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TYPOGRAPHY: FROM READING TO SEEING.

Dissertation in the context of the Master in Design and Multimedia,
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Typography: from reading to seeing.

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“Typography exists to honor content.”

Robert Bringhurst
The Elements of Typographic Style, 1996

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Abstract

We are currently witnessing the emergence of a new paradigm as a result of the influence of technological changes on the creation of typographic design. The way we create, design, and interact with typography has been constantly evolving from the early days of Gutenberg's in the 15th century to the introduction and proliferation of new technologies.

In fact, the creative process has become increasingly unrestricted. When seeking universality, neutrality, and invisibility above all else, typography's communicative ability is undervalued. In the context of designing in digital media, these concepts, which are sustained and systematic in modernism, have been reintroduced in an almost hegemonic way.

Based on a reflection on the evolution of typographic forms, and their value as visual communication tools, this dissertation focus on creating a better appreciation of letters. Through the convergence of art and technology, the practical project of this dissertation results in the creation of a font — *Xtoria Variable Font*. This variable font illustrates typography's illustrious history and explore its communicative ability.

Firstly, an investigation is made on (3.1.) the history of typography and (3.2.) type design. In this context, the main typographic classifications are explored, with a focus on Robert Bringhurst's classification. Moreover, we briefly analyse the anatomy and terminology of typography and (3.3.) variable fonts. Lastly, we focus on (3.4.) some relevant projects developed within the scope of the area in question. Furthermore, the practical project development in this dissertation is documented (4.).

Keywords

Type design, Typography, Variable Fonts, Graphic Design.

Resumo

Atualmente, assistimos ao emergir de um novo paradigma que resulta, inelutavelmente, do impacto das transformações tecnológicas sobre a forma como o design tipográfico é produzido. Desde os primeiros dias da criação da imprensa, por Gutenberg, no século xv, até à introdução e proliferação atual de novas tecnologias, a forma como criamos, projetamos e interagimos com a tipografia encontra-se em constante evolução.

De facto, existem cada vez menos limitações no processo criativo. No entanto, a capacidade comunicativa da tipografia é pouco valorizada, quando se procura sobretudo a universalidade, a neutralidade e a invisibilidade. Estes conceitos, sustentados e programáticos no modernismo, têm sido revisitados de forma quase hegemónica no contexto do design em meios digitais.

Através da reflexão sobre a evolução das formas tipográficas e do seu valor enquanto ferramentas de comunicação visual, a presente dissertação incentiva à apreciação da tipografia como uma arte. O projeto prático desta dissertação resulta na criação de uma fonte — *Xtoria Variable Font*. Baseada na convergência entre arte e tecnologia, esta fonte explora a sua capacidade comunicativa e ilustra a história da tipografia.

Numa primeira fase, é concretizada uma investigação sobre (3.1.) a história e evolução da tipografia e (3.2.) o desenho de tipos. Neste contexto, são exploradas as diversas classificações tipográficas, com foco na classificação de Robert Bringhurst e ainda uma breve análise da anatomia e terminologia da tipografia. É igualmente estudado (3.3.) o campo das fontes variáveis, assim como também é realizada (3.4.) uma análise de alguns projetos desenvolvidos no âmbito da área em questão. Por fim, procede-se à (4.) documentação do desenvolvimento do projeto prático.

Palavras Chaves

Design de Tipos, Tipografia, Fontes Variáveis, Design Gráfico.

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1. INTRODUCTION

This chapter describes the context, motivation and objectives of this dissertation. The document structure is also provided.

Brief Introduction

Typography is an art and a skill that dates back centuries to the introduction of wooden and metal types in printing presses. Robert Bringhurst, author and typographer, in his book *The Elements of Typographic Style*, states: “*Typography exists to honor content*” (Bringhurst, 1996:17). However, whether it is printed in a book or the main creative element in a design project, we believe typography's communicative ability is becoming really undervalued. Typography is not only the style, arrangement and appearance of printed or digital materials. Typography is a complex art and an effective way to communicate a message, not just through text but also visuals. Its origins come from the Greek *typos* meaning “*dent, impression, mark*” and *graphia* meaning “*writing*”.

“A book is a flexible mirror of the mind and the body. Its colour and texture of the paper, the sound it makes as the pages turn, the smell of the paper and ink blend with the size and form, and placement of the type to reveal a little about the world in which it was made. If the book appears to be only a paper machine, produced at their own convenience by other machines, only machines will want to read it.”

Bringhurst, 1996:143

As analysed later in this dissertation, the introduction of moveable type and the printing press in the fifteenth century by Johannes Gutenberg was a defining moment for the modern world, but not the only one. The typography of the Industrial Revolution was essentially about communicating with the masses. Typefaces got wider and more captivating with bolder letters in posters, books, newspapers, magazines, signs and ads. After the Industrial Revolution, media like radio, television, photography and cinema considerably developed. As network communication became progressively significant, along with various technological advancements, typefaces became accessible to everyone.

These days, whether on our phones, in books or on websites, we are continuously processing written words. Type is all around us. Like many other aspects of digital culture, this fact had a substantial role in both the expansion and devaluation of typography. We often reflect on the power of the written word but typography's communicative tone is rarely considered. Typography is still seen as linguistic, reliant on rhetorical language. We believe that type should be perceived as a visual representation of language and thoughts. It should be a real art that “*honors content*”.

Context and Motivation

Typography has a long and illustrious history and it is unquestionably an important subject of graphic design. It is necessary to have a deep knowledge of typography — particularly its development through time — in order to value and use it correctly. At this time, with powerfully communicative visual tools, designers must recognise and understand the communicative complexity of typography, especially in an era of such a visual saturation.

We are witnessing the emergence of a new paradigm as a result of the influence of technological changes on the creation of typography. The way we create, design and interact with typography has constantly been evolving. In fact, the creative process has become increasingly unrestricted. When it seeks universality, neutrality and invisibility above all else, typography's communicative ability is undervalued. In the context of designing in digital media, these concepts, sustained and systematic in modernism, have been reintroduced in an almost hegemonic way.

With this dissertation, we aim to have an exploratory look at the visuality of typography and to have the possibility to develop a deeper knowledge in the areas of type design. It also provides the chance to explore a convergence of art, technology and creativity introduced in the Bachelor Degree in Design and Multimedia at the University of Coimbra and continuously explored in the Master Degree.

Scope and Objectives

Regarding the potential of the ideas mentioned before, this dissertation aims to have an exploratory look at the visuality of typography as a “*voice of the text*”, based on a reflection on the evolution of its forms and its value as visual communication artifacts.

Typography not only combines specific design skills but also knowledge of its evolution, language and technology. For this reason, we plan to carry out our goal through the research of the history and evolution of typography, the anatomy of type, basic concepts of designing type and type classifications. We also intend to focus on technical characteristics and a brief history of variable fonts: the possible future of typography.

To conclude the *State of the Art*, we also analyse relevant projects related to the area. With this fundamental premise, it will be possible to understand the evolution of typography over time as well as to acknowledge how time and technology have affected it. The practical project

should result in the the creation of an artifact that explores the visuality of typography, both in analogic and digital media. Emphasis is given to type design and the development of a variable font, with the main goal to illustrate and explore the concepts mentioned above. In chapter four, we specifically conceptualise this practical component and set the objectives for its development.

Document Structure

The present document contains five chapters. In the *Introduction*, we provide information about the motivation, context, and objectives of our project. In the second chapter, *Development Plan*, we present the overall tasks for the practical project and the methodology used with a description of the steps. In the third chapter, *State of the Art*, we sum up relevant facts acquired while researching this dissertation issue. We briefly examine the history and evolution of typography, the anatomy of type, basic concepts of designing type, and type classifications, with a particular emphasis on Robert Bringhurst's classification system. Moreover, we focus on variable fonts and analyse some relevant projects in the area. In chapter four, *Practical Project*, the practical component of this dissertation is conceptualised and explored. We documented the development process and described the main challenges and problems faced. Lastly, in the fifth chapter, *Conclusion*, we briefly summarise the work accomplished.

2. DEVELOPMENT PLAN

In this chapter, we establish the plan for the development and conclusion of this dissertation. The plan is divided into tasks which are briefly explained. They also include the starting and ending deadlines. Moreover, we analyse the methodology that guides the development of the practical project. We also provide two Gantt charts, one showing an initial time estimate and the other showing the actual period of time once development was completed.

Tasks

The development plan for this dissertation is described in this section along with the tasks involved in the process. Each task is briefly described. In figure 1, we illustrate each specific task with an estimating time to accomplish it.

1. Writing the Dissertation

This task includes (i.) documenting the State of the Art as well as the (ii.) development of this dissertation practical project. Despite the fact that it extends to the whole development period, this task has a crucial deadline, the intermediate delivery in January.

i. September 2021 — January 2022

ii. May 2022 — September 2022

2. Experimentation

This task is scheduled in two different periods referring to the (i.) first experiments, before the intermediate delivery, and (ii.) experimentation throughout the development of the project. The goal of this task is the experimentation and development of tests with the chosen technology, in order to help the growth of the practical project.

i. September 2021— November 2021

ii. February 2022 — May 2022

3. Project Development

This third task is divided into two stages: (i.) defining the initial requirements and specifications of the practical project and (ii.) final development of the practical project.

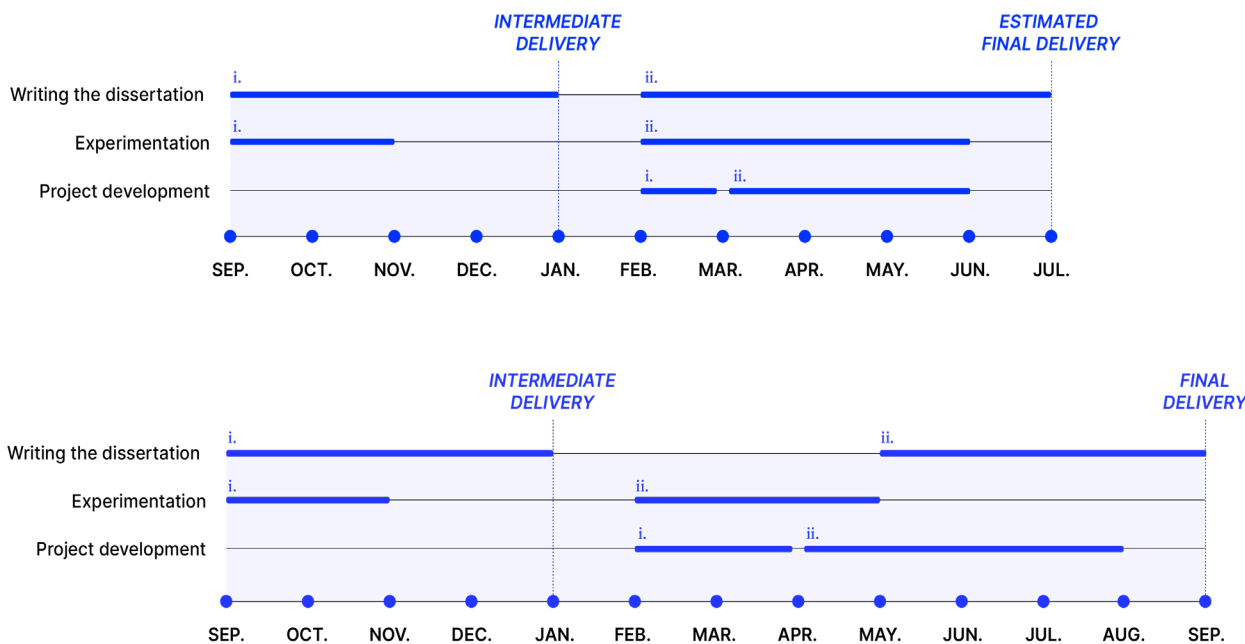
i. February 2022 — April 2022

ii. April 2022 — August 2022

Gantt Chart

Gantt charts help to plan work around deadlines. They present the relationship between the start and end dates of tasks. The concept was first developed around the turn of the nineteenth century by American Henry

Gantt, who devised a method of describing production planning and resource loading for factories and workshops. In this section we illustrate each specific task with an estimated time to accomplish it. Note that two Gantt charts are provided, one showing an estimated final delivery and the other showing the actual period of time once development was completed to the final delivery in september 2022.



Methodology

Regarding the practical component of this dissertation, we choose to use a *Design Thinking* framework/methodology.

Design thinking is a methodology which provides a solution-based approach to solving problems. This methodology follows an overall flow of *i)* understand, *ii)* explore, and *iii)* materialise. Within these significant levels there are six different phases: empathise, define, ideate, prototype, test, and implement.

Tom Kelley in *Creative Confidence*, affirms that Design Thinking is an iterative and non-linear process. This means that designers are continuously using their results to review, question and improve their initial assumptions, understandings and results (Kelley, 2013).

In conclusion, this methodology revealed that emphasis on reflecting, planning, exploring and materialising ideas provides significant benefits for the practical project.

3. STATE OF THE ART

When developing a project, it is crucial to have a thorough understanding of the study area and to learn about projects that have previously been developed. In this chapter, we synthesise the pertinent facts acquired while researching this dissertation. Firstly, we briefly examine the history and evolution of typography to have a better understanding of this subject. This chapter also provides information on the anatomy of type, basic concepts of designing type and type classifications, with a particular emphasis on Robert Bringhurst's classification system. Furthermore, we focus on what the future of typography may be: variable fonts. Lastly, we showcase and analyse some relevant projects in the area. As a result, by the end of this chapter, we should attain the knowledge needed for the practical project.

3.1. History of Typography

The invention of printing with movable type

In the fifteenth century, a rapid social-economic development fueled an urgent demand for the efficient and cost-effective replication of written documents in Europe. Until then, monks and scribes had to copy books by hand. The discovery of moveable type printing¹, first for the commercial publication of brief papers and then for the first mass-produced book, Johannes Gutenberg's Bible of 1455 (figure 1), resulted in a revolution (McNeil, 2017; Bringhurst, 1996).

The cutting and casting of moveable metal types was the most significant innovation in this revolution. As a consequence of this technique, the printing industry grew at a tremendous speed.

“Within 50 years of its invention, more than 1,000 printers had set up workshops in over 200 cities across Europe.”

McNeil, 2017:11

The typefaces cut by the German printers were faithful adaptations of the angular blackletter scripts since the main goal was to imitate the hand-crafted volumes that came before them. As a result, addressing the needs of indigenous readers, new letterform designs were modified to meet regional manuscript styles as printing expanded from city to city (McNeil, 2017; Bringhurst, 1996).

When the humanist philosophy reached Italy, in the Renaissance, letterforms began to develop into the patterns we are nowadays familiar with. Rather than being the outcome of any specific technological discovery, this period in the history of typography was a reflection of contemporary Italy driven by a rediscovery of classical Greco-Roman culture. The capital letters of early humanist fonts were adopted from Roman inscriptions, while the lower case letters were developed from the formal handwriting of Italian scribes. Instead of just copying handwritten letters, punch cutters² (figure 2) gradually improved the beauty and



Figure 1. Detail from Johannes Gutenberg's Bible, 1455.

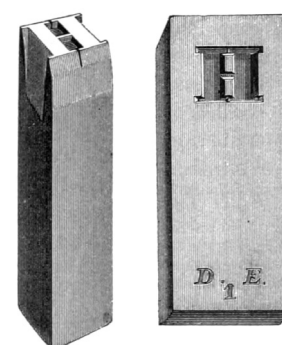


Figure 2. A punch cutter (left) and the respective matrix produced from it (right). The small letters at the base of the matrix are founders marks.

¹A printing technique made up of individual pieces (first made of wood, then of metal) each carrying usually a single letter or character, so that the pieces can be freely assembled or reassembled for printing any combination.

²A craft used to cut letter punches in steel as the first stage of making metal type. Cutting punches and casting type was the first step of traditional typesetting. The cutting of letter punches was a highly skilled craft requiring much patience and practice.

efficiency of characters by making the greatest use of their manufacturing processes. Nicolas Jenson and Francesco Griffo expanded these possibilities in type design (McNeil, 2017; Bringhurst, 1996).

The printing press led to major changes that completely changed civilisation. It was the first mass medium and it freed medieval culture from the constraints of orality and writing by speeding up the dissemination of information and ideas to an entirely new level. Consequently, printing enhanced the capacity of an increasing number of educated individuals to make intellectual and ideological decisions by providing verified knowledge. Knowledge was disseminated wider and faster than ever before. Moreover, as a result of this, the growth of individual rights and liberties expeditiously increased.

The foundations of the modern era

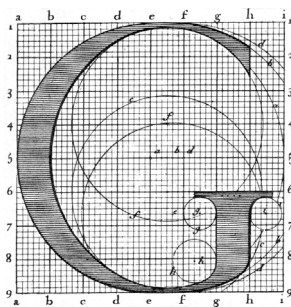


Figure 3. Letter “G” in detail
Romain Du Roi, 1692.

Even though the Renaissance laid the groundwork for the modern era with the introduction of printing and publishing, the economic, scientific and social revolutions of the seventeenth and eighteenth centuries were the main key.

The seventeenth century was a time of growth and expansion, with many European nations attempting to build empires through exploration, conquest and colonisation worldwide. Although there were few technical evolutions in printing and publishing, France achieved a major step in 1692 when the *Académie Française* commissioned the *Romain*



Figure 4. *Lettres courantes Droites*
(on the left); *Suplement des Lettres Droites*
(on the right)
Romain Du Roi, 1692.

du Roi (figure 3 and figure 4), a rationally designed alphabet. This was a landmark from the Age of Reason, signaling the start of a completely new way of thinking about visual communication (McNeil, 2017).

The *Romain du Roi* was the output of a purely logical process, unlike prior typefaces that had emerged gradually over time from formal scripts. Because of their intermediary position between the previous forms of the *Renaissance* and the designs that came later, around the end of the eighteenth century, the fonts that followed its influences are frequently categorised as *transitional typefaces*. *Transitional typefaces* are distinguished by characteristics such as higher contrast than old-style typefaces, a vertical stroke axis and sharp, bracketed serifs that follow reasoned principles.

These characteristics can be seen in Pierre-Simon Fournier's type designs from the 1760s, but John Baskerville (figure 5) mastered them even better in a type design that is a model of *Enlightenment* thinking. Baskerville's numerous advancements to paper, ink and printing processes had an equally significant influence on the path of typographic history, even though he is best known for his type (McNeil, 2017).

In the late 1700s and early 1800s, several type founders relied on Baskerville's methods and letterforms to produce what is now known as "*modern typefaces*". Firmin Didot in Paris and Giambattista Bodoni in Parma were among the first and most influential. Their typefaces (figure 6 and 7) are distinguished by abrupt vertical stress and extreme stroke contrast, as well as flat serifs and hairline horizontals (McNeil, 2017).

Typography developed then for hundreds of years internationally, but only with serif typefaces. The first examples of the new sans serif style did not appear until 1816 in England. The modern typefaces are an extraordinary manifestation of the Age of Reason embodying scientific and classical ideals. They reconceptualised how typography was applied, shifting the direction of visual communication (Jong, 2009).

