionally think in black and white?' The world is colorful, the web is colorful, and Hollywood doesn't produce any black-and-white movies anymore. Only type designers still think in this restricted way" (Clarke, 2017).

[figure 29] Ziza typeface by Novo Typo.

[figure 30] Typewood project workshop by Novo Typo, Bixa typeface, 2016.

With this, Mark is trying to create a path for designers to experiment more and as he says, failure is always an option. He shows something new in type: creating the shapes of each letter using only color, his work challenges the conventional notion of legibility, particularly within the editorial domain. The Ziza typeface exemplifies this challenge. Van Wageningen (Clarke, 2017) also mentions that color becomes part of the "DNA" of the typeface, and soon a font family can become regular, italic, bold, or chromatic. Although support for these fonts is growing, it's still not perfect and file sizes can lead to complications, but Mark believes that these problems will be solved in the future. Novo Typo has two fonts that are created from new to old: digital to letterpress. Those are the Ziza typeface (figure 29) and Bixa Color typeface (figure 30). Bixa Color is a display font that exists in wood type and in web version. It has in total twelve layers (thin, contra, deconstruct, stencil, stripe, left, right, regular, shadow, left, right, black) for mix and match and was supposed to be a modern translation of wooden type into a design that was designed on a computer (van Wageningen, 2019, p.103). This typeface was created for the Typewood[11] project and was also produced manually into wooden characters using a computer numerical control (CNC) router. However, only five of the twelve layers were milled. Mark intentionally introduced some imperfections on the surface of the characters to achieve a certain level of visual irregularity. Ziza typeface is a text typeface thought for editorial applications. As pointed out by Meilleur (Meilleur, 2019), Ziza is not just a family of fonts, it's a provocation and an invitation. The font is created exclusively with color, and its methodology is color-construction. In this approach, color is not merely an additional element to the typeface; rather, it is the defining characteristic. This typeface creates a bridge to antiquity using the movable lead types (figure 31) for letterpress.

[11] The Typewood project is about transforming and translating a digital font into analog material.

[figure 31] Ziza chromatic typeface types developed by Novo Typo Color and produced by the foundry Lettergieterij Westzaan.

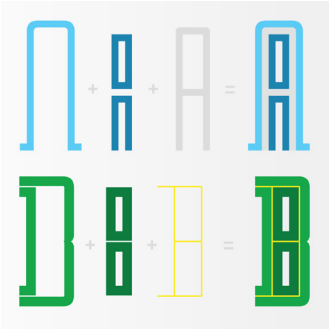
[figure 32] Anagram 2.1 by David Wolske, 2021.

[figure 33] A23D Typeface for letterpress printing, New North Press, 2014.

The Novotypo foundry pushes boundaries in each project they develop, also hoping to achieve a new and modern result while combining old techniques in the creative process. This hybrid approach is admired by David Wolske, designer, typographer, artist, and educator. He combines the traditions of letterpress and printmaking with digital technology practices. His work is usually characterized by the usage of bold colors and overlapping shapes (figure 32). While not directly related to chromatic typography, A23D by Richard Ardagh of New North Press represents a project that also demonstrates a closer integration of this hybrid approach. The font was digitally designed and printed using a Polyjet printer. The durability and precision of the printing technology were instrumental in enabling the production of a highly durable and accurate product (figure 33) (Tim Spears, 2014).

Blesk (figure 34) is a chromatic typeface designed by Ksenya Samarskaya. The font draws inspiration from vintage book covers and was designed to be used on a range of headlines, including display fonts. Similarly, Samarskava perceived a need to contribute to the field in a way that would address an area that had not yet been fully explored, like Mark van Wageningen's. "There's an established history of chromatic typefaces, often inlines and outlines..." were some of the characteristics she didn't want to explore because of the oversaturation of its use in the letterpress days (Samarskaya 2015). Blesk subsequently manifested, the main trait being the incorporation of contrasting elements within each letter.

[figure 34] Blesk font, Ksenya Samarskava, 2015.

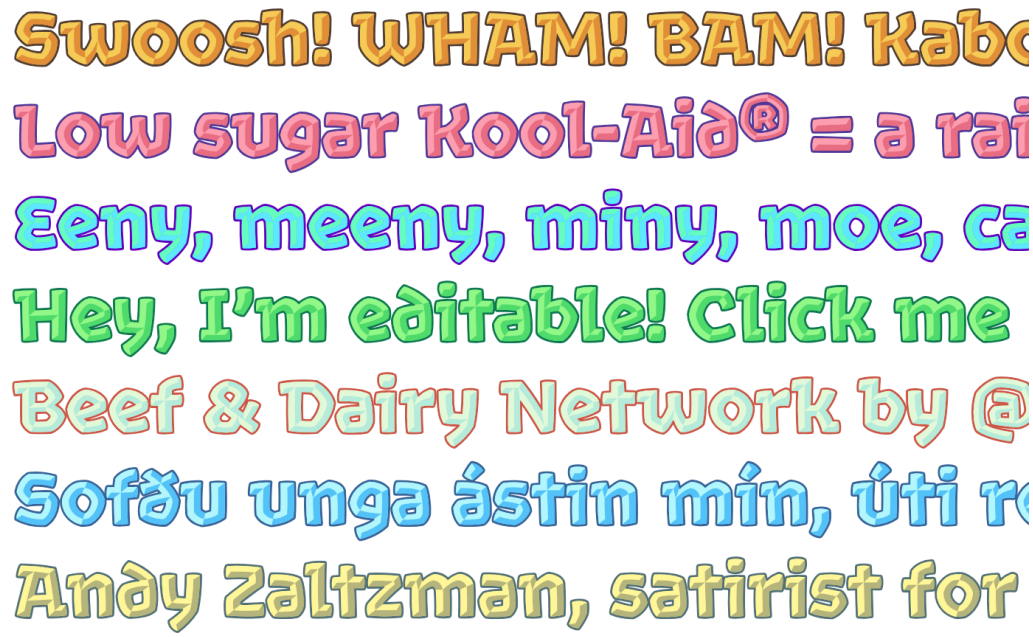


[figure 35] Merit Badge, David Ross, 2018.

Another chromatic font is Merit Badge, (figure 35) designed by David Jonathan Ross, which draws inspiration from a Boy Scout guidebook. The font's defining feature is its narrow slab serif and condensed design. The font has been created using the COLR format and CPAL color tables. The font is made of two axes, one controlling the outline thickness and the other controlling the presence of the serifs (Ross, 2018). This font, inspired the designer and typographer Henrique Beier from Harbor Type to create Rocher Color (figure 36). It is an experimental variable color font, also using COLR/CPAL tables. It features two axes, with a bevel and an extrude slider, disposing a total of 11 color palettes.

> "I used to say the OpenType-SVG format was the best format as it offered the most versatility — until I realized this is just too complex for a low-level job like text rendering. It implements a basic subset of SVG on the font rendering level. But it doesn't work well with other font tech (hinting, variable axes, etc.), and it's a pain to implement. So, I switched sides to COLR. COLR basically re-uses everything that OpenType fonts already have. It 'only' adds layering, and the possibility to change the color of each layer. Simple, but effective." (Nieskins, cit. by Williams, 2022).

Many experts are enthusiastic about the COLR format. Akiem Helmling from the type foundry Underware shares the same enthusiasm about the COLR format, asserting that it has the potential to have a significant impact on type design, potentially even more significant than that of variable fonts. Helmling asserts that all prior color formats have been suboptimal hacks for adding colors to glyphs. Additionally, he posits that OpenType-SVG is not a viable solution, citing its status as a "locked room" within the OpenType structure. (Helmling, cit. by Williams, 2022).

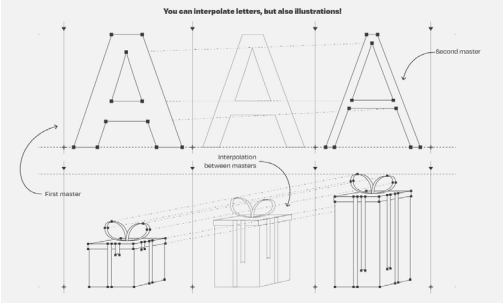


[figure 36] Rocher Color, Henrique Beier.

[figure 37] Making of Plakato Game on a Commodore 64.

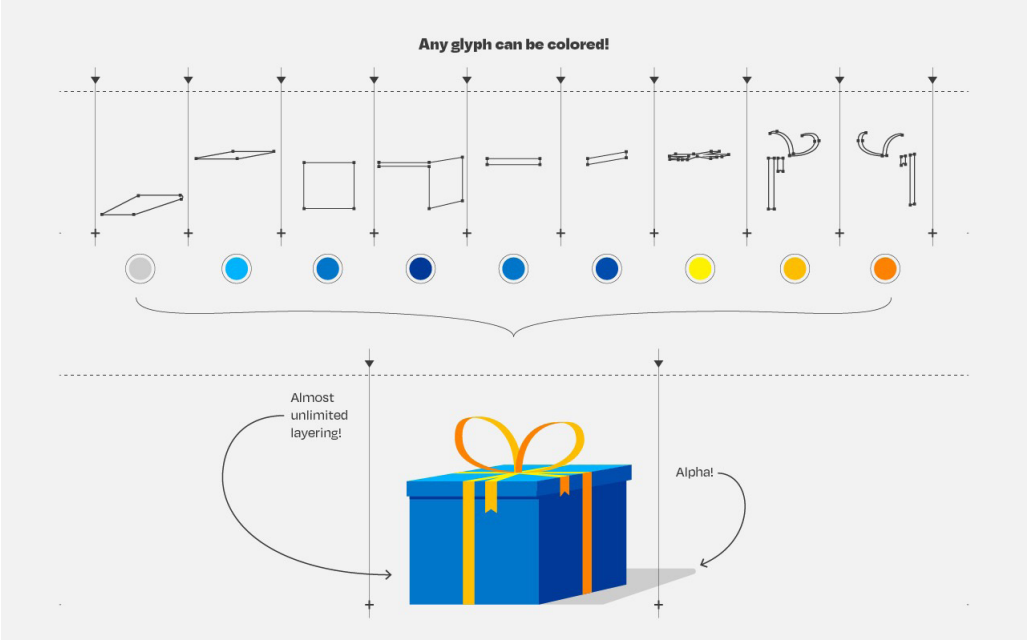
Plakato is a multi-colored font developed by Underware. Plakato is a display font based on stencil letters and influenced by the exploration of unknown typographic possibilities. The foundry took the main idea for the font and applied it in different contexts to create variations of the font. One of those examples is recreating Plakato on a Commodore 64 computer and porting all the design restrictions back to modern computers, making Plakato Game (figure 37). The typeface has a total of 16 styles, and three of those are Plakato Color, with 24 color palettes Plakato Color Grade, which allows individual color customization through a set of sliders that can be downloaded after customization. (figure 38), and Plakato One Two, which is a two-colored font with variable print tables. The typeface uses a total of 1360 colors, this shows how deep a user can go about customization (Plakato, Identity Toolkit, 2024).

[figure 38] Plakato Color and Plakato Color Grade, Underware Foundry.



[figure 39] Demonstration of the instances of variable colored font, Typearture.

There are multiple avenues for exploring chromatic typography in the digital domain. Arthur Reinders, the founder of Typearture, is dedicated to a relatively recent technological advancement: the combination of variable fonts with chromatic typography, which results in the creation of variable color fonts. The objective of these fonts is to highlight illustrative and ornamental elements, while occasionally conveying a narrative. Each typeface and each glyph are accompanied by a distinct animation and illustration, yet remain a font file. To comprehend the functioning of variable color fonts, it is essential to gain an understanding of how a font is rendered. As Typearture foundry (A Tiny Guide to Variable Color Fonts, n.d.) states, fonts are little else than vector drawings, containing several points that connect them, so instead of drawing a letter you can draw an illustration (figure 39). Then, variable fonts come in: through interpolation, you can have two instances of the same letter at two different states (ex: regular and bold), and every position between those two previously set states would be adjustable through a slider that the user has access to. Then, chromatic fonts enter the scene: as stated before, they allow each glyph to have several separate layers of color, so this works perfectly for variable color fonts (figure 40). On the downside, while OpenType-SVG chromatic font support has been rising and variable fonts are supported in most software and browsers, variable color fonts using COLR format are only supported on the web. It's a very recent technology and support for it is still in its early stage (A Tiny Guide to Variable Color Fonts, n.d.). There are two extra color font formats called SBIX and SBDT/CBLC, which are bitmap formats, although they are not frequently used.

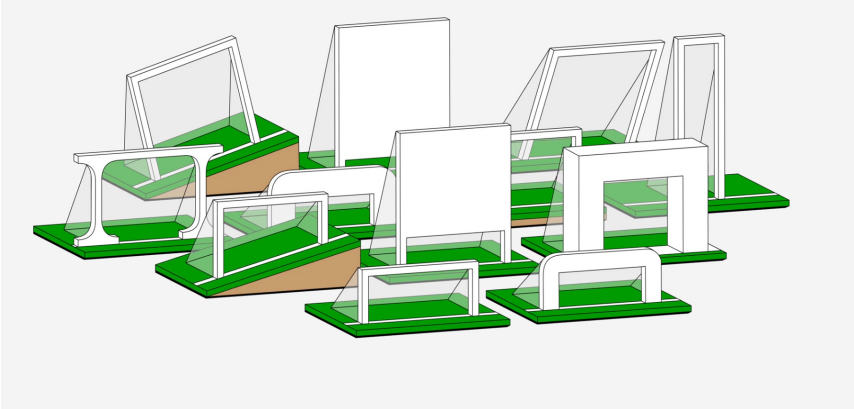


[figure 40] All the layers from a single-colored glyph, Typearture.

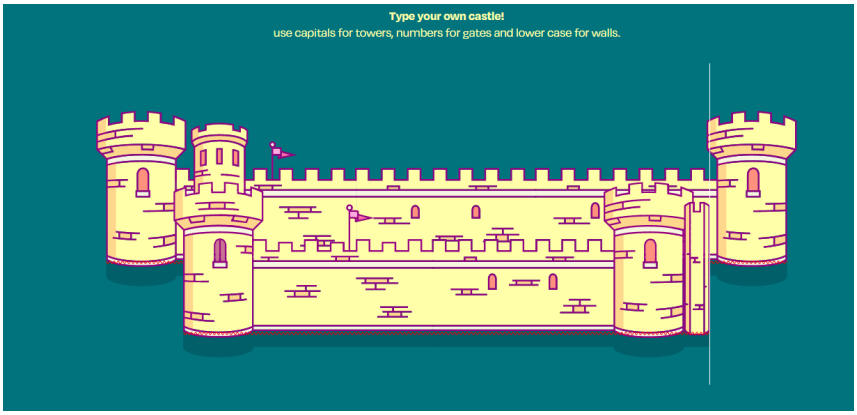
Nabla (figure 41) is an isometric variable color font developed by Arthur Folmer and Just van Rossum. Its design starting point was taking inspiration from vintage computer games. The font format it uses is called COLRv1, and it allows the usage of the variable axis, smooth gradients, shadows and changes the color of the font using pre-defined color palettes, that can be further customized using CSS, something that the format OpenType-SVG is not capable of doing, although it is supported on more software, such as Adobe. The font contains 2 axes, allowing customization of the depth and the highlight (Typearture, n.d).

