Early Writing 40,000 BCE – 3,000 BCE

At its most basic, the earliest forms of visual communication can be traced back to paleolithic and neolithic eras almost 40,000 years ago, where early humans began painting on the walls of caves across the African and European continents (Meggs & Purvis, p. 5). These cave paintings – some of which still persist today in the Lascaux caves of southern France and elsewhere – typically depicted animals with spear marks and were painted using pigments made of animal fat mixed with charcoal, iron oxides, and other materials they could forage (Meggs & Purvis, p. 5). Despite their drawn nature, these paintings were not artistic in intent nor did they exhibit any compositional considerations, but are commonly thought to have been early rites and warnings for power and success during hunts (Meggs & Purvis, p. 5).

Over time, people all over the world would begin developing petroglyphs, or stones with simple signs, figures, or drawings carved into them (Meggs & Purvis, pp. 5-6). These tended to be pictographs in nature, depicting events and observations around the environment around the artist with increasing accuracy and precision over time (Meggs & Purvis, pp. 5-6). However, as common motifs began repeating, many petroglyphs began to shift towards ideographic in nature, illustrating important concepts and ideas as opposed to physical objects (Meggs & Purvis, pp. 5-6). These motifs would become more simplistic and stylized with time, reducing the lines used to draw them and becoming more symbolic in nature, almost resembling early forms of letters (Meggs & Purvis, p. 6).

Fast forwarding to around 8000 BCE, civilization would start to take root in ancient Mesopotamia as humans began to abandon nomadic lifestyles for a growing agrarian society, bringing with them numerous technological advancements (Meggs & Purvis, p. 6). The first city-state would come about in 3000 BCE, when the Sumerian people along the lower crescent of Mesopotamia introduced many intellectual developments that would allow for highly-concentrated living, of which included religion, social orders, and – perhaps most importantly – writing (Meggs & Purvis, pp. 6-7). Used to record extensive information regarding trades, taxes, and inventories, the writing system would begin as pictographs and early numerals arranged in separate frames and slowly transform into an abstracted sign-writing system arranged in horizontal rows, known as 'Cuneiform,' or 'wedge-shaped' in Latin (Meggs & Purvis, pp. 6-9). In turn, Cuneiform symbols started to represent not only a single object, but also thematically-relevant and phonetically-similar objects as well, creating a sound-based meaning behind cuneiform symbols (Meggs & Purvis, p. 9). The increasingly versatile system would thus allow for the standardization of symbols, measurements, and certifications, while also creating codes of law, mathematics, religious texts behind them (Meggs & Purvis, p. 10). All the meanwhile, as invading peoples began to conquer and rule Mesopotamia over its history, they would adopt the culture and writing systems for themselves, spreading its civilization beyond just the land itself (Meggs & Purvis, pp. 11-12).

In Egypt, the Mesopotamian cuneiform system would go onto inspire the system of Hieroglyphics, which laid the basis for its own intellectual dynasty over the next few centuries (Meggs & Purvis, pp. 11-19). Unlike Cuneiform's abstracted symbols, however, Hieroglyphics would maintain pictographic symbols but associate them with phonograms to create a phonetically-based system of writing (Meggs & Purvis, pp. 13-14). As such, Hieroglyphics were heavily design focused, with the direction of text determined by which way its animals face, and particularly important lines of text surrounded by a 'cartouche' frame (Meggs & Purvis, pp. 13-14). Great consideration was given to the texture and decoration of hieroglyphics, often carved into stone as raised symbols, given color to the different patterns, and inscribed into riches and jewelry (Meggs & Purvis, pp. 14). With the advent of Papyrus 'paper,' hieroglyphic text became more accessible to write and store, and soon after simplified into Egyptian hieratic, or 'priestly' script, and even more so into Egyptian demotic, or 'popular' script (Meggs & Purvis,

pp. 14-17). Using papyrus, Egypt became the first civilization to create illustrated manuscripts, which used both pictures and words to convey information, prayers, and stories (Meggs & Purvis, pp. 17-19). These were typically laid out in rectangular sections, with text written in vertical columns separated by lines, while associated pictures were drawn in adjacent (Meggs & Purvis, p. 17). The concentrated text next to the open drawings often created a striking contrast, and other decorative flourishes were created to fill in the complete page (Meggs & Purvis, p. 17).

Early Alphabet 2,800 BCE – 400 CE

The early Cuneiform and Hieroglyphic writing systems were widely influential across cultures, but consisted of hundreds of symbols to learn and memorize, leaving them unwieldy and accessible to only a few (Meggs & Purvis, p. 21). Over time, people would simplify them by leveraging the systems' phonetic properties to reduce them down to a smaller set of characters each representing a basic spoken sound, creating the origins of the modern alphabet (Meggs & Purvis, p. 21). The creation of the first alphabet itself, however, is somewhat uncertain – many believe the Cretan pictographs of early Minoan civilization could have served as initial inspiration, adapting early pictographs to a form of linear script writing in 1700 BCE, many of which resemble early alphabet characters (Meggs & Purvis, p. 21). By 1500 BCE, however, a number of alphabets were active and in use across early civilization, such as the Sinaitic script of Egypt, which adapted Hieroglyphics to use only the initial sound they made, and the Ras Shamra Script, which adapted Cuneiform-like letters to 30 consonants and without any vowels (Meggs & Purvis, p. 23). Perhaps the earliest and most influential incantations, however, were the North Semitic writing system, which took inspiration from many of the surrounding cultures thanks to their advanced sea-faring and created the Sui Generis script as far back as 2000 BCE, which included a syllabary for hundreds of symbols (Meggs & Purvis, p. 21-23). This would eventually spawn both the 22-character Phoenician and Aramaic alphabets, that would respectively diverge between Western and Eastern writing systems (Meggs & Purvis, p. 23).