Typography as a need of commerce

At the end of the eighteenth century, industry was expanding at an extraordinary rate in Great Britain. Manufacturing procedures for large-scale production were reinvented by technical advancements. For that reason, companies began to depend on more efficient production methods and low-cost labor. People went from rural regions to large urban areas in search of jobs, resulting in a rapid population expansion in the industrial cities.

Baskerville

Figure 5. Baskerville typeface, design in 1750s by the artist John Baskerville.

Didot

Figure 6. Didot typeface, design in 1784 - 1811 by the artist Firmin Didot.

Bodoni

Figure 7. Bodoni typeface, design in 1813 by the artist Giambattista Bodoni.

Increased commercial competitiveness forced typefaces to work harder on posters and hoardings in the crowded fast-moving atmosphere of the cities. For the first time typefaces had to yell in short bursts to fight

Figure 8. Harrild and Sons' New Abridged Specimens of wood-letter, Corners, Borders, 1809.



for attention (figure 8), beginning around the turn of the nineteenth century. As a result, large bold typefaces start to flourish. The arrival of line-casting machines — first Ottmar Mergenthaler's Linotype in 1886 and then the Monotype a year later — changed the composition of text type. Line casting allowed type to be selected via a keyboard, typeset and redistributed into the machine automatically after use (McNeil, 2017).

The rise of the Avant-Garde creative movements

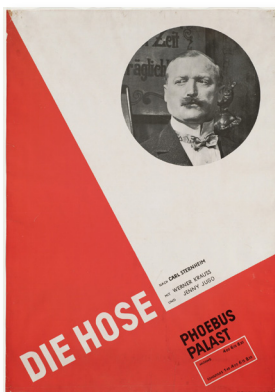


Figure 9. Die Hose, Poster for the film directed by Hans Behrendt design in 1927 by Jan Tschichold.

After World War I, many avant-garde artistic literary and philosophical movements emerged to question social institutions. Although they could not have been more divergent geographically, politically, or conceptually, these initiatives are now simply combined under the banner of "modernism", covering several movements ranging from *Art Nouveau* to *Dada*, and from *Art Deco* to *Futurism*. Even though they were inspired by multiple factors, the members of these groups all had the desire to break free from the past of Western art, design and literature to create different forms (McNeil, 2017).

Postwar modernist communication design rejected long-standing ornamental traditions in place of bold verbal and visual statements, which were frequently based on radical social and political beliefs. To celebrate the functional aesthetic of the built environment and the

machine, cutting-edge materials, technology and industrial processes were proudly used in their works.

Many typographic designers at the time began to explore geometric structures and positive and negative space manipulation (figure 9). For their designs, they combined existing sans serif typefaces or designed grid-based, modular, frequently single-case alphabets (figure 10). Among the many examples of pioneering work that heavily influenced the advertising design arena are Herbert Bayer's *Universal*, Jan Tschichold's *Transito* and Josef Albers *Kombinations-Schrift*, with Paul Renner's groundbreaking *Futura* setting an insatiable global trend for the use of geometric types upon its release in 1927 (Jong, Purvis, Tholenaar, 2009).

In section 3.4. we analyse in detail the impact of these avant-garde creative movements in typography and how they radically changed typographic ideals and created fresh approaches to text.

Graphic Design became a specialised field

Many members of the design profession were concerned in the 1950s with achieving objectivity in communication, motivated by the principles of pre-war modernism.

Following World War II, many individuals craved a sense of order and neutrality, which ended up in one of the most significant design trends of the twentieth century. The *International Typographic Style*, commonly known as the *Swiss Style*, prioritised clear organisation, navigation and readability. Content-driven layouts, proportional grids, logical



Figure 10. Olivetti poster, design in 1959 by Herbert Bayer.



Figure 11. Collection of music posters designed by Mike Joyce, following in the footsteps of Swiss Style. Made between the 1970s and the 1980s.

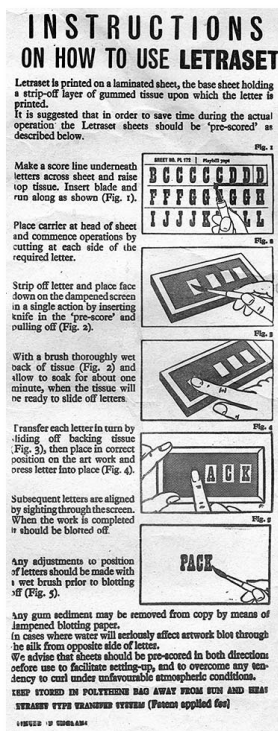


Figure 12. Original directions from the manufacturer, LetraSet (dry-transfer lettering).

text alignments and plain-looking sans serif typefaces (figure 11) offered contemporary graphic design a new feeling. The postwar growth in the design supply and demand happened in the context of fast developments in the technologies used to generate type, indicating a shift away from letterpress print production. Photocomposition was a brief period in typography's history. However, this technique had a lasting impact on the industry (McNeil, 2017).

The earliest photo-setting devices³ were developed in the 1940s, it was not until the early 1950s that they became commercially viable. In the 1960s, dry-transfer lettering⁴ (figure 12) arrived, bringing type to the hands of designers for the first time. When merged, these technologies revolutionised the design industry. Combined with fast, inexpensive and efficient offset litho printing methods, the new technologies lead the way to a revolution in the visual communication industry, putting primary activities away from conventional printing companies and toward designers, typographers and large advertising agencies (Jong, Purvis and Tholenaar, 2009).

These improvements boosted the graphic design profession, giving users power over the creation of printed messages for the first time and paving the way for the digital revolution of the 1980s and 1990s.

A shift from mechanical to digital technologies

In the nineteenth century, typography and technology underwent significant improvements. For 400 years, the lead setting system limited choices. New technology revolutionised typography, design and printing.

The emergence of personal computers in the graphic design sector changed every aspect of the industry. Adobe's *PostScript* page-description language appeared about the same time as a device-independent protocol for turning digital data into visual output. When the first affordable, user-friendly design software was introduced, it started a revolution in the design, printing and publishing sectors, known as the desktop-publishing revolution (Purvis, Tholenaar and Jong, 2009).

In the 1990s, Microsoft and Adobe introduced OpenType⁵ fonts that support Unicode fonts, which means that a single OTF can have over

³ The first practical phototypesetting machine was developed by Louis Marius Moyroud and Rene Higonnet, in 1946.

⁴ Dry transfers are decals that can be applied without the use of water or other solvent.

⁵ OTF is a font file format for scalable font files.

65,000 glyphs. Moreover, texts in various languages with Unicode⁶, such as English, Czech, Russian or French, could be set in a single typeface. The OpenType format extended the existing TrueType⁷ font, provided a flexible character set within a single typeface than previous technologies allowed and offers a wide range of automatic features (McNeil, 2017).

These extensive experimentation possibilities fueled a lot of new designers to draw new typefaces. The majority of type designs from the 1990s were short-lived and several have been considered self-indulgent. Nonetheless, they are crucial examples of a period when traditional visual communication principles were being questioned in response to archaic, dominant ideas that were perceived as unsuited to a multifaceted world. Furthermore, we also witness a rapid growth of small digital type foundries like Emigre (figure 13 and 14), GarageFonts, T-26, Hoefler and Co., the Font Bureau and FontFont, while larger organisations such as Monotype, Linotype, Adobe, Berthold, Agfa, Bitstream and other major programs to digitise, update and expand their type libraries (McNeil, 2017; Bringhurst, 1996).

As network communication became progressively significant with the emergence of the *World Wide Web*, a variety of typefaces were created to suit the simple need of reading on low-resolution computer displays.

“When digital type-design tools became as affordable as other graphic design software, type production was possible for anyone with an interest, whether formally trained or not.”

McNeil, 2017:439

This, along with the release of massive typeface libraries, turned digital type from being an expensive tool for a specific sector, to a very affordable commodity that was accessible to everyone. Like many other aspects of digital culture, this fact had a substantial role in both the expansion and devaluation of typography.



Figure 13. Cover of the Emigre Catalog, 1992.



Figure 14. Cover of the no. 24 Emigre Magazine, 1992.

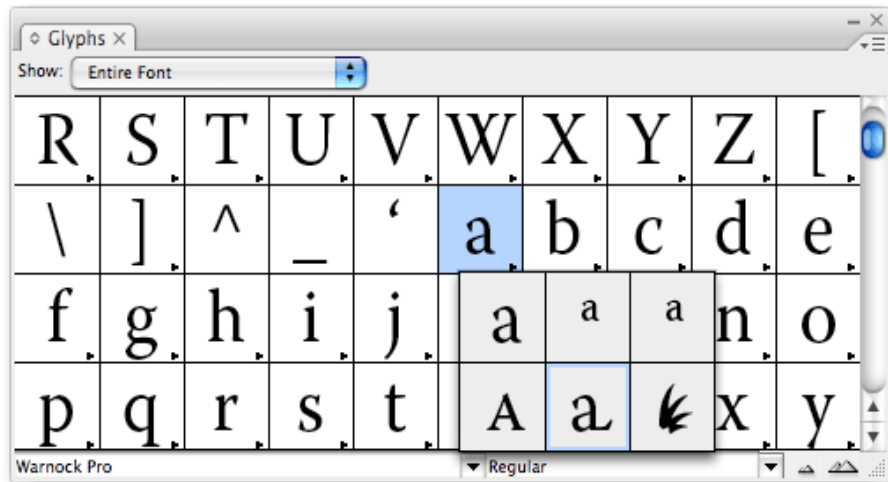
⁶ A font that covers a large portion of the Unicode character set to support multiple written languages, making it easier to exchange text files internationally. It assigns a code to every character and symbol in every language in the world.

⁷ TTF is a font file that provide highest quality display on computer screens and printers without any dependency on resolution.

A Digital World

In the twenty-first century, typography may be found in printed materials, but it is equally essential in digital communication. Web, interactive and responsive media provide unimagined possibilities for the role of type in contemporary culture. Typographic text is being applied for more than just mass communication; it is also used for personal social intera-

Figure 15. OpenType Font. A wide collection of characters gives the opportunity of having access to as much different characters for many different languages as needed.



tions and real-time navigation through interactive interfaces on screens with resolutions close to printing (McNeil, 2017).

Nowadays typographic text is not only employed for mass communication but is also used for personal social interactions and real-time navigation through interactive environments on screens with resolutions similar to print. In the late 1990's, when type for the Web was originally introduced, it was perceived with suspicion by the design community due to the lack of security against illegal copying of proprietary typefaces. However, since 2008, web browsers have been updated to make licensing easier and a variety of subscription services have sprung up. Google established a free library of open-source typefaces (figure 15) in 2010 with the stated goal of making the internet more accessible to everyone, whereas Adobe's Typekit is a collection of thousands of fonts for application on the Web or in apps (McNeil, 2017).

Web fonts have become a prominent component of the visual landscape in a relatively short period, as the transmission of visible language undergoes yet another massive shift, perhaps the largest in its history. Although one can only conjecture on the present media's social and cultural influence, the numerous developments of digital and virtual technologies are clearly causing a significant shift in the nature of information acquisition, social interaction and human communication.

Regardless of the dynamic alterations that words are submitted to in the new media, typography continues to need a study of physical arrangements, the psychology of reading and the gradual exposure of information (Rendle, n.d.).

The exploration of sans serif typefaces has become an important trend in post-millennial type design, with many practitioners attempting to achieve the complex goal of integrating humanist traits with geometric type design constructions (Jong, Purvis, Tholenaar, 2009).

It has been argued that due to the dominance of new media, traditional printing would be phased out. Some contend, however, that materials retain distinctive characteristics that make them preferable to other media. In an increasingly virtual and asynchronous world, print remains physical, tactile and present. The truth is that in the last century, type design, like many other technology-driven fields, has experienced more fundamental changes than ever before.

Nowadays, the main question is about the future of typography. Many believe that the most beautiful and interesting part about the future of typography is that there is not only one future but many. There are infinite futures of typography, and the opportunities only expand when new browsers, new features and new devices become available to us (Rendle, n.d.).

3.2. Type Design

Type Classification

There would be no consistent professional vocabulary in biology without scientific classifications and scientists would be significantly less effective communicators when researching plants and animals. In the typographic world, a shared standardised system of classification is lacking. Type has been classified in many ways over the years, both formal and informal. Even though the number of styles has grown with reasonably good documentation, and the process has been largely evolutionary, the design community has not developed a complete classification system yet.

By the time we write this dissertation, none of the existing classifications are considered complete or all-encompassing. However, they are a helpful tool to study typography as well as to use it correctly and effectively. This chapter introduces a brief overview of what we believe to be the main type classifications.

A. Thibaudeau Classification by Francis Thibaudeau

The Thibaudeau Classification is a way to group typefaces into four general families, according to shape and serif character. Invented in 1921 by the french typographer Francis Thibaudeau, it was later expanded by Maximilien Vox in 1954, and in 1962 by ATypI, Association Typographique Internationale (Thibaudeau Classification Encyclopedia, n.d.).

The typographer was motivated to develop the first systematic classification system for type, due to the complexity and disorganisation of type catalogues he used. Originally, there were only four main categories: *Roman*, *Didot*, *Egyptian*, and *Antique*. Due to his French perspective, he uses *Didot* to describe modern roman typography, rather than the *Didone* popularised some years later by the Vox System in 1954. He also uses *Antique* to describe sans serif capital faces, like those drawn by the Romans and Greeks. Thibaudeau later added the *Script* and *Display* sections to categorise types used in advertising (Childers et al., n.d.).

The system he proposed was the most rational and straightforward of that time. Francis Thibaudeau did an extraordinary job of dividing types and nomenclatures in this regard.

B. The Vox System by Maximilien Vox

The Vox System, created by Maximilien Vox in 1954, is the closest type classification to a broad consensus. Employing established terminology along with new terminology, Vox identifies ten main categories: *Humanes*, *Garaldes*, *Reales*, *Didones*, *Mécanes*, *Lineales*, *Incises*, *Scriptes* and *Manuaires*. He categorises serif typefaces according to their historical period, and the rest according to the letter's visual appearance.

Vox invented the term *Garalde*, combining *Garamond* and *Aldine*. Since its newness, it was criticised. Being at first unfamiliar to the professionals who would be using the system; those critics had a point, but ultimately, they were wrong. The term *Garalde* is still being used in subsequent type classification systems sixty years later. The same may be said of the word *Linéale*, which suggests that sans serif typefaces are fundamentally monoline. However, that word remained popular for several decades before being pulled out in the 1980s and replaced with Sans Serif (Childers et al., n.d.; Cheng, 2020).

C. The Vox ATypI System by Maximilien Vox

The Vox ATypI system is based on the 1954 iteration of The Vox System. Upon its release, that system was widely regarded as the standard in typeface classification. The ATypI revised version adds much-needed subclassifications to the *Linéale* section, which goes on to become the norm in Sans Serif subclassification.

This classification divided all of the categories into three main classes: *Classicals*, *Moderns* and *Calligraphics*. In the same order, we have *Humanes*, *Garaldes*, *Réales*, *Didones* and *Mécanes*; *Lineales*; *Incises*, *Manuaires*, *Scriptes* and *Fraktur*; the *Moderns* category includes both serif and sans serif typefaces. Using *Calligraphics* to head the topical category is misleading because not all of the subcategories are calligraphic. Overall, it is an upgrade over its predecessor, but it's far from perfect. (Childers et al., n.d.; Cheng, 2020).

D. The elements of Typographic Style by Robert Bringhurst

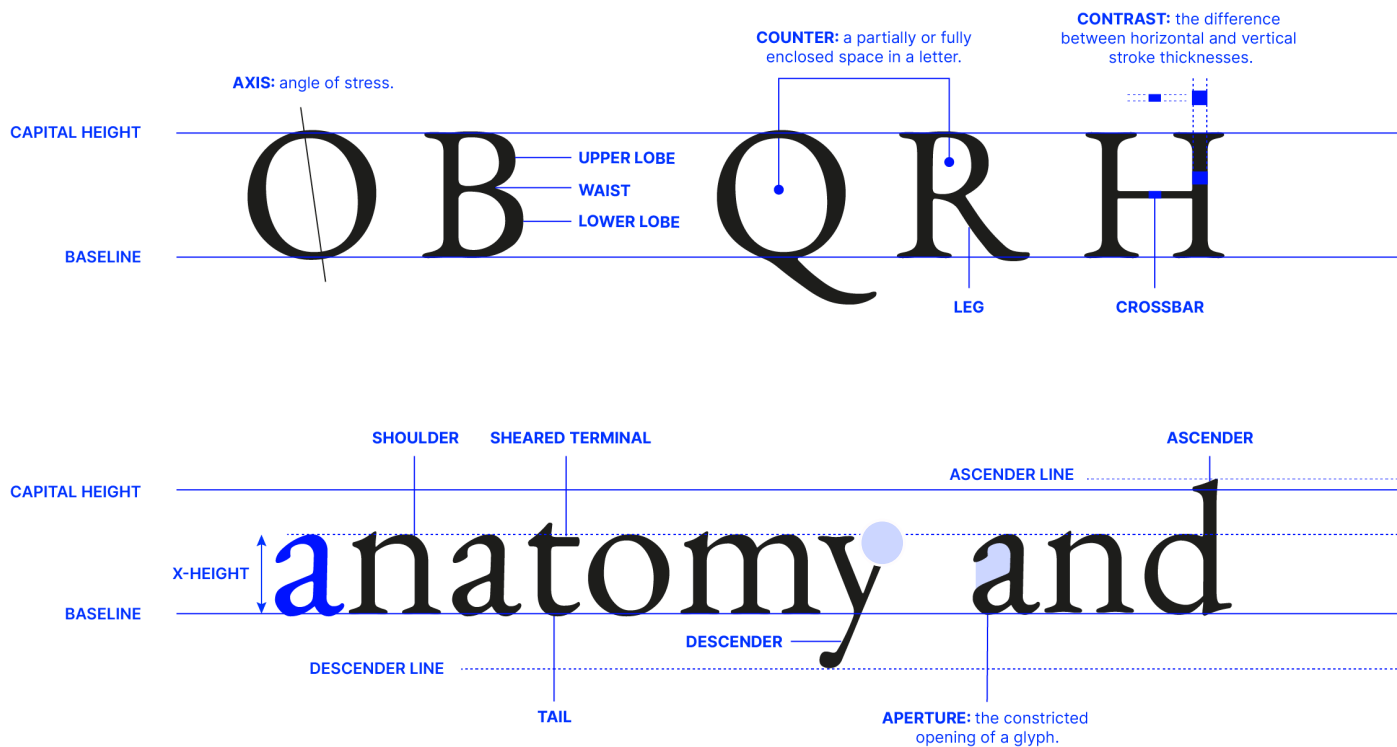
In *The Elements of Typographic Style*, Robert Bringhurst defines a peculiar approach to type classification, which connects typefaces to artistic movements. Bringhurst divides his system into eight classes: *Renaissance*, fifteenth and sixteenth centuries; *Baroque*, seventeenth century; *Neoclas-*

sical, eighteenth century; *Romantic*, eighteenth and nineteenth centuries; *Realist*, nineteenth and early twentieth centuries; *Geometric Modernist*, twentieth century; *Lyrical Modernist*, twentieth century; and *Postmodern*, late twentieth and early 21st century (Bringhurst, 1996).