[figure 41] Nable typeface variations, Typearture.

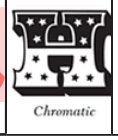
Although the format COLR is constrained in its applications, its potential for creative expression is boundless. Rob en Robin is a creative studio based in Breda. The studio's primary areas of expertise are illustration and animation. They employ the use of sliders to manipulate the illustrations they create. The COLR form obviates the necessity of losing the manipulation slider when exporting. Similarly, as Arthur Folmer has demonstrated, the illustration is manipulated by drawing it as a font file and adding the requisite axes along the way. The F.C. Variable font serves as an illustrative example of this workflow (figure 42). By this concept, Typearture Typeable Castle is also a font that enables the rapid construction of a castle through the use of keyboard-based input. The font functions by associating specific characters with specific architectural elements. For instance, capital letters are used to represent towers, numbers indicate gates and lowercase letters depict walls. Each letter exhibits slight variations in these attributes (figure 43). Table 2 was created to summarize some of the most paradigmatic characteristics of different chromatic fonts.



[figure 42] F.C. Variable typeface, Rob en Robin.



[figure 43] Typearture Typeable Castle.

Contemporary Projects									Revival Projects			
Nabla	Rocher Color	Merit Badge	Blesk	Bixa Color	Ziza	Detroit	Stewartby Cgrinatuc	Brim Narrow	HWT Aetna Streamer	HWT American Chromatic	Chromatic Ornate	
												Extrude
												Bevel
												Inline
												Outline
												Inset
												Interior Ornamentation
												Highlight
												Color Construct
												Chromatic

[table 2] Table summarizing the most paradigmatic characteristics of chromatic fonts.

2.3 Visual Communication through the Glyph Design

As mentioned before, this project attempts to communicate visually through the glyph design the urgent theme of climate change, bringing fresh attention to the issue and inspiring greater public awareness and engagement. To achieve this, investigation in the field of adding social value to glyph design was imperative. As the designer Andreu Balius (2022, p.1) says, "Type design is an activity that can go beyond the mere creation of new forms to supply an increasingly saturated market with typefaces. As a specialized activity, it can contribute to a more inclusive dialogue within the framework of our global society". There are several methods by which this contribution can be made. One such method is by communicating a message or telling a story through the design of the letter, as exemplified by Typearture's work and the following of Andreu Balius. In these examples, artisan communities are given a sense of authorship by allowing them to contribute their traditions to the design process.

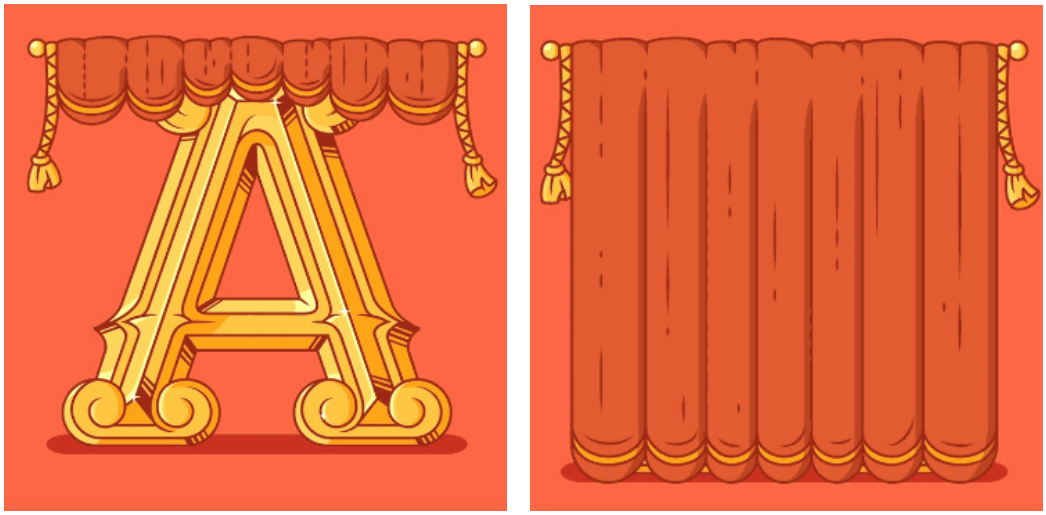
Typecraft Initiative[12] is a collaborative type design project. Their goal is to demonstrate that type can give visibility to artisan communities, by letting them be a part of the initial phase of the design (figure 44) (Balius Planelles, 2022). These typefaces contain typical patterns and drawings that are made by hand by the workers, using pencils, cutting tools, paper, cloth, and hammers. After this manual process, all the letters are digitized (figure 45) where everyone can use them. The project collects the values and traditions of these communities, teaches them how to write their name, and shares their traditions with the world, creating social value only by using letters. Beyond that, these workshops give the workers methodologies they can apply in their work, becoming an experience that shares knowledge in both ways (Balius Planelles, 2022).

[12] The Typecraft Initiative launched in 2012. It is managed by designer Ishan Khosla, from Delhi, designer Sol Matas from Berlin, and Andreu Balius from Barcelona, with the collaboration of artist Shirley Bhatnagar and local NGOs such as Rangsutra and Mon Ami Foundation (Balius, n.d.)

[figure 44] Workshop carried out with a group of women artisans in the Barmer region, Rajasthan, India.

[figure 45] Typography creation process, Typecraft Initiative.

Designers will invariably identify novel methods of conveying a narrative or message through the configuration of the letterform. Typearture examines this concept in depth in projects such as "Variable Color Initials." Each letter from A to Z is associated with a distinct narrative, which is presented in the form of an animation. Some illustrate narratives (figure 46), while others depict aspects of everyday life. In another project, a chromatic typeface Niklaas, the chocolate letter color font, typearture brought to the digital world a tradition from the Netherlands, called "chocoladeletter", a chocolate biscuit that has existed since the 19th century. The indicated project shows another way extra value can be added to a typeface, resulting in something that is surprisingly usable and complete, ranging from white chocolate to dark chocolate and several toppings at the user's disposal. (figure 47).



[figure 46] The Typearture Variable Color Initials, letter A.

[figure 47] Niklaas, the chocolate letter color font specimen, Typearture.

2.4 Chapter 2 Summary

Given the nature of the project, it was imperative to undertake a comprehensive analysis of the current state of art. The research was divided into two sections: one comprising projects that sought to revive existing typographic forms, and the other comprising projects that sought to create entirely new chromatic typographic approaches.

The advent of digital support for colored formats enabled designers to create multi-layered glyphs on software. The revival of old fonts offers the opportunity to experience these historical typographic forms once again. The aforementioned examples illustrate the potential benefits of revival projects, which may facilitate the reintroduction of historical and occasionally overlooked fonts. Examples like Virgin Wood Type which produces some sets of chromatic type in wood, in a pantograph router just like in the old days, to help keep the spark alive. Workshops gather people's interest while also having a pedagogic effect. By now people consider William H. Page & Co work a treasure, so bringing old fonts that they produced is imperative, so people can use and learn to use them digitally. P22 Type Foundry and Hamilton Wood Type Museum focus on the matter of preserving the old like they have done on the projects HWT American Chromatic and HWT Aetna.

Contemporary all-new projects range from projects that influence the 19th century aesthetic or finding new ways of using chromatic typography. Color is an important aspect of transmitting a feeling or an aesthetic, and Wageningen (2017) states that in the future, color will be the new italic; color will be the new bold. Jamie Clarke's project Brim Narrow was an important and useful case to analyze for this project. The detailed explanation written about his process helped the author to be aware of possible problems that this project might have in the development of the chromatic system, such as layer structure. Both Brim Narrow, Blesk, Detroit and Rocher Color projects gave ideas and help to mitigate structural problems. Van Wageningen, the founder of Novo Typo Foundry, works to find new ways to use chromatic typography. He posits that chromatic typography can serve a functional purpose in addition to its purely decorative role. In contrast to the conventional approach of adding color to shapes, he employs a method of creating shapes out of color. The process is executed from beginning to end, initially designing the font in software and then fabricating movable types from it for use in letterpress printing. This methodology facilitates the interconnection of analog and digital domains.

Although the integration of analog and digital elements rekindles the experience of the printing process, this does not diminish the significance of fully digital approaches. Typearture Foundry is dedicated to the synthesis of variable fonts and chromatic typography, which he achieves through the creation of variable color fonts. The objective of these fonts is to prioritize the representation of illustrative and ornamental elements while simultaneously conveying a narrative. The examples shown go straight to Andreu Balius's point of typography being not just letters that we use to write anything but also used as a platform of communication. Although comprehensive support for these fonts is not yet available in the majority of software and web browsers, they represent a novel approach to typography and communication.

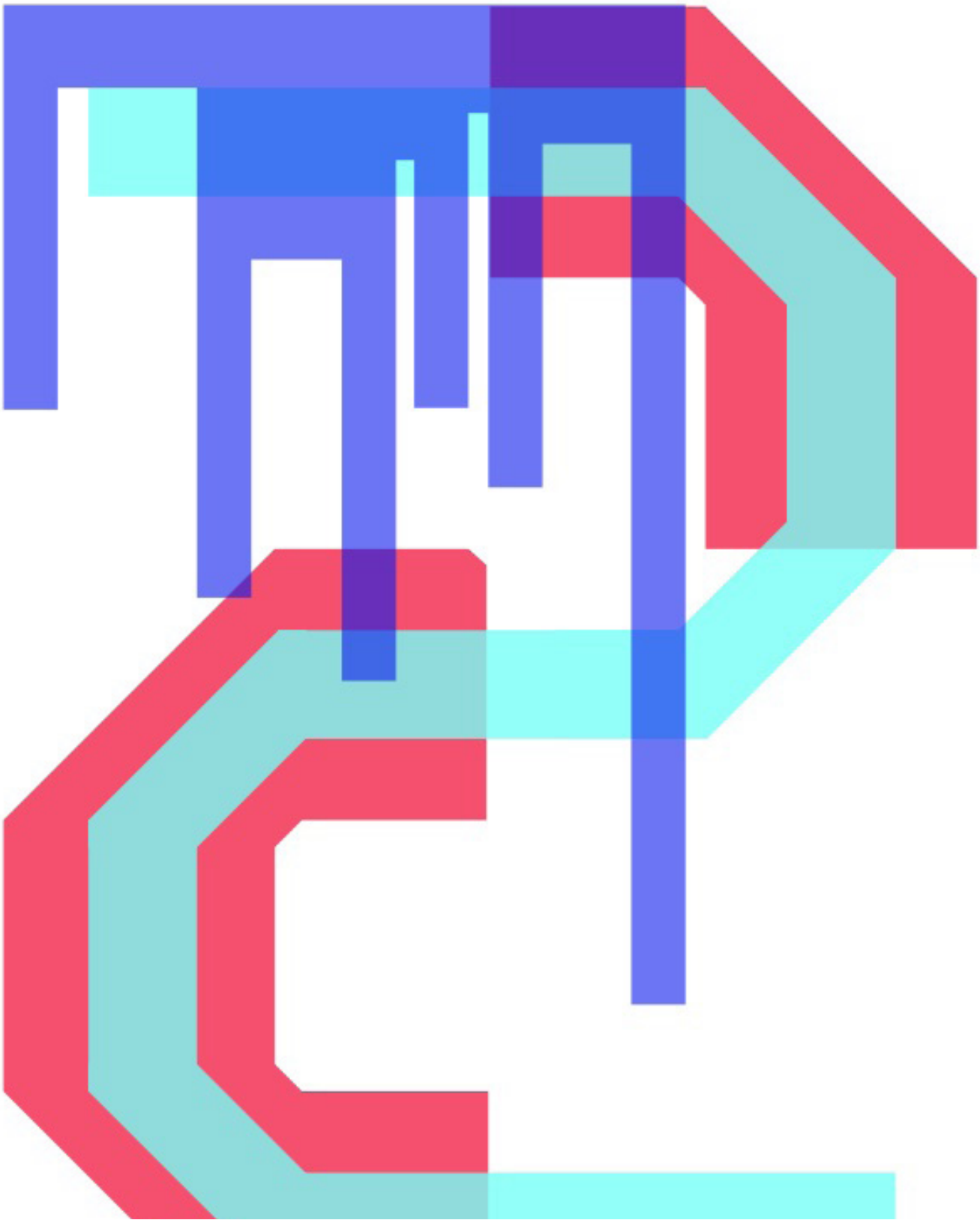
As one of the project's primary objectives is to communicate a message through glyphs, it was essential to conduct thorough research into existing

practices in this field. The work of Andreu Balius provides an illustrative example of how typography can serve a social function, facilitating the formation of communities and disseminating their cultural heritage to a global audience. Similar to the way Andreu Balius highlights how type design can transcend the mere creation of forms to contribute to a more inclusive dialogue within global society, this project seeks to use chromatic typography as a medium for social commentary.

In conclusion, the analyses of all these projects were important to analyze the limitations of software and to take precautions for possible problems that might become apparent in the development of the system.

PART 2

EMPIRICAL WORK



This part of the report presents all the processes associated with the project. It is divided into three parts: methodology, where instruments, stakeholders, and indicators to be collected are described; typeface development, involving the first sketches, digital creation, and 3D production; workshop, showcasing the practice and analyzing the data collected, concluding with the validation and discussion of the achieved results.

As stated before, the project Chromatic Aberration focuses on the development of a chromatic typeface, with characteristics suited for climate change social causes. Its objectives are to gain insight into the capacity of chromatic typography to convey a message, and to raise awareness and consciousness of the stated cause, later validating the viability of the approach. Furthermore, it is valuable to explore the opportunities given by using chromatic typography for communication purposes. By enabling symbolism through color, different hues can represent various aspects of a theme. This added layer of meaning reinforces the message and creates a more immersive visual experience, wether through the exploration of new color formats or by revisiting old techniques.

3. METHODOLOGY

Following the idea of McNiff and Whitehead, (as cited in Muratovski, 2016, p.62), applied research is a type of research that enables the author to investigate and evaluate their work. So, the methodology adopted is mainly mixed, of nature practice-led. Candy explains that this research leads primarily to new understandings about the design practice itself (as cited in Muratovski, 2016, p.62). This was the method adopted hoping that the research, being inner-directed, would help formulate the creative work and contribute to new uses of chromatic typography.

This investigation started by defining the theme and objectives, followed by a literature review and analysis of the state of the art, where case studies were selected due to their great relevance inherent to the topics covered. The historical context was focused on the evolution of chromatic wood type and its evolution to the digital world, and a passage through contemporary projects. The empiric phase of the project was carried out in parallel with the analysis of the case studies. This way, feedback was coming in, helping to shape and look for possible aspects to take note of. This methodology allowed the conception of a chromatic typeface, divided into three layers, existent in the digital and physical through typography type shapes, overall contributing to a greater conception of the project. The digital version of the font was also tested by two colleagues with knowledge in the area, amid its development, to assess its progress by making three posters using the chromatic typeface, with total freedom of the user to which layers, colors, and composition to use. This allowed the author to evaluate the result and ease of use.