In regards to the latter, the Aramaic script was heavily calligraphic, with thick horizontal strokes contrasting thin vertical ones (Meggs & Purvis, p. 23). The characters and styling would later inspire and be adapted into the Hebrew and Arabic alphabets, which would each add their own characters for vowels and extensions for inscriptional writing (Meggs & Purvis, p. 23). The Arabic in particular alphabet would then branch eastward with Muslim conquests and discoveries and is thought to have inspired scripts such as classical Sanskrit and contemporary Indian writing (Meggs & Purvis, p. 23-25).

In contrast, the Phoenician alphabet was deceptively simple, and became widely influential and utilized across Ancient Greece (Meggs & Purvis, p. 25). Over time, the Greeks would create and standardize the Ionic, or early Greek, alphabet, molding Phoenician characters into consonants and introducing a few more for various vowels (Meggs & Purvis, p. 25-27). As opposed to the heavy calligraphic focus of the Aramaic script, the Greek alphabet was heavily inspired by geometry, using basic shapes to create letters comprised of uniform vertical, horizontal, diagonal, and curved strokes (Meggs & Purvis, p. 27). These would only become more refined with the introduction of the early pen, which allowed for greater precision at fewer strokes, eventually leading to the uncial, or classical Greek, variation in writing (Meggs & Purvis, p. 27). With the conquest of Alexander the Great around 323 BCE, this was the alphabet that was spread across ancient civilization, inspiring many libraries and classical works in its wake (Meggs & Purvis, p. 28).

By the time the Roman Empire would take over what remained around 250 BCE, they would once again adapt it into the Latin Alphabet, comprising of 23 letters from the ancient Greeks, and the addition of 3 more in the later Middle Ages (Meggs & Purvis, p. 28-29). Using this system, several derivatives were

created for different scopes of importance, including the precursors to modern-day capital and lowercase letters, as well as characters with serifs for use in public monuments (Meggs & Purvis, p. 29). Papyrus scrolls would also start to be replaced around 190 BCE, swapped out for reusable wax tablets and bound parchment sheets made from refined leather (Meggs & Purvis, p. 31). Known as a codex, the latter would create the basis for modern day books, allowing for writers to use both sides of a sheet as well as keep multiple works open at a time (Meggs & Purvis, p. 23). Because of their greater versatility and durability, the codex would eventually be heavily adopted by Christians to differentiate and preserve their sacred texts, becoming a symbol of Christian faith juxtaposed by the Pagan scroll (Meggs & Purvis, p. 31). After Christianity was officially solidified as the religion of Rome in 325 CE, codices and books would become standardized across the empire and remain as such even past its dissolution (Meggs & Purvis, p. 31).

All the meanwhile, many important writing systems and inventions were being developed in Asia, cut off from the rest of the world (Meggs & Purvis, p. 35). In China, the earliest writings can be traced up to 1800 BCE, carved into the shells and bones of animals, and later more commonly cast-bronze items (Meggs & Purvis, p. 35). Primarily used for ceremonial purposes, the Chinese script would have many local derivatives until officially standardized under emperor Shihuangdi around 260 BCE as the Hsaio Chuan, or small seal, style -- using many even and balanced strokes to fill in an imaginary square for each character (Meggs & Purvis, p. 35-37). Though this style would eventually evolve into the Li-Shu (clerical) style and even later the Chen-Shu (regular) styles, the focus on visual design would always be at the forefront, balancing the structure, white-space, and nuances of each character (Meggs & Purvis, p. 37). Notably, the Chinese script is not an alphabet, but a visual system of almost forty-four thousand logograms where characters represent entire, distinct words (Meggs & Purvis, p. 35). The Chinese script was also heavily calligraphic, thought to be inspired by nature and imbued with bones, meat, blood, and muscle, representing the size, proportion, texture, and spirit of characters respectively (Meggs & Purvis, p. 37-39). As such, the calligraphy was often linked to a deep spirituality, emphasizing and connecting the writer with tao, or the energy of the universe (Meggs & Purvis, p. 39). Much of the Chinese script would later be adopted by and inspire the Japanese or Korean writing systems as well, although adapted to a more alphabet-like structure (Meggs & Purvis, p. 31-32,35).

The ancient Chinese would also go on to invent paper around 105 BCE, replacing the common bamboo slats and silk sheets of the region for a more versatile and economical writing material (Meggs & Purvis, p. 39). Paper would allow for not just the better storage of information – improving from the scroll to accordian-like, and eventually codex-like stitched books – but developments in early printing as well, with the introduction of block, or relief, printing (Meggs & Purvis, p. 39). Relief printing is a process whereby a craftsman takes an image or passage of text and carves it backwards into a flat block, such that the characters or figure of interest remain raised while everything else is cut away, or vice versa (Meggs & Purvis, p. 39). This allows a possible printer to repeatedly paint the raised portion with ink and press it into paper, leaving on it an impression of the original figure (Meggs & Purvis, p. 39). Using this technique, the Chinese would be able to widely produce and adopt printed goods such as paper money, books, and playing cards (Meggs & Purvis, p. 43-45). However, due to the extensive nature of their written script, attempts at automating the process as early as 1045 CE were met with the challenges of needing to carve and sort each individual symbol, and unfortunately never caught on (Meggs & Purvis, p. 46). These inventions would slowly spread westward to Europe, inspiring a new era of textual and graphic design (Meggs & Purvis, p. 46).