Bringhurst uses the same name for serif and sans serif faces. These labels avoid the discrepancies of *x-heights* and serif designs in exchange for a reference to the artistic circumstances of each era in typographic history. We choose this last classification as a guide in this dissertation since Bringhurst's perspective establishes a more sensitive conservancy approach, which will be analysed in *section 3.4. Related Work*.

Type Terminology and Anatomy

Understanding the anatomy of type, not only allows us to identify what is right and wrong in type but also lets us to use it properly and talk about it effectively, much as learning the anatomy of a human allows making a good diagnosis. Karen Cheng, in *Designing Type*, refers that type design, like language itself, is influenced by time and cultural context. It is important to note that designers use a variety of names to describe the

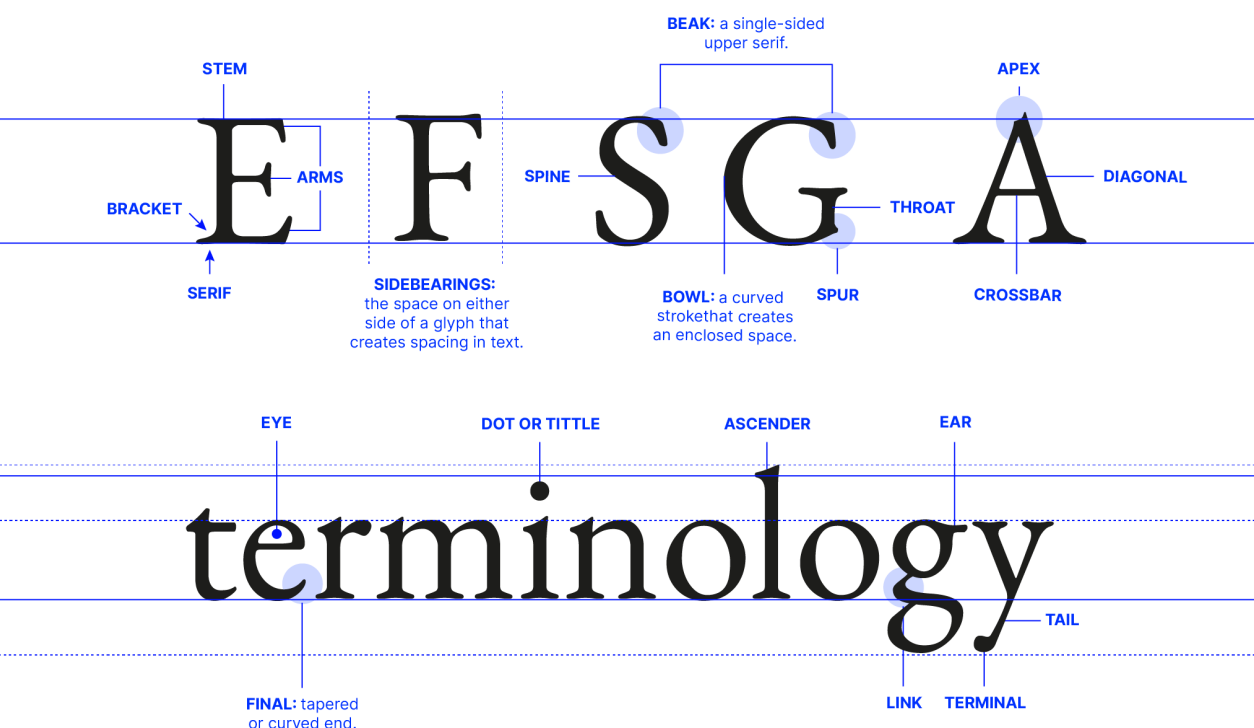


different parts of a letter despite there is no official standard. We consider the terms shown below, used in Cheng's book, fairly universal.

Cheng says the terms "font" and "typeface" are sometimes used incorrectly. The term "font" referred to just a single set of metal type in one size and one style — for example, *Garamond Roman*, 12 pts. The word "font" comes from a french word that means "metal casting". Because modern digital typefaces are meant to cover a wide variety of sizes, the term "font" is no longer size-specific. However, the term "font" still refers to a single typeface — such as light, bold and italic. The word "typeface" was used to denote a family or collection of related fonts — for example, *Garamond Regular* and *Italic* in 10, 12, and 14 Pts. The term "typeface" is still correct in this context. However, using "typeface" is more appropriate when referring to the design of a typeface — the way a typeface looks or works (Cheng, 2020).

Given the experimental nature of this work and also for a better understanding, we provide an illustration of type terminology and anatomy (illustration adapted from Cheng, 2020).

When designing a typeface, it is also important to be aware of the negative space between letters. This negative space is just as important as if not more important than the positive letter shapes. Legibility and



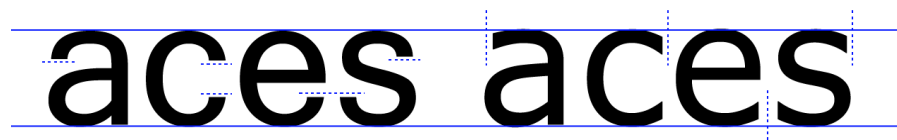
readability, both relate to the ease and clarity of type, refer to two different concepts. Legibility is related to the shape of the glyphs. Readability refers to how the font is arranged (Bringinghurst, 1996; Cheng, 2020).

In the 2015 documentary *Typographically Speaking*⁹, the type designer Matthew Carter explains that many of the letters in his 1996 typeface *Verdana* — for example, the *n* and *o* — are identical from those in *MS Sans*, a 1992 typeface drawn by Microsoft (figure 16). Engineers working with Carter on *Verdana* were confused because, despite the similarity in many characters, text set in *Verdana* was noticeably more legible on the low-resolution digital screens of the time, than text set in *MS Sans* (Cheng, 2020).

Figure 16. The “o” is similar. The *MS Sans* “n” (outlined) is narrower than *Verdana*.



Figure 17. *MS Sans* (on the left) has closed apertures and horizontal stroke endings. *Verdana* (on the right) has open apertures and vertical stroke endings.



Unlike most of the typefaces used on screens, which were designed for print and intended to be read on paper, *Verdana* was designed for use on the computer screen, created from the beginning to be readable at small sizes, with simple curves and open apertures (figure 17). *Microsoft Sans Serif* is a TrueType font introduced with early Windows versions. It is a successor of *MS Sans Serif*, a font introduced in Windows 1.0. Both fonts are very similar to *Arial* and *Helvetica* (Typotheque, n.d.).

Carter explains that the reason *Verdana* was more legible than *MS Sans* was not the letter shapes, but interletter spacing (figure 18). In *MS Sans*, adjacent letters were sometimes too far apart — creating “rivers” of space in the text — or too close together — creating merged letter pairs that were unclear (Cheng, 2020).

In general, a typeface is considered to be well spaced when groups of letters — words, sentences and paragraphs — form a regular and even rhythm creating a consistent shade of “gray”, without darker or lighter spots. As Karen Cheng explains in *Designing Type*, typeset words are

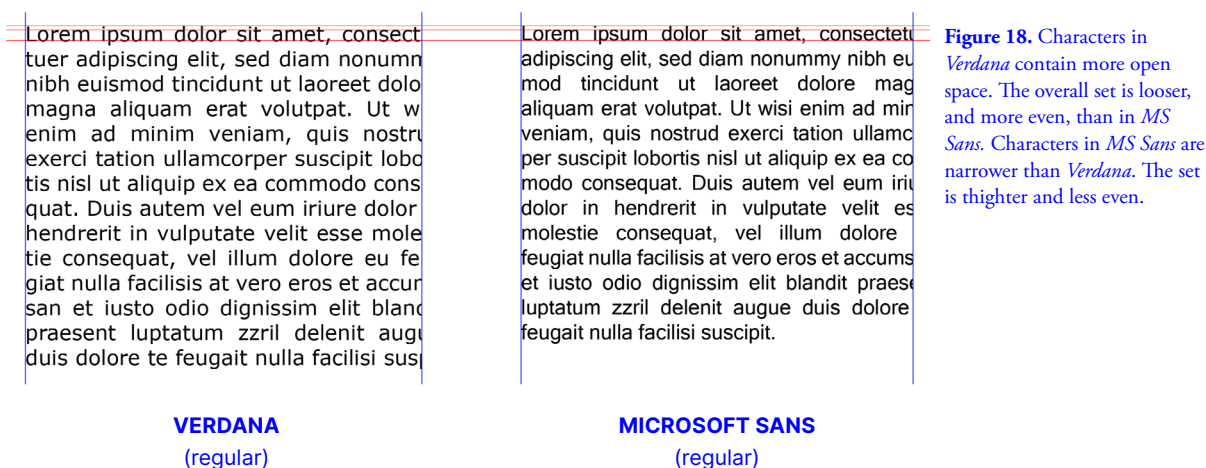
⁹ In *Typographically Speaking: A Conversation with Matthew Carter* documentary, released in 2015, the type designer Matthew Carter discusses the process behind his creation of several of the best known typefaces in the world, including *Bell Centennial*, *Verdana*, *Sophia* and *Miller*.

essentially formal compositions of black and white. When type is set properly, black letter structures are evenly distributed on a white ground, creating a visual pattern (Cheng, 2020).

When arranging text in a page, we should be aware of this principle. Perhaps the theory of invisibility in design was best articulated by the type designer Adrian Frutiger.

“If you remember the shape of your spoon from lunch, it is the wrong shape. The spoon and the letter are tools; one to take food from the bowl, the other to take information off the page... letter is banal and beautiful.”

Adrian Frutiger



To achieve even letter spacing, we must also know two particular terms. Kerning and tracking (figure 19) are intended to improve the positioning of letters and words on a page. Kerning looks at the adjustments of spaces between a pair of letters, while tracking is responsible for the spacing between larger groups of letters and blocks of text (Bringinghurst, 1996).

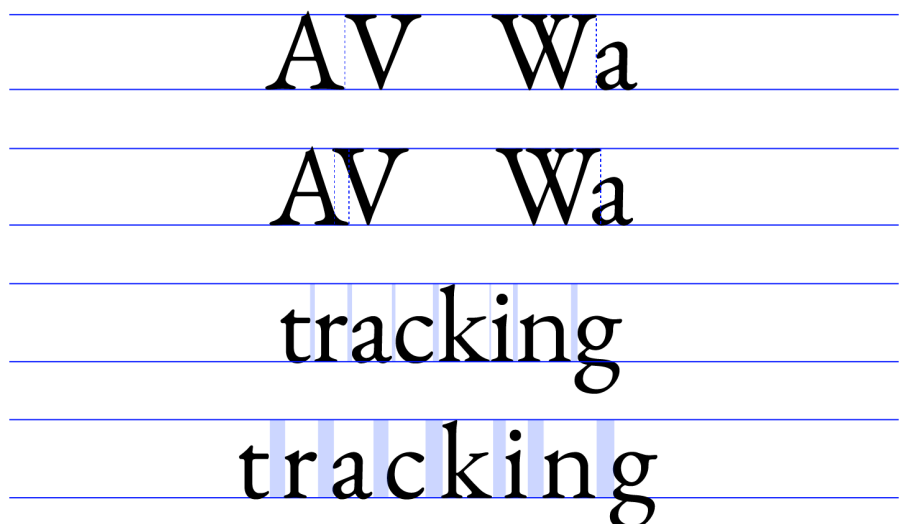


Figure 19. In the first illustration no kerning is applied. In the second illustration kerning is applied. In the third illustration no tracking is applied. In the last illustration tracking is applied.

3.3. Variable Fonts

Since part of the practical project of this dissertation focuses on the development of a variable font, in this third section we intend to provide a brief overview of variable fonts. Typography used on the web has long been seen as secondary to web page efficiency, leaving designers unable to apply the most fundamental typographic principles to online content.

The Open Type Variable Font format, which was released in september 2016 by Adobe, Apple, Google and Microsoft, is based on the concept of interpolation. It allows designers to create a single master font that instructs a web browser — or another text-rendering program — to generate the required interpolated fonts, rather than exporting each interpolation instance as a separate, static font file. The effectiveness of this system is enhanced by the fact that the browser only needs to load one master font rather than several tpestyles (Cheng, 2020).

Packing many different styles into a single font file, variable fonts open up new possibilities for designers. They are a typographical advancement that gives more flexibility and control while also delivering faster load times and easier file management. In addition, they can also provide a better experience, increasing the legibility by adapting to the reader and their environment.

A brief history of variable fonts

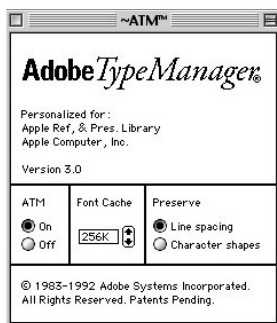


Figure 20. Adobe Type Manager, 1992.

In the late 1980s, Adobe presented the *PostScript*¹⁰ format and Apple presented the True Type format for font file development. They both used Bezier curves¹¹ to construct characters. In 1991, Adobe presented the Multiple Master technology as an extension of the *Post Script* format. It allowed storing several contour variants for one glyph in the same font file. These variants were the endpoints on a scale, between which you could find intermediary values, for example, in order to change the weight or width.

To use such a font, a static face had to be generated first using a special program: Adobe Type Manager (figure 20). It then had to be uploaded to the system for use in a graphic editor. Due to the complexity of

¹⁰ A programming language that describes the text and graphic elements on a page to a printer or other output device. It was developed by Adobe in 1985.

¹¹ A mathematically defined curve. Bezier curves take a set of points, and generate values between those points.

using this format, it has never become popular and designers continued to create static typefaces (TypeType, 2021).

In 1997, Adobe and Microsoft together presented the Open Type technology. It was based on TrueType but allowed for a far higher number of characters to be implemented — 65000, compared to 256 before. True Type also enabled Open Type features, like small capitals support, tabular characters, stylistic sets, contextual alternates, and so on, which we couldn't picture a modern typeface without (TypeType, 2021).

In 2016, Adobe, Apple, Google and Microsoft released Open Type Font Variables, a new version of the Open Type format. Designers could now write information on several faces of a font family in a single file. This format's main feature is identical to Multiple Master, but with one major distinction: static faces no longer need to be generated in advance. Parameters can be adjusted in the graphic editor directly.

Technical characteristics

Looking into each character of a typeface, you can identify anchor points based on which it is constructed. With variable fonts, we can connect these points and determine the midpoint positions if the number of these points is the same in the lightest and boldest faces. Variable fonts allow near-infinite variation along specified design axes (figure 21). In a variable font, a design axis is a style for variation. Each extra axis increases the number of typeface choices available. This range of possibilities is

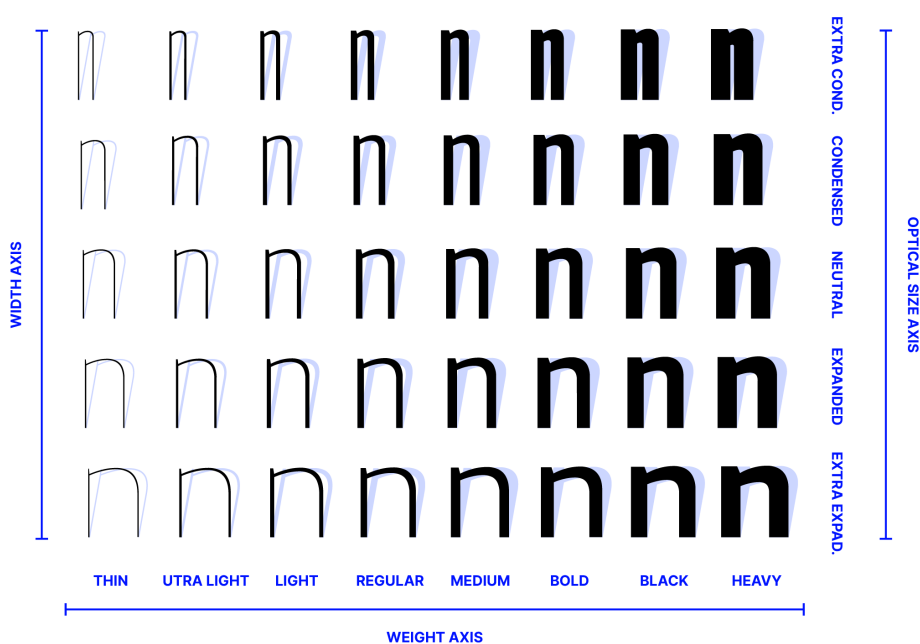


Figure 21. Main design axis. *Weight axis, width axis, optical size axis and slant axis (letters with opacity).*

referred to as a design space. *Weight* and *width* have been the most common axis. Another significant axis is *optical size* — fonts may be adjusted for use at very small, very large and any size in between. In addition, *slant*¹² is another axis. It is suitable when the characters in the slanted face are generated the same way as those in the upright face. This variant is most commonly found in sans serif fonts (Monotype, 2017; BBC, n.d.).

Despite the common axis, designers can create and apply their own by adjusting characteristics such as serif length, lowercase, uppercase character height, ascender and descender height, contrast and so on. There are now a million possibilities with different axes. Moreover, with custom axes, the font options are nearly endless. To summarise, variable fonts can now be used to solve basically any typographic problem.

The future of typography

Variable fonts provide limitless variation along specified design axes while also allowing large font families to be packaged more compactly. Designers in all media, including print and screen, are drawn to the former, whereas web developers and organisations involved in web infrastructure and devices with limited storage capacity are drawn to the latter (Communication Arts, 2017).

We believe variable fonts have two major benefits: efficiency and responsiveness. As we previously mentioned, fonts are stored as a set of mathematical curves. Once your single font file is loaded all your styles are loaded, so you save several network requests. Another advantage is their responsiveness. You can make the typeface adapt to the user's environment as soon as you have an axis that can affect a specific aspect of the typeface. This characteristic led to the creation of a tool that handles a variety of specialised problems when working with typography.

Variable fonts have indeed the potential to become a staple in the typography world. The revolution in variable fonts is highly probable. However, it will take time to rebuild and create new good typefaces, as well as for the operating systems and apps support to catch up. Right now, we are witnessing a tiny glimpse of the future. Nonetheless, we can ascertain that variable fonts make it a thrilling time to be not only a typographer but also a designer.

¹² The *slant* axis is similar to *italic*, but differs in two key ways. First, it's expressed as a degree continuum, and according to the OpenType specification should be "*greater than -90° and less than +90°*"; Second, it doesn't include glyph substitution.

3.4. Related Work

In this chapter, we showcase and analyse some relevant projects in the area. Although some projects do not have a direct representation of what is intended to be developed in the practical project, they still have a significant value for the area. Through the analysis of these projects, we not only aim to refer to important projects and draw relevant conclusions but also build the premises for the practical project.