The project was, then, submitted to a workshop, to evaluate and validate the system. The workshop's objectives were to stimulate chromatic typography compositions, understand how the participants perceived the theme, how different compositions could enhance the message, and develop a series of demonstration posters for climate change in a group dynamic environment. Initially, the workshop was going to be held at FBAUP, limited to 10 (ten) participants, mostly all related to graphic design, students at Faculdade de Belas Artes da Universidade do Porto. However, due to unforeseen circumstances with the school grounds, caused by work in the workshop facilities, a contingency plan was activated, and the workshop was sized down to a convenience sample of 6 (six) participants, related to arts, graphic design, typography, and industrial design and hosted at a personal location. For a superior organization of the workshop, a script (appendix I) was made to organize the phases and time for each task, which was then updated to a new script (table 3) to match the new location's work conditions. This table summarizes the steps necessary to conduct the workshop, as well as the date and expected time. In addition to this script, another table was made where it described each step of the workshop and what was supposed to be gathered from it, as well as the materials necessary[13]. To gather the information needed from the workshop, the behavior of the participants towards the system was evaluated. Before finalizing the activity, participants were invited to have a dialogue (appendix II) about their opinions towards the system and the activity. This dialogue was indispensable as it allowed the author to receive feedback and suggestions from the participants, for future upgrades to the project. This feedback was, then, analyzed and compiled. The font was also made available as open source, online[14]. The methods and instruments, as well as the indicators collected, were summarized in table 4.

[13] Check appendix I.

[14] The font is available on github https://github.com/TiagoVieiraRego/Chromatic-Aberration-Typeface

DATE: 26 JULY DURATION: 3H30 Nº OF PEOPLE: 6	
STEPS	DURATION
1. Presentation	10 min
2. Introduction to Chromatic Typography	20 min
3. System explanation	5 min
4. Break	5 min
5. Printing of Poster A4	2h
6. Cleaning	30 min
7. Dialogue and finalization	20 min

[table 3] Summary of the contingency plan workshop script.

Phases		Related to	Stakeholders	Methods/Instruments	Indicators to be collected
1	Scoping and Definition	Both		Mind map, Literature Reviews, Exploratory Research	
	Concept generation	Both		Mind map, Literature Reviews, Exploratory Research	
2	Start of the research	Theorical		Literature Review, Contextual Design	General knowledge in the area of study
	Early project experiment	Project		Experience prototyping, Experiments	Test if the project objective is valid
	Analysis of projects related to the matter	Project	Community	Case Studies,	Knowledge about known projects in the area of study
	In-depth research	Theorical		Literature Review, Case Studies, Triangulation,	Profound knowledge of the theme's history and its roots
3	Content analysis	Theorical		Content Analysis	Summarize the research done to apply it to the project development
	Project development	Project		Prototyping, Research through design,	
4	Workshop	Project	Design Students	Experiments, Testing	Analyze if the participants perceived the message and if it was effective
5	Analysis and discussion of the project's results	Both		Surveys, Content Analysis	
6	Deliver the font to a climate institute	Both	Institution		

[table 4] Instruments and indicators to be collected.

4. PROJECT DEVELOPMENT

The following chapter aims to describe the process of creating a chromatic typeface from its first sketches, ideas, and conceptualization to the final production of the typography shapes on an SLA printer. It is divided into three sections: the conduction of studies for the first ideas of the chromatic aberration typeface, influenced by concepts from *Type and Color: How to Design and Use Multicolored Typefaces* from Mark van Wageningen and *Specimens of Chromatic Wood Type and Borders & Co.* from William H. Page; the process and the difficulties overcome in creating the font digitally, as well as exploring the Opentype-SVG and COLR formats; the tools used to 3D print the types and their implementation for the workshop.

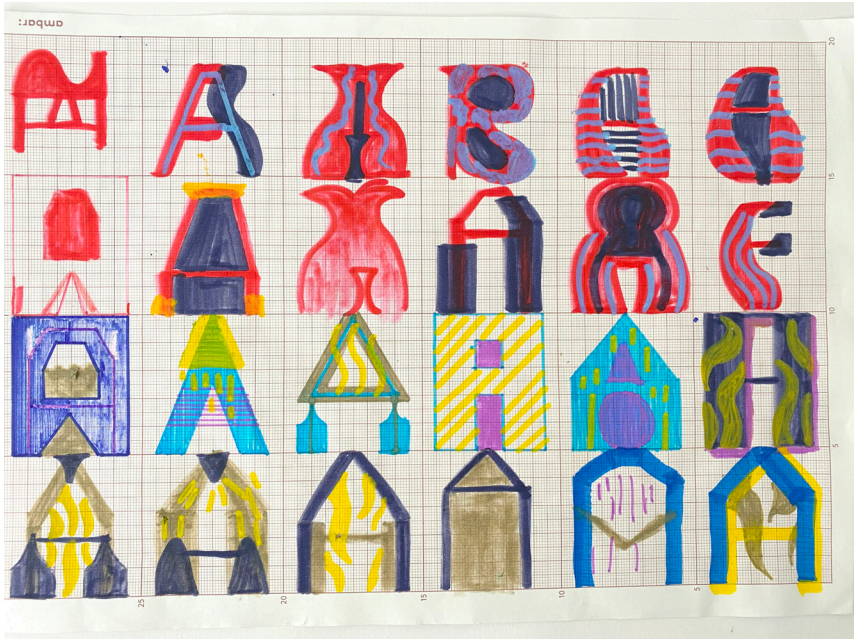
4.1 Gathering Foundations and Sketching the First Ideas

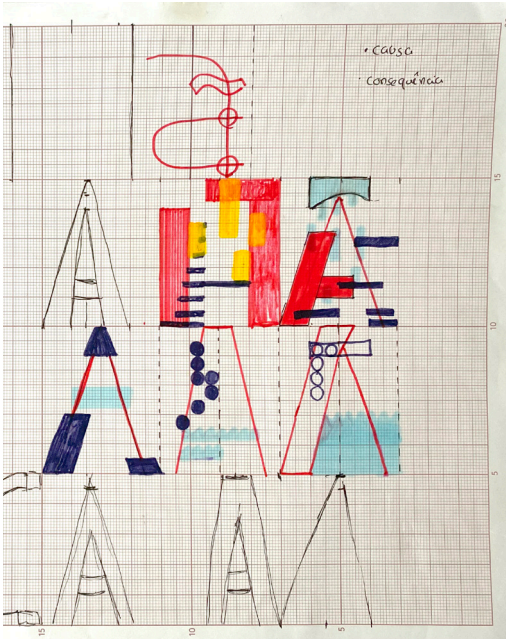
Since this project is about creating a chromatic typography, divided by layers it was valuable to use references such as the book *Type and Color: How to Design and Use Multicolored Typefaces* by Mark van Wageningen. The vision for the font was to create a modern typeface based on contemporary values presented in the theoretical research from the second chapter, mainly Ziza typeface and Typearture projects, while cross-referencing ideas from the book *Specimens of Chromatic Wood Type and Borders & Co.*

Mark van Wageningen mentions in his book three different starting points to start designing multicolored typography: calligraphy, hand-lettering, and type design. This project focuses on the type design aspect, although as van Wageningen states "(...) the principle of working with colors and different layers also applies to the hand-letterer or calligrapher" (2019, p.21). The project followed some steps mentioned by van Wageningen, mainly: defining basic shapes and the relationship and proportions of each element constructing the layer; the design grid, as stated by van Wageningen can be very a useful tool as long as the designer does not enforce it too rigorously (2019, p.46); defining the layers, which is the principle of splitting the letter into several parts, to assign individual colors to them (van Wageningen, 2019, p.63). Subsequently, optical corrections were implemented, followed by the coloring of the layers and a verification of the contrast between each character and its width. These steps were crucial for the creation of a unified typeface. From start, it was resolved that the typeface would exhibit a geometric quality. Analyzing the *Specimens of Chromatic Wood Type and Borders & Co.* was also critical, despite the aesthetic being completely different, there were still incredible color palettes and ornamentation to be taken. It was also defined early that the system would be only in capital letters plus numerical and applied for display purposes. The aforementioned approach permitted the exploration of a more experimental methodology, since capital letters tend to have a uniform shape. In this manner, the prioritization of legibility was not a primary objective, as Van Wageningen states "As you read, you do not look at every letter individually. You do not read first r, then e, a, d to read the word read. You read a word-image." (2019, p.69).

The preliminary phase commenced with an examination of the author's antiquated preliminary sketches (appendix III). Subsequently, a fundamental grid of 4x5 was implemented, along with fundamental shapes, to initiate the delineation of prospective solutions. As van Wageningen states, "Before you

begin designing a typeface, it would not hurt to think about a system. (...) helps determine the basic shapes of your letters" (2019, p.37). The materials used for the drafts were thin and bold markers, with color to test layer combination possibilities. Additionally, in some instances, the creation of collages was attempted through the printing of existing typefaces and the combination of these with newly drawn shapes. A monospace option was contemplated, but it proved to be a significant detriment to the readability of the typeface due to the absence of rhythm. The first sketches lacked simplicity and/or presence while sometimes being too illustrative (figure 48). Also, serifs were early put to the side after a quick realization they were not suited for the wanted result. Following a period of contemplation, further sketches were produced, combining the essential form with greater contrast between the constituent layers, exploring the possibilities of abstraction and even incorporating curved elements. Following a comprehensive review of the aforementioned

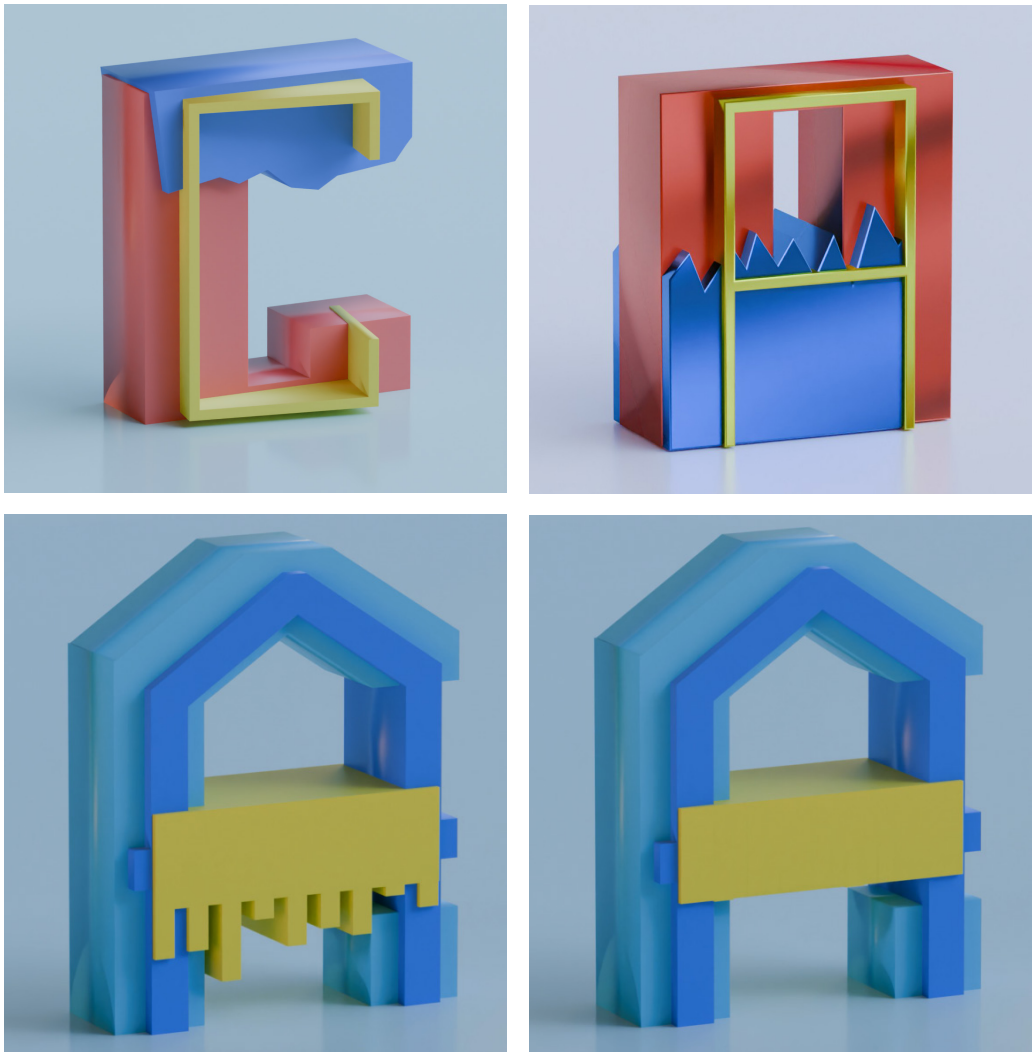




[figure 48] Author's sketches of the typeface.

[figure 49] Selected styles by the author.

experiences, the sample was reduced to three distinct styles (figure 49). While manual drawings on paper were being made, 3D visualization experiences of some characters were carried out for better visualization of the layer's intersections and even possible variation (figure 50). These experiences were created in Blender and were indispensable to achieve the final result. The proposal chosen had a geometric drawing with basic shapes and 45º degree turns and elements allusive to the rising sea levels and/or defrosting, and the overall shape was more suited for the project's needs. The draft had a deconstructed layer, a full character layer, and a layer focused on the theme. This seemed the most balanced output since neither the theme-focused layer nor the letter shape compromised each other. Subsequently, a few more characters were drawn by hand to test possible shape combinations.



[figure 50] 3D Experiments conceived in Blender.

[figure 51] Final sketch of Chromatic Aberration typeface.

The following step was to produce the typeface (figure 51) digitally since it was easier to manipulate the shapes to test the rest of the characters.

4.2 Digital Typeface Design

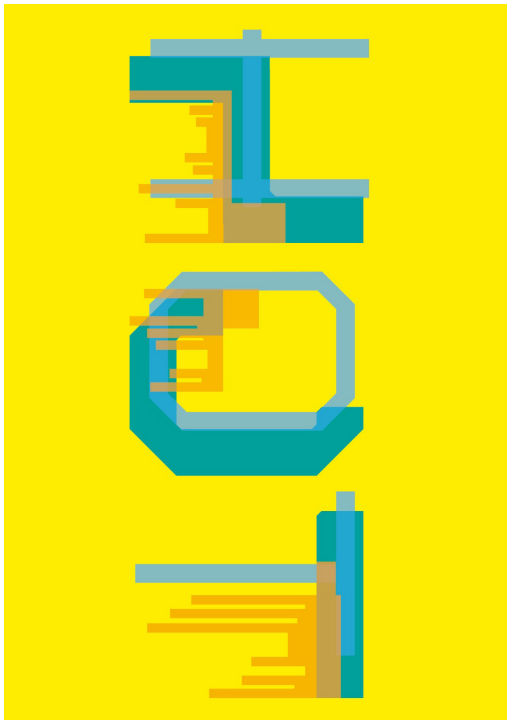
[15] Fontlab is a font creation software.

