GRAPHIC DESIGN FUNDAMENTALS

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GRAPHIC
DESIGN
FUNDAMENTALS

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Graphic design is present in every aspect of everyday human life. Very often we are not aware of its existence, with most of us receiving signs, signals and colors intuitively. Therefore, a clear and informed graphics is very important as it represents the things and ideas we want to convey, warn about, or encourage our audience to act upon. Road signs, for example, are all based on geometric figures (circle, square, twisted square - rhombus, triangle) and the associations they evoke in us (ie. active - warning triangle turned upside--down). These are the basic geometric figures which work in a very precise way. You need to acquire knowledge about the systems that affect us to sme degree. You need to understand why this happens. This involves the basics of psychophysiology of vision - our visual apparatus closely connected with the nervous system and the brain.

Issues such as perspective, color, contrast are very important art aspects necessary for a proper movement within the means of artistic expression.

Graphic design consists of the basics that are compiled and presented in this guide. This knowledge will become the essential foundation for shaping and experiencing space around us and will allow to formulate clear and strong visual messages. Its aim is also to encourage the reader to further in-depth study and exploration in the field of graphic arts.

"I want to make beautiful things, even if nobody cares, as opposed to ugly things. That's my intent."

Saul Bass

Actions taken on a plane can be chaotic or even unstructured. Apply certain rules and arrangements to the composition consisting of various elements and it becomes comprehensible and clear. The picture below shows several elements arranged according to the axis of symmetry, as well as number of items. The resulting systems are characterized by order, arrangement and deliberately chosen and logical plan. The order in this example is symmetrical (both in the horizontal and vertical line).
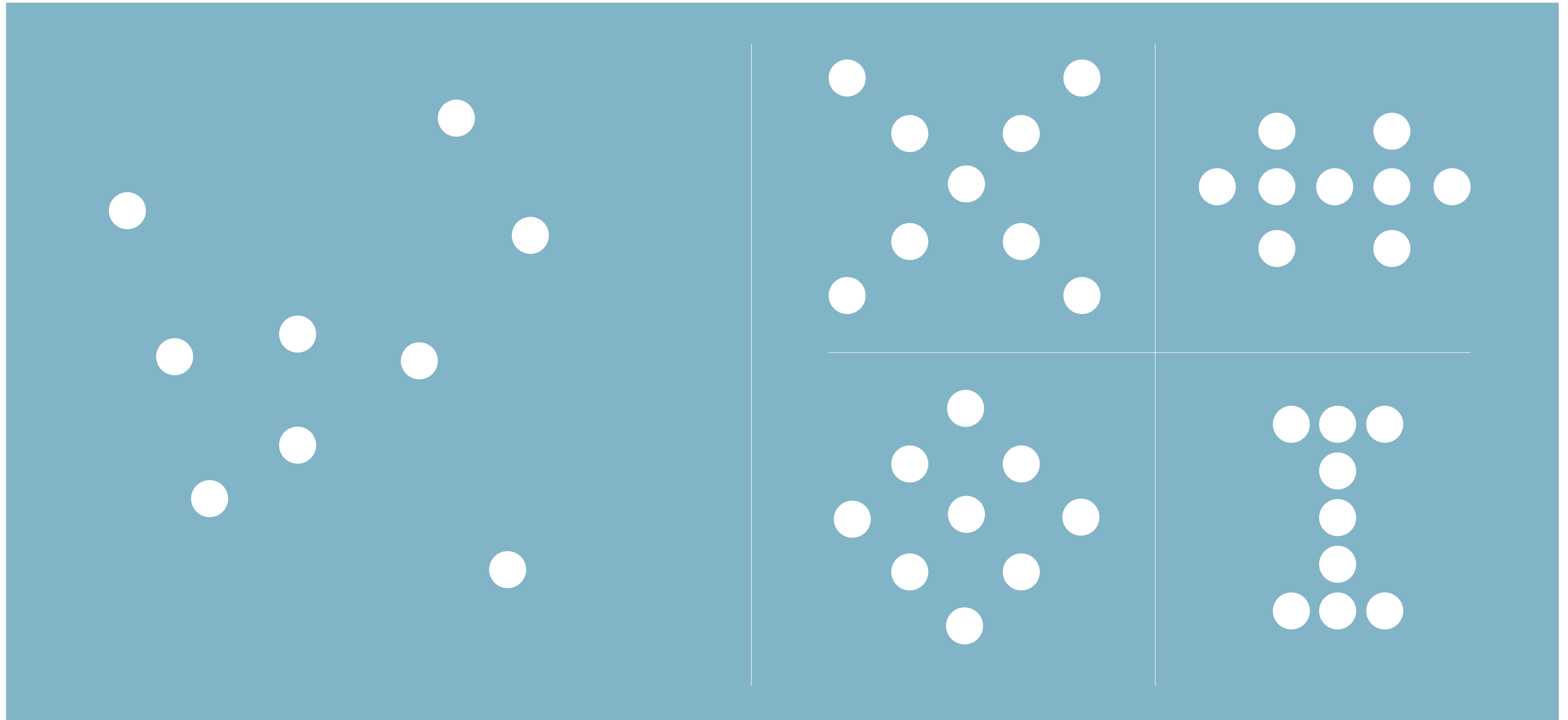
The point is the very basic unit in graphic design. „The point is the most powerful graphics constituent. One might say it is an atom of artistic expression." (Adrian Frutiger, Man and His Symbols) It is also a component of the line. Points make a printed image (printers do not print color solids, but dissect them into separate color points, which will be discussed later on in this guide).
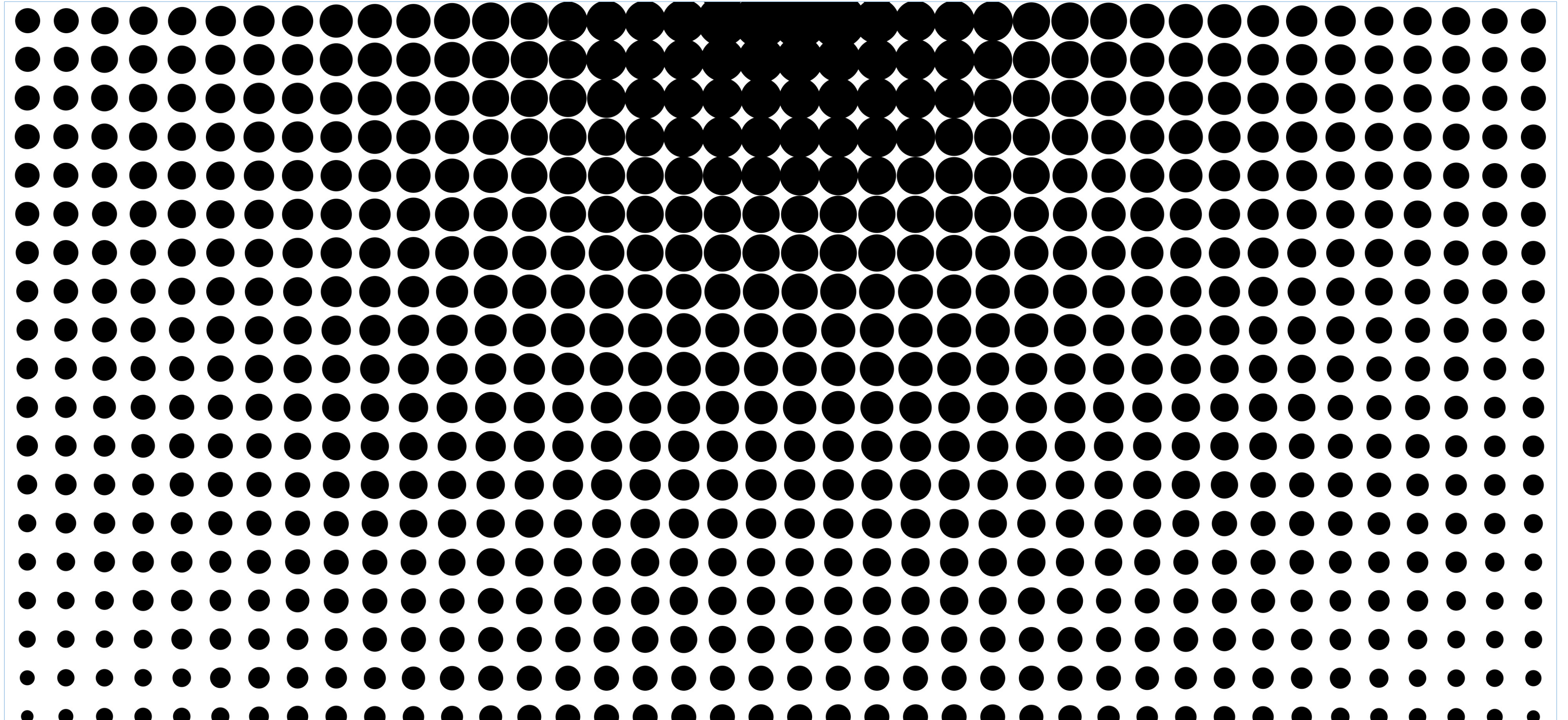
The rhythmic multiplication of a point can be used to build a gradation of gray.
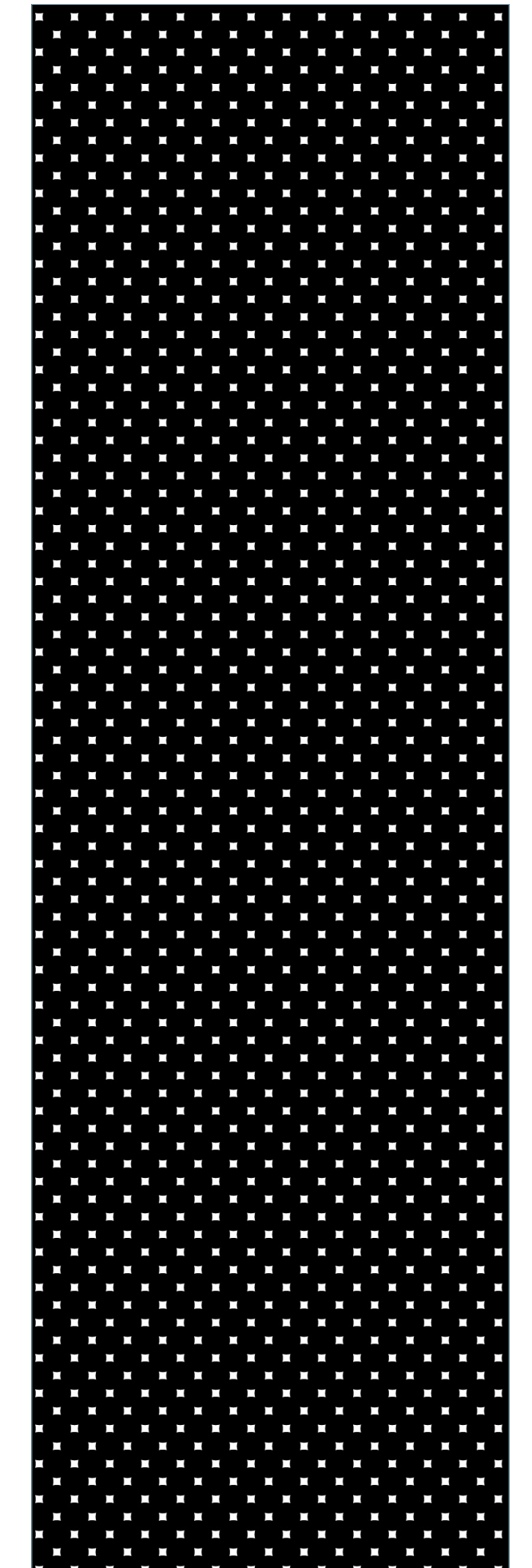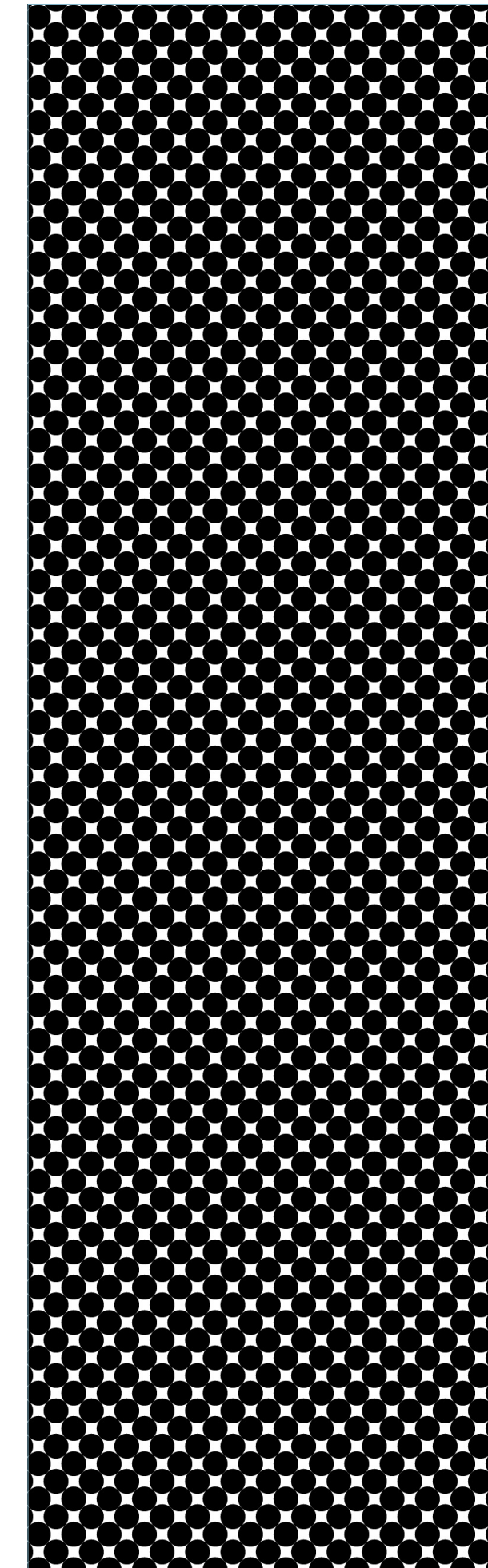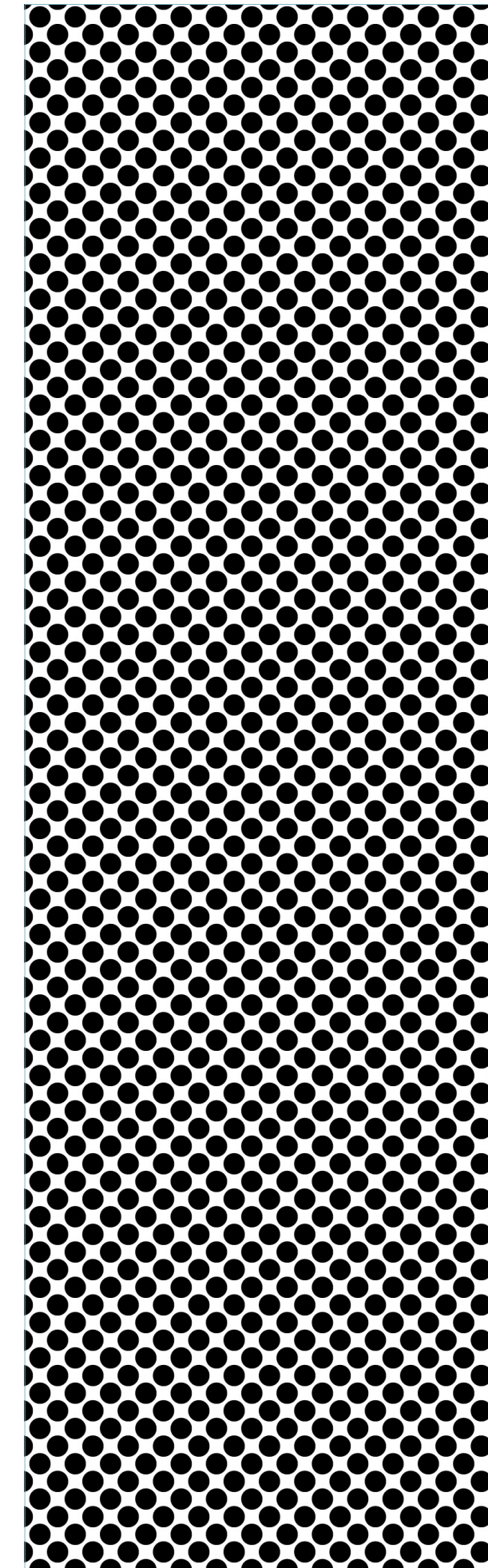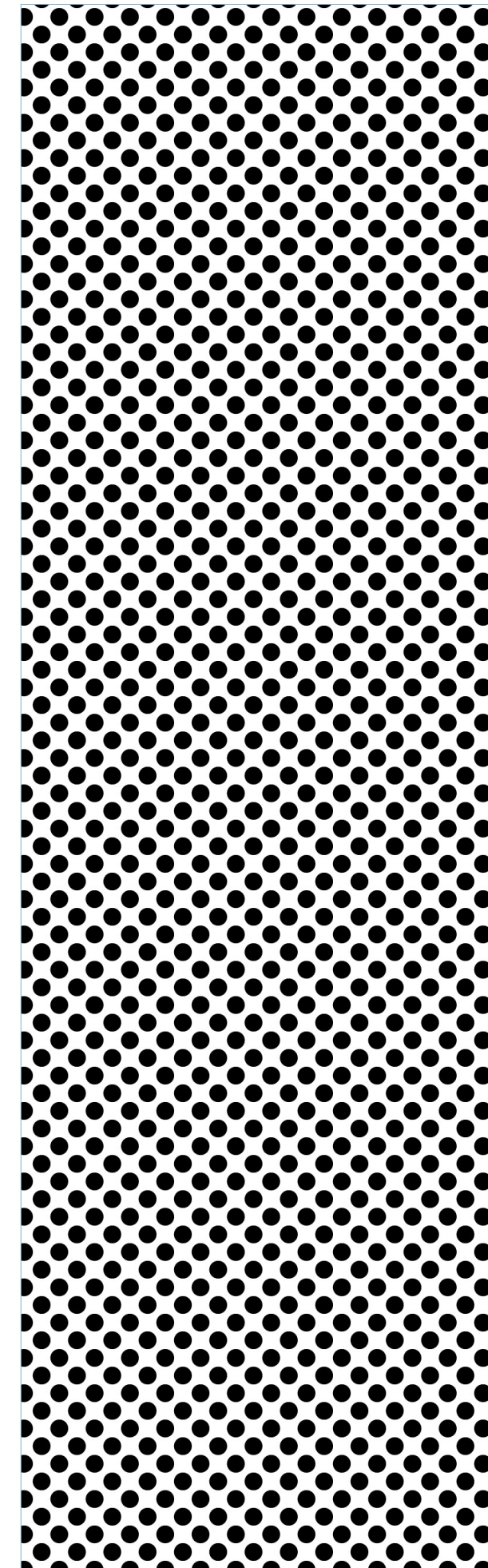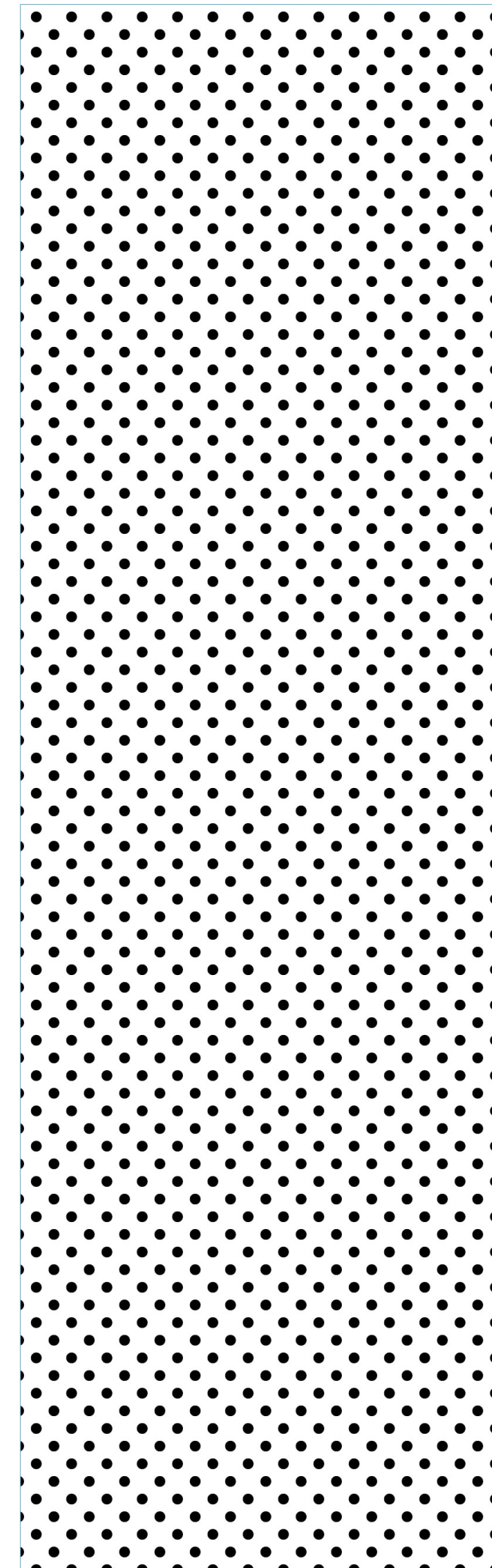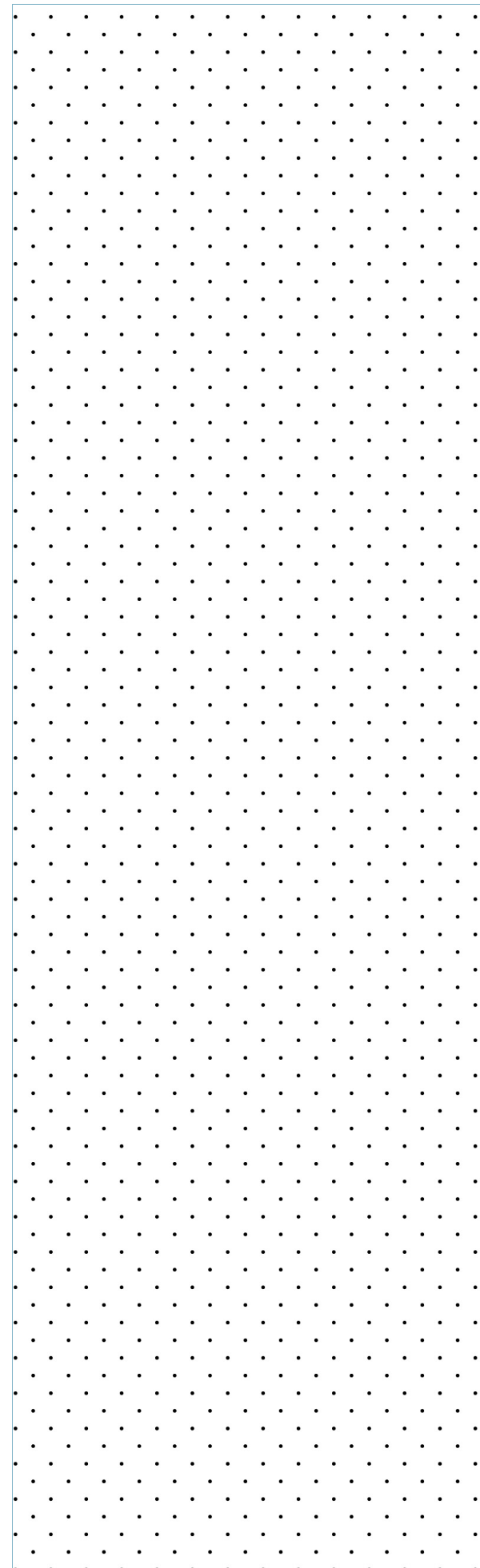
The scale and position of the point can be used to create the desired effect. In the example below, Circular Black and White Halftone Pattern create the impression of density and change in the gradation of the surface.