The Avant-Garde: Dadaism and Futurism

Artists such as *Futurist* and *Dada* created stunningly innovative typographic compositions such as visual poems and collages of words and letters that bridged the gap between visual art and literature. These avant-garde artists rejected historical forms and looked to the alphabet as a system of abstract relations. In 1909, with the publication of the *Futurist Manifesto*¹³ by Marinetti, outdated thoughts were demolished with the rise of *Futurism*.

Projects such as *Parole en Liberté* or *Les Mots en Liberté* (figure 22) introduced a blasting effect into twentieth-century life. The dynamic typographic compositions were intended to create an emotional reaction. The designer and author Filippo Marinetti, became a significant reference for avant-garde artists who took advantage of page composition as a way of expressing themselves (Drucker, n.d.; Meggs, 2016).



Figure 22. Art prints in *Les mots en liberté* by Filippo Marinetti, 1919

¹³ The *Manifesto of Futurism*, written by Filippo Tommaso Marinetti and published on the front page of the french newspaper *Le Figaro* on February 20, 1909, proclaimed the desire of the author and *Futurists* to abandon the past and embrace the future. Tired of Italy's reliance on its classical heritage and disdainful of the present, these artists called for a new aesthetic language based on industry and the machine.

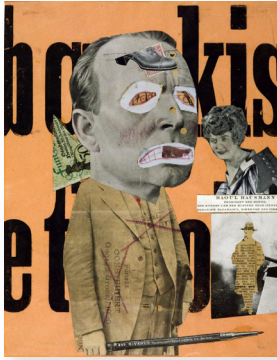


Figure 23. Raoul Hausmann
The Art Critic 1919–20.

Dadaism was born in 1916 in Zurich, Switzerland. This artistic and literary movement emerges as a reaction to World War I, nationalism and rationalism. Influenced by ideas and innovations from *Cubism*, *Futurism*, *Constructivism* and *Expressionism*, *Dada's* aesthetic became a powerful inspiration for artists and designers in many cities like Berlin, Paris and New York. The movement radically changed typographic ideals and created fresh approaches to text (figure 23 and 24). Unburdened of its rules and conventions, type was allowed to become expressive and subjective (Drucker, n.d.; Meggs, 2016).

“Words emerge, shoulders of words, legs, arms, hands of words. Au, oi, uh. One shouldn’t let too many words out. A line of poetry is a chance to get rid of all the filth that clings to this accursed language, as if put there by stockbrokers’ hands, hands worn smooth by coins. I want the word where it ends and begins. *Dada* is the heart of words.”

Ball, 1916

Figure 24. Detail of the 1922 poster *Small Dada Evening*. Kurt Schwitters and the Theo van Doesburg embarked on a tour of Holland to introduce Dada to local artists with this poster.



The group's poetic output was fresh and unique, and its typography needed to be as expressive and creative as its content. Moreover, the cultural discipline developed and applied to typography by other streams of contemporary design, such as the *Bauhaus*, was complemented by *Dada* in combination with aspects of *Constructivist* and *Suprematist* typography.

The endless influence of the Bauhaus

The *Bauhaus* is probably the most important avant-garde school of the twentieth century, founded in 1919 by the architect Walter Gropius in Weimar, relocated to Dessau in 1925 and closed in 1933 in Berlin under pressure from the Nazi Regime. This movement particularly advanced typography as a medium of its own. It advocated for the use of typography as an expressive art material that is manipulated by artists and designers without regard to predetermined rules and structural principles.

Typography had a significant impact on the foundation of the *Bauhaus*. This movement, in particular, the teachers László Moholy-Nagy (figure 29), Herbert Bayer and Joost Schmidt (figure 25 and 26) contributed to the dissemination of the *New Typography movement*. The works are often characterised by a clear type area, the use of concise typographic signs, strong contrasts of colour, size and position, standardised formats, and the blending of image and font. *Bauhaus* works were indeed primarily used in self-promotion for the school and its products but increasingly started to be used for commissioned work (Rössler, 2017; Meggs, 2016).



Figure 25. Kameliendame, designed by Joost Schmidt in 1927.



Figure 26. (figure on the left) Cover for *Foto-Qualität* (Photo-Quality), special issue of *Qualität* vol. 9, designed by László Moholy-Nagy in 1931.

Effects of Technology on Typography

Between the late 1980's and the early 1990's, there was a moment of exceptional typographic euphoria. Designers were able to command the industry's standard type technology from their desktops for a relatively small investment in hardware and software. Digital technologies, which were introduced in the late 1980s, transformed not only the conditions in which type was designed and distributed, but they also changed the conditions in which type was applied (Eye Magazine, 2001).

In 1984 the standard for digital typography and design was set with *Emigre* (figure 27), the alternative-culture graphic-design magazine, launched by Rudy VanderLans and Zuzana Licko. Coinciding with the birth of the Macintosh computer, the *Emigre* team was among the early adaptors to the new digital technology. *Emigre*, a quarterly publication devoted to visual communication, created some of the very first digital

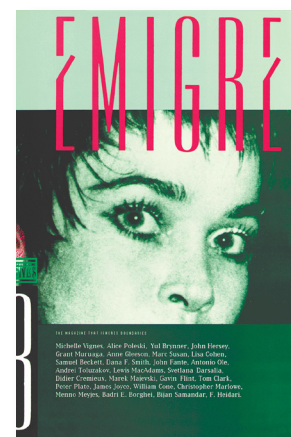


Figure 27. *Emigré* Magazine, issue #3 1985.



Figure 28. The Face Magazine, designed by Neville Brody.

layouts and typeface designs winning them both worldwide acclaim and much criticism (Emigre, n.d.).

As one of the best-known graphic designers since the 1980's, Neville Brody is a London-born designer who studied design in Britain during the 1970's. He is one of the most celebrated graphic designers of his generation and a leading typographer and internationally recognised art director. He spent three years studying at the London College of Printing where his work, which was quite experimental in nature, was met with quite unfavorable criticism because the school generally taught traditional printing methods (AIGA, 2021).

Brody's experimentation with his self-made sans serif typography, along with his *Pop Art* and *Dadaism* influence (figure 29 and 30), caught the attention of companies. Brody made his name popular through his



Figure 29. Brand strategy for Nike, designed by Neville Brody in 1988. On the right, two pages of The Face magazine from 1980's.

Figure 30. Two pages of the Face Magazine, designed by Neville Brody in 1980's.

work as art director for *The Face* magazine (figure 28). He changed the basic and structural rules that existed in British culture into a more artsy and vibrant aesthetic. His designs provoked some form of emotion that people would stick to one page instead of turning pages as they would normally do when reading a novel (AIGA, 2021).

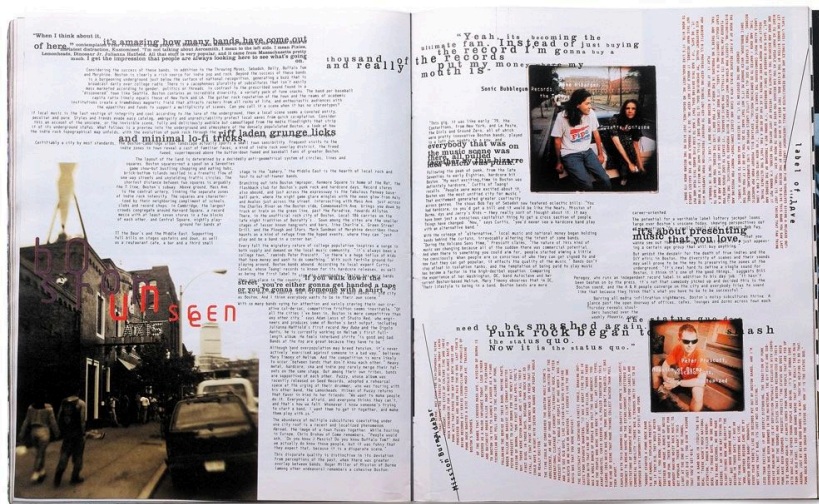


Figure 31. Pages of Ragun Magazine issue #55, designed by David Carson in 1994.

In 1992, *Ray Gun* magazine (figure 31 and 32) was founded. *Raygun* was led by the work of David Carson who served as its art director for seven years and seventy issues. While its pages were not related to graphic design, this magazine proved to be an exploration of typography, layout and visual storytelling that shift the approach of many graphic designers of the era.

Carson's style of typographic experimentation influenced the development of the deconstruction style of design and a whole new generation of designers. In addition, *Ray Gun* was the first magazine Carson sent to the printer as electronic files. Before that, he had generated elements by computer, then prepared camera-ready art on boards (Meggs, 2016).

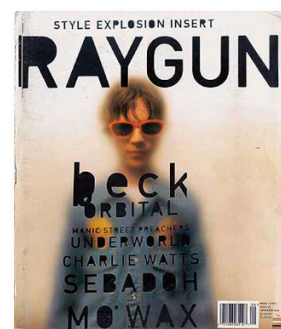


Figure 32. *Raygun* Magazine, designed by David Carson.

A reflection on Robert Bringhurst's classification

As previously mentioned in *section 3.2.*, in *The Elements of Typographic Style* (figure 33) written in 1996, Robert Bringhurst writes about typography in a really poetic form while acknowledging that the period of a typeface's development reflects not only its style but also its manufacturing process.

"Like oratory, music, dance, calligraphy — like anything that lends its grace to language — typography is an art that can be deliberately misused. It is the craft by which the meanings of a text (or its absence of meaning) can be clarified, honored and shared, or knowingly disguised."

Bringhurst, 1996:17

The Los Angeles native who currently resides in Canada is a poet, book designer, typographer, historian and linguist. He comes up with remarkable words that explain why typography is essential. This is most simply and clearly demonstrated in *section 1.1. First principles*: *"Typography exists to honor content"* (Bringhurst, 1996:17).

Bringhurst sets two scales for classifying type. The first is a collection of fine arts-inspired artistic movements: *Renaissance, Baroque, Neoclassical, Romantic, Realist, Geometric Modernist, Lyrical Modernist* and *Postmodern*. These labels avoid the inconsistencies of *x-heights* and serif designs in favor of a reference to the artistic circumstances of each era in typographic history.

A second scale runs alongside the first one, identifying the typeface's original form: foundry type for hand composition, hot metal type for

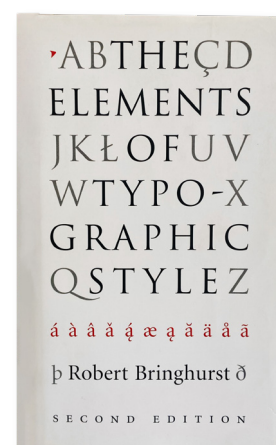


Figure 33. *The Elements of typographic Style* by Robert Bringhurst, 1996.

machine creation, phototype or digital typefaces. By combining the two approaches for classifying typefaces, he creates a system that allows the comparison of visually related designs without explicitly implying correlations (Emigre, n.d.; Bringhurst, 1996).

As we previously mentioned, we choose Bringhurst Classification as a guide in this dissertation, since his perspective establishes a more sensitive approach. It is a fact that nowadays, typography is widely seen as essentially linguistic — dependent on the rhetoric of language. The visual expression of type should be a visual manifestation of language and thought — it should be a real and unique art.

Typography as “the voice of the text”

Postage stamps have existed since 1840. Many countries use stamps as a way to publicise their culture and Peter Bil’ak did a excellent job when designing the Dutch standard postage stamps, in 2004 (figure 34).

“Text is obviously a carrier of information (...) I am interested in the formal aspects of text, such as the shapes of letters and so on. It is something so omnipresent, that most people never pay attention to it. Someone needs to formalise these shapes, make them functional, and inject a character into them. A typeface is comparable to a voice; it colours the content.”

Bil’ak, 2014

Figure 34. Dutch standard postage stamps designed by Peter Bil’ak.

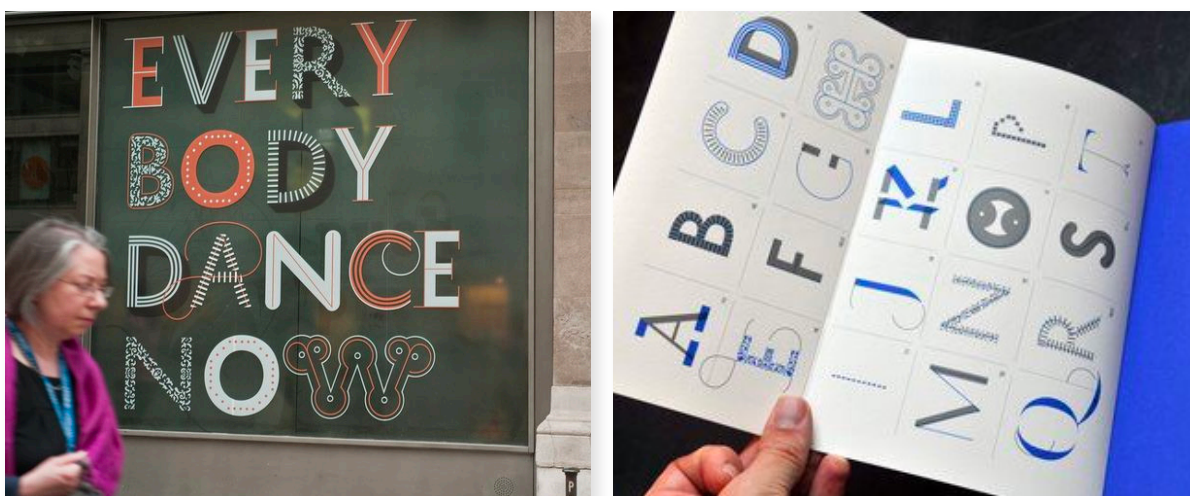


The Dutch landscape inspired the design of these standard postage stamps, with the well-known view of geometric fields from the air, the first view of the country offered to travelers landing at Schiphol. Apart from the landscape as an inspiration, the stamps provide a different perspective. Since the width of each letter determines the width of the

surrounding block, the design is uniquely typographical. Setting metal punches adjacent to each other is how old-style metal printing works. In this way, the stamps are indeed a subtle homage to Dutch typography traditions. The stamps were first printed in a run of 150 million copies and have subsequently been reprinted three times (Bil'ak, 2014).

In the early 1990s, Peter Bil'ak explored decorative layering systems, inspired by nineteenth-century *Tuscan* types. In 2008, the project took a new twist when Bilak worked on proposals for the *Twin Cities* typeface. Instead of proposing one typeface, he presented a system that could take any form, inspired by the evolution of typography (figure 35).

Figure 35. On the left, *History* Typeface applied in a commercial project. On the right, *History* Typeface applied in print.



Based on a skeleton of Roman inscriptional capitals, the typeface *History* includes 21 independent typefaces which share metric information so that they can be combined. *History* typeface has the potential to generate thousands of different unique styles through the superposed layers ranging from *humanist renaissance*, *transitional*, *baroque*, *script-like*, early *grotesque* to *digital* types (Bil'ak, 2014; Typotheque, n.d.a.).

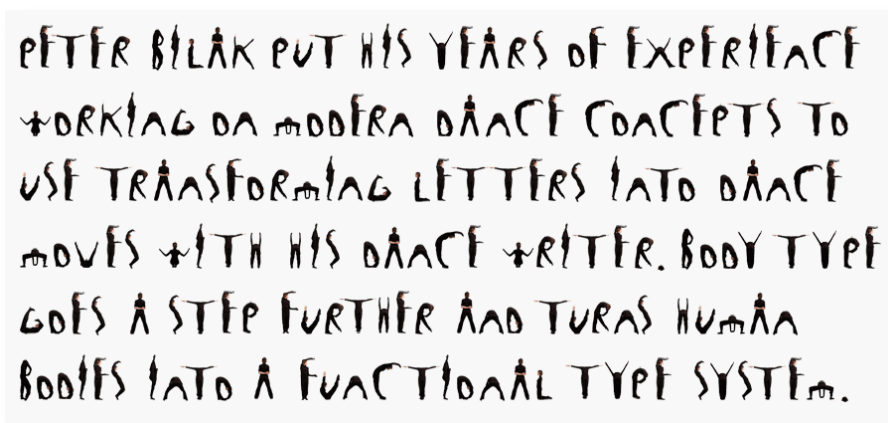


Figure 36. Body Type, created by Peter Bil'ak. "Peter Bil'ak put his years of experience working on modern dance concepts to use transforming letters into dance moves with his dance writer. Body Type goes a step further and turns human bodies into a functional type system".



Figure 37. “ABC” Body Type, designed by Peter Bil’ak.

Body Type (figure 36) was also created by Peter Bil’ak in 2011. Thanks to the models Valentina Scaglia and Lisa van Bommel, *Body Type* goes a step further and turns human bodies into a functional type system.

Consider that there are several predecessors in the history of art and typography, ranging from Peter Flötner’s *Anthropomorphic Alphabet* (1540) to Anthon Beeke’s *Nude alphabet* (1970), *Body Type* is special in the way it employs typographic principles to create a type family with multiple styles (figure 37).

“Seeing type design solely as a problem-solving exercise is limiting, however, reducing type design to a response mechanism, a craft detached from its own history. When the idea of cultural progress is supplanted by technological progress, the less obvious motifs of type design such as continuity or self-awareness are neglected.”

Bil’ak, 2014

Body Type comes as a set of 26 high-resolution photos or as a Photofont file and includes two styles, *Regular* and *Bold*, for a greater range of expression. While *Body Type* is undoubtedly a display typeface, it also works nicely in smaller text. Without a doubt, *Body Type* gives plenty of personality to any message (Bil’ak, 2014; Typotheque, n.d.).

The future of type

Web typography has blossomed over the past five years with fonts available from many typography suppliers, the widely supported `@font-face`¹⁴ CSS element, and above all: variable fonts. As mentioned in *section 3.3*, variable fonts are an evolution of the OpenType format that enables many different variations of a typeface to be incorporated into a single font file.

Charles Nix, *Monotype’s Creative Type Director*¹⁵, says today’s consumers expect distinct, dynamic, personalised branding and lightning-fast web load times wherever they are and on whatever device they are using. It is built to meet that demand — “*One font file with*

¹⁴ The `@font-face` CSS at-rule specifies a custom font with which to display text; the font can be loaded from either a remote server or a locally-installed font on the user’s own computer.

¹⁵ A studio with one of the largest library of fonts in the world. Monotype developed many of the most widely used typeface designs, including *Times New Roman*, *Gill Sans*, *Arial* and *Albertus*.

millions of styles that's magically fast, awesomely powerful, and surprisingly fun (...) Helvetica Now Variable invites designers to paint with type." Nix says (Monotype, 2021).

Created by *Monotype Studio* in 2019, this variable font is a good example of a typeface that maintains its classic simplicity but has now "depth, dimension, possibility, flexibility, character and a digital expression". *Helvetica Now* (figure 38) is available through *Monotype Fonts* and can be purchased at *MyFonts*.



Figure 38. Helvetica Now Variable being used in an advertisement.

Grafier Variable Font (figure 39) is a sharp serif typeface inspired by *Baskerville*, with unusual connecting serifs for some letters, released in 2019. Grafier is a typeface that rethinks classic design in the digital era. The uncompromisingly straight serifs, which join inside the letters and its brutal linearity supported by distinctive flag-terminals, chopped shapes and squarish punctuation make *Grafier* a unique typeface (Grafier, n.d.b.).