With the main idea for the character set, the first few glyphs were vectorized. One of the first precautions to take note when digitizing chromatic characters, was to have special caution when placing the anchor points since they need to be overlapping correctly depending on the layer being worked on. This is enormously important because it prevents strange or annoying edges when overlaying the letters (figure 52) (van Wageningen, 2019, p.134). Mark van Wageningen points out another aspect which is file size. Since these fonts have color information, with at least two layers, the size will at least double then a standard font would be, so data minimization is important (2019, p.136). This is particularly the case in the context of web design, where the use of a lightweight and rapidly loading typeface can facilitate the expedient display of content on a website. In the case of the chromatic aberration typeface, a snapping grid was used to accurately position the points. The various layers of each glyph were constructed using the tools available in Fontlab[15], which enabled the assignment of a distinct color to each layer. The digital rendering of the character set resolved any previous ambiguities regarding the drawing. From here on, the layers will be treated as layer 1 (one), layer 2 (two), and layer 3 (three). Layer one refers to the bold and deconstructed, layer two refers to the thinner, fully drawn letter, and layer three refers to the defrost/sea level.

[figure 52] Placement of the intersecting vectors, Novo Typo Color Book.

In the first version of the typeface (figure 53), although the characters were drawn, there were still several difficulties and problems to overcome. The first version served only as a way to draw the full set of characters freely without worrying about aspects such as character spacing and corrections. Even though a snapping grid was being used to help with anchor point placement, it proved to be ineffective from time to time. Some layers were still not aligned correctly due to the grid being too strict to make small corrections. The defrost/sea level layer was static, and the upper part was overly bold. The width of some characters was excessive, resulting from an adherence to the 5x4 grid too rigid. The inner curves were also too sharp due to the geometric nature of the typeface, which in some characters (such as A, C, and D) compromised layer two, making it appear disproportionate. There was still another obstacle to tackle, which was the bottom alignment of layer two to the x-axis. In some characters such as A and F, the height would go all the way to the base of the letter, touching the x-axis, while on B it would not. Although these were complications to solve, the typeface was beginning to take shape, following the project's needs.

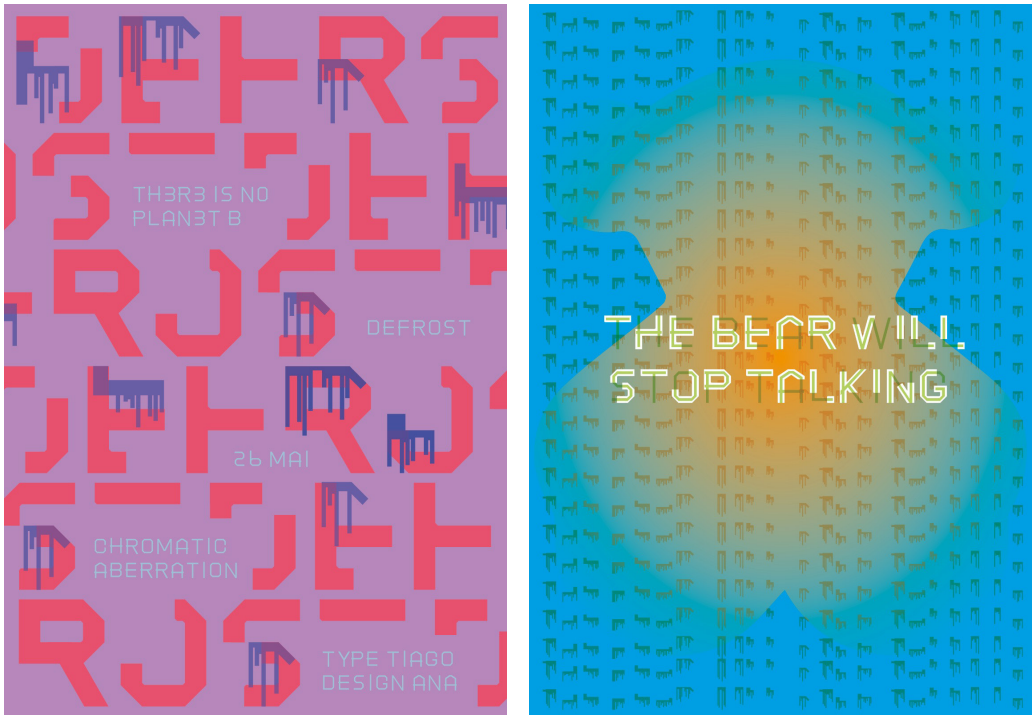
[figure 53] First version of Chromatic Aberration typeface.



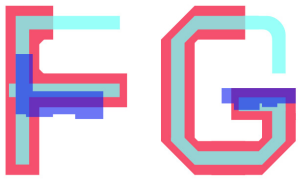
[figure 54] Experiment with Chromatic Aberration, courtesy of Maria Ruão.

The following step was focused on solving these problems, and later adding the first variation axis. Layer three became more dynamic with newly added shapes, the width of letters such as E, F, M, and W was adjusted as well as letter spacing. The grid was at this point, discarded, in preference to manual alignment, which allowed more controlled placement of anchor points. The inner curves were also adjusted by adding a small compensation at the point of most stress which also streamlined the font and made it more cohesive. In this phase of the study, two colleagues were provided with the font for the purpose of evaluating its progress and ease of use. The instructions were to create a climate change poster in a relatively expeditious manner, with minimal deliberation, to capture the initial impressions. The font was exported in SVG-OpenType format[16], in separate layers, as this format is the accepted color format for the majority of software applications. The results showed that the users felt enough freedom with the font to use only the layers they wanted, whether that be combining layer one + two, or layer one + three. They experimented with misalignments (figure 54) and the usage of a single layer (figure 55). After using the font, they reported that the installation was straightforward, just like any other typeface, however, the usage had a learning curve. Through an oral conversation, their experience with the typeface was discussed and it was noted that the typeface alone was enough to create an awareness poster, without the need to add props or other elements, since the glyphs were varied. Due to the nature of SVG-OP, the glyphs are stored as scalable vector graphics files with color information, using the RGB color space. This makes it particularly difficult to change color without resorting to alternative workarounds and can also lead to undesirable results when printing digitally (van Wageningen, 2019, p.141). Also, to place the different layers on top of one another, the glyphs have to be superimposed, and then change the selected layer, which can become labor-intensive after some time. Although this feedback was taken into consideration, it was most technical limitations. The results were enlightening to the nature of the typeface's theme.

[16] Check page 49.

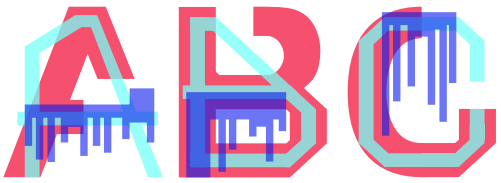


[figure 55] Experiment with Chromatic Aberration, courtesy of Ana Coelho.



[figure 56] Variation Axis of Chromatic Aberration typeface.

In an attempt to add variation and dynamism to the typeface, the following step involved the creation of two variable axes. Variable fonts use interpolation to create new instances of a glyph between two set values, as long as they have the same number of points and handles (Typearture, n.d.). The variation axis created was one controlling the thaw drag of layer three and the other added curved elements to some of the characters to break the geometric shape (figure 56). This approach introduced a multitude of additional possibilities to the typeface, thereby affording the user a greater degree of freedom in their font selection.



[figure 57] Stylistic set of Chromatic Aberration typeface.

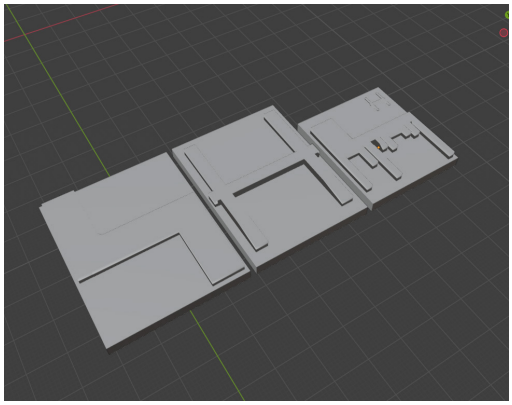
The generation of the variable variants presented certain challenges, primarily due to the positioning of certain anchor points. In light of these considerations, it became necessary to redraw certain elements of layer three to accommodate the potential overlap of anchor points when utilizing the axis. When the typeface was finalized with its respective layers and axis, it was decided that a stylistic set (figure 57) would be created. A stylistic set refers to alternate glyphs that can be changed by the user using OpenType features in supported software, such as Adobe Suite. The goal of this stylistic set was to provide the user with out-of-the-box implementations of the layers, and also to expand the glyph catalog of the typeface. The idea for this set was to take the existent drawing and modify the geometric shapes thus creating what looks like a mutated variant. It maintains the same layer structure, just with added possibilities to experiment with something new. With the typeface fully structured and organized, it was exported (figure 58).

[figure 58] Chromatic Aberration typeface.

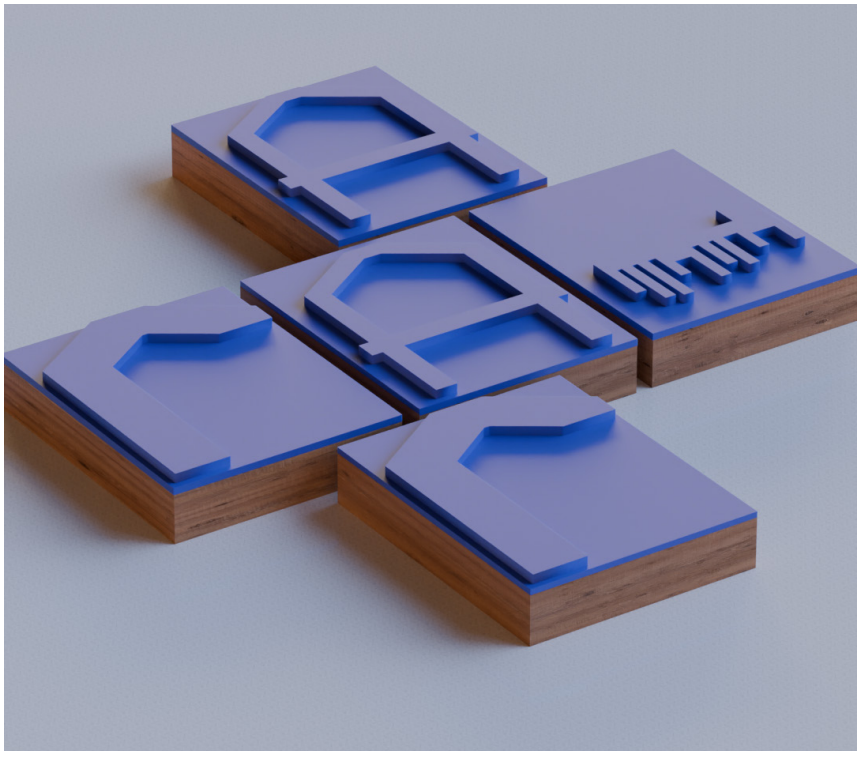
The export was chosen to be done in three formats: Regular OpenType, SVG-OpenType, and COLR/CPAL. Due to constraints with each format, it was decided to have different alternatives. Since this typeface had from the beginning an experimental approach, technological limitations were known. Regular OpenType, although not saving color information, it allows the user to use the variation axis and add the color himself as wishes. SVG-OpenType locks the user from accessing the variable axis but saves color information and has wide support, however, few programs allow color changes. COLRv1/CPAL fonts can be made variable, the colors can be adjusted using CPAL color palettes, by using CSS coding, gradients, and blending modes. The downside is that COLR fonts are not supported on desktop applications. Only QuarkXPress allows the use of COLRv0 format, which features all the above except gradients and blending modes. Right now, COLR and COLRv1 fonts are best suited for web applications, having a smaller file size than SVG-OpenType, since color information is not stored directly inside the glyph, but in a separate CPAL color table. The Font Gauntlet from ABC Dinamo was instrumental during this testing phase, as it permitted the assessment of each format's functionality. Upon completion of this initial phase, the subsequent phase of the project was dedicated to the creation of typography type shapes.

4.3 Physical Type Shapes

In *The Craftsman*, Richard Sennett explores the blending of contemporary methods with age-old abilities, illuminating how craftwork changes and advances in the digital era (Sennett, 2008). This convergence is shown by the creation of a multicolored typeface for this project, which celebrates both the history and contemporary typographic arts through the use of digital design, 3D printing, and the physical process of assembling and utilizing the set. The typeface set chosen to be 3D printed was the one previous to the axis variations and stylistic set. This phase was started by 3D modelling all the characters in blender (figure 59). This process, although taking some time due to having to model each glyph individually and making sure the mesh of the object was intact, was straightforward. Also, it was made a 3D render of what the result was expected to be (figure 60). To associate layer three with the specific character, a small extrusion was made on the surface of the base. This, however, later will be proven to be insufficient. The overall dimensions of each character were a constant thought since it had to be decided at the start. Since the workshop involved printings in A4 paper, the dimensions were decided to be 5x4cm. There exist numerous technologies to print moveable types, each having its advantages. For this project, the options were vast, between a CNC router, laser cutting, FDM printer & SLA printing.



[figure 59] 3D Model of the typography types in Blender.



[figure 60] Model of the expected result.

4.3.1 Dive Into SLA Printer, FDM Printer, Laser Cutting

The CNC router[17] was discarded in the early stages, out of convenience and because of the required set-up due to the machine being unused for some time. The experiments were, then, made using the remaining options:

I. **SLA printing (stereolithography):** Uses a light source to cure liquid resin into hardened resin. The process is made by a build plate that lowers into the reservoir, where the liquid resin is stored. The UV light source traces the object's surface and solidifies it, layer by layer, lifting the platform on each layer. To prepare the file for printing, slicing software has to be used such as AnycubicPhotonWorkshop[18].

II. **FDM printer:** Uses a heated nozzle to extrude melted filament which moves layer by layer to build up the artifact. It is overall, easier to use than SLA printing.

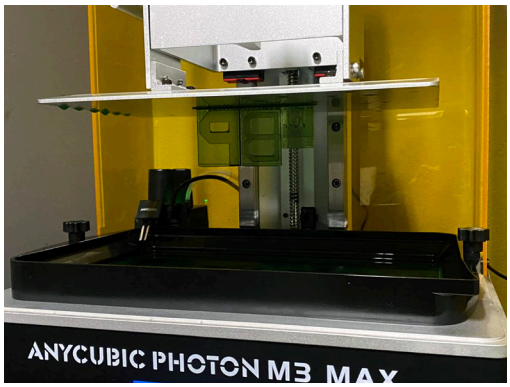
III. **Laser Cutting:** The device employs a focused layer source to facilitate cutting on the desired material, whether that be plywood or acrylic. The process is characterized by high precision and clean edge cuts, and it is the fastest of the three.

The typeface shapes printing began on the FDM printer using filament. Although the resulting product demonstrated durability, the surface where ink would be applied exhibited an unsatisfactory finish. This was due to the filament leaving diagonal lines on the surface. Resin and laser cutting experiments were performed next. The resin prints required much tweaking. The first few runs were printed with the character horizontal to the build plate. This occurred in the edges of the character base becoming warped and even more warped after curing the resin. Also, the first runs were printed with a depth of only 2.5mm, which very quickly proved to be insufficient as the character became brittle and snapped very easily. Later, the depth was increased to about 5mm and that made the character durable, however, the build plate printing orientation[19] was still not solved, as the piece was still bending around the edges. Moreover, sometimes supports of each piece would fusion with the letter block itself, resulting in an even printing surface, suggesting software settings tweaking was needed. Other times, only the base of the letter was printed. In parallel, experiments were being made in the laser cutting machine. Acrylic sheets were considered to be used as material, however, due to the difficulty in finding compatible acrylic, a 3mm MDF sheet was the material chosen. The result was interesting, with a precise cut. However, one concern was the absorption of paint and humidity which over time could compromise the design and integrity of the character.