source: Public Domain / Submitted by Liz Aragon

The spectator is able to subconsciously draw a line between two points in space.

The line - whether it is straight, curved, wrapped, fine or thin is the most basic, simplest trail a man can lay out on the plane. It is an extension of our thoughts, expression of emotions charted by the movement of the hand.

You can already see the line characterizing the shape on this 30 000-year-old cave hyena painting found in the Chauvet Cave in France.

source: https://commons.wikimedia.org/wiki/File:20,000_Year_Old_Cave_Paintings_Hyena.png
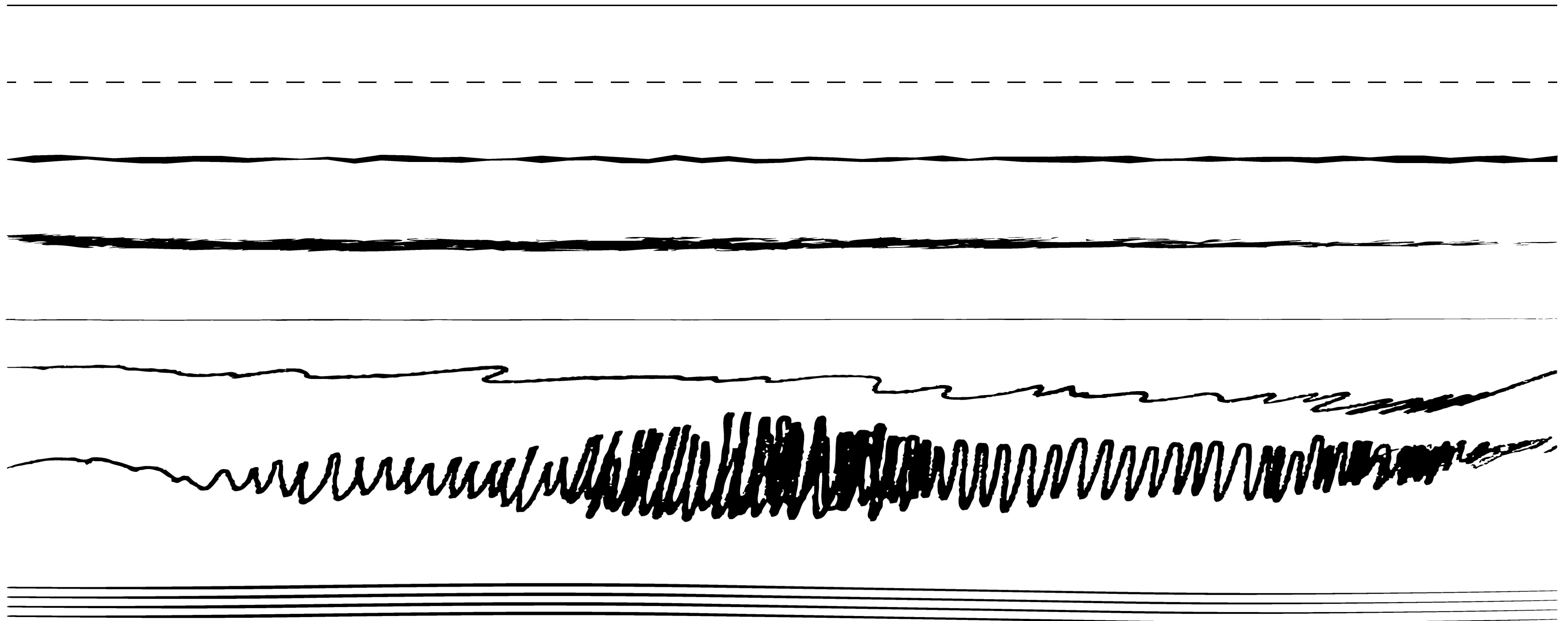
The resulting combination of thought and gesture efforts developed for centuries, as evidenced in calligraphy. Ideograms hand drawn with the use of traditional tools have become an art form.The best example is the japanese calligraphy (shodō means the way of the brush in japanese). In the japanese calligraphy there are several varieties of type styles. Writing is a way of self-discipline and self-education. This involves the mastery of one's skills, but also of his own mind and emotions. It is almost the way of transcendence.

Miracle Healing Calligraphy
Return Safely
(Japanese) Buji ni Kaeru

   The line, as one of the basic graphic components, allows to create abstract and non-
-abstract forms drawn on the two-dimensional space. An artist often employs lines to
create a three-dimensional representation on a two-dimensional space. Drawing is the
most important, oldest and fundamental way of creating signs.

„A drawing is simply a line going for a walk.”
Paul Klee

Pablo Picasso, one of the greatest artists of the 20th century, created many drawings. By analyzing his creative path we can trace the changes in the artist's approach to the line, the method of marking but also Picasso's formal approach to the organization of the plane. The line is created depending on the medium. The differences between Picasso's drawing, graphic/metal techniques and lithography are very distinct.