Printing 1300 BCE – 1700 CE

Prior to the introduction of printing, the production of manuscripts was a laborious and arduous process, often requiring a team of scribes to carefully plan and write a text in parts (Meggs & Purvis, p. 49). Headed by a single scholar who functioned as both editor and designer, each page of the manuscript would be laid out both graphically and informationally, and then passed on to separate writers and illustrators who would respectively letter and draw the contents according to a standard style (Meggs & Purvis, p. 49). This often left manuscripts reserved for religious and status symbols, and, as such, commonly included ornate decoration and precious materials such as gold leaf adorning the margin – giving rise to the term 'Illuminated Manuscripts,' which today more generally refers to any manuscript written from the late Roman Empire to the adoption of printing (Meggs & Purvis, p. 49). This span of about a thousand years coincides with what is now known as the Middle Ages, and is responsible for the creation and destruction of many manuscripts and sources of classical knowledge – as well as innovations in graphic design which still persist today (Meggs & Purvis, p. 49,51).

Starting with the classical era in 500 CE, manuscripts were almost entirely Roman and pagan in authorship and content, commonly laid out in a comic-like structure where passages of text were positioned next to associated illustrations along horizontal guidelines matching the image in height and width (Meggs & Purvis, p. 50). Notably, the illustrations often had colorful borders to differentiate their contents from the rest of the page, as well as labels and names depicted on the drawings themselves to identify important figures (Meggs & Purvis, p. 51). Following the collapse of the Roman Empire, many classical-era manuscripts would be lost as former territories started to retract in social isolate and general illiteracy, leaving only their monasteries the tools of writing to preserve sacred Christian texts (Meggs & Purvis, p. 51). From these monasteries emerged the Celtic era of design, where manuscripts were written with increasingly abstract and complex ornamentation -- with thick, geometrically-patterned borders contrasting ornate, scaled lettering, and sometimes even entire 'carpet-pages' of patterns inspired by oriental rug designs (Meggs & Purvis, p. 53). Along with this complex styling, Celtic era manuscripts were also the first to create spaces between letters to differentiate words more easily, as well as larger initials to mark the beginning of a section or important passage (Meggs & Purvis, p. 53-54). Notably, many differences in regional design and quality would emerge until King Charlemagne's unification of central Europe in 800 CE, allying with the church to create the 'Holy Roman Empire' and introduce feudalism across its many regions (Meggs & Purvis, p. 55). Under his rule, Charlemagne would also create schools and emphasize writing reform, standardizing lettering such that each character is separate and not connected, as well as creating distinct capital and lowercase character for easier writing and legibility (Meggs & Purvis, p. 55). This so called 'Caroline' period would eventually meld into the Romanesque and Gothic eras of design, where feudalism would shift to more stable forms of governance, and manuscripts and literacy would be more available to the general population (Meggs & Purvis, p. 55,59-60). Following in design, these eras would see lettering become more linear and universal across regions, with great care taken to balance against images and borders of flat color (Meggs & Purvis, p. 59-60). Illustrations would become more intricate as well -- shifting from a flat plane to add perspective and depth, and expanding into calendars, maps, and other tools beneficial to the reader (Meggs & Purvis, p. 66). However, though the design and demand of illuminated manuscripts had certainly reached a peak by the turn of the fourteenth century, the labor and skill required of their one-off production made them difficult to mass-produce. By the time printing was adopted in full force, the design and production of handwritten manuscripts would slowly be phased out, with existing illuminated manuscripts relegated to templates for printed layouts (Meggs & Purvis, p. 66).

Printing itself would begin with a modest start in Europe, having taken a long journey from China to get there (Meggs & Purvis, p. 73). The earliest printed works – typically thought to be printed textiles tracing back to the early fourteenth century – were done via traditional relief printing, also known as Xylography,

using woodcut blocks with raised designs (Meggs & Purvis, p. 73). Over the next century, however, relief printing expanded into a growing market for playing cards, pictures of saints, and early block books, and would be sought after by all classes of people (Meggs & Purvis, p. 73-75). Compared to traditional manuscripts, these prints tended to be more pictorial and less reliant on text, allowing the illiterate to join the wealthy in the market for visual goods (Meggs & Purvis, p. 75). As such, illustrations were often kept simple and dominant over text, depicting important figures, religious instruction, and even early propaganda for its growing audience (Meggs & Purvis, p. 75). Notably, having just arrived a century prior, paper was essential to empowering the growing market – providing a plentiful and accessible substance to meet the increased speed and need of printers (Meggs & Purvis, p. 73). Together, they were able to fuel the printing revolution, though as demand started to outpace supply, authors turned to more mechanical means of printing (Meggs & Purvis, p. 76).

It wouldn't be until around 1450 CE that typography, or moveable type, would be perfected and put into production in any meaningful way (Meggs & Purvis, p. 76). Though many related innovations were made along the way, – separating blocks for each individual letter, creating the first metal typeset, etc. – the field was plagued by logistical problems in material and design (Meggs & Purvis, p. 76). In adapting traditional relief printing, woodblocks struggled to withstand the force and durability needed for moveable type, and created problems regarding the spacing and alignment for characters of different widths (Meggs & Purvis, p. 77). As well, switching to metal type required material soft enough to mold, but hard enough to hold up over time, as well as new ink that would appropriately stick to it (Meggs & Purvis, p. 77-79). Metalsmith Johannes Gutenberg would be the first inventor to balance all these considerations, developing a two-part mold for creating the typeset, as well as the iconic printing press for impressing them on paper (Meggs & Purvis, p. 77-79). Using this system, Gutenberg would try to mimic the design and lettering of existing manuscripts, creating the gothic font now known as 'Textura' and omitting decorative features that would set it apart from a handwritten version (Meggs & Purvis, p. 77,81). Though Gutenberg would begin the production of the first set of printed books – a forty-two-line Bible – he would be forcibly cut out of the business by Johann Fust, a wealthy Burgher to whom he owed money (Meggs & Purvis, p. 79-81). Together with Gutenberg's assistant, Fust would continue production near its end, and form the first the printing firm to sell typographical books (Meggs & Purvis, p. 81).