The family consists of 10 styles: five weights from *Regular* to *Black* in two contrast variations. All the styles are available in a variable font with two axes. Straight letter shapes makes *Grafier* a good pair for sans serif fonts. The typeface works perfectly in big and medium sizes; low-contrast styles are suitable for short texts as well (Grafier, n.d.b.).

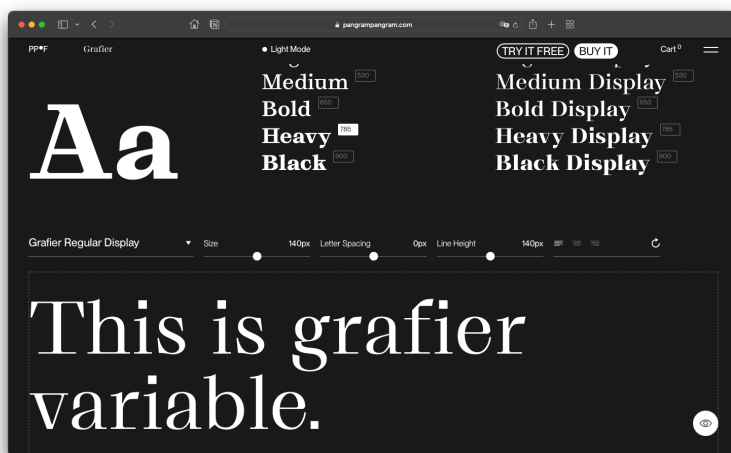


Figure 39. Screenshot of the website, typeface Grafier Variable.

Inter (figure 40) is another variable font family specially designed for displays. *Inter* features a tall *x-height* to aid in the readability of *mixed-case* and *lower-case* text. Several OpenType features are provided as well, like contextual alternates that adjust punctuation depending on the shape of surrounding glyphs, slashed zero to disambiguate "0" from "o", tabular numbers and multiple other features.

In total, there are eighteen styles available, nine *Regular* and nine *Italic* versions of the same. The *Inter* font was released in 2018 and updated in late 2020, by Rasmus Andersson (Variable Fonts, n.d.b.; Google Fonts, n.d.).

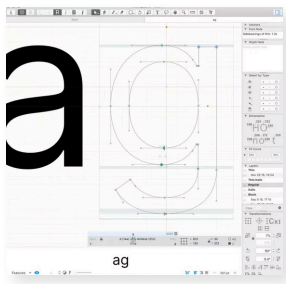
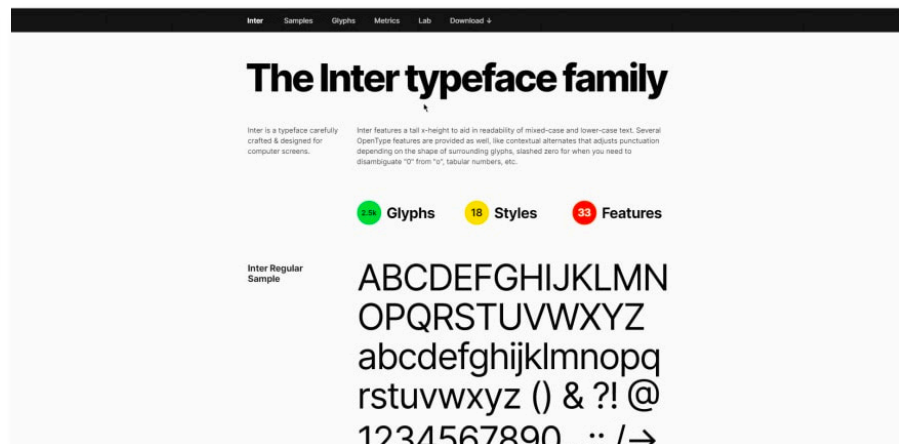


Figure 40. Screenshot of the site and glyphs; *Inter* typeface family.



3.5. Conclusion of the State of the Art

The purpose of this chapter is to conclude the State of the Art by synthesising the key research findings related to the research aims. The intermediate delivery begins with a research stage which includes an analysis of the history and evolution of typography. From the development of moveable type and printing press in the fifteenth-century to the emergence of digital type as an affordable tool accessible to everyone, typography has been constantly evolving. Taking into account the importance of typography's evolution, particular periods of typography are presented according to the following order: The invention of printing with movable type; The foundations of the modern era; Typography as a need of commerce; The rise of the Avant-Garde creative movements; Graphic Design as a specialised field; A shift from mechanical to digital technologies; Digital World.

Afterward, we outline the main systems of typefaces classification: *Thibaudeau Classification* by Francis Thibaudeau, both *Vox System* and the *Vox ATypi System* by Maximilien Vox, and Robert Bringhurst's classification. It is important to stress that type classification allows a better understanding of the typefaces. Therefore, it helps to narrow down our research. Later, we briefly present an overview of the anatomy and terminology of type. This not only allows us to identify closely what is right and wrong in type but it also lets us use typography properly, and discuss it effectively.

We also provide a brief context and history about variable fonts, their technical characteristics and their potential being the newest technological advancement in the typography world. Further, we showcase and analyse some relevant projects. Although some of the projects do not have a direct relation to the practical project to be carried out, they still have a significant value for the area and allow us to draw relevant conclusions. Nowadays, typography depends on the rhetoric of language. Our main goal, then, is to explore the visual expression of type as a visual manifestation of language and thought.

We may thus point out that such powerful visual tools make clear the importance of exploring and acknowledging the communicative complexity of typography. It is, therefore, crucial to develop a strong foundational understanding of the topics described above.

4. PRACTICAL PROJECT

This chapter details the work developed as part of the practical project created in the context of this dissertation. Firstly we give a brief context and define the main objectives of the practical project — *Xtoria Variable Font*. The development of the variable font is then approached from a technical perspective, as well as the challenges and problems faced. Note that, the *Xtoria Variable Font* final TTF file, instructions for its use, and other useful informations can be found in the GitHub repository, available in: <https://github.com/sofiatorrespasseira/Xtoria-Variable-Font>.

Brief context

In the practical project, we have an exploratory look at the visuality of typography, through the convergence of art, technology, and creativity. Based on a reflection on the evolution of typographic forms, and their value as visual communication tools, the practical project results from the creation of a variable font.

“Typography is the craft of endowing human language (...). Its heartwood is calligraphy - the dance, on a tiny stage, of the living, speaking hand - and its roots reach into living soil, though its branches may be hung each year with new machines. So long as the root lives, typography remains a source of true delight, true knowledge, true surprise.”

Bringhurst, 1996:11

It is important to note that our focus is to create value and a better appreciation of letters, as well as a deeper understanding of what they mean when echoing a communication tone.

In consequence, we will focus on the development of a variable font that visually illustrates typography’s illustrious history and explores its communicative ability: *Xtoria Variable Font*.

4.1. Xtoria Variable Font

Conceptualization

As asserted in section 3.3. of the *State of the Art*, variable fonts have the potential to begin a new chapter in digital typography. *Xtoria* not only illustrates typography’s history but also explores the main premises we are studying in this dissertation: *“Typography as a voice of the text”*.

For this reason, and since variable fonts are often defined according to their use in web design, we decided to focus on how they can also benefit print. Instead of adapting a print font for screens, a common procedure at present, this variable font was designed to be used on-screen and on paper from the start.

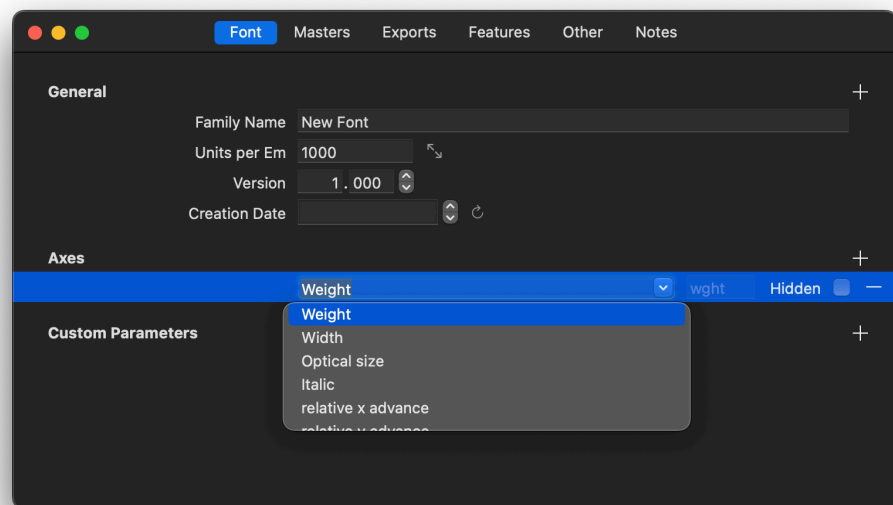
It is important to note that *Xtoria* was crafted to have a strong, unfiltered and fearless personality. By being variable this font gives the possibility to explore extremely different styles with a single file. Unlike other existing variable fonts, *Xtoria* can transform from sans to serif

without using alternate versions of the characters. From *Renaissance* to *Postmodern*, *Xtoria* illustrates the potential contained within variable fonts in a very unique way. This font offers more than thirty-two possible combinations thanks to its eight unique font styles and four distinct axes.

Creating Xtoria

For the development of the variable font, we decided to use the *Glyphs software*. *Glyphs software* is a Mac font editor that allows drawing high-precision vectors, efficiently reusing shapes, and easily managing letters, figures and symbols (Glyphs, n.d.). To create a variable font in *Glyphs software* we first need to set up a design space. A design space is a coordinate system defined by axes. As mentioned before, we can choose registered axes: *weight*, *width*, *italic*, *slant* and *optical size*; and a range of proposed axes¹⁶: *relative x advance*, *relative y advance*, *x opaque*, *y opaque*, *y transparent descender*, etc. (figure 41).

Figure 41. Screenshot of axes selection in *Glyphs software* (File > Font > Axes).



In this case, we not only chose those axes but also created private new axes, according to the evolution of typography anatomy. We chose Robert Bringhurst classification (figure 42) as a guide in the development process since his perspective establishes a more sensitive approach. We connected our variable font to artistic movements, divided into Bringhurst's classes:

¹⁶ OpenType supports custom/private axes, allowing any font developer to create a font with whatever axes they wish. It is recommended to register proposed new axes in a GitHub repository that is used for discussion and review of those proposals. When a proposal of new axes is admitted, the new axes will appear on the software.

Renaissance, Baroque, Neoclassical, Romantic, Realist, Geometric Modernist, Lyrical Modernist and Postmodern. In the section below, titled *Axes and Instances definition*, we justify and explain our decision.

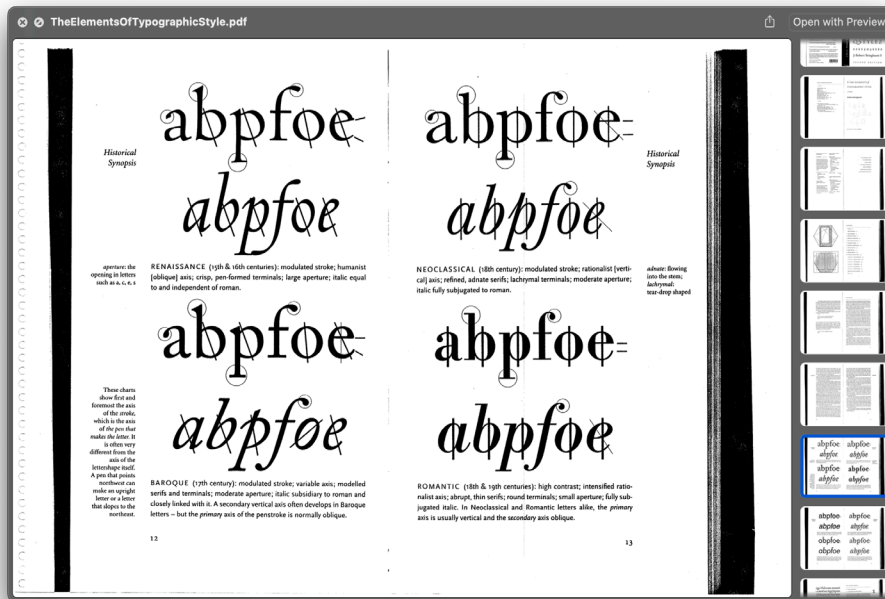
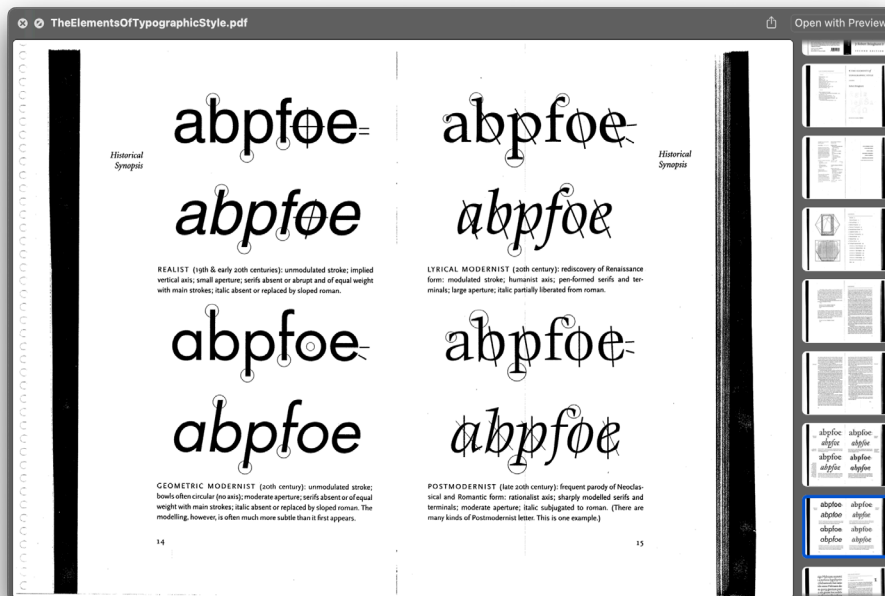


Figure 42. Screenshots of Robert Bringhurst classification in *The Elements of Typographic Style*.



Unfortunately, due to the complexity of the project, we only designed the lowercase letters. While designing our variable font, we continuously test it in use. For testing our variable fonts we can easily use Adobe Illustrator, Adobe Photoshop or InDesign. After importing our variable font into the Adobe Fonts folder, we can choose the font in the text panel, and open the slider pop-up to experiment with the different axes (Glyphs, n.d.).

Alternatively, we also have web pages that allow us to quickly test our font: Wakamai Fondue, Dinamo's Font Gauntlet (figure 43) and Axis Praxis. In our case, we used Dinamo's Font Gauntlet webpage (in <https://fontgauntlet.com/>) to test *Xtoria Variable Font* by simply dropping the TTF file on the website.

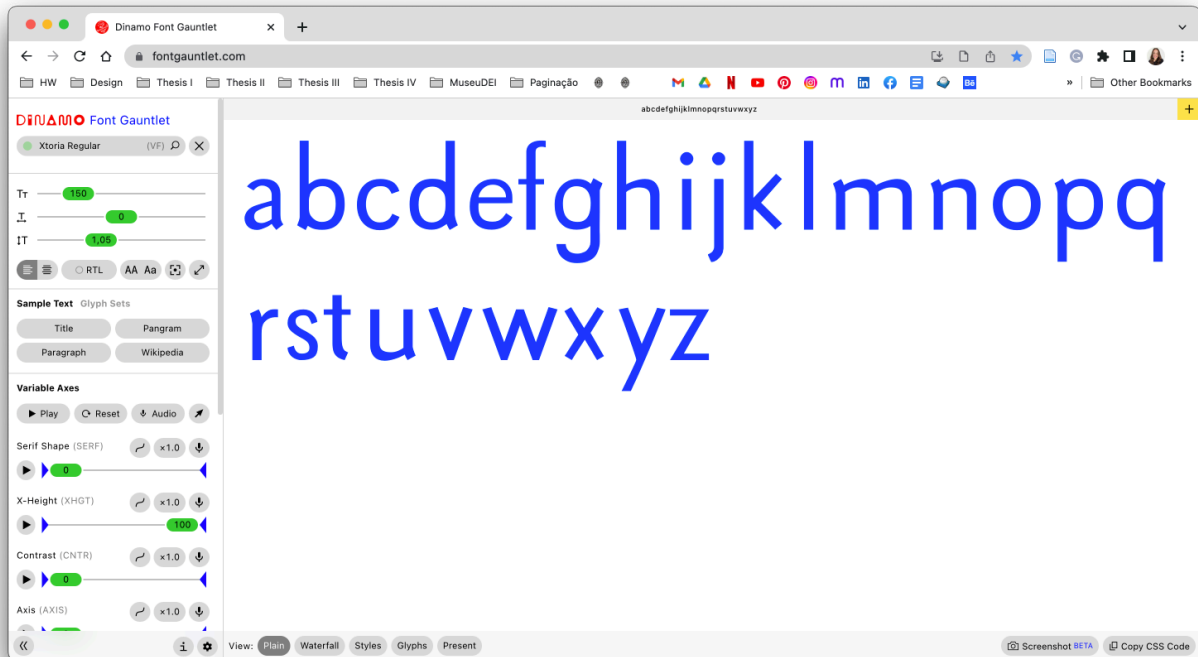


Figure 43. Screenshot of Dinamo's Font Gauntlet with *Xtoria Variable Font* loaded.

Axes and Instances definition

As stated in section 3.3. of the *State of the Art*, variable fonts are based on the concept of interpolation. Looking into each character of a typeface, you can identify anchor points based on which it is constructed. With interpolation, it is possible to connect these points and determine the midpoint positions. However, we can only do this if there is an equal number of points on all faces of the typeface. This technique allows almost limitless variation along predetermined design axes.

If we want to interpolate, we first need to set up a design space. A design space defines the dimensions in which the typeface develops through a coordinate system defined by axes, much like a cartesian coordinate system. However, instead of x , y , z axes, we have design axes that make sense for typography. Axes control the different aspects of letters (Glyphs, n.d.). A design space also stores information about instances. Even though our font is variable, meaning we already have an endless

amount of instances, we should still pick some spots in the design space and define them as instances for the font submenu. Each instance is one font, or style, in the font family we generate. Instances are what the computer calculates.