Pablo Picasso's Dog Line Drawing. This drawing is an excellent example of simplification of form. The artist drew a quick sketch using the simplest form that brought out maximum content. Shape of Picasso's pet dog created with one single line, without lifting the tool from the paper, depicts its characteristic features, physique, proportion and disposition. Picasso's masterful skill of observation only adding to the final denouement.
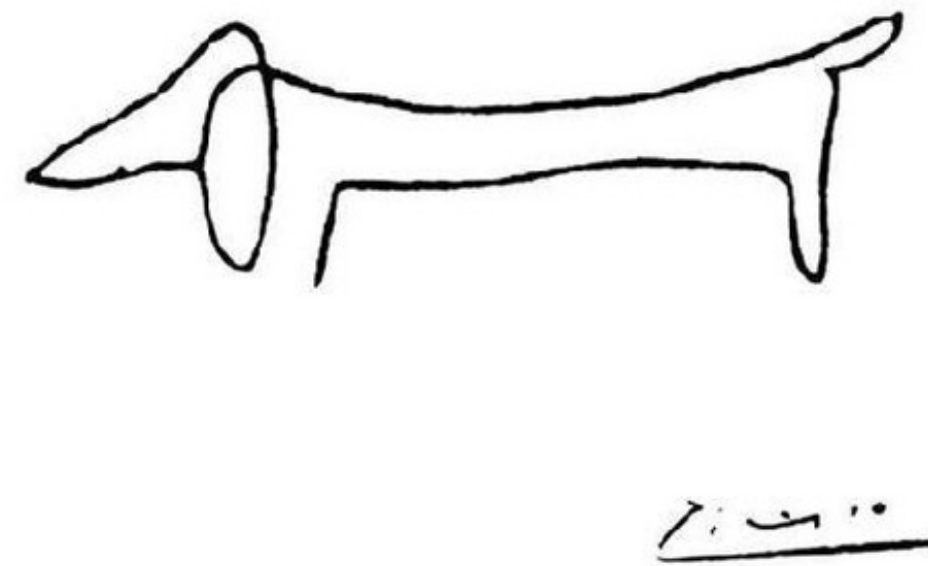
The perception of these two directions is essential in human observation. We encounter horizontal one more often, it is present as the horizon, water surface etc. Vertical is rarely found in nature. Horizontal and vertical, closely related to the gravity, are very familiar to the viewer's perception. Any violation of these directions will boost the composition, therefore it should be used very sensibly.
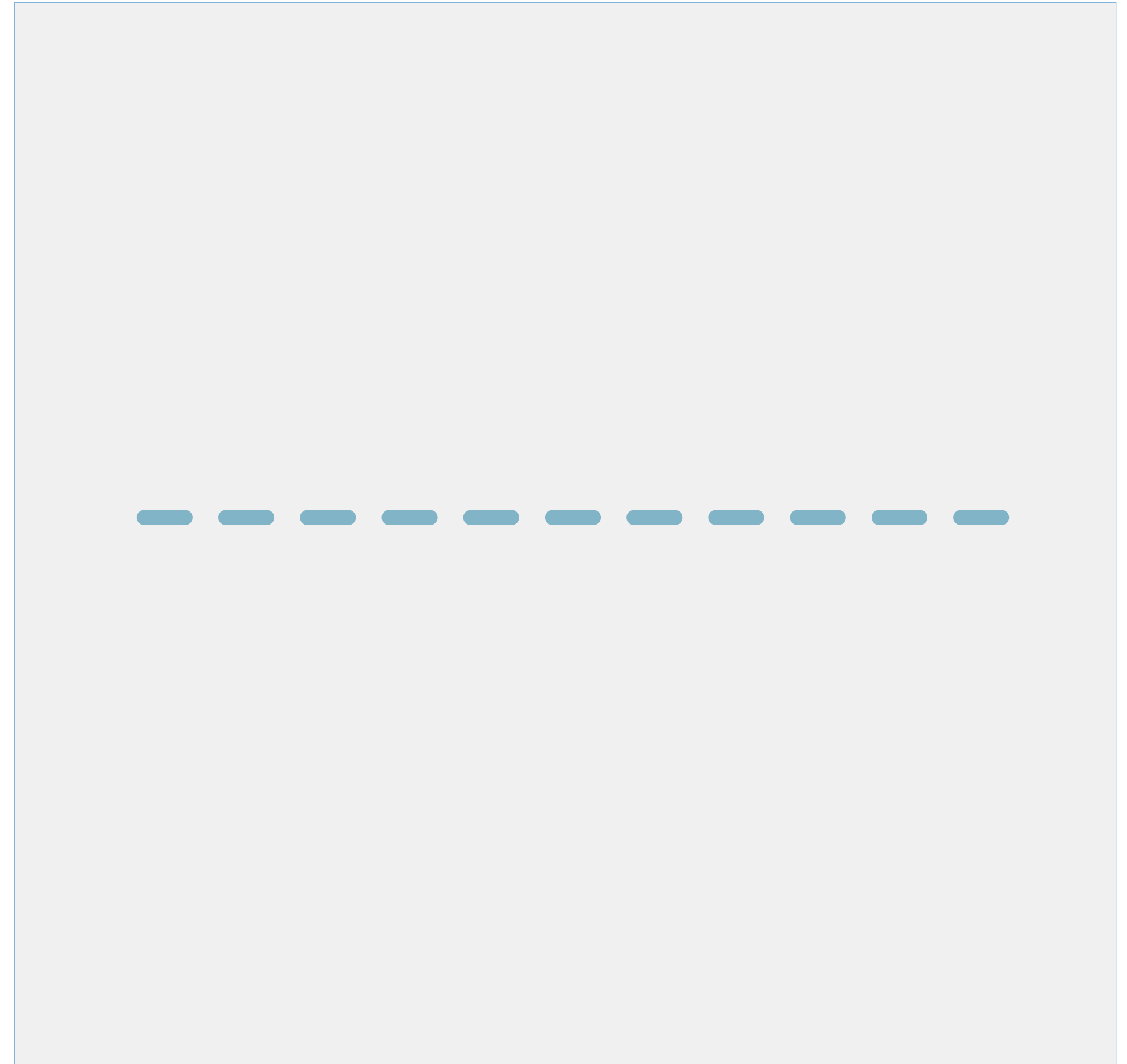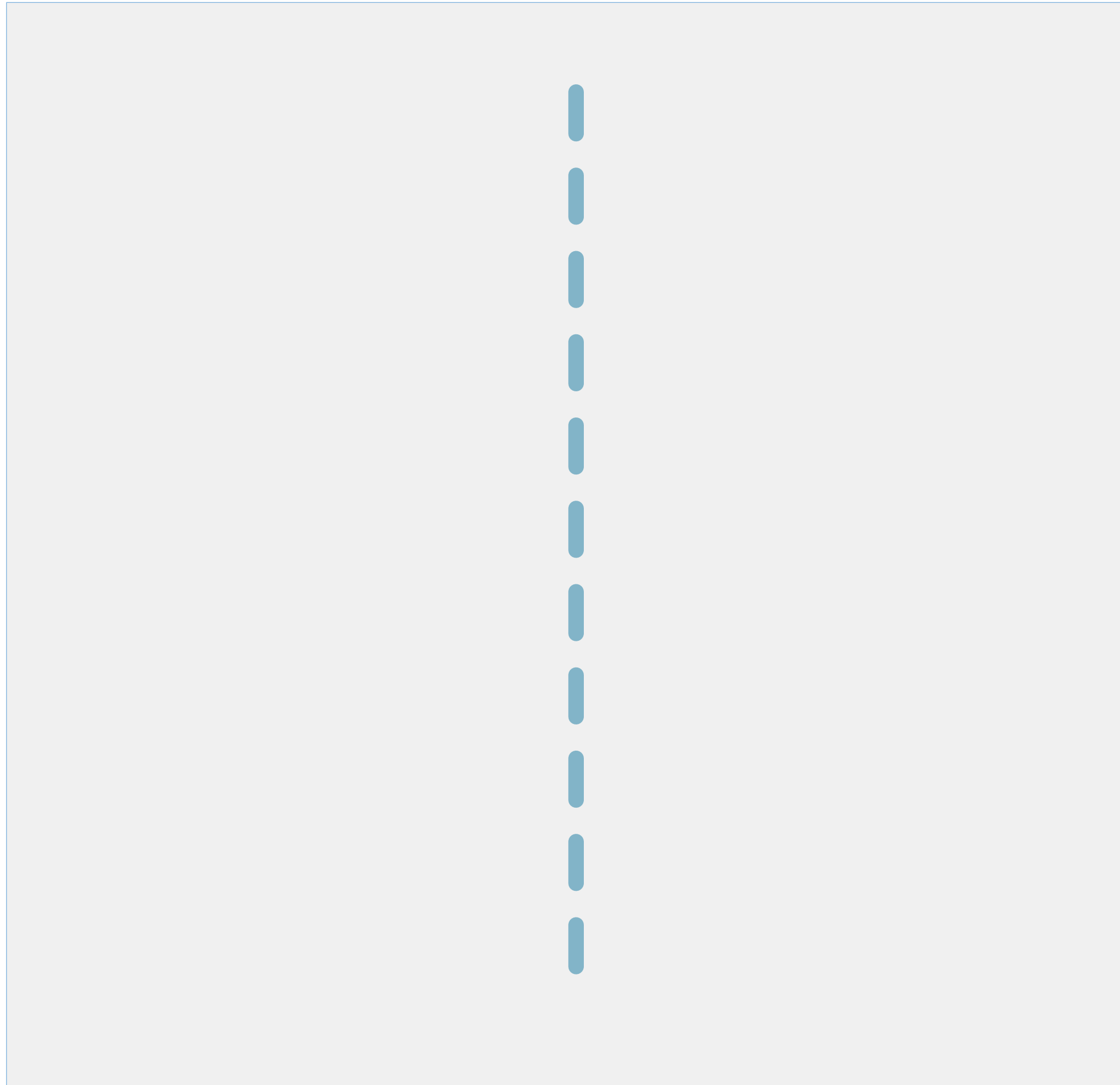
Sharp shapes, polygons, triangles, any objects with sharp angles create the impression of danger, inconvenience. Oval shapes rich in curves are regarded as pleasant and natural.

The example of circle below depicts the way the shape can evoke different things. The perception of the circle (see Frutiger) varies depending on the choice of particular means of art, color combinations or scale. It can limit the plane, be a spatial form or mark the center of the plane. In some cases, the circle can separate the plane from the background or be easily perceived as a hoop.

source: Luciano Testoni / Public Domain
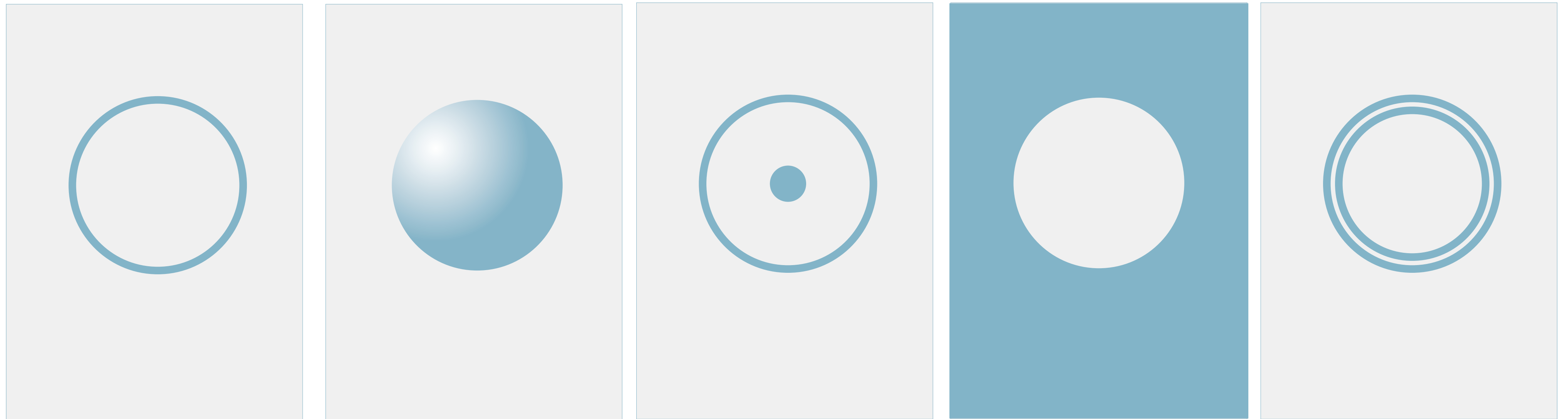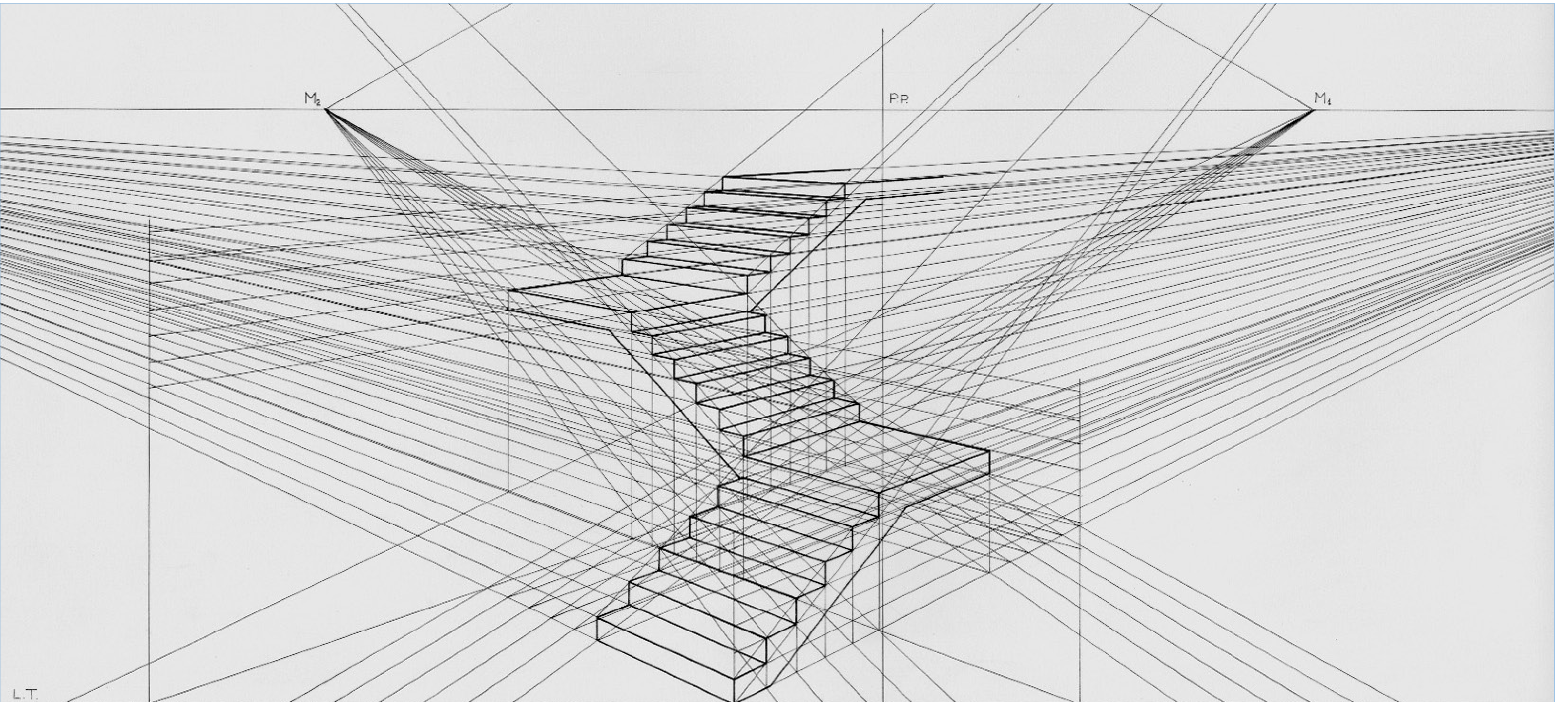
Visual perspective is a way of describing three-dimensional space on a plane. It has developed over time, its attributes discovered by various artists and architects. See right: Vase in perspective, Paolo Uccello pen on paper Florence, Galleria degli Uffizi, Gabinetto dei Disegni.

"Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution."

Albert Einstein

source: www.aiwaz.net
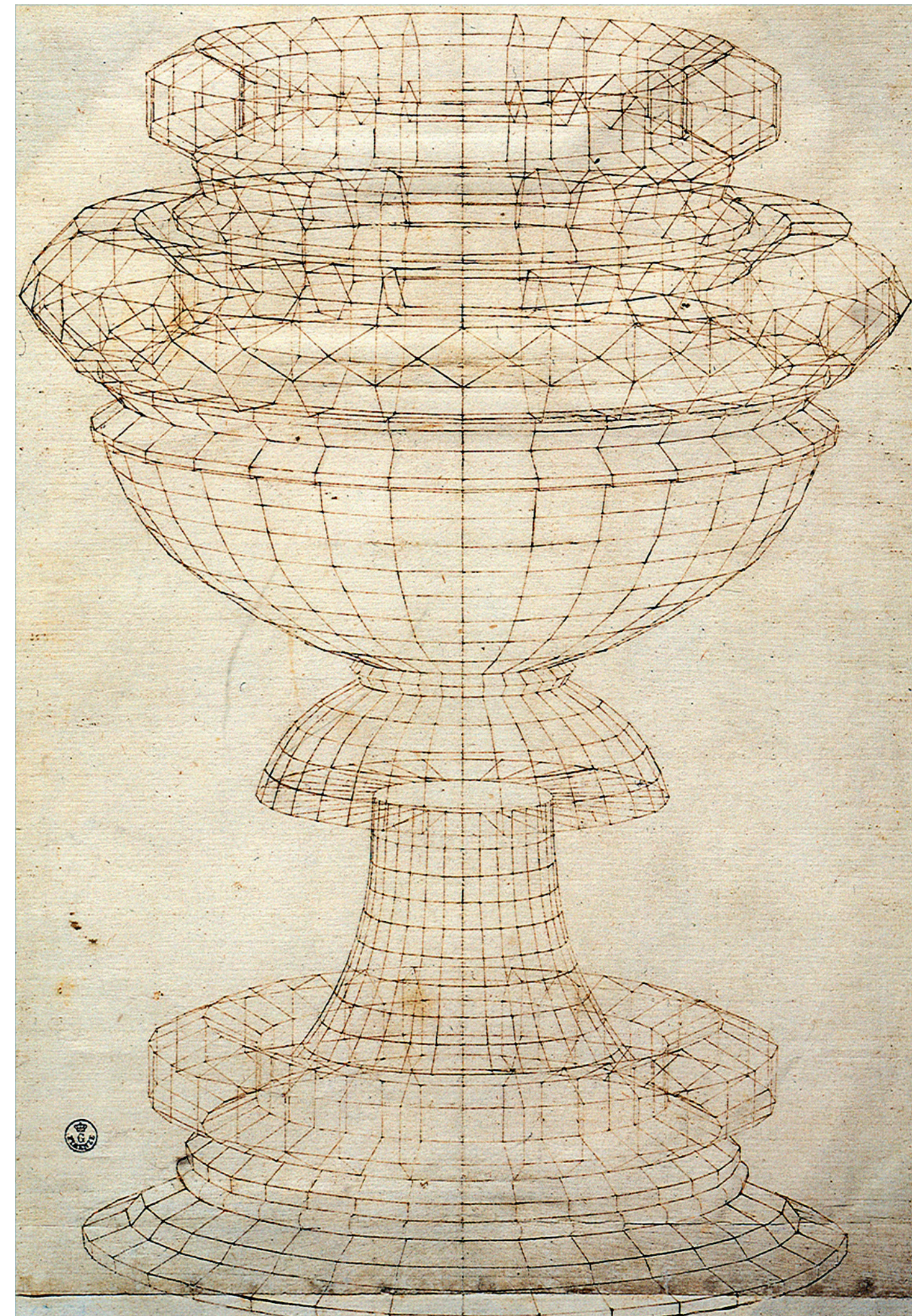
The diagram on the right shows the basic ways of creating perspective with division into linear, color, aerial, inline, reverse and curvilinear perspective.

Ut aut et, sitas dolori venim harum orehe- Tempor repra int lac-

1 pt perspective

2 pt perspective

3 pt perspective

Horizon Line

Horizon Line

Horizon Line

source: https://hamiltonianofdesign.files.wordpress.com/2014/05/types-of-perspective4.gif

$$a = b = 30$$
$$AB = AC = AD$$

Isometric Projection

$$a = b$$
$$AB = AC \neq AD$$

Dimetric Projection

$$a \neq b$$
$$AB \neq AC \neq AD$$

Trimetric Projection
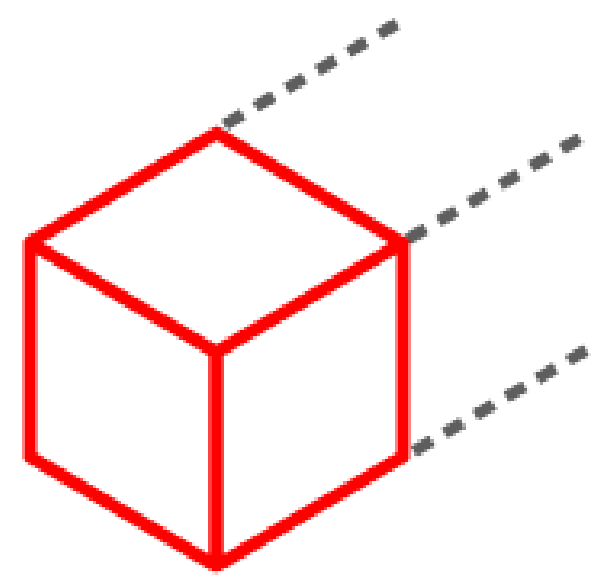
Isometric Projection
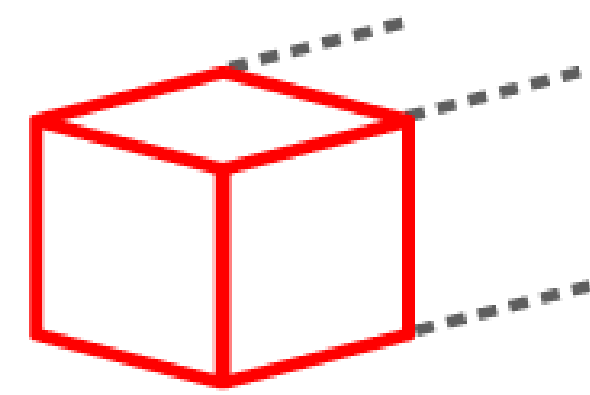
Dimetric Projection
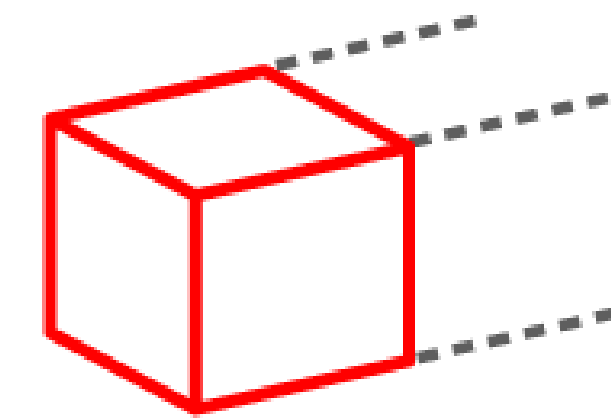
Trimetric Projection

Perspective

source: https://hamiltonianofdesign.files.wordpress.com/2014/05/axonometric-projection1.gif