For a while, typographic printing remained close to its origins in the German city of Mainz, creating small firms associated with Gutenberg's original assistants as well as innovations in the scale and color of typefaces (Meggs & Purvis, p. 82). However, it would take less than a decade until the city was plunged into war by a wider power struggle in the German nobility, sending the firms and technology migrating across the continent (Meggs & Purvis, p. 82). By the end of the decade, printing firms would be open in cities all along central Europe, with each region developing their own styles and typefaces (Meggs & Purvis, p. 83). In Germany, the new center of typography had migrated to the city of Nuremberg, where new firms began experimenting with format and typefaces (Meggs & Purvis, p. 89,93-94). Mixing typography with traditional relief printing, these firms were among the first to create illustrated manuscripts depicting important figures and maps (Meggs & Purvis, p. 87-89). As well, copperplate engravings were developed to produce complicated and light patterning along the borders and margins of these text, balancing against the heavyset imagery and font (Meggs & Purvis, p. 83). To plan and layout these illustrated books, so-called 'exemplars' were used and passed amongst scribes, detailing important editorial notes about the printing and design of each page (Meggs & Purvis, p. 87,90). As well, as target audiences evolved to capture the general population, so did the contents and design of the books to meet their needs, shifting from extensive religious texts to smaller works in both contents and size (Meggs & Purvis, p. 89). Outside of books, new formats such as broadsides were often printed, spreading important notices and advertisements through one-sided pages (Meggs & Purvis, p. 85). Eventually, broadsides

themselves would give way to posters, pamphlets, and newspapers in both design and function (Meggs & Purvis, p. 85).

Meanwhile, the beginnings of the Renaissance would sweep across Italy and France and into the rest of the continent, inspiring a renewal in classical lettering and design (Meggs & Purvis, p. 103,110-112). Starting in fifteenth-century Italy, designers would create a typeset based on the lettering of old Roman monuments and manuscripts, mixing gothic traits with Roman formalities such as serifs (Meggs & Purvis, p. 97). Compared to the traditional Gothic typeface, the new Roman characters were found to be less dense and therefore more legible, creating new considerations in typography (Meggs & Purvis, p. 103,113). This led calligraphers and designers to experiment with typefaces and styles, varying the weight, dimensions, and geometry of characters to find balances that would best complement a page (Meggs & Purvis, p. 107-109). Popular motifs of this era included the one-to-ten ratio of stroke width to height for distinguishability of characters, and the introduction of italics, whose slanted nature allowed for emphasis and denser characters (Meggs & Purvis, p. 109). Innovations in letter design also led designers to re-examine the layout of books, particularly when it came to the structure of text, illustrations, and further decoration (Meggs & Purvis, p. 104,107-109). During this time, structural tools would begin to be added to the pages of books, including title pages which denoted the author, editor, and publishers, as well as page numbers and notes along the bottom margin of pages (Meggs & Purvis, p. 109). Illustrators, too, would look for methods to mechanize the printing of graphics and decorations, developing new systems of wood and metal blocks that could attach to the press itself (Meggs & Purvis, p. 103-104). This revolution in printing and design would allow more complex characters and graphics to be printed and distributed, contributing to a growing repertoire of typefaces and graphics unique to each region in Europe, and even the colonies in America (Meggs & Purvis, p. 119,122-124). Typographic innovation would eventually die down going into the seventeenth century, where the design of books would standardize into a more consistent format (Meggs & Purvis, p. 122).

Over the coming centuries, the inception of typography in Europe didn't just revolutionize the design and production of books, but of literacy itself – democratizing information across all classes of people in a way never before seen (Meggs & Purvis, p. 73,85). Books and printed word not only became increasingly accessible, but a primary means of communication, spreading news and ideas as a fraction of the previous cost and time (Meggs & Purvis, p. 85). Language and typefaces would be standardized across regions of Europe, and the unity in printed design and ideals brought with it rising nationalism, contributing towards the modern nation-state (Meggs & Purvis, p. 85). The Renaissance and Enlightenment would have arguably been impossible without printing, needing a way to consistent learn, record, and share ideas with a growing audience (Meggs & Purvis, p. 87). From the humanistic philosophy of their writings sprung new reform and revolution fueled by printing; Martin Luther's 95 these were distributed amongst the public via printed broadsides, and many early works of revolutionary America and France consisted of illustrated books and printed philosophies questioning the role of the Monarchy (Meggs & Purvis, p. 85-87). Though some regions would attempt to resist it through heavy censorship enacted by the church and state, printing would become a fact of life leading into the industrial revolution, bringing with it change in both ideas and design (Meggs & Purvis, p. 85).

Industrial Revolution 1750 – 1900 CE

Starting in late eighteenth century England with the invention of John Watt's steam-powered engine and continuing into the late nineteenth, the Industrial Revolution would live to see societies across the west become more urban and commerce-oriented, shifting power from the aristocracy to capitalist manufacturers and merchants (Meggs & Purvis, p. 151). Printing and graphic design during this period

would be driven by early marketing and technological advancements, with a focus in content shifting from philosophical to more materialistic ends (Meggs & Purvis, p. 151). The components of design and production, which were previously all done by a singular craftsman, were now split up amongst different specialized roles and machines, reducing the cost and increasing the efficiency of the printing process along the way (Meggs & Purvis, p. 151). In doing so, the approach to graphic design would be irrevocably split into several focuses and built together in layers, setting the stage for the modern design process.