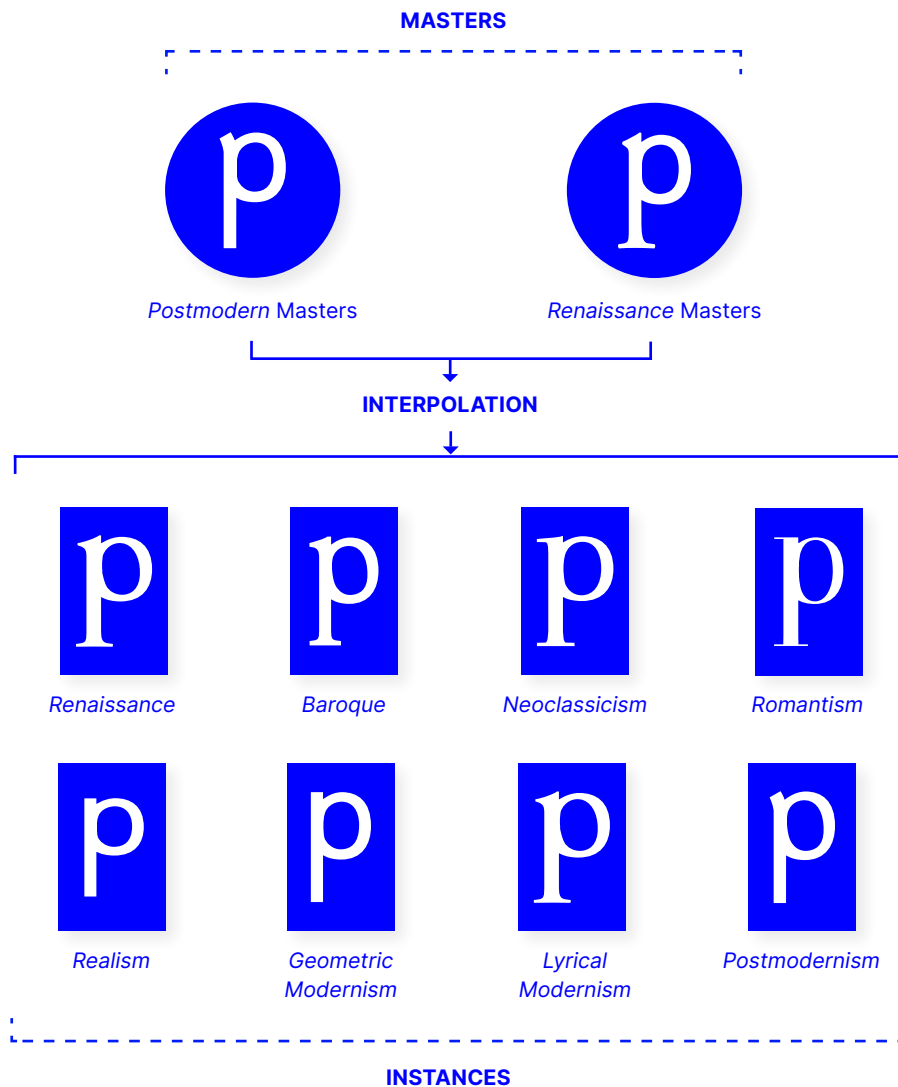


Figure 44. Exemplifying diagram of the interpolation of two masters: *Postmodern Serif* and *Renaissance Serif*.

Bearing that in mind, and knowing our goal was to connect our variable font to Robert Bringhurst’s classification, we set eight instances and reflected on the main typography anatomy differences between them. According to Bringhurst’s historical synopsis:

— *Renaissance* (15th & 16th centuries): modulated stroke; humanist (oblique) axis; crisp, pen-formed terminals; large aperture; italic equal to and independent of roman.

— *Baroque* (17th century): modulated stroke; variable axis; modelled serifs and terminals; moderate aperture; italic subsidiary to roman and

closely linked with it. A secondary vertical axis often develops in Baroque letters - but the primary axis of the pen stroke is normally oblique.

— *Neoclassicism* (18th century): modulated stroke; rationalist (vertical) axis; refined, adnate serifs; lachrymal terminals; moderate aperture; italic fully subjugated to roman.

— *Romantism* (18th & 19th centuries): high contrast; intensified rationalist axis; abrupt, thin serifs; round terminals; small aperture; fully subjugated italic. In Neoclassical and Romantic letters alike, the primary axis is usually vertical and the secondary axis oblique.

— *Realism* (19th & early 20th centuries): unmodulated stroke; implied vertical axis; small aperture; serifs absent or abrupt and of equal weight with main strokes; italic absent or replaced by sloped roman.

— *Geometric Modernism* (20th century): unmodulated stroke; bowls often circular (no axis); moderate aperture; serifs absent or of equal weight with main strokes; italic absent or replaced by sloped roman. The modeling, however, is often much more subtle than it first appears.

— *Lyrical Modernism* (20th century): rediscovery of Renaissance form: modulated stroke; humanist axis; pen-formed serifs and terminals; large aperture; italic partially liberated from roman.

— *Postmodernism* (late 20th century): a frequent parody of Neoclassical and Romantic form: rationalist axis; sharply modelled serifs and terminals; moderate aperture; italic subjugated to roman.

After defining our instances (figure 45) we reflected on which axes we should design. We could use any of the official's registered axes, with a predefined four letters tag: *Weight* (wght), *Width* (wdth), *Italic* (ital), *Slant* (slnt) or *Optical Size* (opsz). Despite the existence of common axes, we decided to create our own private axes based on specific aspects that illustrated the evolution of the eight artistic movements.

While creating our own private axes, we had to pick a four-letter tag to avoid a potential collision with future software updates. It is recommended to keep our private tags in all caps, e.g., "TRCK" for Tracking or "ROTN" for Rotation. Predefined axes are always lowercase because all-cap tags are officially reserved for private use (Glyphs, n.d.).

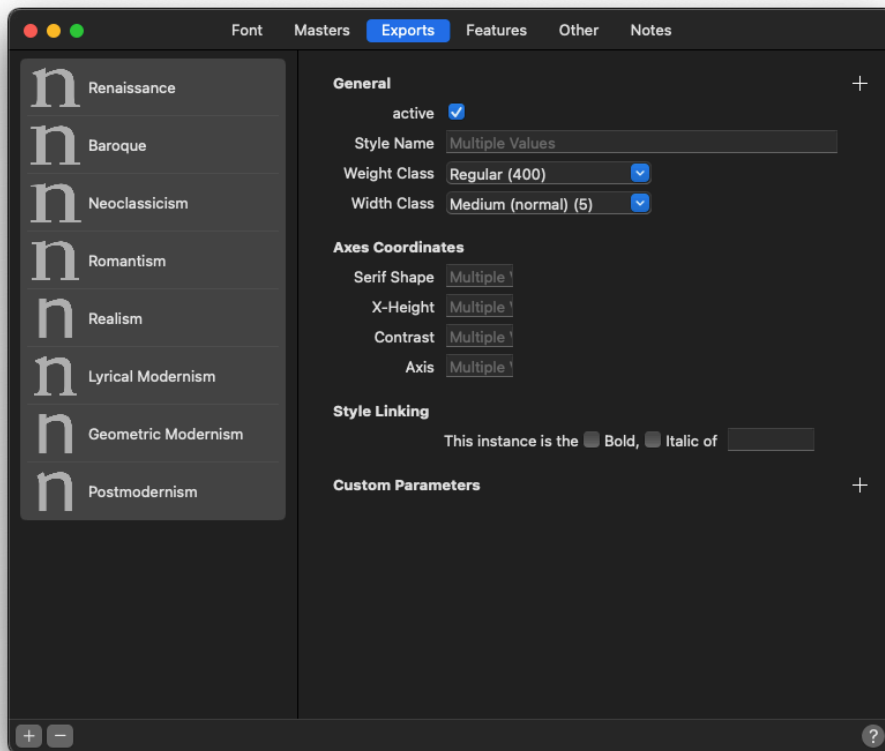


Figure 45. Screenshot of *Glyphs software*: The eight instances created (File > Font > Exports).

This approach provided two key benefits. Firstly, creating our own private axes offered us several possibilities to design the features we needed. Therefore, we expanded our design options and had the opportunity to expose individual aspects of the artistic movements.

Secondly, this approach unlocked an even more creative solution and provided us with maximum flexibility. Creating new private axes gave *Xtoria* some really wonderful character and allowed us to create a dramatic effect on its visual tone.

Consequently, we identified the predominant typographic anatomy differences between our instances (*Renaissance*, *Baroque*, *Neoclassical*, *Romantic*, *Realist*, *Geometric Modernist*, *Lyrical Modernist* and *Postmodern*) and defined six axes: *Serif* (SERF), *X-Height* (XHGT), *Aperture* (APRT), *Axis/Angle of Stress* (AXIS), *Contrast* (CNTR) and *Italic* (ital).

It is important to keep in mind that among all identified axes, there were many more anatomical letter attributes. Nonetheless, due to time constraints, we had to select and prioritise the attributes that were not only more visually evident, but also allowed us to consolidate the main premises of this dissertation. To help visualise our instances, we selected two typefaces of each artistic movement identified by Robert Bringhurst in *The Elements of Typographic Style*. All samples bellow have between 18pt and 22pt. Note that we have combined the Neoclassical and Baroque movements due to their similarities.

— *Renaissance* (15th & 16th centuries);

Sample of Garamond typeface (Claude Garamond, 1530):

If you change the way you look at letters,
the letters you look at change.

Sample of Jenson typeface (Nicolas Jenson, 1470):

If you change the way you look at letters,
the letters you look at change.

— *Baroque/Neoclassicism* (17th to 18th century);

Sample of Caslon typeface (William Caslon, 1732):

If you change the way you look at letters,
the letters you look at change.

Sample of Baskerville typeface (John Baskerville, 1750):

If you change the way you look at letters,
the letters you look at change.

— *Romanticism* (18th & 19th centuries);

Sample of Didot typeface (Firmin Didot, 1784):

If you change the way you look at letters,
the letters you look at change.

Sample of Bodoni typeface (Giamattista Bodoni, 1798):

If you change the way you look at letters,
the letters you look at change.

— *Realism* (19th & early 20th centuries);

Sample of Akzidenz typeface (Berthold Type Foundry, 1896):

If you change the way you look at letters,
the letters you look at change.

Sample of Helvetica typeface (Arthur Ritzel, 1960):

If you change the way you look at letters,
the letters you look at change.

— *Geometric Modernism* (20th century);

Sample of Futura typeface (Bauer Type Foundry, 1927):

If you change the way you look at letters,
the letters you look at change.

Sample of Memphis typeface (Rudolf Wolf, 1929):

If you change the way you look at letters,
the letters you look at change.

— *Lyrical Modernism* (20th century);

Sample of Palatino typeface (Stempel Foundry, 1949):

If you change the way you look at letters,
the letters you look at change.

Sample of Dante typeface (Giovanni Mardersteig, 1954):

If you change the way you look at letters,
the letters you look at change.

— *Postmodernism* (20th century);

Sample of Triplex typeface (Zuzana Licko, 1898):

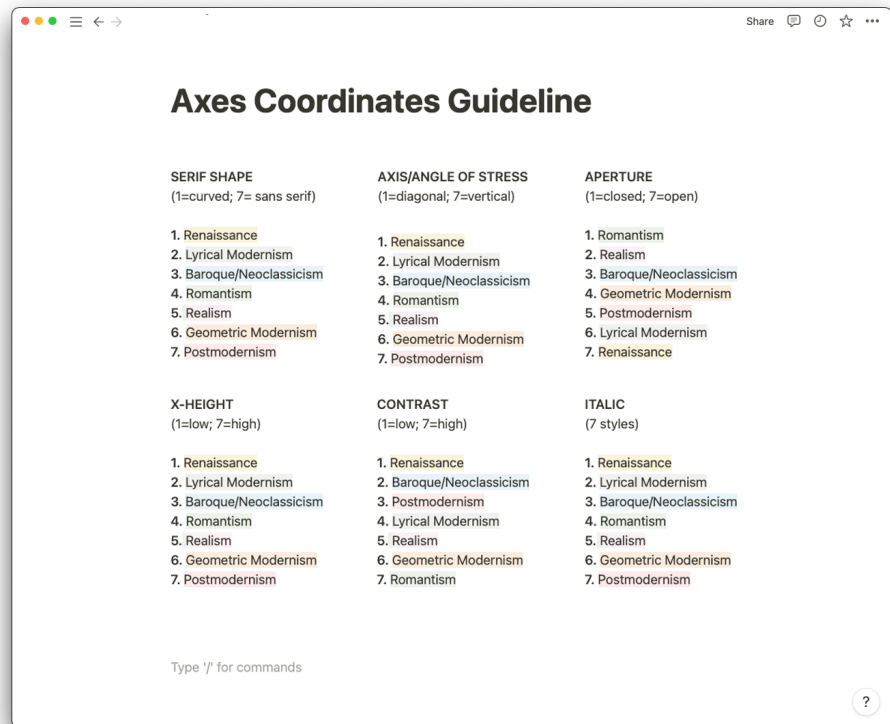
If you change the way you look at letters,
the letters you look at change.

Sample of Officina typeface (Erik Spiekermann, 1990):

If you change the way you look at letters,
the letters you look at change.

Afterwards, an Axes Coordinates Guideline was developed to support the initial tests. The eight instances were classified according to a criteria within each axis (figure 46). In fact, this guideline helped us understand the magnitude of the practical project.

Figure 46. Screenshot of Notion software. Original Axes Coordinates Guideline with the respective axes criteria followed.



With the initial axes option — *Serif Shape*, *X-Height*, *Aperture*, *Axis/Angle of Stress*, *Contrast* and *Italic* — we would be designing seven different artistic movements within six different axes, leading us to two thousand one hundred eighty-four distinct characters (forty-two individual draws multiplied by fifty-two characters of the alphabet). An impossible task due to time constraints.

The original Axes Coordinates Guideline¹⁷ pressured us to simplify the development of the project and lead us to a twenty-six lowercase letters variable font with four different axes (*Serif Shape*, *X-Height*, *Axis/Angle of Stress* and *Contrast*). We were aware that it would still be an arduous challenge, but the more we decrease our axes, the harder it would be to exemplify our concept.

¹⁷ The Original Axes Coordinates Guideline was developed to simplify the first approach to the development of the project. The second one was developed to help verifying the right values for our instances.

Masters set up and draws

Once our design space was set up with instances and axes, we were ready to draw the input for the interpolation — the masters. Masters are organised in different layers of each character. The automatic interpolation connects the points of all the masters and determines the midpoint positions — the instances.

However, as mentioned before, we can only do this if there are compatible outlines for interpolation. To achieve this outline compatibility, all masters must have the same amount of paths, nodes and anchors as well as components; all components, paths, nodes and anchors must also be in the same order across all masters. In practice, a *Renaissance* letter must have the same structure as a *Postmodern* letter (figure 47).

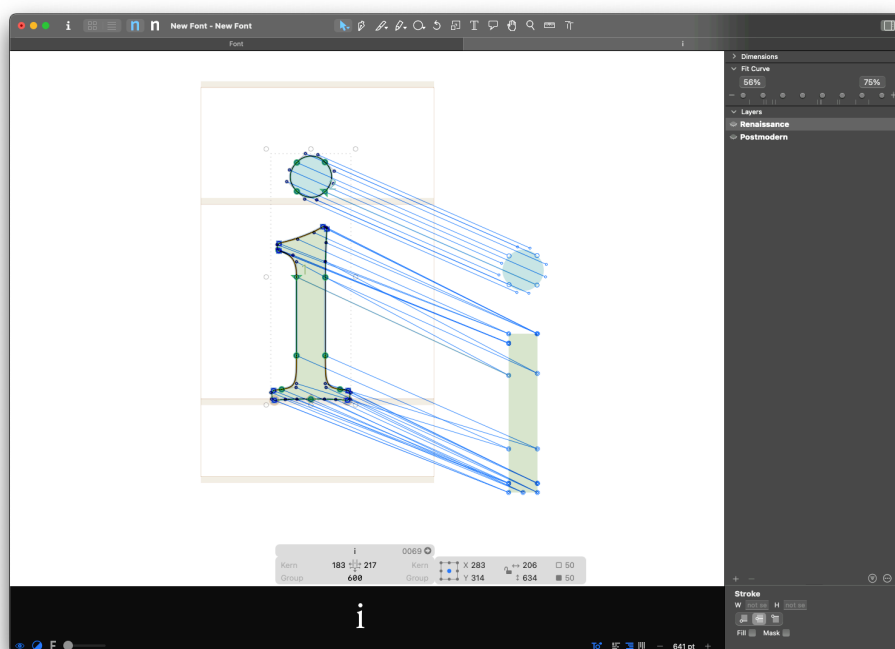


Figure 47. Screenshot of *Glyphs* software. Example of two compatible masters: *Renaissance* and *Postmodern*.

Thus, since we were working with such distinct styles, we constantly jumped back and forth between masters to make sure they were interpolated nicely. In fact, this task proved to be much harder than we had anticipated and it is discussed later in the chapter *Challenges and Problems Faced*. For the above-mentioned reasons, we draw our masters as simple as possible. The main challenge here was to draw the most basic skeleton of all letters that would fit all artistic movements.

Our best approach was to draw a default master. In our case, the default master should be the most complex glyph, regarding the number of paths, nodes and anchors: *Renaissance* glyphs.

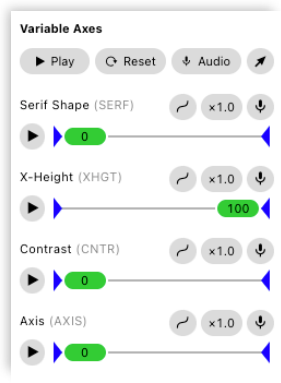


Figure 48. Example of variable axes in use.

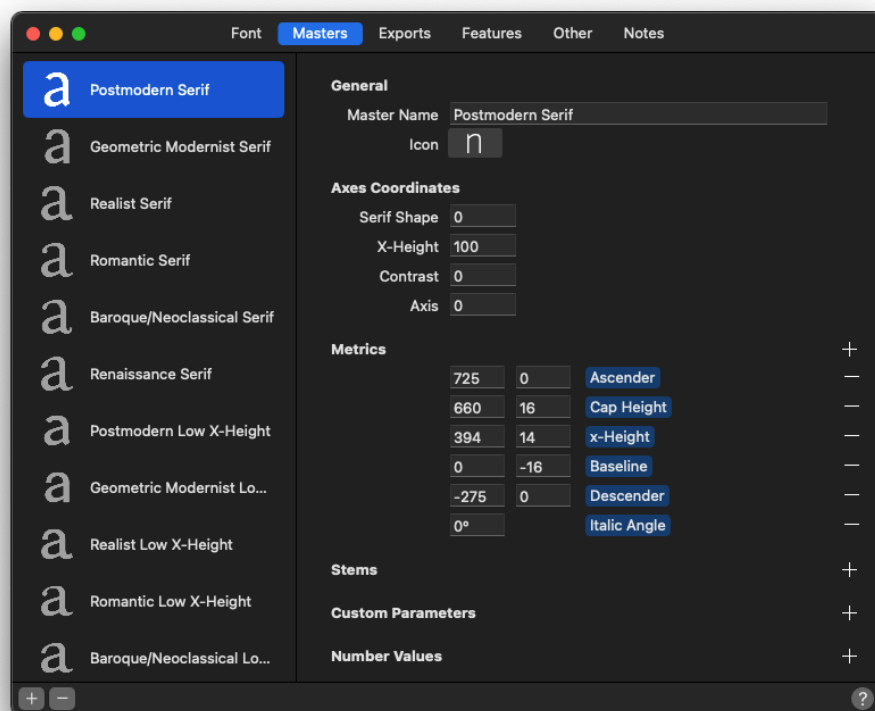
Each further master must be connected, ideally via a single orthogonal move, to another master and every chain must connect to our default master. Consequently, we chose the *Garamond* font to guide the style of the default master in order to speed up the process. The method consisted in optimising and simplifying as much as possible all the characters, concerning all the remaining masters with extremely different styles.