[17] A CNC router is a machine used for cutting, carving, engraving, and shaping various materials like wood, plastic and metal using a computer-controlled system. CNC routers are widely used in industries such as woodworking, as they allow for highly accurate, repeatable, and complex designs to be produced with minimal human intervention.

[18] Each 3D Printer requires software to be able to slice the desired product.

[19] Check figure 61 for reference.



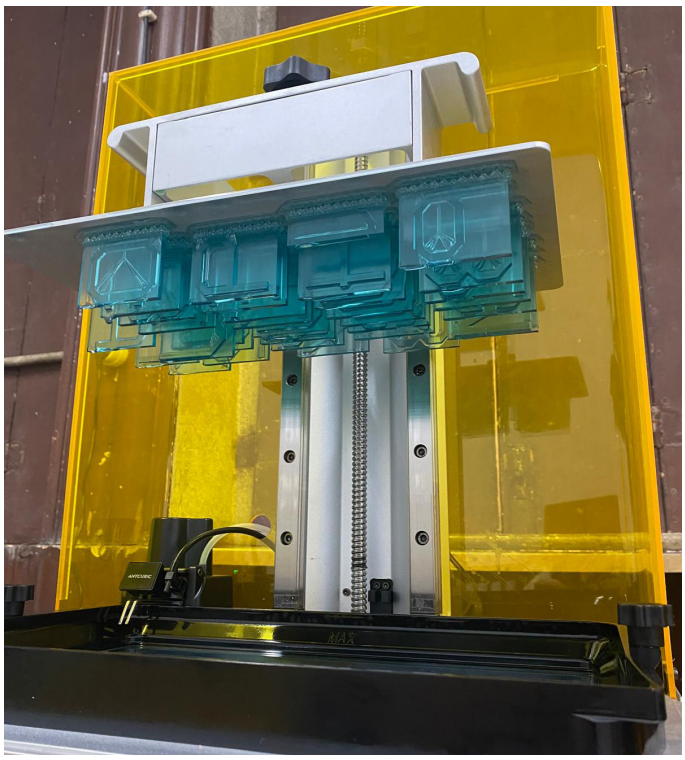
[figure 61] Solution to print the types more reliably.

These tests can be seen in appendix IV. This concern was proven to be accurate, since when test printing with the MDF types, the printing surface became crumbly and after cleaning up, warping was slightly noticeable. The three materials were tested by printing character A on a sheet of paper. The ink used was not definitive, as this was acrylic, so it smudged a lot (appendix V). Out of all the options, despite the warping edges yet to be solved, resin yielded the best results with a smooth printing surface and being easily cleanable. With more trial and error using the SLA printer, it was realized that if the characters were printed vertically (perpendicular to the build plate), the warping on the edges was minimal (figure 61).

In total, 3 (three) layers were printed, each with a different color to different and facilitate choosing the characters[20]. The colors chosen were, for layer one translucent red, layer two translucent blue and layer three translucent green. Due to circumstances with the school grounds mentioned in the methodology part, the resin printing workstation had to be relocated to another part of the school, which in turn caused some constraints. The SLA Printer used was an Anycubic Photon M3 Max[21] (figure 62). The production of layer one, which was red-colored, went smoothly. It was noticed that after curing, small scratches showed all around each piece, however, this did not impact printing performance, just the aspect portion. Some characters of layer two had to be printed several times, such as the "i" because exposure times had to be adjusted. The printing of layer three registered major setbacks because the FEP film of the reservoir tank broke, causing half of the printed types to be lost. With this, another resin printer had to be utilized, which was a small Anycubic Photon printer. The machine's printing space was substantially smaller, which meant smart management of the types position was required. The first run on this printer yielded unsatisfactory results (appendix VI). Problems such as the block

[20] The choosing of the colors were made out of convinience and by availability on the manufacture's website.

[21] This resin printer, due to its big printing area allowed for a more efficient producing time.



[figure 62] 3D Printing of the typography types using an SLA printer.

dropping from the build plate to the reservoir or the supports bending on the build plate were verified. This was in part because of the need for calibration in the z-axis and also because this SLA printer uses different software than the one used previously, so a few test runs were made before the desired result was achieved. In total, 108 pieces were printed using resin, which means 36 pieces per layer. The precision of some pieces of layer three was found to be inconsistent because the entire process was derived from the use of two separate machines.

The idea from the start was to print with just enough height so the system of shapes would be sturdy, and afterwards glue it to a piece of MDF with a higher height, so the piece would be easier to handle. This was to save time and printing resources. To achieve this, a 12mm thick sheet of MDF was cut with a table saw to match the size of each resin type (figure 63). The process was found to be ineffective for two reasons: firstly, the precision of the cut was inadequate, and secondly, the piece itself crumbled into dust, due to the quality of the MDF. Consequently, this approach was not continued. Laser cutting the pieces for the extra precision of the cut was the following option, however, this time it was used a sheet thickness of 3mm and then layered three pieces on top of one another, totaling 9mm thickness[22] (figure 64). This approach resulted in a straight and durable base for the resin types to sit on and contributed to achieving the desired result (figure 65).
Obs: It was expected to produce a wood printing chase to facilitate placement of the characters and spreading the ink, however due to constraints that idea was no longer feasible.

[22] Each piece of MDF was covered with wood grain filler to achieve maximum water resistence.

[figure 63] Cutting MDF with a table saw.

[figure 64] Sheets of MDF laser cut and glued together.

[figure 65] Final typography types using 3D printing.

5. WORKSHOP

The need to validate and evaluate the chromatic font Chromatic Aberration's utility and usability in a manual process led to the creation of a workshop. Richard Sennett examines in his book *The Craftsman* how the interaction between the hand and the mind is valued in the production process, whether it is manual or assisted by technology, to conduct meaningful work and build abilities. This viewpoint is especially pertinent to the workshop using the 3D resin types, as the process of manually printing the chromatic layers reflects the importance of artisanal work even in a digital setting. To achieve this, the workshop's objectives were to stimulate chromatic typography compositions; understand how variation could enhance the message; and develop a series of demonstration posters for climate change in a group dynamic environment; all resulting in a method that combines the concept of the typeface with the manual printing process to articulate how chromatic typography is interpreted culminating in a teaching experience. This approach also allowed realizing through practice the system's limitations and potential.

The number of participants was limited to 6 (six) for the activity. This imposed limit is justified by attending to the space conditions and attention each participant needs. The participants had experience in the following areas: arts, graphic design, typography, and industrial design. To make the workshop run smoothly, it was created an activity guide that described each stage in detail[23].

[23] Check appendix I.

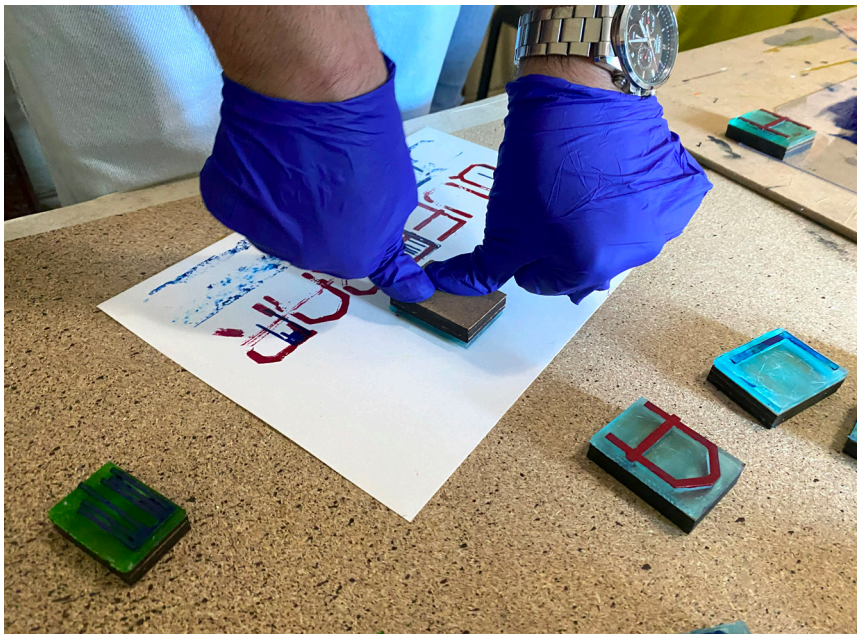
5.1 Practice

The total duration of the workshop was 3:30 hours and it was divided into six parts: presentation and introduction to the project, introduction to chromatic typography, system explanation, printing phase with the 3D printed types, cleaning and finalization with a dialogue to gather feedback. In advance of the workshop, a succinct PDF document was distributed to all participants, providing an overview of the project. Furthermore, the document requested that they think of a composition related to climate change, which could be either illustrative or a sentence, for printing. The workshop was divided into two tables: one was where the participants could work, and the other was to organize the materials needed (figure 66). The workshop began by explaining the theme's project, as well as describing the subsequent steps of the workshop. A brief demonstration was also made to show the system's functionality. At the end of the presentation, some participants had questions, that were clarified.

[figure 66] Chromatic Aberration layers organized for the workshop.

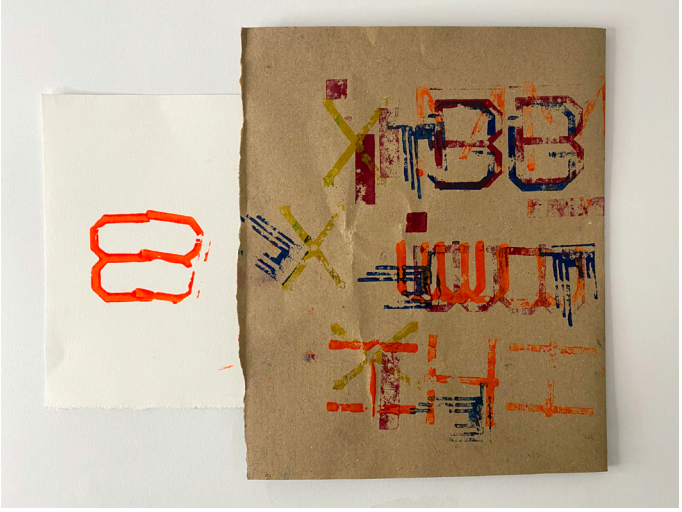
Following up, each participant started by gathering the characters they needed. In cases where they needed to use the same letter, they would help each other. Also, at this time, a total of 5 ink colors were spread on pieces of glass (figure 67) so there would be more chromatic variation. Moreover, when participants required the use of alternative colors, the preceding one was meticulously cleaned and a new one was promptly applied. It was a requirement that each participant utilize nitrile gloves.

[figure 67] Spreading the ink in the workshop.



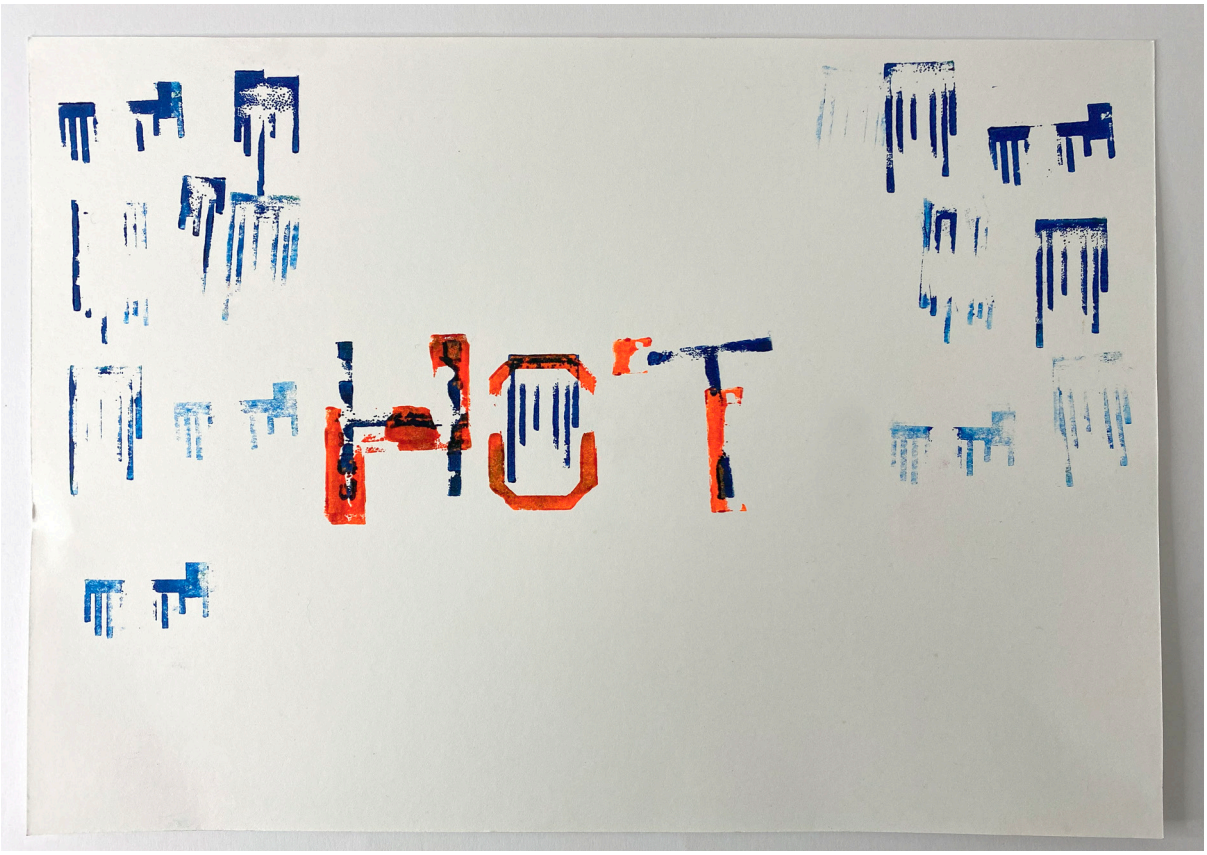
The participants, then, started spreading the ink on top of the types with the help of a roller (figure 68). The absence of a printing chase made this part more challenging.
Some of the participants brought their ideas as asked, whereas others elected to develop their compositions extemporaneously.
The printing process was approached experimentally, allowing for the exploration of the natural misalignment that occurred.
Some participants utilized this misalignment to manipulate the result. The additional height provided by the MDF sheets was also advantageous, as it facilitated more efficient handling of each glyph. The time required for each layer to dry before applying the subsequent layer was not a significant concern, as the paint dried rapidly. The pressure each person applied, overlapping, ink quantity, and surface irregularities were all also playing factors, contributing to variation in the final result. The first round of prints was made using regular white paper, while the second round, kraft paper and journal was made available for more exploration possibilities. At the end of the workshop, the prints were left to fully dry, and the materials were cleaned. The participants were invited for an oral dialogue to discuss their opinions, processes, and difficulties. This helped to gather feedback and valuable information about their perspective on the project.