In the lead up to the Industrial revolution, standard typography had generally shifted from old to transitional and modern Roman typefaces, which emphasized verticality and contrast in characters (Meggs & Purvis, p. 129). As opposed to the even-weighted strokes characteristic of traditional gothic and handwritten lettering, the new typefaces leveraged the printer's ability to create strokes of differing weights, ending them in neat, tapered serifs (Meggs & Purvis, p. 129,137-142). Created using a mathematical grid, they were meant to pull your eyes along in a pleasing effect, making them primarily useful for books and other densely packed texts (Meggs & Purvis, p. 129). As advertising and titles became more prominent, however, marketers looked for new typefaces that would be more expressive and eye-catching to a passing viewer, thus beginning a revolution in typographic design and convention (Meggs & Purvis, p. 152). Hundreds of new type families would be created for different advertisements, comprised of similar, interchangeable fonts with varying characteristics such as italics, weight, scale, and spacing (Meggs & Purvis, p. 130,152). Certain design motifs would keep reappearing along the way, such as 'fat-face' fonts, which increased the weight and contrast of characters to produce a strong, bolded effect (Meggs & Purvis, p. 152-153). Other prominent motifs included the so-called 'Egyptian' fonts, with thick, slab-like serifs and geometric construction, and 'Tuscan' fonts, which conversely had thin, curving serifs and rounded lettering (Meggs & Purvis, p. 153). Perhaps most importantly, these would lay the inspiration for 'sans-serif' fonts, which recreated the geometric proportions of previous typefaces, but without a serif (Meggs & Purvis, p. 155). Though its use would be awkward at first, it would eventually lead into the proliferation of many fonts we see today. Along with these typefaces, font designers would also begin playing with more novelty characteristics, such as outlines, perspective, and even reversed printing (Meggs & Purvis, p. 153-154). For better use on posters and large prints, new, stronger wooden types would be reintroduced such that fonts could be created that were larger, lighter, and more economical than the standard metal type (Meggs & Purvis, p. 155-157).

The industrial revolution also brought with it mechanical innovations within printing and typesetting, reducing the manpower and time needed to start and finish a print job. The first major innovation since Gutenberg's original design came in 1800 with the creation of the first all cast-iron printing press, which reduced the force necessary to print while also increasing the size of available printing space (Meggs & Purvis, p. 158). This design would lay the groundwork for the steam-powered press just ten years later, which replaced the pressure mechanism with a roller that would carry the paper against a bed containing the typeface, automating the process and improving its efficiency (Meggs & Purvis, p. 158). Over time, the steam press would be refined to add more cylinders as well as reposition the typeface on the cylinder itself, resulting in a press that could print almost 8,000 sheets an hour, compared to the 250 it started out at (Meggs & Purvis, p. 158). To meet the increasing speed and requirements of printing, the first papermaking machine was created in 1803 and inventors began a race to automate the process of setting together type (Meggs & Purvis, p. 160). Though the presses and journalists could theoretically improve almost exponentially, the task of translating a written article into an array of metal type character by character became a major bottleneck in the process, taking a skilled team of typesetters hours to finish a single page (Meggs & Purvis, p. 160-161). It would take until 1886 for American Ottmar Mergenthaler to perfect a solution known as the linotype, which used a keyboard and matrix to compose metal type along

a page (Meggs & Purvis, p. 161). With these machines, the time and costs required of printing sank to unprecedented levels, allowing printing to solidify its prominence in daily life.

Along with mechanical innovation, the era would also invite new inventions that would forever more change the landscape of graphic design. The first to come about was the invention of lithography around the end of the eighteenth century, which introduced another form of printing whereby an artist could reproduce the nuances and shading of a drawn piece without the discrete outlines common to woodblocks (Meggs & Purvis, p. 174). By leveraging the immiscible property of oil and water, lithography worked by first drawing on a flat surface – typically limestone – with a grease pencil, and then etching it such that the oils became rooted within its pores (Meggs & Purvis, p. 174). Next, a printer would then pour a light layer of water that would be absorbed into the stone, and afterward apply an oil-based ink to the surface, which correspondingly only sticks to the oiled drawing (Meggs & Purvis, p. 174). Using a press, the ink could then be transferred onto sheets of paper, creating a reusable method of printing the fine details of artists' drawings (Meggs & Purvis, p. 174). Eventually, this process would expand into chromolithography in the latter half of the nineteenth century, which used multiple stones with different colored inks and variations of the same drawing to produce a full-color print (Meggs & Purvis, p. 174). With as little as 5 stones for flesh tones, gray backgrounds, red, yellow, and blue, a printer would be able to replicate a realistic, nigh-photographic portraits and landscapes onto paper and tin (Meggs & Purvis, p. 174-175). Perhaps even more importantly, the other major milestone of the Industrial Revolution was the invention of photography following a string of discoveries and innovations related to the capturing, refining, and printing of photographs. Photography itself relied on a well-known principle whereby if one had a dark box with a small lens, then the light coming through would recreate the image of brightly-lit objects outside of it (Meggs & Purvis, p. 161). Though the science had been well-documented for quite some time – with a basic handheld 'camera obscura' (Latin for 'Dark Chamber') existing as early as 1665 CE – the race was on to figure out how to make the image permanent and transfer it onto paper (Meggs & Purvis, p. 161). The first photographic image would be created by Joseph Niépce, who used light-sensitive sheets of pewter to capture and harden images of drawings laid on top of it when left in the sun in a process known heliogravure, or 'sun engraving' (Meggs & Purvis, p. 161-162). After his death in 1833, personal friend Louis Jacques Daguerre would take over his research and implement the mechanism in a camera obscura, replacing the pewter sheets with silver-coated copper plates and iodine crystals to create more clear, precise, and vibrant photographs (Meggs & Purvis, p. 162). Though it had obvious limitations such as the meticulous sensitizing required and its susceptibility to glare, he would present and release the invention as the Daguerrotype in 1839 to major success (Meggs & Purvis, p. 162-163). Meanwhile, English inventor William Henry Talbot was experimenting with 'photogenic drawings' on paper, whereby he soaked the paper in light-sensitive silver-chloride and exposed it to light while covering it in paper or lace, effectively capturing an image where the bright, non-covered parts came out dark while the dark, covered parts came out light (Meggs & Purvis, p. 163). Working with chemist Sir John Herschel, Talbot was able to implement it within a camera obscura and use the 'negative' produced to contact print a separate 'positive' afterwards (Meggs & Purvis, p. 163-165). Releasing in 1840 as the Calotype, Talbot's photos may have not been as clear as the Daguerrotype due to the necessary process of reprinting the positive but were widely preferred for the ability to reprint any image at all (Meggs & Purvis, p. 165). Through advancements in photochemistry, wet- and dry-plate methods were eventually created to improve the detail and resolution captured in 'positive' photos, making photography more effective as well as accessible (Meggs & Purvis, p. 165). However, though the process of positive recreation had been improved, printing photographs was still largely inefficient compared to traditional woodblock illustrations, leading to a search for quicker method of mass printing them (Meggs & Purvis, p. 165-166). The solution, a process whereby a photograph was broken down into tiny 'halftone' dots of