source: http://www.apollo13art.com/National/lifedrawing1/lectures/images/head-perspective.jpg
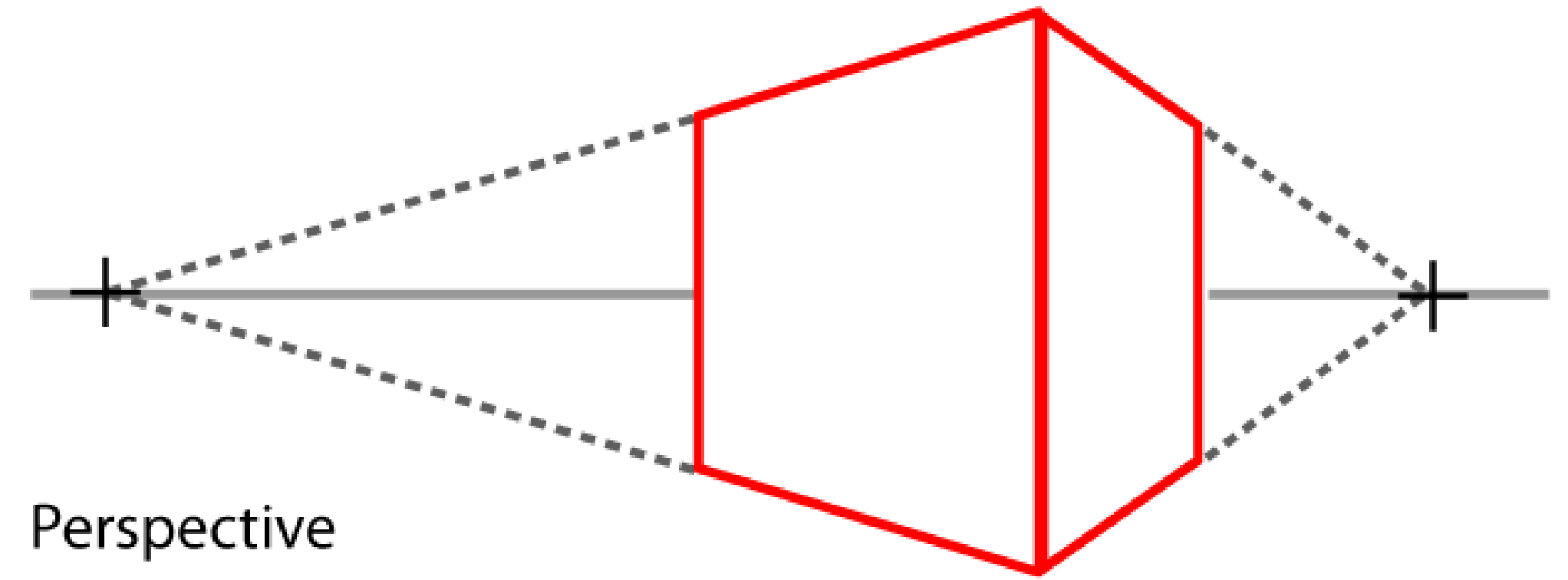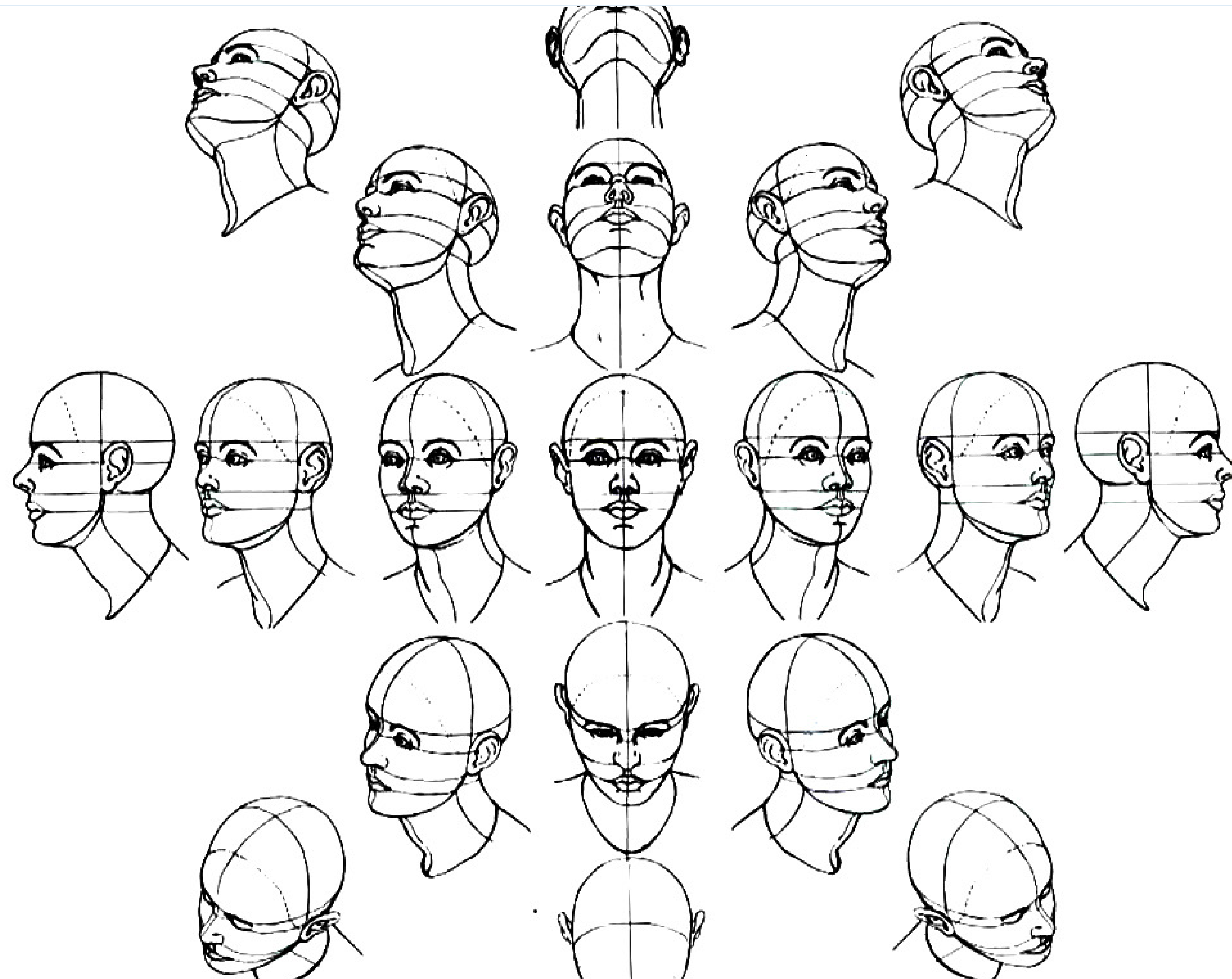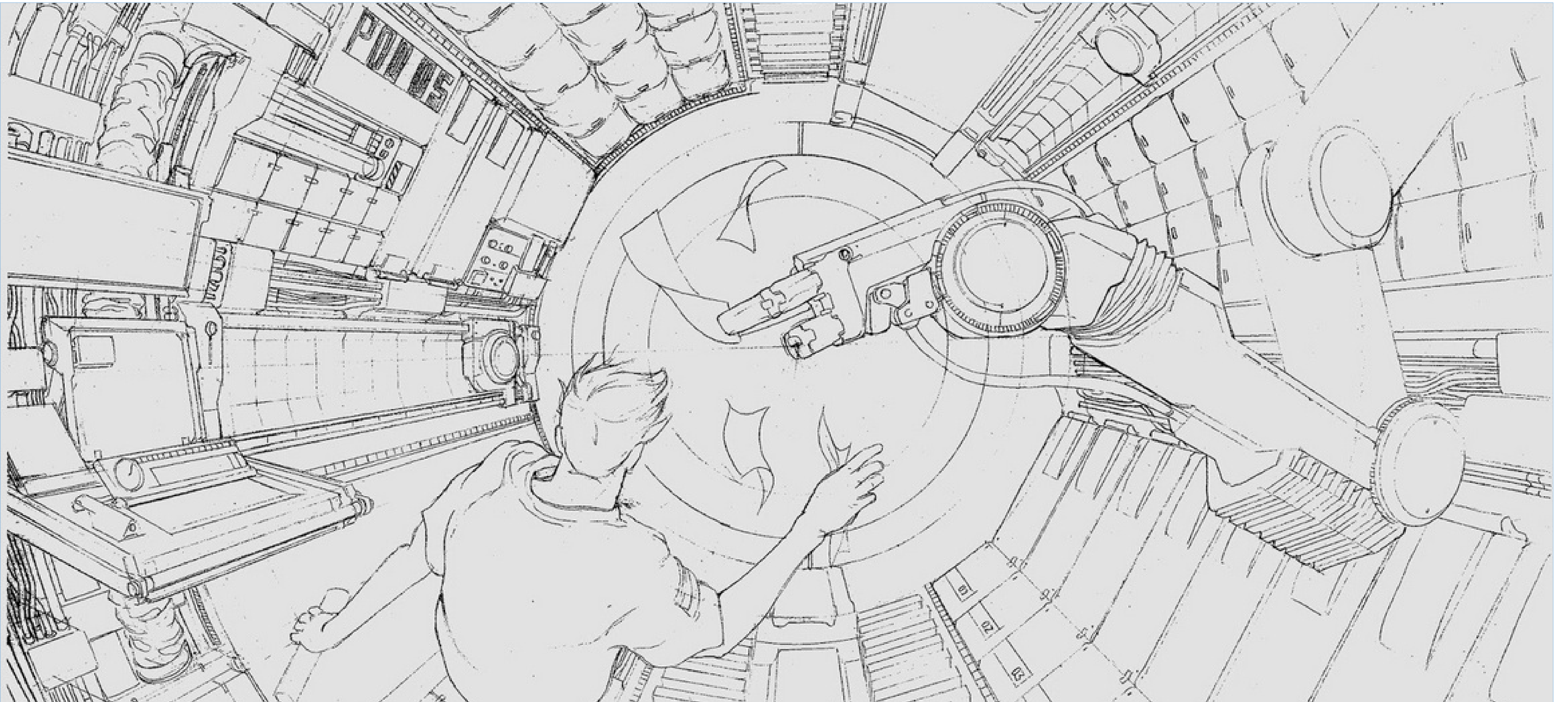
The basic design components are light and shadow, light and dark, white and black. These two colors - non-colors - allow you to get the most powerful combination.

It is worth noticing that in black and white drawing - we take out white imposing black with the tool we use. However, in the convex graphic techniques (ie. linocut, metalcut, etching, woodcut) we take out white color with a chisel/stylus/scraper leaving black (or color).

„*Black and white are the colors of photography. To me they symbolize the alternatives of hope and despair to which mankind is forever subjected.*"
Robert Frank