Before drawing the masters we also needed to set the axes coordinates for each of them (figure 48). We could enter any number, as long as the values were sufficiently different so that *Glyphs software* calculated intermediate instances. Considering what they would visually represent, we selected different scales for the axes:

- Serif Shape (SERF): 0-100;
- X-Height (XHGT): 0-100;
- Contrast (CNTR): 0-20;
- Axis/Angle of Stress (AXIS): 0-20;

Afterwards, we picked an appropriate name for each master (figure 49). Note that the master names were not exported into the final font file. For example, we didn't draw a *Lyrical Modernist* master because its draw resulted from the automatic interpolation between *Renaissance* and *Baroque/Neoclassical* masters.

Figure 49. Screenshot of *Glyphs software*. Example of the master Postmodern Serif axes definition (File > Masters).



Initially, we were going to draw twenty-four masters but due to out-line incompatibility, we also had to draw the interpolation between the maximum value of *Axis/Angle Stress* with the maximum value of Contrast. This problem is discussed later in the chapter *4.2. Challenges and Problems Faced*.

To sum up, we drew thirty masters (figure 50) that illustrated the four axes we previously defined. It is important to empathise that multiple masters projects are an underexplored field in variable font territory, especially when dealing with multiple axes. There was very limited information on the best approach to the first experience with multiple masters on the most practical level, such as workflow tips and tutorials.

Postmodern Serif	Geometric Modernist Serif	Realist Serif	Romantic Serif	Baroque/Neoclassical Serif	Renaissance Serif
Postmodern Low X-Height	Geometric Modernist Low X-Height	Realist Low X-Height	Romantic Low X-Height	Baroque/Neoclassical Low X-Height	Renaissance Low X-Height
Postmodern High Contrast	Geometric Modernist High Contrast	Realist High Contrast	Romantic High Contrast	Baroque/Neoclassical High Contrast	Renaissance High Contrast
Postmodern Oblique Axis	Geometric Modernist Oblique Axis	Realist Oblique Axis	Romantic Oblique Axis	Baroque/Neoclassical Oblique Axis	Renaissance Oblique Axis
Postmodern Oblique Axis, High Contrast	Geometric Modernist Oblique Axis, High Contrast	Realist Oblique Axis, High Contrast	Romantic Oblique Axis, High Contrast	Baroque/Neoclassical Oblique Axis, High Contrast	Renaissance Oblique Axis, High Contrast

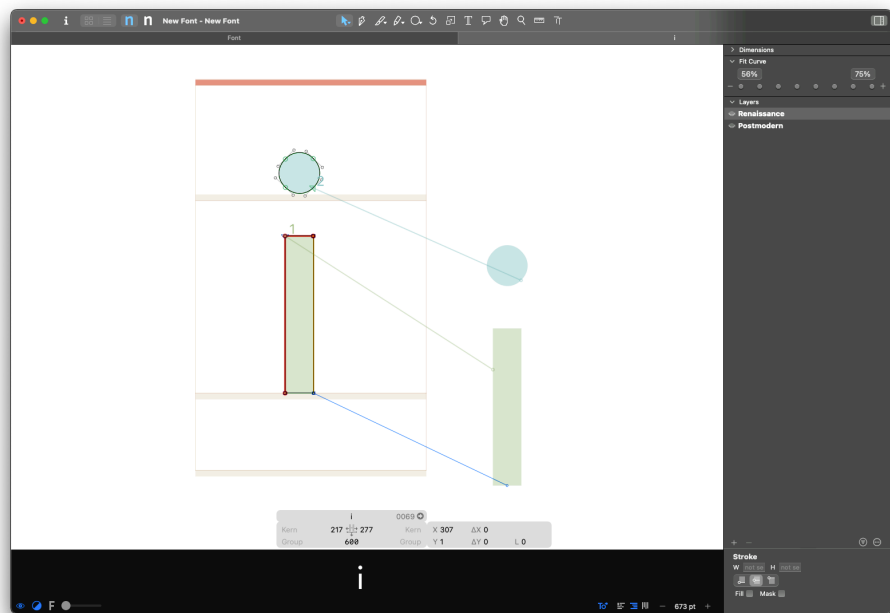
Figure 50. All thirty masters illustrating the four axes: *Serif*, *X-Height*, *Axis/Angle of Stress* and *Contrast*. Letter “p” is used as an example.

4.2. Challenges and problems faced

Outline compatibility

As stated before, the outlines of our masters transform between various shapes using an interpolation technique. When interpolation occurs, what truly interpolates are the nodes, handles, components, and anchors x and y coordinates. To make this happen, the order and position in which points and components are kept must be the same in every master. In its essence, we just needed compatible outlines for interpolation in all masters (figure 51).

Figure 51. Screenshot of *Glyphs software*. Example of two incompatible masters. Note that these masters are connected with wrong nodes.



This outline compatibility turned out to be one of the major challenges of this practical project. In fact, until the writing of this dissertation, dealing with such diverse styles in variable fonts had never been attempted. Due to the lack of information about multiple masters projects with multiple axes, we kept master's draws as simple as possible through an overlapping of some points. However, as discussed later in the section *Axes Combinations*, we still faced significant problems with interpolation between specific axes combinations.

Nonetheless, to ensure outline compatibility we had to follow some criteria that were not easy to establish right from the beginning. Firstly, all masters must have the same amount of paths, nodes, handles, anchors as well as components. Secondly, all paths, nodes, handles, anchors

and components must be in the same order across all masters. Lastly, all masters must have the same set of anchors. Fortunately, *Glyphs software* easily identified incompatible outlines marked with a red triangle in the Font View menu. *Glyphs software* also provided a preinstalled smart filter called *Incompatible Masters* that helped us in this challenge.

When outline incompatibility was detected we had two main solutions. To begin with, we could correct path directions. Path directions are one of the most common reasons for incompatibility. Its main cause is a wrong starting point, leading to differing outline orders in all masters. In most cases, this was fixed with *Paths > Correct Path Direction*. This command analyses the path structure and if necessary toggles the path direction for each path. Additionally, it normalises the start node for each path, usually to a position as close to the baseline as possible and as far left as possible. Lastly, it reorders the shapes (Glyphs, n.d.).

Nonetheless, this command could not solve all glyph incompatibilities. In some cases, we had to reorder the shapes of the characters. In *Filter > Shape Order*, a pop-up is open. In the pop-up, each line represents a shape and each column represents a master. In our case, we had thirty columns. We made sure we dragged the shapes in all columns into the same order so that each line consisted of corresponding shapes only.

During this process, we also had the filter *Compatibility View* on, through *View > Show Master Compatibility*. This filter shows us all relevant masters for the interpolation of the selected character in an escalated view. Each shape, line and curve segment of the character is in a colour code. The colour code indicates: green = compatible segments; yellow = technically compatible segments, but with angles deviating more than 20° between masters, hinting at a wrong start point; and red = incompatible segments or the corresponding segment is missing in the other master. This filter turned out to be really efficient during the process (Glyphs, n.d.).

Even when glyphs are perfectly compatible, there is still a chance of incompatibility if there are two or more point-compatible shapes in each master. In the case of character “i”, all masters were perfectly compatible but the colour code indicated that the top dot was not interpolating. This happened because, in the *Realist* artistic movement the top dot is a square, instead of a circle. This is called a shapeshifter because the points position change throughout the progress of the interpolation. In fact, the *Correct Path Direction* in all masters should have corrected this. However, that did not fix it so we had to reorder the paths manually by selecting and cutting one path after the other and pasting it back again.

Another serious problem was interpolation kinks. *Renaissance*, for example, had a lot more outline angles than *Romanticism* or *Realism*. This problem happened because the ratios between the points were different (figure 52). Drawing different styles resulted in a disparate proportion in the distance between the first and middle point, and the distance between the middle point and last point. The best solution was to get rid of the triplet, reducing it to two points.

Figure 52. Example of a kink in *Baroque* instance. The *Romanticism* instance generated has no kinks. However, the mid interpolation, *Baroque* instance, results in a kink at the final of letter “a”.



However, this was not possible because all the thirty masters needed to have the same amount of points. We were able to overcome this challenge by trying to manually sync angles between masters as much as possible. Small adjustments in some cases made the kink unnoticed. Despite that, there were characters that we just could not transform into a perfect geometric shape.

Axes combinations

From the beginning of the project, we knew it would be a challenge to deal with such contrasting styles in one variable font. We tried to keep the masters’ draws as simple as we could. However, we still faced a significant problem when combining specific axes combination.

When *Xtoria* was tested, we observed that using the *Contrast* and *Axis/Angle of Stress* axes together caused an overlap in the characters (figure 53). We believe this happened because, when the contrast axis reached its maximum value, *Glyphs software* was unable to automatically generate such thin shapes. However, *Glyphs software* only properly supports four axes since January 2021. Under the circumstances, this problem is possible to be an unsolved bug or an exporting issue.

As a possible solution, we attempted to redesign our shapes, but it did not work. As a consequence, we had to manually draw the interpolation between the maximum value of *Axis/Angle Stress* with the maximum value of *Contrast*. Initially, we were going to draw twenty-four masters for each character but due to this problem, we had to increase our number of masters to thirty. We realised this would take longer than we had anticipated, but it was the strategy we defined.

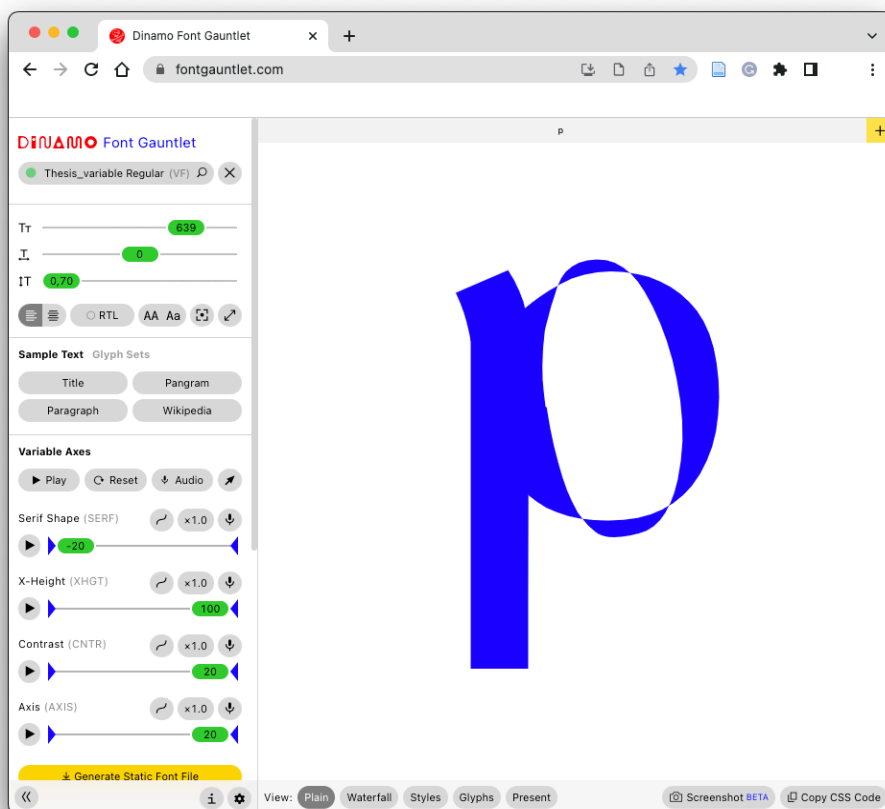


Figure 53. Example of *Contrast* and *Axis/Angle of Stress* axes together caused an overlap in letter “p”.

Glyph substitution

When particular characters were designed in certain masters, we knew we had to employ alternate glyphs. Alternate glyphs are often created to provide a broader palette of typographic possibilities beyond what is available in the basic styles. In our case, we would be using alternate glyphs to switch between very different artistic styles, such as a *Renaissance* letter “a” to a *Geometric Modernism* letter “a” (figure 54) or a *Romantic* letter “g” to a *Realist* letter “g” (figure 55).

To simplify, we needed to have a substitution between two versions of the same character. For cases like this, OpenType offers so-called sty-



Figure 54. On the right, an example of *Renaissance* letter “a” (*Garamond* typeface in use); On the left, an example of *Geometric Modernism* letter “a” (*Futura* typeface in use).



Figure 55. On the right, an example of Renaissance letter “g” (*Garamond* typeface in use); On the left, an example of *Geometric Modernism* letter “g” (*Futura* typeface in use).

listic sets. These stylistic sets define up to twenty variations of the alphabet and put them into our font. Nonetheless, the current version of *Glyphs software* does not support this feature while using multiple masters. Stylistic sets only work between two masters. Therefore, we opted for the automatic interpolation, which resulted in some shape distortions in middle instances (e.g. letter “g”). Additionally, it was not possible to draw the *Geometric Modernism* letter “a” since its form was completely different from the shape of other masters.

Glyph distortion

The latest variable font technologies are primarily oriented towards simple typefaces. That means that in our case, *Glyphs software* assumes that our font has simple outlines with the smallest possible number of nodes and that all characters share similar shapes.

Figure 56. *Realist Serif* masters of letters *c, f, g, r, s, t, y*.



Figure 57. Mid instance between *Realist Serif* and *Romantic Serif* masters of letters *c, f, g, r, s, t, y*.



Figure 58. *Romantic Serif* masters of letters *c, f, g, r, s, t, y*.



In general, *Xtoria* meets these requirements. Nevertheless, our variable font can also be classified as a typeface with “complex” outlines. With such different master styles, it is predictable for our typeface to break, at some point, any of the above assumptions. From the start of designing our font, we had to take decisions on export performance and constantly adjusting our paths. However, there were some glyph distortions that we had predicted, but we did not have the time to correct them.

The main distortions were in the interpolation of descenders and ascenders, between the masters *Romanticism* > *Realism* and *Realism* > *Geometric Modernism*. We can observe these evident distortions in characters *f*, *g*, *t*, *y* and also small distortions in characters *c*, *r* and *s* (figure 56, 57 and 58). A possible solution would be to create an intermediate master between those distortions and “smooth” the interpolation manually creating a Virtual Master.

A Virtual Master allows us to apply a specific axis to some glyphs. For example, in this case, the axis *Serif Shape* would apply to letters *f*, *g*, *t*, *y*, *c*, *r*, *s* but not to letters *a*, *b*, *e*, *m*, *n*, etc. It would not make sense to draw a new master for all the fonts. Rather, Virtual Master allows us to introduce an extra master only for those characters that have a distortion.

Avoiding bugs and helpful scripts

It is confirmed that OpenType Variable Fonts implementation is still buggy. While designing our font sometimes it did not interpolate properly in Illustrator or InDesign. In addition, even though all major browsers now support variable fonts on both desktop and mobile, we also faced some problems when testing our variable font on the web.

The main bugs we were able to track were characters staying static and not reacting to axes slider position changes and minor kinks appearing during slider movements. When we exported the final font file and opened it on the desktop, we identified a bug that took us a significant time to solve: all font characters had distortions (figure 59).

Initially, we did not understand why this situation occurred but we managed to eliminate this problem. Noncapable Variable Font software is only able to display the default outlines. Only one set of outlines is stored in the final font file. In our case, that default outline was the first master and for some reason, our font appears distorted. To enter a different default, we selected *File* > *Font Info* > *Font* and added a custom parameter called Variable Font Origin. Generally, all bugs were resolved

with Custom Parameters. Custom Parameters had multiple purposes. Most of them allowed us to set a specific value in the final OpenType font and applied it at export. However, in this last case, picking non-default values increased the number of our extreme shapes, and therefore, it also increased the file size. In order to attenuate this fact, we picked one of the masters in an extreme end of the design space concerning file sizes and load times.

Furthermore, we also used *Mekkablue Scripts Collection*, a collection of very useful scripts to make variable fonts to circumvent some bugs. This collection is one of the most popular Python script collections for *Glyphs software*. ‘*Mekkablue*’ is the online pseudonym of *Glyphs* team member Rainer Erich Scheichelbauer.

Figure 59. *Realist Serif* masters of letters *c, f, g, r, s, t, y*.



6. RESULTS

In this chapter, we document the results of the practical project: *Xtoria Variable Font*. Screenshots of the automatic generated instances are provide, as well as a photo documentation of *Xtoria print booklet Specimen*.