various sizes, was created in 1881 by American Frederick E. Ives and enabled newspapers to print photos with seemingly continuous tones and detail (Meggs & Purvis, p. 166). Colored halftones were perfected in the late 1890s, allowing illustrations to capture the full range of colors in an extension very similar to chromolithography (Meggs & Purvis, p. 166).

The Industrial Revolution was perhaps one of the most important eras in recognizing and transitioning graphic design to where it is today. Mass production brought with it quick, timely, and increasingly detailed graphics, launching advertisements, newspapers and magazines into popularity and daily life across the Western World. Chromolithography would launch advertisements and magazines into a new age of vibrancy and detail, with almost 700 American firms alone using it in conjunction with political campaigns, holiday cards, packing, and even trading cards (Meggs & Purvis, p. 175-178). On signboards and posters, chromolithography would be used with woodblock printing to announce and depict incoming circuses, festivals, and even world fairs (Meggs & Purvis, p. 179). Magazines would be hosted, boasting it painting-like detail of its lithographic prints and coming with hundreds of eye-catching advertisements (Meggs & Purvis, p. 184). In the newspaper industry, photography would take reporting by storm, bettering documenting life around America and Europe during the turn of the twentieth century (Meggs & Purvis, p. 169-170). Perceptions of the American Civil War, for example, would be drastically impacted by photographs and woodblock illustrations of the front lines, contributing to rising anti-war sentiments amongst the public (Meggs & Purvis, p. 169,181). Amongst the best of these, illustrator Thomas Nast of *Harper's Weekly* would be lauded by President Abraham Lincoln and Ulysses S. Grant for his efforts in capturing the war, and would later go on to create the modern political cartoon in his struggle exposing William Tweed of Tammany Hall (Meggs & Purvis, p. 181-182).

In the period following the Industrial Revolution, graphic design would be reconsidered not only as a means to deliver information, but as an artform in and of itself (Meggs & Purvis, p. 189). In a movement reclaiming 'Arts and Crafts,' the layout of books would be rethought and redesigned to capture the nuance and detail of traditional Illuminated Manuscripts, filling in pages with beautiful decoration that promoted imagination and readability (Meggs & Purvis, p. 192-195). The 'Art Nouveau' era would start, trying to replicate the naturalism and spontaneity of the world around it (Meggs & Purvis, p. 212-213). Graphics would find themselves in an era of reconsideration and experimentation, leading to some of the most important innovations of the later twentieth century.

The Bauhaus 1900 CE – 1950 CE

The beginnings of the twentieth century would find itself in a time like no other; In a rapidly post-industrial environment, many Western societies would find themselves grappling with changing social structures, newly evolving technologies, and rising tensions along national lines (Meggs & Purvis, p. 269). Within this volatile era, artists and designers would start to question longstanding traditions of art and design, making waves in new forms of expression and composition (Meggs & Purvis, p. 269). Following this, many important art movements would take the Western world by storm, reconsidering the essence and conventions of art, and furthermore of graphic design.

Among the first and most prominent, the cubism movement was first spearheaded by Pablo Picasso in the early 1900s, and focused primarily on translating nature into bold, geometric planes first inspired by tribal African works (Meggs & Purvis, p. 269-270). Cubism itself can be split into two main phases with the first being analytical cubism, where artists like Picasso looked for ways planes could together compose larger images through individual textures, color, and shapes (Meggs & Purvis, p. 269-270). After Picasso, the movement would then shift to synthetic cubism, which used similar techniques to not completely replicate an image, but instead capture its essence and symbolic likeness (Meggs & Purvis, p. 270-271).