source: : http://www.hmseurope.com/silhouette%20régressif.jpg
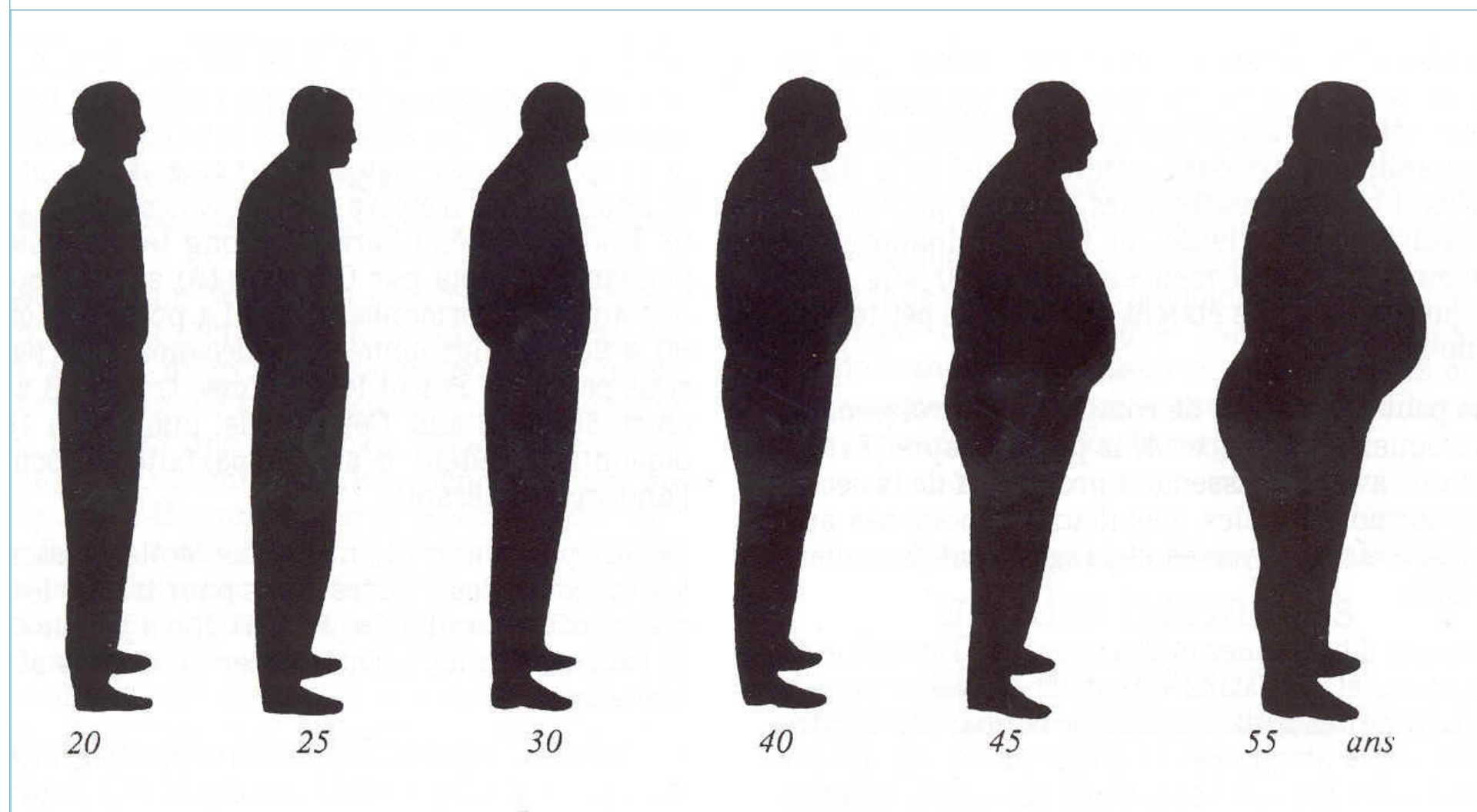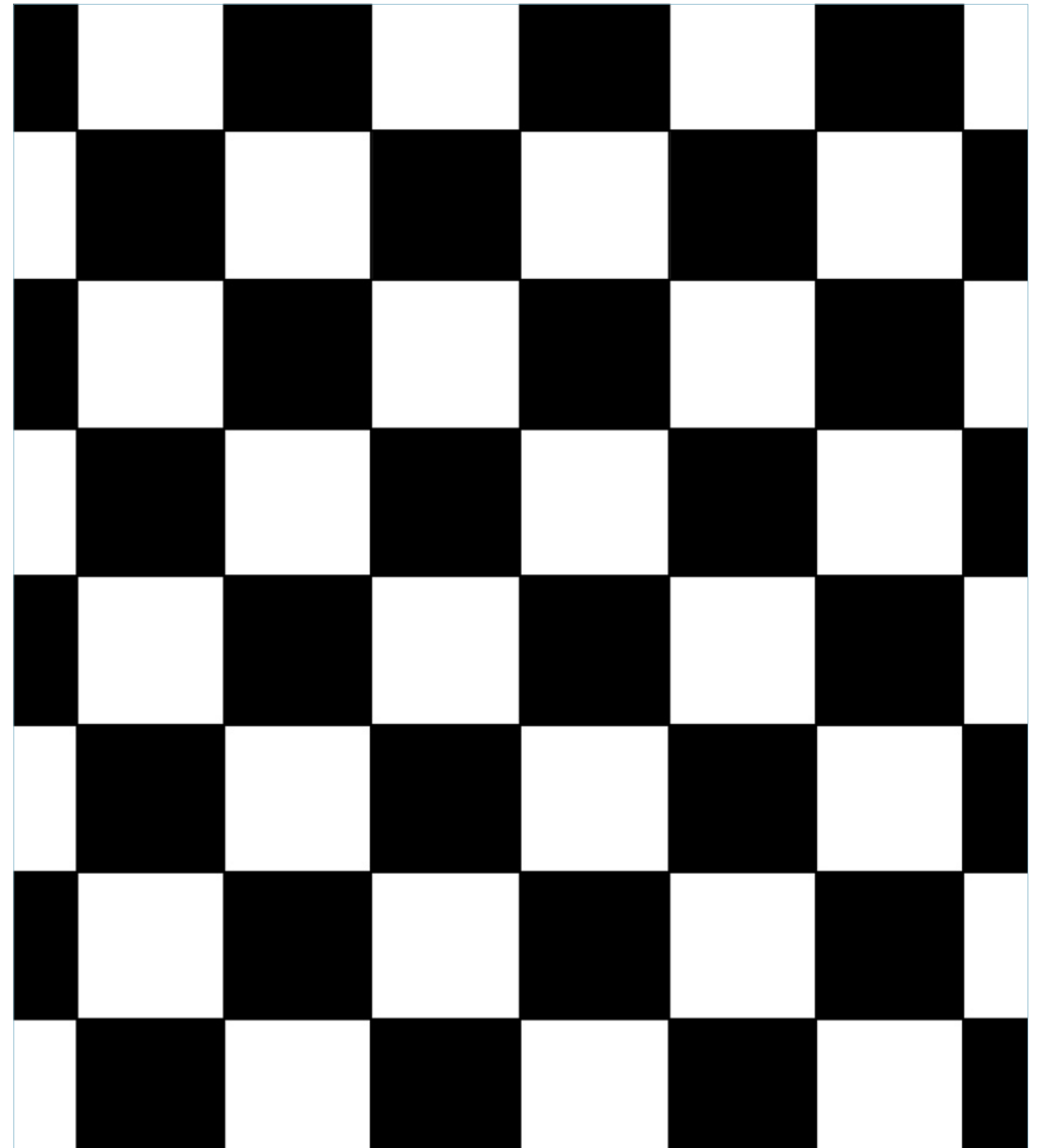
There is a wide range of midtones between the black and white.

*„Life isn't black and white. It's a million gray are-
as, don't you find?"*

Ridley Scott
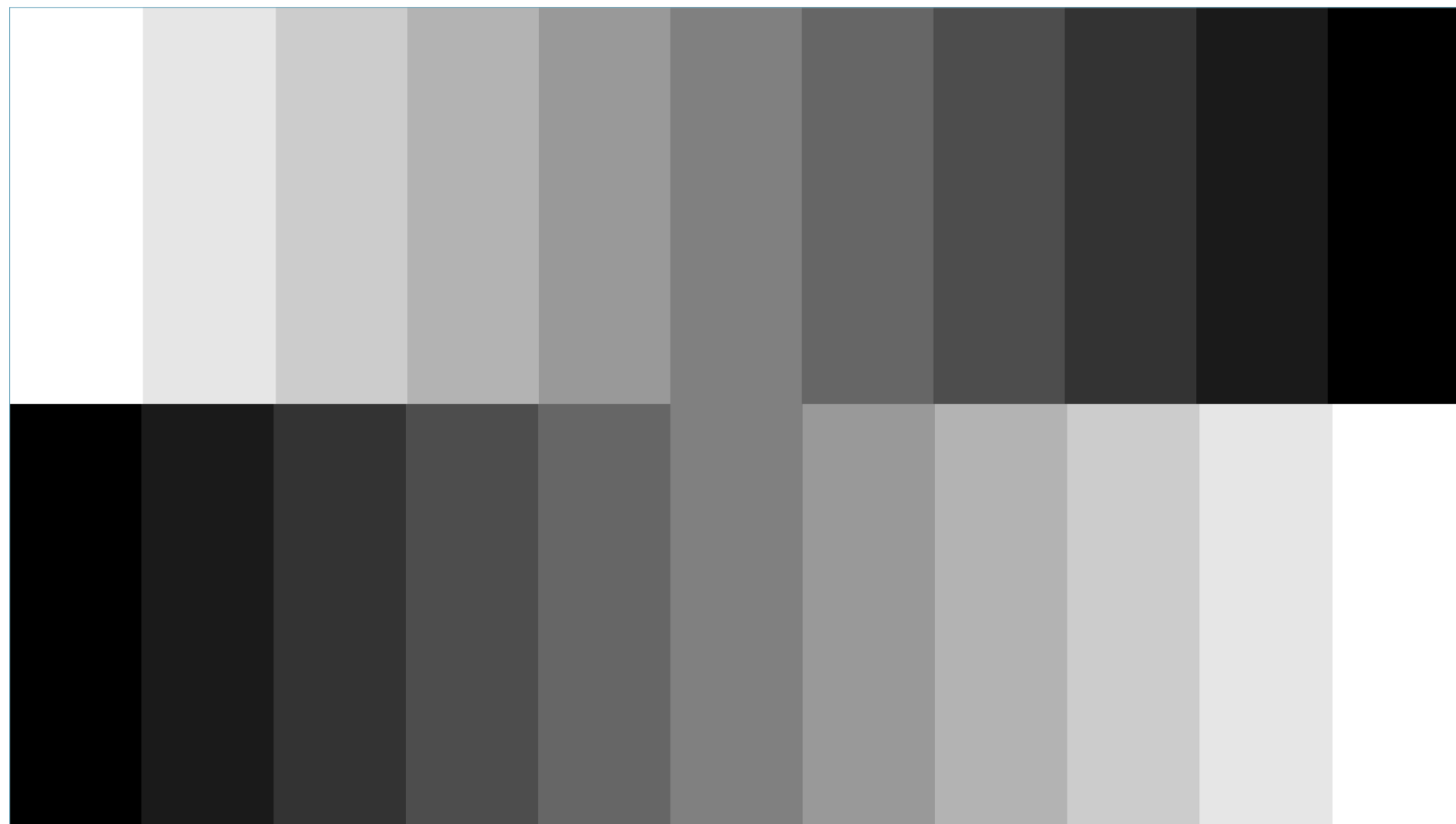
The phenomenon of perception of color is a bio-physiological process which involves the eye, nervous system and vision center in the brain with the light, one of the most complex natural phenomena, responsible for color apprehension.

„Color is the keyboard, the eyes are the harmonies, the soul is the piano with many strings. The artist is the hand that plays, touching one key or another, to cause vibrations in the soul.”