Figure 60. Renaissance automatic generated instance. Axes values: Serif Shape=100; X-Height=80; Contrast=10; Axis=10;



Figure 61. Baroque automatic generated instance. Axes values: Serif Shape=80; X-Height=80; Contrast=5; Axis=10;

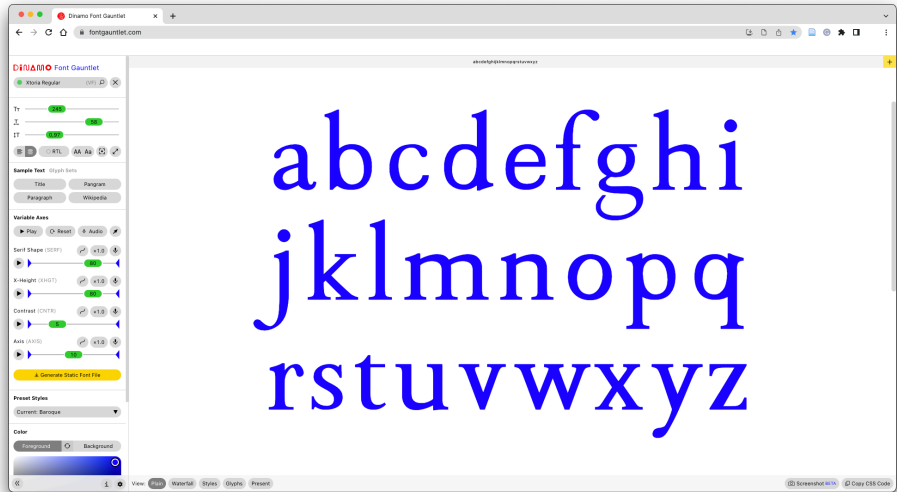


Figure 62. Neoclassicism automatic generated instance. Axes values: Serif Shape=80; X-Height=80; Contrast=15; Axis=0;

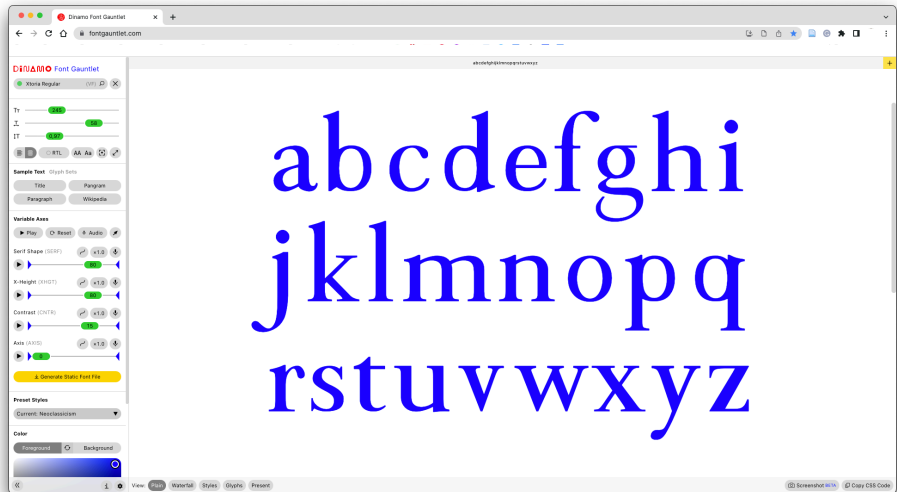


Figure 63. *Romantism* automatic generated instance. Axes values: Serif Shape=60; X-Height=40; Contrast=20; Axis=0;



Figure 64. *Realism* automatic generated instance. Axes values: Serif Shape=40; X-Height=40; Contrast=0; Axis=0;



Figure 65. *Lyrical Modernism* automatic generated instance. Axes values: Serif Shape=80; X-Height=90; Contrast=0; Axis=10;

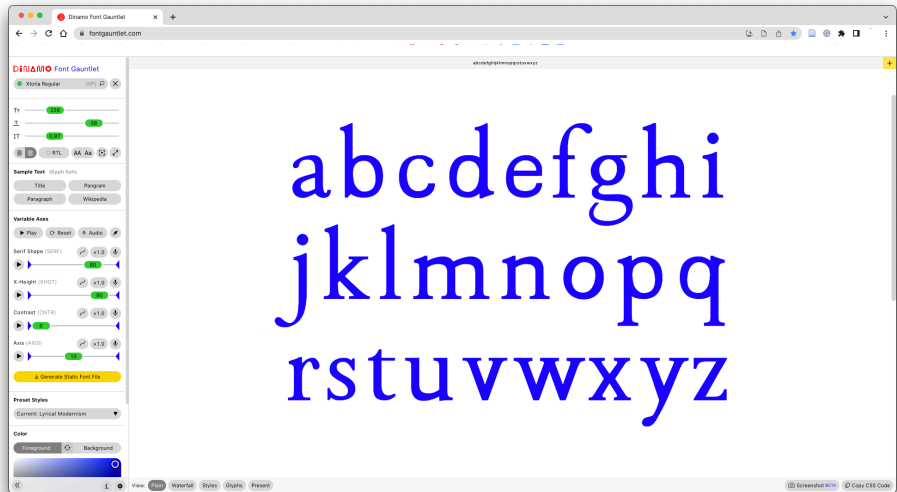


Figure 66. *Geometric Modernism* automatic generated instance. Axes values: Serif Shape=20; X-Height=70; Contrast=0; Axis=0;



Figure 67. *Postmodernism* automatic generated instance. Axes values: Serif Shape=0; X-Height=70; Contrast=0; Axis=10;



Print Booklet Specimen

In a virtual and asynchronous world, print remains physical, tactile and present. It has been argued that due to the dominance of new media, traditional printing would be phased out. However, we believe that print retains distinctive characteristics that make it preferable to other media. Before the web, the printed *specimen* was the only way to present a type-face correctly. For this reason, we create a *Booklet Type Specimen* that showcases *Xtoria Variable Font*. A photo documentation of *Xtoria Booklet Type Specimen* is provide in the next pages.

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In The Elements of Typographic Design, written in 1966, Robert Bringhurst writes about typographic design in a poetic form while acknowledging that the period of a type designer's work reflects not only his or her own personality but also the personality of the manufacturing process.

Renaissance
Serif

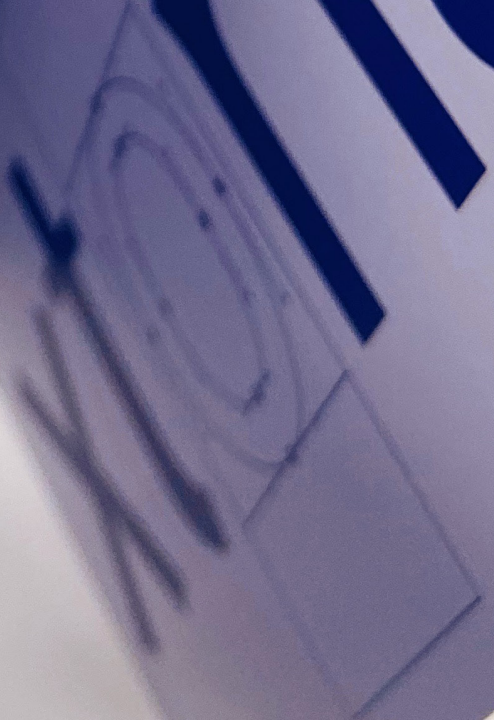
Neoclassical
Serif

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P P

ria

X
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Z
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F
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K
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M
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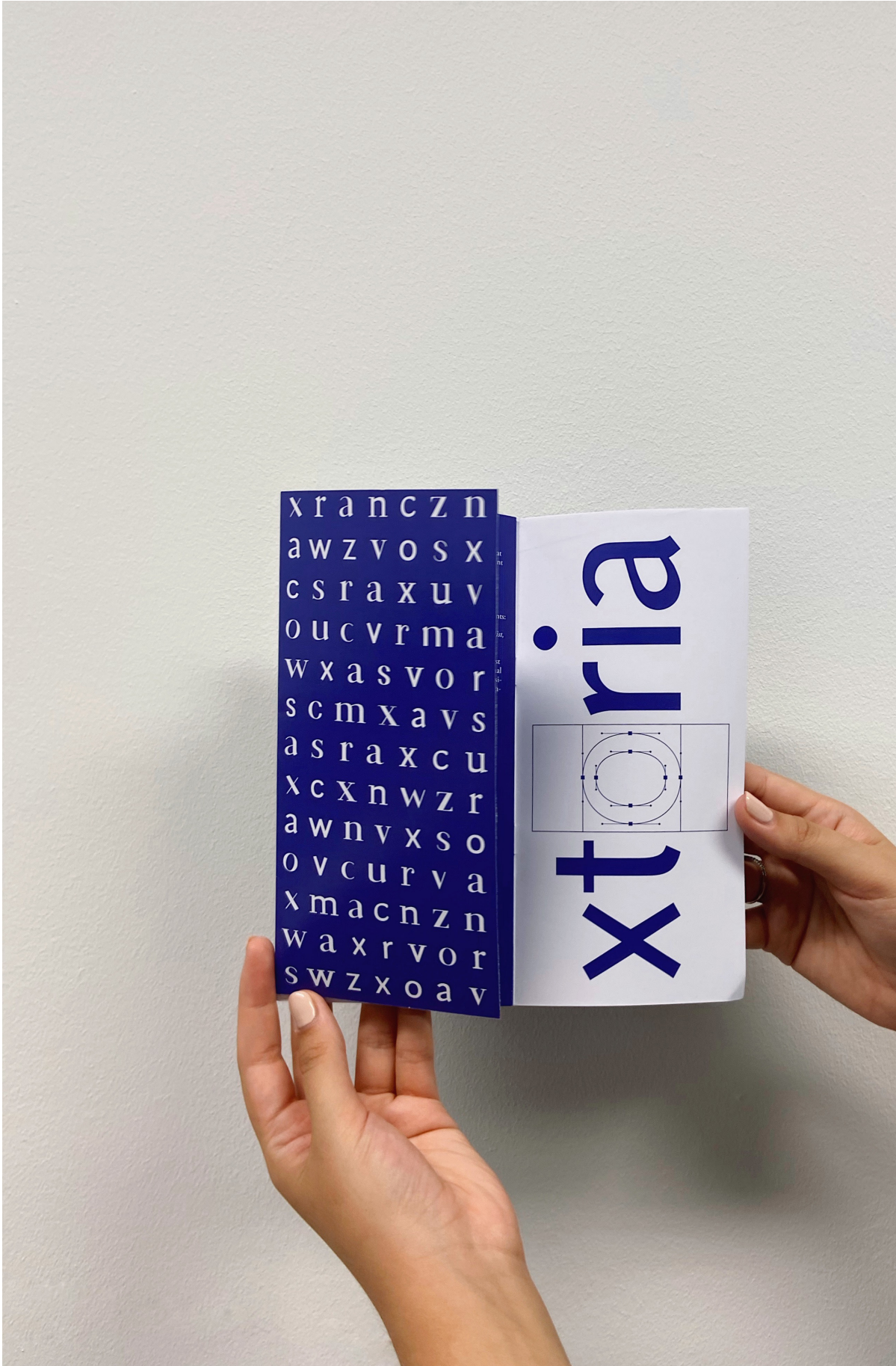


From *Renaissance* to *Postmodern*, this font illustrates the potential contained within variable fonts in a very unique way. *Xtoria Variable Font* was crafted to have a strong, unfiltered and fearless personality.



From Renaissance to Postmodern, this font illustrates
the gradual evolution of the variable forms in a very
simple way. From Gothic font we crafted to have
a more unified and looser personality.

x r a n c z n
a w z v o s x
c s r a x u v
o u c v r m a
w x a s v o r
s c m x a v s
a s r a x c u
x c x n w z r
a w n v x s o
o v c u r v a
x m a c n z n
w a x r v o r
s w z x o a v



Postmodern Serif	Geometric Modernist Serif	Realist Serif	Romantic Serif	Baroque/Neoclassical Serif	Renaissance Serif
Postmodern Low X-Height	Geometric Modernist Low X-Height	Realist Low X-Height	Romantic Low X-Height	Baroque/Neoclassical Low X-Height	Renaissance Low X-Height
Postmodern High Contrast	Geometric Modernist High Contrast	Realist High Contrast	Romantic High Contrast	Baroque/Neoclassical High Contrast	Renaissance High Contrast
Postmodern Oblique Axis	Geometric Modernist Oblique Axis	Realist Oblique Axis	Romantic Oblique Axis	Baroque/Neoclassical Oblique Axis	Renaissance Oblique Axis
Postmodern Oblique Axis, High Contrast	Geometric Modernist Oblique Axis, High Contrast	Realist Oblique Axis, High Contrast	Romantic Oblique Axis, High Contrast	Baroque/Neoclassical Oblique Axis, High Contrast	Renaissance Oblique Axis, High Contrast

In *The Elements of Typographic Style* written in 1996, Robert Bringhurst writes about typography in a really poetic form while acknowledging that the period of a typeface's development reflects not only its style but also its manufacturing process.

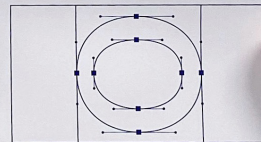
Bringhurst sets two scales for classifying type. The first is a collection of fine arts-inspired artistic movements: Renaissance, Baroque, Neoclassical, Romantic, Realist, Geometric Modernist, Lyrical Modernist and Postmodern.

A second scale runs alongside the first one, identifying the typeface's original form: foundry types for hand composition, hot metal type for machine creation, phototype or digital typefaces. By combining the two approaches for classifying typefaces, he creates a system that allows the comparison of visually related designs without explicitly implying correlations.

Robert Bringhurst classification was used as a guide in the development of *Xorin Variable Font* since his perspective establishes a sensitive approach. *Xorin Variable Font* is connected to Bringhurst's eight classes.

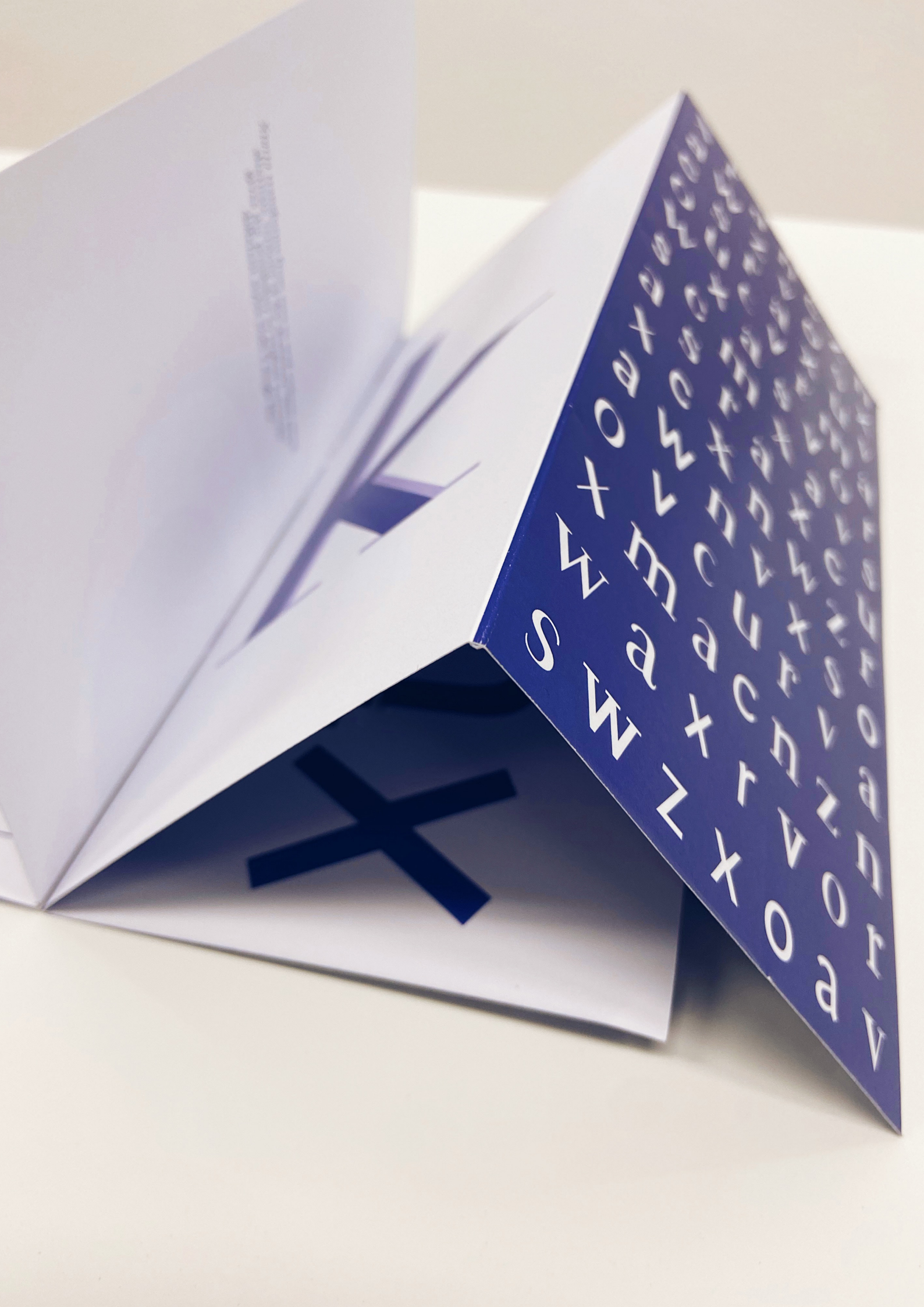
Xorin Variable Font has 30 masters that illustrated 4 axes: *Serif, X-Height, Axis/Angle of Stress* and *Contrast*.

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5. CONCLUSION

In this chapter, all the work developed for the previous months is summarised. Additionally, we set the main ideas for future research and provide a personal reflection.

Sum up

This dissertation started by researching the main premises explored from a historical context and a reflection on related projects. In the first approach, we acquired an exploratory look at the visuality of typography and had the possibility to develop a deeper knowledge in the areas of type design and variable fonts.

Firstly, we conducted an investigation on the history of typography and type design. In this context, the main typographic classifications were explored, with a particular focus on Robert Bringhurst's classification. Moreover, we briefly analysed the anatomy and terminology of typography and variable fonts. Furthermore, we focused on some relevant projects developed within the scope of our study. This analysis fully shed light on the perspective we raised originally.

Typography is a complex and carefully balanced art form. As analysed, new and emerging technologies are reshaping the way we create, design, and interact with typography. In the initial stage, we first sought a deeper understanding of the concepts above described and related them to the practical component we wanted to develop.

Through the convergence of art and technology, the practical project resulted in the creation of a variable font — *Xtoria*. Based on a reflection on the evolution of typographic forms, and their value as visual communication tools, we aimed at creating value and a better appreciation of letters. This variable font illustrated typography's illustrious history and explored its communicative ability. To create the variable font we first set up a design space, with eight instances — *Renaissance*, *Baroque*, *Neoclassical*, *Romantic*, *Realist*, *Geometric Modernist*, *Lyrical Modernist* and *Postmodern* — and four axes — *Serif*, *X-Height*, *Axis/Angle of Stress* and *Contrast*.

Afterwards, we designed our masters and created *Xtoria*, illustrating the potential contained within variable fonts. During the development stage, we faced up to some challenges such as outline incompatibility and glyph distortions. Nevertheless, we always tried to circumvent problems faced and bugs. We are aware that, until the writing of this dissertation, dealing with such disparate styles in variable fonts had never been explored. Due to the absence of information about multiple masters projects with multiple axes, this practical project turned into a massive challenge. The early stages of our study did not quite meet the objectives set for the practical project. However, we can confidently say we are very pleased with the final result.

Future research

Since we did not accomplish the goals set for the practical project, it is, therefore, crucial to make a list of improvements and broaden suggestions for future research. To begin with, the most remarkable improvement to achieve is to complete the font. Due to the complexity of the project, we only designed the lowercase letters. *Xtoria* variable font lacks uppercase letters, decimal digits, punctuation and eventually symbols. Additionally, kerning needs to be applied. Another substantial refinement we propose is solving glyph distortions. Nevertheless, we truly believe there are really interesting distortions, at some points of the instances, that could be explored as potential design materials. In addition, the master's draws could be polished.

Bearing in mind that a font is not complete until we put it into context, we suggest exploring this variable font on the web and in print. Our initial goal was to implement an immersive web platform that explored the less functional aspects of our variable font such as emotional expression, personality and character. *Typography is the voice of the text*, and variable fonts have extreme potential to illustrate this concept. Nowadays, there are a lot of resources to explore variable fonts on the web. Thus, regarding the practical project, we regret not having time to explore *Xtoria* on the web.

Personal reflection

To finish this dissertation conclusion, it is important to mention that we do not aim to provide a solution to our point of view. In fact, we acknowledge that few things have affected the history of graphic design as significantly as the rise of technology and digital transformation. However, designers do have the ability to influence our values and expectations in so many ways. We are therefore responsible for using our skills and knowledge to keep Design and Typography as a timeless art and craft, with a rich, prestigious and honoured history. To sum up, we must take full advantage of this new paradigm and have an exploratory look at the visuality of typography. With this dissertation, it is possible to state that we have accomplished the ideas devised initially. It has been an unprecedented experience to have the opportunity to investigate and explore a subject I have always admired. "*Typography exists to honor content*", and so do we exist to honour what we learn. Not only as a student but also as a Designer.

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