Between these two focuses, graphic design and art would be pushed towards bold colors and precisely placed planes, abstracting existing environments into geometric shapes (Meggs & Purvis, p. 269-271). Accordingly, the collage would become very popular during this time, which rendered works as two-dimensional layers that come together to create visual associations (Meggs & Purvis, p. 270). Overlapping near the end of cubism, Futurism would also be another major art movement with influences in design (Meggs & Purvis, p. 271). Particularly concerned with typography, futurism aimed for revolution and unbridled, dynamic expression; Conventions such as the horizontal lines and column justification were thrown out, and in their place, typography was disjoint, sculpted, and even overlapped to evoke chaos (Meggs & Purvis, p. 271-273). Futurism would capture the speed and noise of post-industrial society using new typographic techniques, removing flourishes such as capitals, punctuation, and even proper grammar to instead leave only onomatopoeias and taglines to get their message across (Meggs & Purvis, p. 273). Other art movements would come and go as well, such as the Dadaism and Expressionism art movements respectively concerned with the contextualization and expression of art (Meggs & Purvis, p. 277,284). Dadaism, an at-times anarchic movement concerned with mocking art, society, and tradition, often used seemingly nonsensical layouts and imagery to attack conventions and question what the essence of art was (Meggs & Purvis, p. 277). It was an artistic, political, and at points ill-defined movement, and eventually led into surrealist and dream-like undertones in content and composition (Meggs & Purvis, p. 277,283). In contrast, expressionism came from a more organized approach to artistically capture not the objective physical, but the subjective emotions and anecdotes behind the subject. Born from two approaches, expressionism was centered around either abstracting an existing subject into emotional motifs, or building the emotional motifs without the intended subject in view (Meggs & Purvis, p. 284). The core and aesthetic of these movements would transcend past the arthouse into the graphic design of posters, books, covers, and other works, setting the stage for the rest of the century (Meggs & Purvis, p. 280,287-289).

It was meanwhile in the 1920s that Russian artists and poets were increasingly becoming enamored with the cubist and futurist movements, quickly adopting and combining them into one consistent cubo-futurist movement (Meggs & Purvis, p. 317). Coming just after World War I and the triumph of the Bolsheviks in the Russian Revolution, this new experimental breed of art stood in contrast to the elaborate conventions of czarist Russian, using common and coarse materials in solidarity of the poor and meager (Meggs & Purvis, p. 317). In the design sphere, the principles of the movement were adapted in a style known as suprematism, which sought to use new, abstract geometry and composition to create a sensation above all else (Meggs & Purvis, p. 319). Particularly used in propaganda, suprematism helped artists and politicians communicate with illiterate populations using only graphics to convey emotion and information (Meggs & Purvis, p. 319). The Russian art movement would then further split in 1921 with the introduction of constructivism, which pushed all artists to abandon art without a political and informational role in favor of integration in design, visual communications, and other applications (Meggs & Purvis, p. 319). Constructivism brought with it an undeniable optimism for the future of communist society, hoping to combine aesthetic and technology to immerse the Russian public in a richer environment (Meggs & Purvis, p. 319-320). With heavy inspirations in architecture, it relied primarily on geometric layers, pure colors, and heavy sans-serif typography, and would have lasting impacts on civil engineering, posters, and even film (Meggs & Purvis, p. 322,317-329). Though it was powerful and fiercely nationalistic, constructivism would die down in Russia following Stalinist purges, though not before spreading westward (Meggs & Purvis, p. 327-331).

In Germany, constructivism and the other art movements would find themselves solidified in the essence of one of the most important design schools of the modern era (Meggs & Purvis, p. 345-346). Known as Das Staatliche Bauhaus – or more simply, the Bauhaus – the school aimed to unify the technology and

design of mass-production for a more beautiful, accessible society (Meggs & Purvis, p. 345). Opening in the aftermath of World War I within Weimer, Germany, the Bauhaus would have its roots in an existing fine-arts academy merged with a neighboring applied-arts university (Meggs & Purvis, p. 345). Notably, the Bauhaus would notably make no distinction between the two, and would also go on to hold equal its influences from architecture, interior design, typography, and other crafts (Meggs & Purvis, p. 346). In doing so, all art and craftsmanship were given the same background and objectives, with a central idea that 'form follows function' (Meggs & Purvis, p. 346-347,351). The Bauhaus's inspiration and message would be particularly prominent in graphic design, where it would spawn a movement carefully balancing readability, composition, and aesthetics within a design (Meggs & Purvis, p. 347). Though the Bauhaus school itself avoided creating or subjecting its students to a certain style, prominent works focus around rational, geometric shapes evoking a machine-like quality with minimal flourishes to distract from its message (Meggs & Purvis, p. 346-347). Typography itself would be redesigned to express only one unique, unmistakably distinct symbol per character, with major consideration towards hierarchy, justification, and whitespace utilization for the most direct communication (Meggs & Purvis, p. 351). Followingly, photos and illustrations would often be encouraged to integrate typography within the image to impart the clearest interpretation to the viewer (Meggs & Purvis, p. 349). From this design analysis, the Bauhaus school would have impacts not just in graphic design, but in a wide range of fields from product design to visual statistics for decades to come (Meggs & Purvis, p. 353,359-360). Following difficulty with the reigning Nazi government for perceived 'cultural Bolshevism', the Bauhaus would move from Weimer to Dessau to eventually Berlin, closing its doors in 1933 (Meggs & Purvis, p. 349,353). After its fourteen year lifespan, its members and proponents would find themselves migrating to allied Europe and America, where they spread the message and core of the Bauhaus internationally (Meggs & Purvis, p. 352-353).

Digital Design 1950 CE – 2020 CE

From the lessons, innovations, and movements of previous centuries, the present era of graphic design finds itself in an increasingly vibrant and ever-changing period. Beginning in the latter half of the twentieth century and continuing presently, design movements have come and gone in conversation with the modernistic styling of the last half-century, as well as the rapidly shifting power structures within the world (Meggs & Purvis, p. 439).