[figure 68] Participants printing with the typography types (courtesy of Maria Ruão).



5.2 Results

The overall results of the workshop showed to be varied, between typographic and illustrative approaches. After the presentation and explanation, the participants easily came up with an idea to be printed, directed to the theme's interest. The typeface specimen was made available so everyone could check what layers belonged where. Although the questions they had were cleared at the end of the presentation, it was observed that the participants felt overwhelmed regarding the system's layers because of the number of types available. It was also noted that the participants were having trouble associating which characters the layer three types belonged to. This is probably caused by the quality of the lighting available in the space and the use of translucid resin. Possibly if the extrusion of the letter was higher and the resin used was opaque, this would make choosing the right layer easier. This resulted in a point in the workshop where, rather than seeking the matching layer, the participants began to search for a layer based on its shape. Prints were experimented on regular A4 paper, kraft paper, and journal (figure 69).



[figure 69] Workshop results on different supports.

They proceeded to combine different layers, leaving approximately one-third of layer one and half of layer three unused. In the course of the printing process, it was noted difficulties concerning spreading the paint on the surface, due to the absence of a printing chase. Maybe, this could have been prevented if the size of each piece was larger. Another issue that confused two participants was the difficulty in aligning the pieces with the previous print[24]. Other than that, the participants found the printing phase straightforward. It was registered during the printing process, that due to minor warping on the printing surface in some parts of each character, the printed letter didn't print fully flush, which created a texture on the paper. It was also observed that the decision to only have one set available did not cause obstacles or delays other than having to clean the surface with paint thinner every time a color change was needed. This, however, was a good thing because it kept variation a factor due to having five total colors. The results were all pretty varied, with different types of approaches (appendix VII), whether they be typographical, illustrative, or abstract. It was also interesting to see the participants adapting the system to their own will, instead of the other way around. Furthermore, this was made feasible by the fact that the system itself was not overly prescriptive about its usage.

For a better and deeper interpretation of the results, at the end of the workshop, it was discussed with the participants several points regarding the typeface, the system, and the organization of the workshop. This oral discussion had an informal approach and was intended to collect feedback and help shape the project for future studies. The following questions were set:

[24] Check Conclusion - Suggestions for Future Studies.

Is the typeface system easy to understand?

The collective response of all participants was that the system is indeed comprehensible. They pointed out that they felt overwhelmed with the number of layers available. Two participants pointed out the idea that maybe if layers 1 and 3 were in some way, modular, where instead of having 36 pieces, there were only 8 or 10 that adapted to the letters from layer 2, it would make the process smoother.

Did you have any prior experience or knowledge about chromatic typography?

None of the participants had any prior knowledge of this particular niche within the field of typography. This, in some way, might have influenced their perspective on the method and subsequently, their results. It also allowed them to become familiar with chromatic typography in an experimental environment.

Did you think a physical approach to a digital system was pertinent?

The participant's response to this question was a unanimous decision, of yes. An analog approach in a group environment created a dynamic influenced by imperfect overlaps, ink breaks, and changes in ink pressure that could not exist in digital format. It creates a freedom of technique.

Regarding the system utilization, did you think it was straightforward?

About 4 of the participants pointed out that the types size could have been bigger, so it was easier to distribute the ink. Also, as observed during the workshop, the participants said that finding the corresponding layer 3 piece was a hard task due to the lighting and the use of translucent resin. However, as pointed out by one participant, it was possible to use types from other letters, originating new possibilities.

Was the number of pieces available enough?

One set was more than enough since a large portion of characters was left unused. The participants ended up sharing the pieces and the color needed was also changed as soon as necessary.

Did the starting presentation restrict creative freedom?

All 6 participants felt that the initial presentation was essential to help them know what to create and expect. One participant said that when she was invited to the workshop, she felt under pressure because she did not fully understand the theme and had no prior knowledge of chromatic typography hence, she feared not knowing what to print. However, with the initial presentation, it was defined boundaries that simplified the process.

What would you change in the system and are there any recommendations for future studies?

The participants pointed out aspects that they already mentioned in previous questions, such as character size, pointing that it would have been interesting to experiment with bigger sizes of the types. One participant proffered recommendations for future studies where this system could be explored using generative design. This approach would entail providing the machine with an algorithm and a set of previously generated layers, thereby enabling it to construct illustrative and typographical examples that elucidate the theme. Another participant also pointed out the adaptability that is easily achieved in certain layers. For example, turning the layer 3 upside down simulates a flame, which would be interesting to explore. The creation of a mechanism to align the layers properly, if the user wanted, was also mentioned.

Conceptually, the feedback from the Chromatic Aberration typeface system was positive, even with all the adversities found. The workshop objectives were fulfilled and matched the initial expectations. This experimental approach using a digital system in an analog environment brought varied results and facilitated the creative process of the participants (figure 70). The results are valuable to a deeper understanding of system capabilities and to future improvements.

[figure 70] Participants experimenting with varied color combinations (courtesy of Diana Meireles).

CONCLUSION

The project was developed around its primary objective, which was to gain an understanding of and promote the use of chromatic typography as a means of raising awareness and consciousness of a given theme while exploring the possibilities and opportunities of creating a typeface based on a system of layers using color. The project research focused on the history and analysis of wood type and chromatic typography; surveying contemporary case studies whether they were revival projects or setting new boundaries for chromatic typefaces; development of digital chromatic typography as well as using 3D printing and laser cutting to assemble the physical types and the validation of the system through a workshop. In *The Craftsman*, Richard Sennett makes the case that "making" is a method of thinking and reflecting on the world around us as much as a means of production. The project's chromatic typography, which incorporates a design that references climate change, embodies this thoughtful approach in which the entire creative process — from digital design to the use of types in the workshop — serves as a concrete and deliberate investigation of the subjects covered.

In the theoretical framework, a passage was made through the origins and the emergence of chromatic typography, tracing its evolution in a period comprehended between the 19th century and to modern day. A thorough historical contextualization was necessary to understand the current landscape of chromatic typography. The Tuscan font style, which was a popular choice for creating chromatic types was deeply analyzed and comprehended rooting the research on its given characteristics. Additionally, traditional chromatic typography patents were analyzed, illustrating how foundries meticulously designed typefaces, created in an era far from the advent of personal computers. The development of chromatic wood types quickly reached its zenith due to rapid technological advancements, in a period when wood types were falling out of use. The transition of traditional chromatic typography into the digital realm was highlighted, showcasing how analog and digital technologies have converged. We can understand in some contemporary projects the benefits of using a hybrid work method, exploring digital and analog at the same time, which in turn sets new boundaries for chromatic typography exploration. The decline of letterpress in favor of other printing mechanisms such as offset printing due to its numerous advantages, marked a shifting point. Years later, due to its proximity, materiality, connection, and tactility, the activity which provides a sensorial unique printing experience, is resurging in an experimental, artistic expression and exploration way, valued by its process. This renewed interest mixed with digital fabrication such as 3D printing and laser cutting is fueled by artists, designers, and experimental studios. There was also a focus on analyzing case studies to understand and gather intel about the current state of the art. This analysis was divided into revival projects and contemporary projects while exploring current color font formats. Revival projects play a crucial role in the reintroduction and preservation of old, often forgotten fonts. Chromatic typography workshops rekindle interest in traditional practices and serve an educational purpose. Contemporary all-new projects push limits and explore the limitations of technology, defying layer structure, color input of the typeface, and format limitations. Since one of the objectives of this project is to communicate a message through glyphs, it was

crucial to research how this added social value has been achieved previously. This research framework allowed to fill in the gaps in the necessary information to convey the project, making it possible to anticipate possible problems ahead, according to the stipulated objectives.

The empirical project was addressed next. The methodology adopted is mainly mixed (action-research), of nature practice-led, which enabled the author to achieve a new understanding of the project. This method allowed to formulate the creative work and contribute to new uses of chromatic typography.

Additionally, a chapter was dedicated to the creation of Chromatic Aberration. This chapter describes the process starting from: initial sketches and ideas; digital font; printing and assembling the physical types. The final typography system resulted in a color font split into 3 layers. The design of the proposed system is based on two principles: on the knowledge of the case studies; and the construction of a pedagogical tool that intersects with typography. This same chapter facilitated the identification and comprehension of constraints and limitations associated with the use of color fonts. The objective is to convey a message that is shaped by the selected color palette, the style of letterforms, and its usage. The preceding theoretical research was integrated into the creative process, thereby expanding the knowledge base and demonstrating the potential applications of chromatic typography in the context of social causes.

To analyze the usability of the typographic set, as well as perceive and evaluate the participant's attitudes towards it, a workshop was held. The workshop's results were collected through observation and a dialogue between participants to collect feedback and their perspectives. The results indicate that the participants have a very favorable perception of the project's theme which is therefore satisfactory. It was possible to test the chromatic set in a group environment, where each participant contributed to the exploration and dynamic of the activity.

It is therefore concluded that all the objectives set were achieved. The current project has explored the association of a chromatic font to social causes and also contributed to further understanding and development in this area. The designed system is highly customized and catered to a function, which allows it to align its purpose with the set objectives. The research substantiated the results, contributing also the progress of the design community. It was also noted that the results of the Chromatic Aberration workshop yielded interesting and unique results due to the irregularity of the printed types, which wouldn't have been possible if this plasticity hadn't been exploited. A physical approach cultivates unexpected outcomes and creativity. It is easier to think about an idea when we have a paper and a pen in the hand. It also makes each print become authentic and with a story behind it. Although the results were positive, the typeface and the types remain a prototype, where future improvements can be made to better cater to the user. Finally, the impact of the project would be amplified if a connection was made with an institute claiming climate change.

Study Limitations

The main hindrance in the development of the project was the workshop. One realizes that the collected data is only a sample representing the spectrum of the project. The restriction the workshop had due to the unavailability of the school workshop's impacted the available conditions. It would have been interesting to do the workshop in another environment, with students from Faculdade de Belas Artes da Universidade do Porto.

Suggestion to Future Studies

It is anticipated that this project has contributed to the expansion of knowledge in this domain, facilitated the adoption of these practices, and established a foundation for future research. During the course of this project's development, several potential avenues for future developments were identified.

The theoretical research made to define and gather foundations for the projects was indispensable. However, it is suggested to broaden the research to include generative and modular approaches.

On a digital approach, the possibility of integrating machine learning with a set of defined characters and parameters remained unexplored. In this sense, it is suggested investigation that supports this hypothesis, especially when machine learning is becoming more utilized.

In a physical production level, it was left to explore other materials such as acrylic, which would be interesting. Also, other means of production such as using a CNC router or Multi Jet Fusion. It would be beneficial to explore these alternatives and even try different calibrations for the SLA printer to yield a more precise result, that way, the printing method would be more accurate. Therefore, research in these methods is suggested to test plasticity and durability and, of course, the printed result. Also, possibilities should be tested regarding simplifying the number of layers needed, maybe with a semi-modular approach to layers one and three. The absence of a printing chase made the process more challenging while alligning the typography types, so it would be interesting to explore the production of one. In addition, it would be valuable exploring different sizes of types for different types of applications.

In terms of feedback collected, besides the workshop, the project was presented at IJUP (appendix VIII), which received an honour, and the feedback was essential to reevaluate some steps and ideas.

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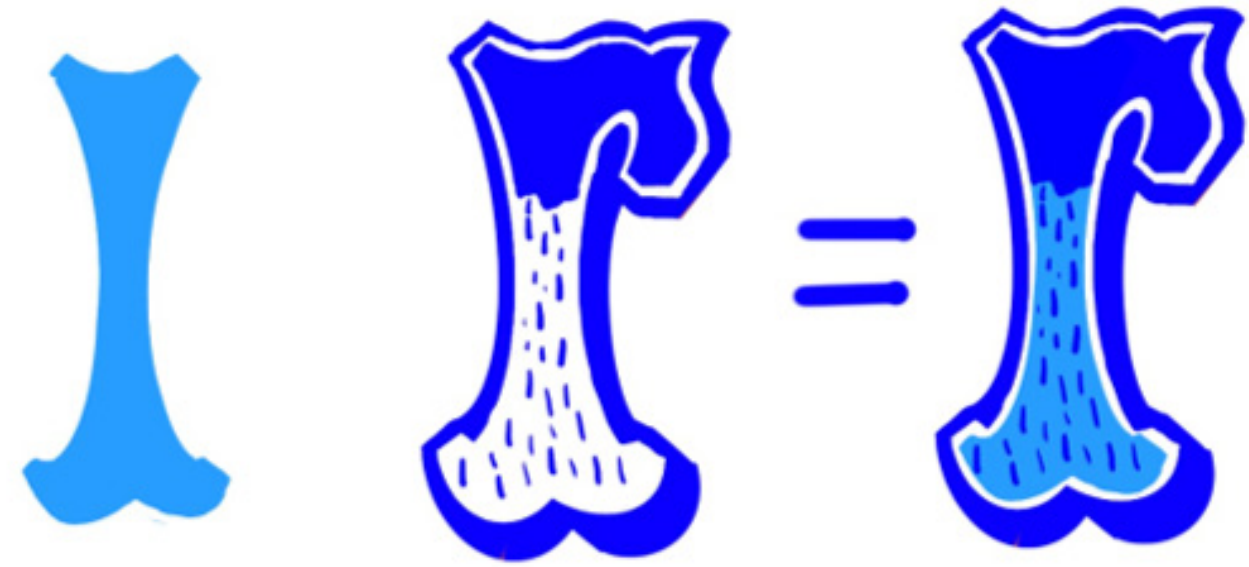
APPENDIX

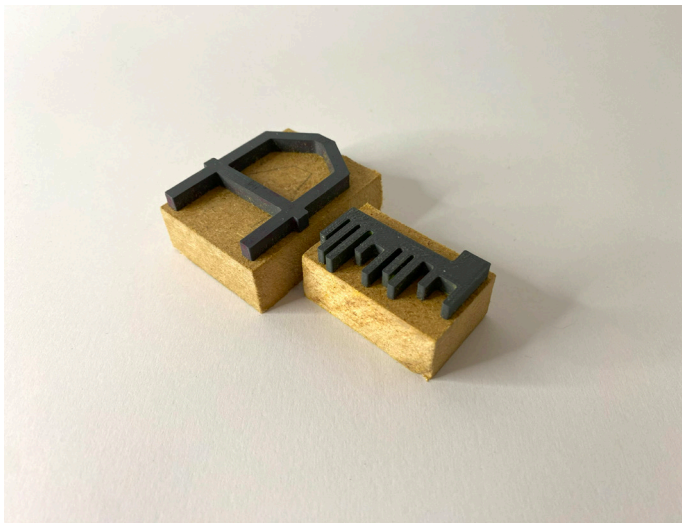
STEP BY STEP GUIDE	
1. Apresentação do projeto e do tema + Explicar o que irá ser feito no decorrer do workshop (.ppt). Ligar a ideia do tema alterações climáticas às matrizes físicas, e explicar como é que o sistema funciona: com overprint, sobreposição de formas, desalinhamentos, pressão, quantidade de tinta, irregularidades do material. (fazer breve demonstração?)	
2. Contextualizar o que é a tipografia crómatica: origens, evolução, mostrando exemplos do William Page, tipos de madeira, projetos de revival e contemporâneos, resumido para não se tornar cansativo	
3. Explicar como utilizar o sistema	
5. Iniciar a atividade principal, uso livre de cores. As peças irão estar separadas por caracter, para ser mais fácil a organização. Os participantes terão que partilhar as matrizes devido ao limite de peças disponíveis. Os participantes terão que pensar numa ou mais palavras à escolha, para montarem a sua composição. Pode ser algo abstrato ou algo legível, a escolha é livre. Cada participante terá que usar luvas. A tinta é espalhada em vidro com uma espátula. O rolo capta a tinta e é espalhada por igual na peça, que posteriormente é impressa no papel.	
6. Limpeza do material e do espaço. Uso de lava-rolos.	
7. Perguntar aos participantes se acharam que o tema estava presente no sistema, e se de alguma forma os relembrou da pretinência das alterações climáticas. Recolher feedback.	Utilizar uma mesa apenas para colocar o material