Starting in 1950, this new era can first be traced to a movement known as Swiss Design or the International Typographic Style (Meggs & Purvis, p. 397). Continuing the work of the Bauhaus and movements prior, the Swiss Design movement was primarily centered around reforming existing typography and layout with modernist, clean, and objective design -- prioritizing geometric layout, proportional whitespace, and harmonious construction (Meggs & Purvis, p. 398-400). It was many during this time when sans-serif fonts – which had previously been seeing increasing use in popular culture – became a mainstay of the movement, seen as a more progressive and direct form of typography for use in reports, packaging, and books (Meggs & Purvis, p. 397). New typefaces and families would also be created that still persist in large part today, such as the Univers and Helvetica typefaces which emphasized well-defined form and harmony (Meggs & Purvis, p. 400-401). In design, layout would be done on a mathematical grid, with ample whitespace dictating margins and paragraph breaks, while columns of text increasingly adopted a flush-left, ragged-right approach to justification (Meggs & Purvis, p. 397). Together, these made spacing and legibility more consistent in passages of text, as well as layouts more distinct and intuitive in structure (Meggs & Purvis, p. 398). Recognizing the neat legibility and balance of the characters and graphics, the International Typographic Style found itself quickly spreading beyond

just Switzerland, and true to its name, became a powerhouse in international corporations and institutions (Meggs & Purvis, p. 410).

Corporate systems, particularly after World War II, would become especially prominent in graphic design, hiring entire teams of designers to create consistent systems and aesthetics that visually unify and differentiate their products from surrounding conglomerates (Meggs & Purvis, p. 439). Perhaps first starting with the Columbia Broadcasting Station (CBS) of New York, the company would become one of the earliest powerhouses in graphic design, with rigorous standards and reputation for quality programming, design, and advertisement (Meggs & Purvis, p. 441). First trademarking themselves with the iconic pictographic eye in 1951, they emphasized the use of bold silhouette and symbolic imagery within their designs, leveraging the connotative power of their product with their identity itself (Meggs & Purvis, p. 441-442). Eventually, as the movement for corporate design started to spread across companies like Shell, Nabisco, and Exxon, it wasn't just product and packaging that was being targeted, but entire corporate trademarks (Meggs & Purvis, p. 443). Spearheaded by designers such as Raymond Loewy and Paul Rand, striking and distinctive symbols would come synonymous with corporate entities, emphasizing its symbolism, recognition, and distinctiveness to its viewers (Meggs & Purvis, p. 443,445-447). Corporate design would eventually explode in the 1960s, when it combined with the incoming International Typographic Style to create a larger movement centered around systematic corporate identities (Meggs & Purvis, p. 451). Entire design systems and packages would be created to unite a corporation's aesthetic and messages, with a focus on minimalism, rationality, and standardization (Meggs & Purvis, p. 451-453). Notably, this era of strong corporate branding would also inspire the standardization of many common signs and symbols seen across society today, such as the many signs related to transportation, public services, and other aspects such as where smoking is permitted (Meggs & Purvis, p. 455). Today, corporate visuals still persist as one of the dominating facets of graphic design, and have helped give many companies power and brand recognition in daily life (Meggs & Purvis, p. 463).

With the rise of the digital age beginning in the 1980s, however, graphic design increasingly finds itself in an evolving and divergent culture (Meggs & Purvis, p. 571). The rise of computer-aided graphic design applications has both displaced centuries old processes involving layout, typesetting, and photography, while enabling one person to have precise and total control over an entire graphic (Meggs & Purvis, p. 571-573). With a consumer laser printer and access to commercial design applications, one can plan, layout, and print a graphic in record time and cost (Meggs & Purvis, p. 571). As well, computers have enabled an entirely digital design movement both on the level of individual user- interfaces and the entire World Wide Web (Meggs & Purvis, p. 571). Tools as simple as mouse and windows to as application-specific as layers and grids make the user experience intuitive and accessible, embodying the beginnings of a word-less design language (Meggs & Purvis, p. 571-573). On the internet, webpages have revolutionized the flow of information, contributing to a repository of books, news sources, magazines, and completely unique formats that possibly outgrows the contributions of the printing press itself (Meggs & Purvis, p. 591-593). Built from three main systems – HyperText Transfer Protocol (HTTP) that defines how the site is loaded, HyperText Markup language (HTML) that defines the content of site, and Universal Resource Locator (URL) that defines how the site is reached – the website is surprisingly versatile, allowing for near unlimited revision, design, and accessibility (Meggs & Purvis, p. 592-593). With the introduction of many different devices and screen dimensions, interactivity and responsiveness have become essential, redesigning the same work to look consistent across multiple formats (Meggs & Purvis, p. 596). With the increasing quantity of websites demanding our attention, many strive to individualize themselves and their aesthetics, creating a digital revolution in design, interactivity, and content.

Today, graphic design is becoming recognized as an increasingly essential element of visual communication and messaging. More graphic designers than ever have entered the workforce, bringing with them new ideas and aesthetics across digital and print formats. Design-wise, we currently live in a vague post-modern era of sorts, where heavy corporate design is being met with a greater focus on individual, activist, and globalist designs, -- often resulting in more chaotic, bombastic, and striking designs (Meggs & Purvis, p. 491). Though at-times ill-defined and ineffective at capturing all the divulging design movements, post-modernism has brought with it unconventional aesthetics and revolutionary experiments in design (Meggs & Purvis, p. 491). Ever-present in the written, printed, and electronic media throughout history, graphic design has the power to capture the hearts and minds of people around the globe, and has enabled everything from renaissance to revolution. Across formats and movements, graphic design has always been important to the delivery and content of information, and the future brings with it an invitation for experimentation and innovation.