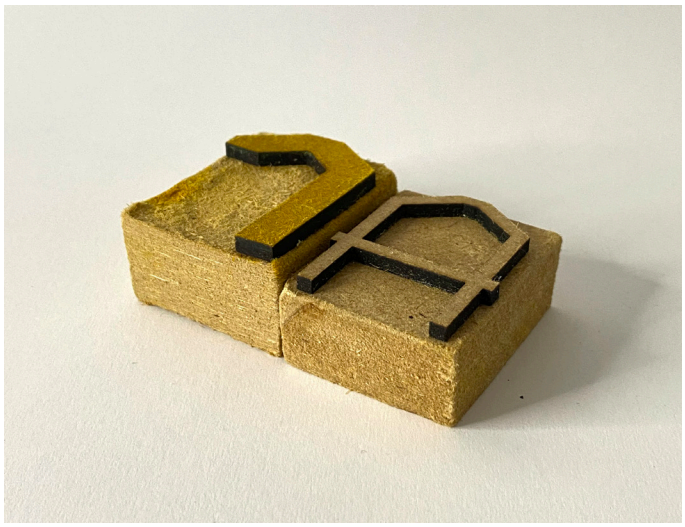
MATERIALS NEEDED		
Computador	**Balde**	**Fita de Pintor**
Matrizes	**Espátulas**	**Toalhitas**
Rolos	**Luvas**	
Tintas	**Folhas**	
Vidro	**Lava-Rolos**	
Espécimen Tipográfico	**Rolo de Cozinha**	

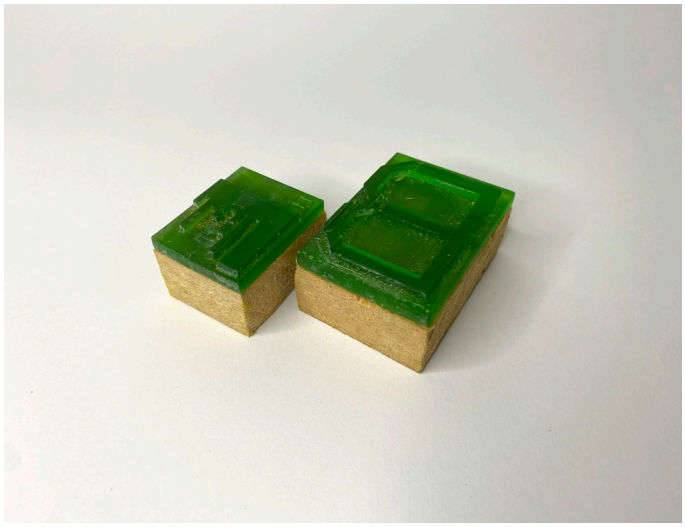
DATE: 26 JULY DURATION: 4H15 Nº OF PEOPLE: 10	
STEPS	DURATION
1. Presentation	15 min
2. Introduction to Chromatic Typography	10 min
3. Introduction to the system	10 min
4. How to use the system	20 min
5. Introduction to overprint	15 min
6. Break	20 min
7. Poster printing	2h
Cleaning	30 min
Survey and finalization	15 min

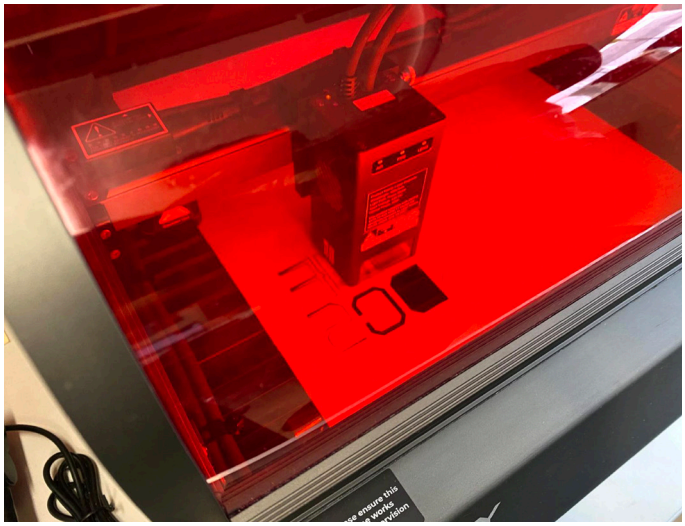
DIALOGUE
Is the typeface system easy to understand?
Did you have any prior experience or knowledge about chromatic typography?
Did you think a physical approach to a digital system was pertinent?
Regarding the system utilization, did you think it was straightforward?
Was the number of pieces available enough?
Did the starting presentation restrict creative freedom?
What would you change in the system and are there any recommendations for future studies?

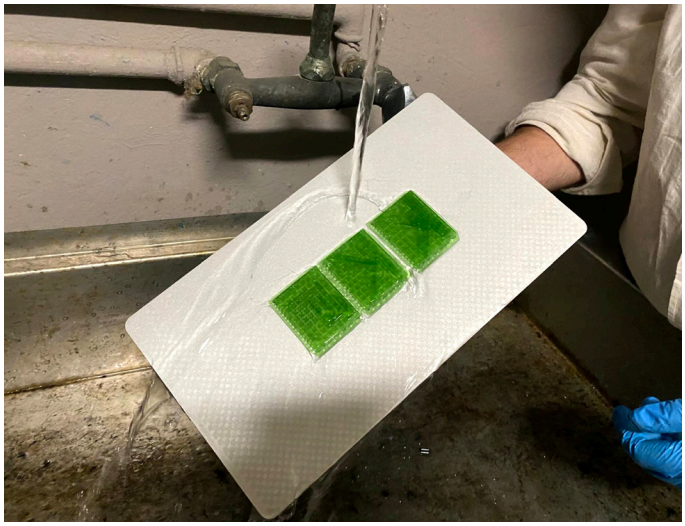


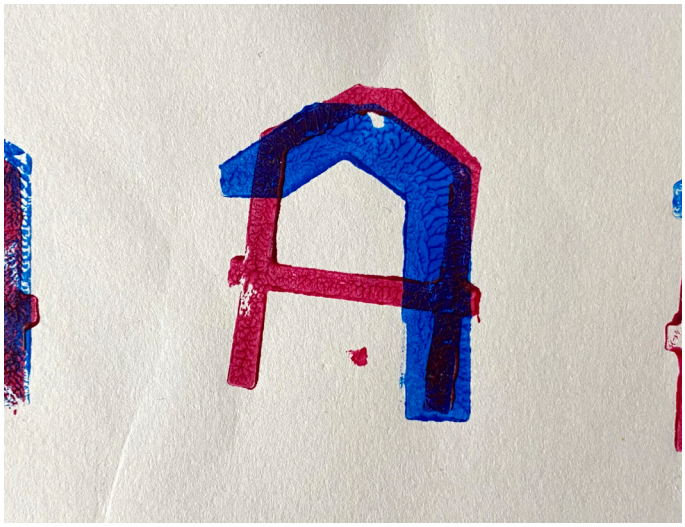


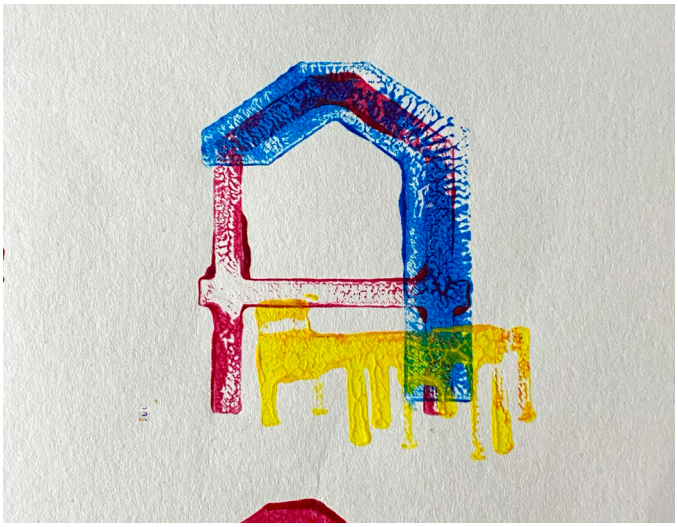


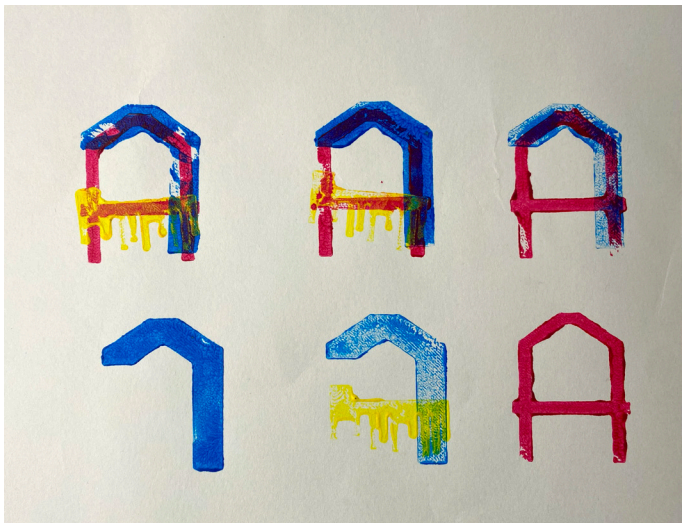


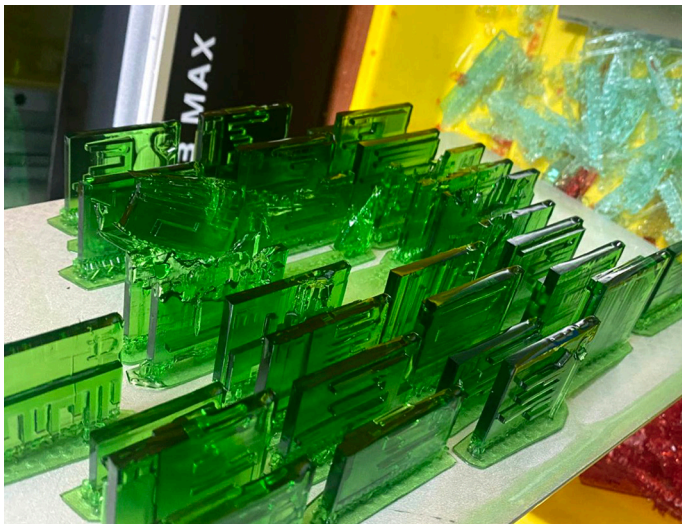








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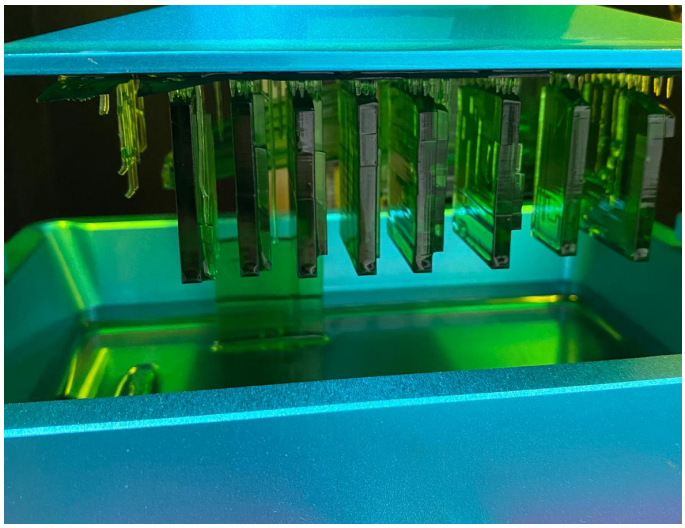

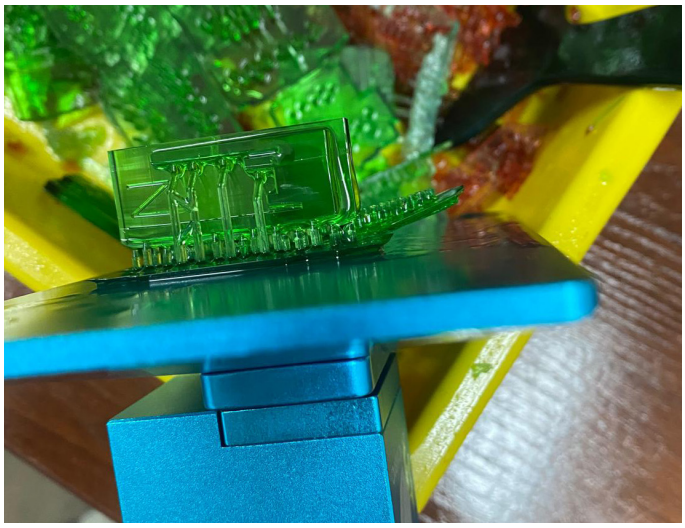

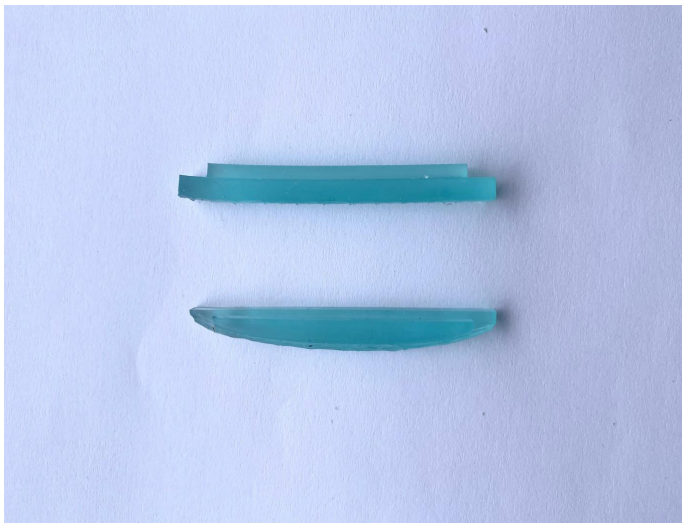

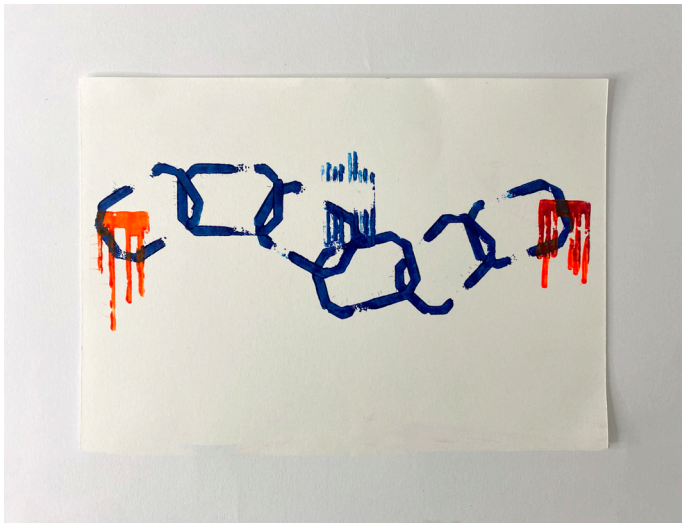

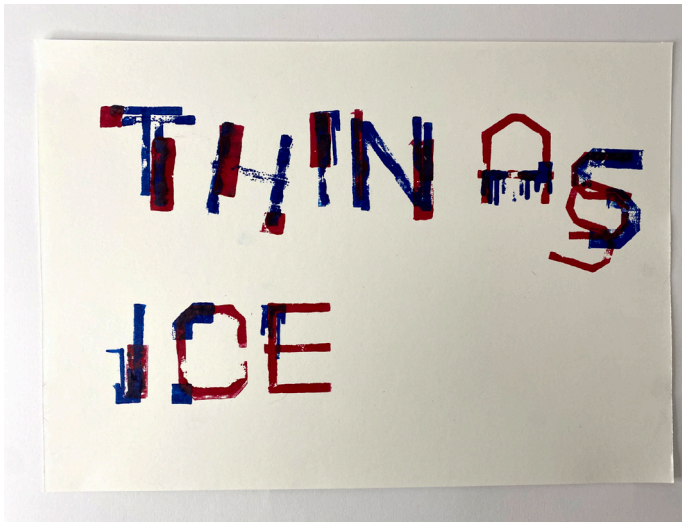
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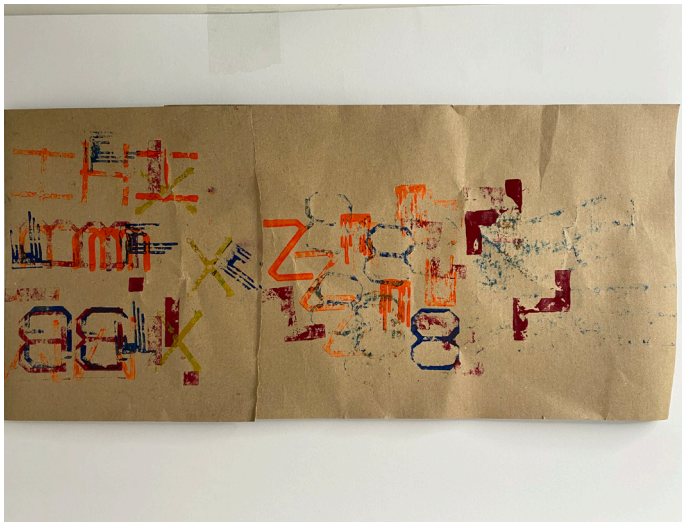

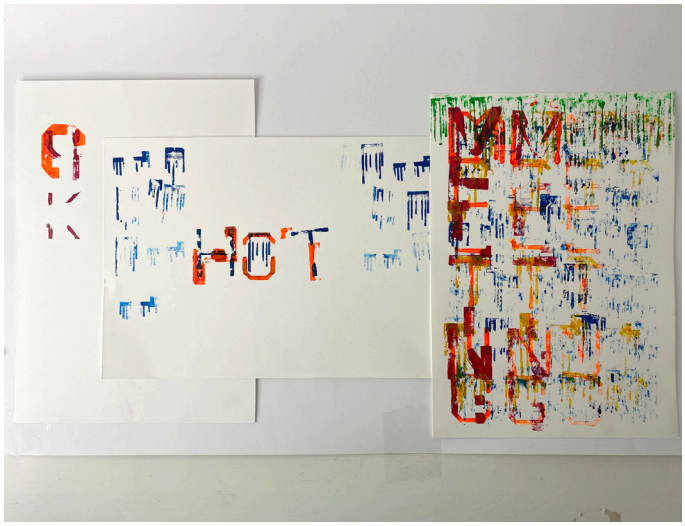
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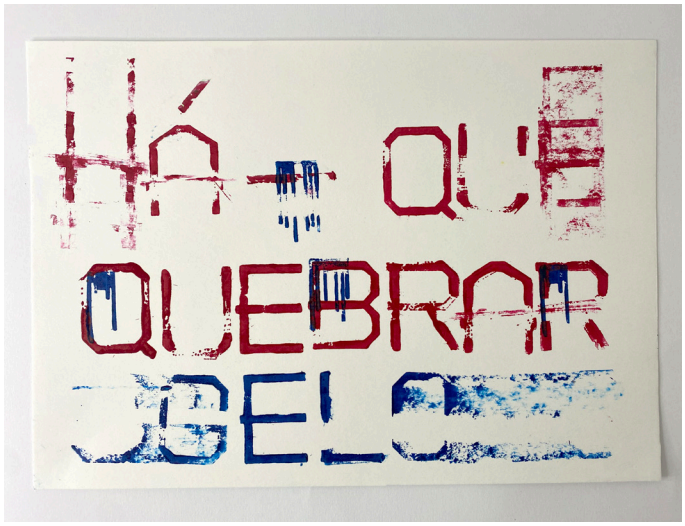
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PLANET

Chromatic Aberration

Development of a chromatic typography for social awareness

Introduction

Chromatic fonts (fig. 1) are not new, as the designer Jamie Clark (2017) says. They have been around since the mid-19th century, although it may not seem that way. As Fleishman (2018) says, “When we think of the past, we often imagine it in black and white.”. When looking back at letterpress printing works done in the 19th century most of them are printed in black, so it is unique to see that chromatic fonts originated in this era. Chromatic fonts are achieved by printing two or more corresponding type styles on top of one another. It consists of each glyph having two or more layers: a base layer with one color, and the ornamental layer that is printed on top with another color. The result is a parti-colored glyph: the two previously chosen colors and the result of those colors overlapped.

The goal of this project was to create a chromatic typography set with the theme of climate change as its focus. Nowadays people are more aware of climate change due to youth-led climate movements and global initiatives for reducing greenhouse gas emissions, such as the Paris Agreement. However, due to the increased awareness, campaigns and projects related to the matter tend to be less effective since people are already familiar with the idea.

Aim

This project aims to comprehend how chromatic typography can transmit a message, ultimately raising awareness and consciousness of a theme. Furthermore, it is important to explore the possibilities and opportunities that this way of drawing typography by layers can offer and realize what has been done before in chromatic typography.

There is also a focus on the analog side of the project, (fig 3) to test layer composition when printing several layers on top of each other, thus creating whole new results.

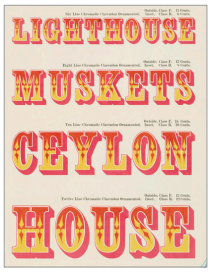


fig. 1 - Specimens of chromatic wood type, borders & Co, William Page, 1874

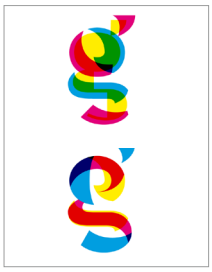


fig. 2- Ziza typeface, Novo Typo Foundry, 2018

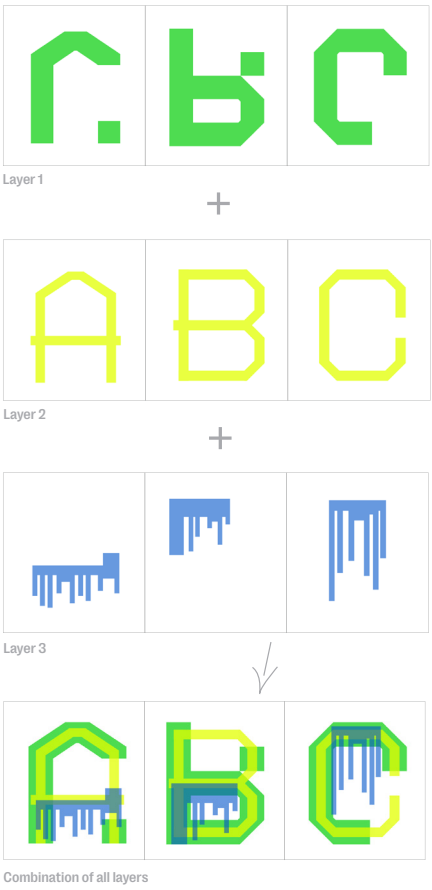
fig. 3 - Chromatic Ornate molds manufactured by Virgin Wood Type.

Methodology

The theoretical framework of this project focuses on contextualizing the history and evolution of chromatic typography. Books, as “Type and Color” by Novo Typo, interviews, articles, and specimens were analyzed and investigated to gather information.

Subsequently, contemporary case studies were chosen through exploratory research, to understand the current state of the art. The case studies were selected based on projects where color was a main component of the project, and projects that had experimental approaches to enhance the message that it was communicating.

The project development was made simultaneously with analyzing the case studies. This way, feedback from those studies was coming through, shaping, and perfecting the empiric work. A multi-colored and multi-layered digital chromatic typography system is developed, introducing three layers in each glyph, and various possible color combinations that can be printed in analog form using a set of matrices. Each glyph has an informative purpose, due to the theme. To prove the efficiency and possibilities of each character, a workshop with a sample of graphic design students is expected to be conducted to observe how the color and layers affect the effectiveness in perceiving the theme.

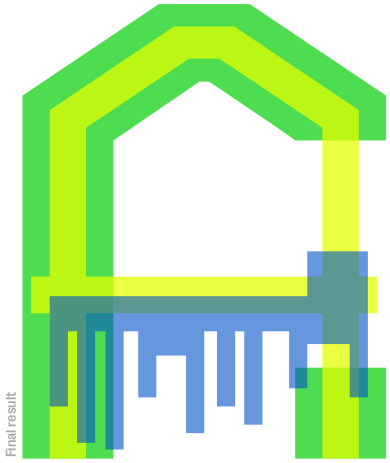


Results

A digital version of the font was created and matrices are set to be developed and its printing capabilities tested using analog processes. Also, a workshop is expected to be conducted to validate the project. During the workshop, a series of climate demonstration posters are produced to prove the effectiveness of the matrices. This is followed by a discussion and evaluation of the results obtained from the workshop.

Conclusion

This project aims to promote awareness to social causes, so the environmental cause was taken into consideration when developing the capital set of letters. It is important to understand the ability of chromatic typography to communicate through the glyph alone, so research in this area was relevant. Besides that, the development of chromatic typography comes from a passion of mine, growing since my first year of master’s. In addition, the project highlights the importance of taking a stance and developing innovative approaches to address significant themes by providing renewed attention and generating the necessary interest in the population. Furthermore, the project also combines digital and analog means to provide new solutions.



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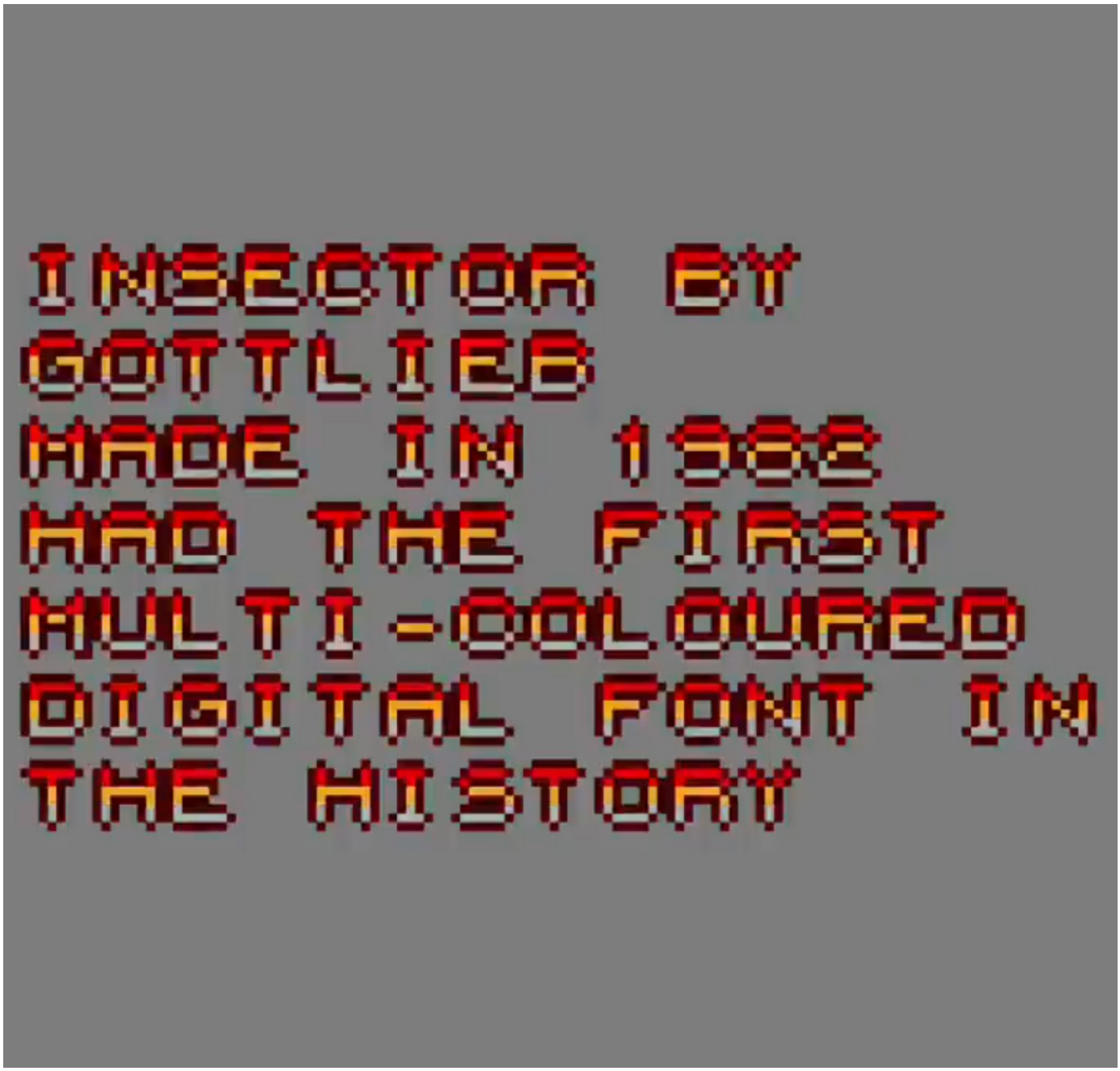
ANNEXES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