Wassily Kandinsky

TRADITIONAL
COLOR WHEEL

Red

OrangeRed

RedViolet

Orange

Violet

YellowOrange

VioletBlue

Yellow

Blue

GreenYellow

BlueGreen

Green
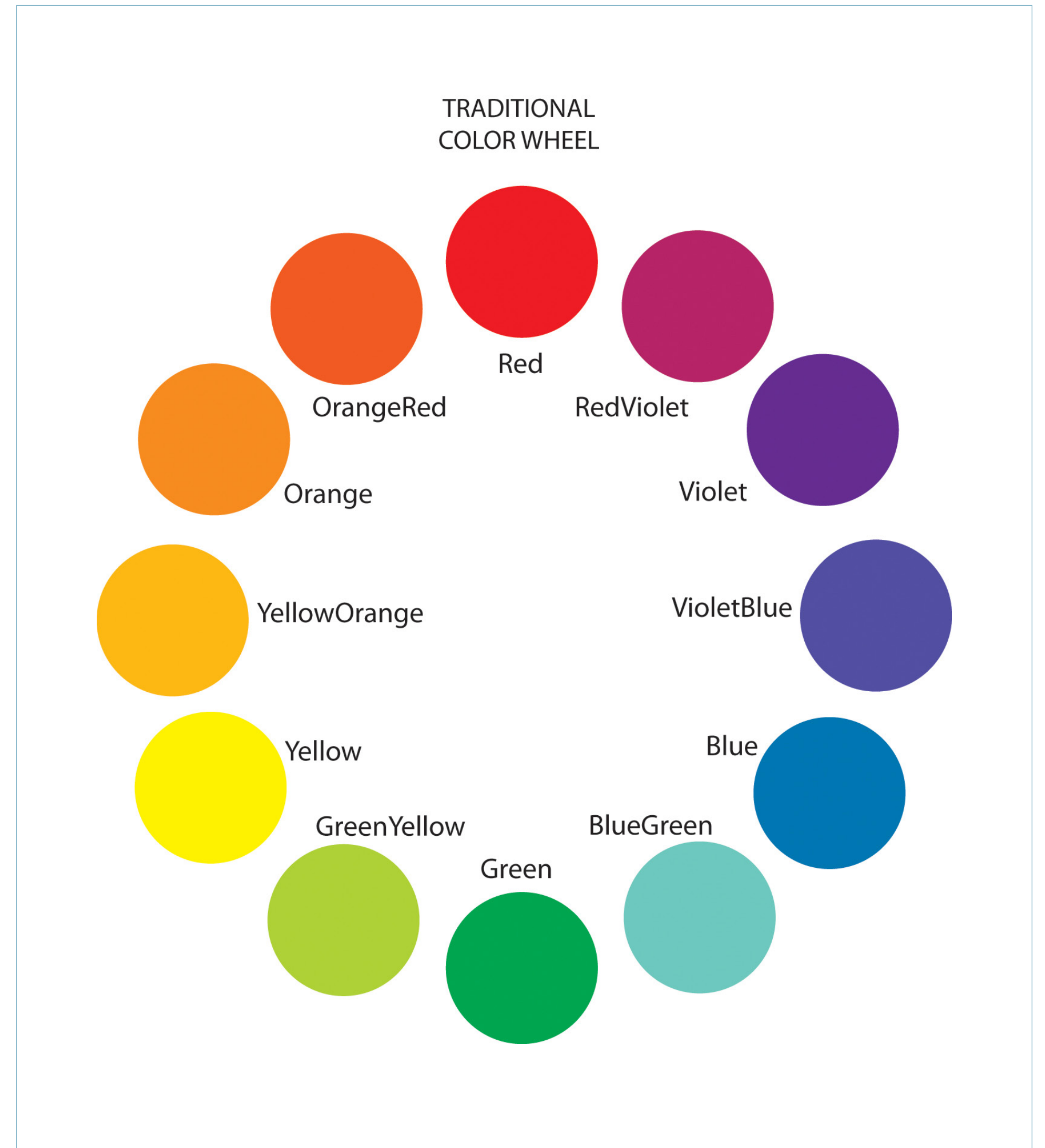
source: http://loopele.com/home-design-color-palettes/

Color palettes allow you to juxtapose different variants of the selection of colors. It is easy to select two colors that go together. The trick, however, is to choose a gamut consisting of 3 and more colors. Warm colors are perceived as positive and soothing, but they may express a feeling of warmth. They can also be used as warning colors. Cool colors are calming, but such distinction may appear to be confusing. The choice of colors should be preceded by studies and experiments in mixing colors and shade composition.
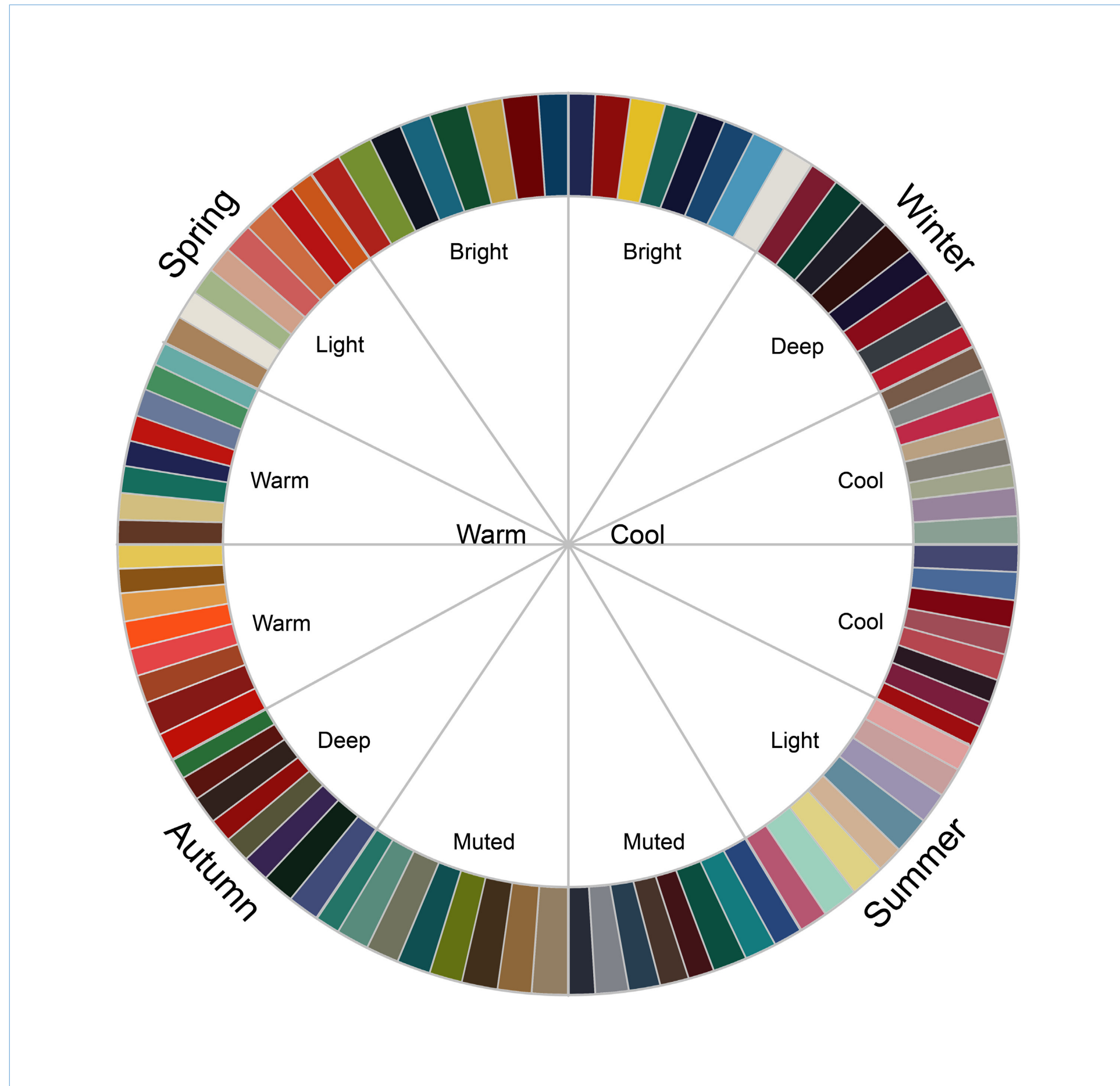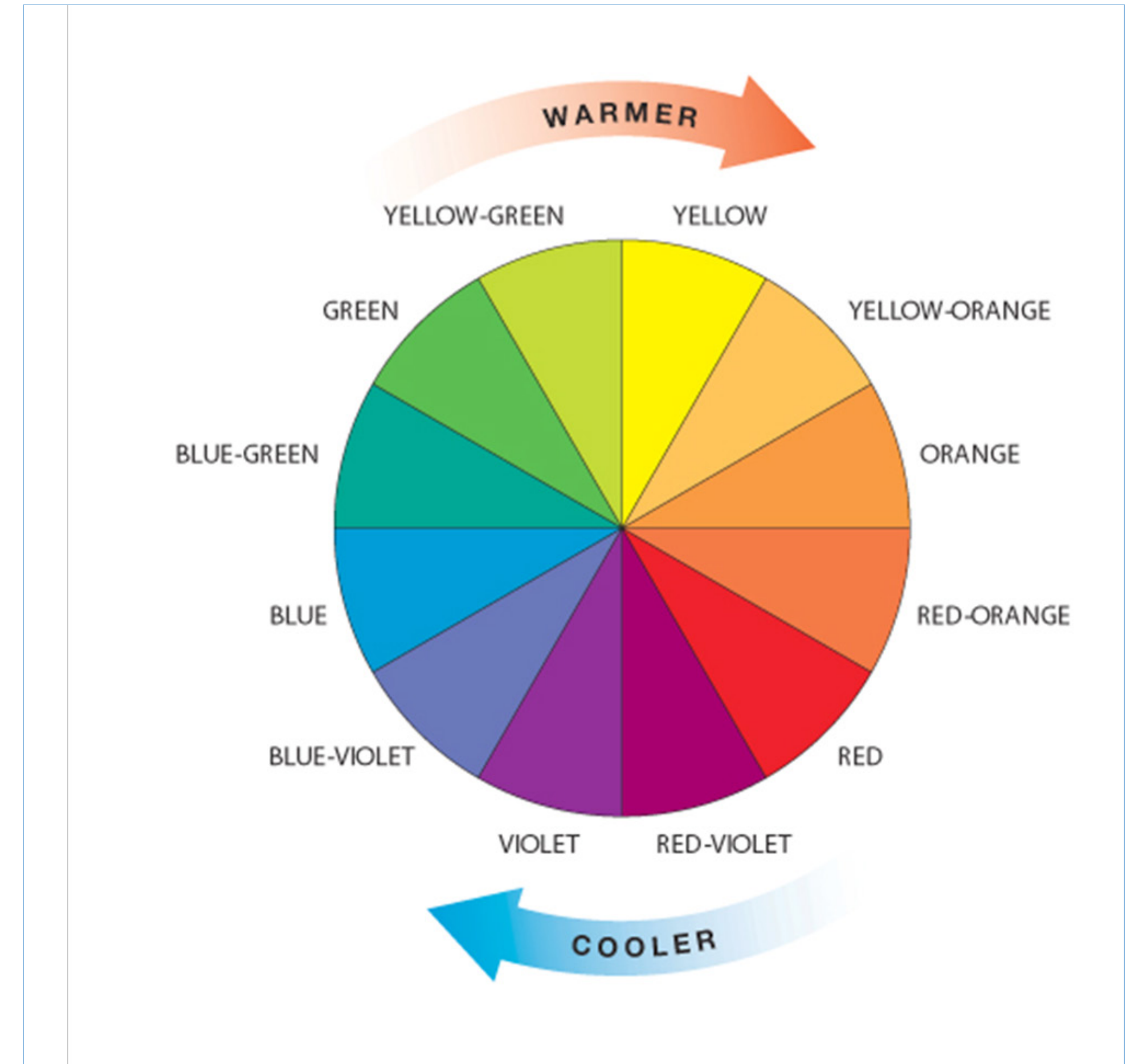
Ishihara color test plate. The number in the circle may not be visible to visually impaired people.

"The phrase and the day and the scene harmonized in a chord. Words. Was it their colours? He allowed them to glow and fade, hue after hue: sunrise gold, the russet and green of apple orchards, azure of waves, the grey-fringed fleece of clouds. No it was not their colours: it was the poise and balance of the period itself. Did he then love the rhythmic rise and fall of words better than their associations of legend and colour? Or was it that, being as weak of sight as he was shy of mind, he drew less pleasure from the reflection of the glowing sensible world through the prism of a language manycoloured and richly storied than from the contemplation of an inner world of individual emotions mirrored perfectly in a lucid supple periodic prose?"

James Joyce, A Portrait of the Artist as a Young Man

source: https://upload.wikimedia.org/wikipedia/commons/e/e0/Ishihara_9.png
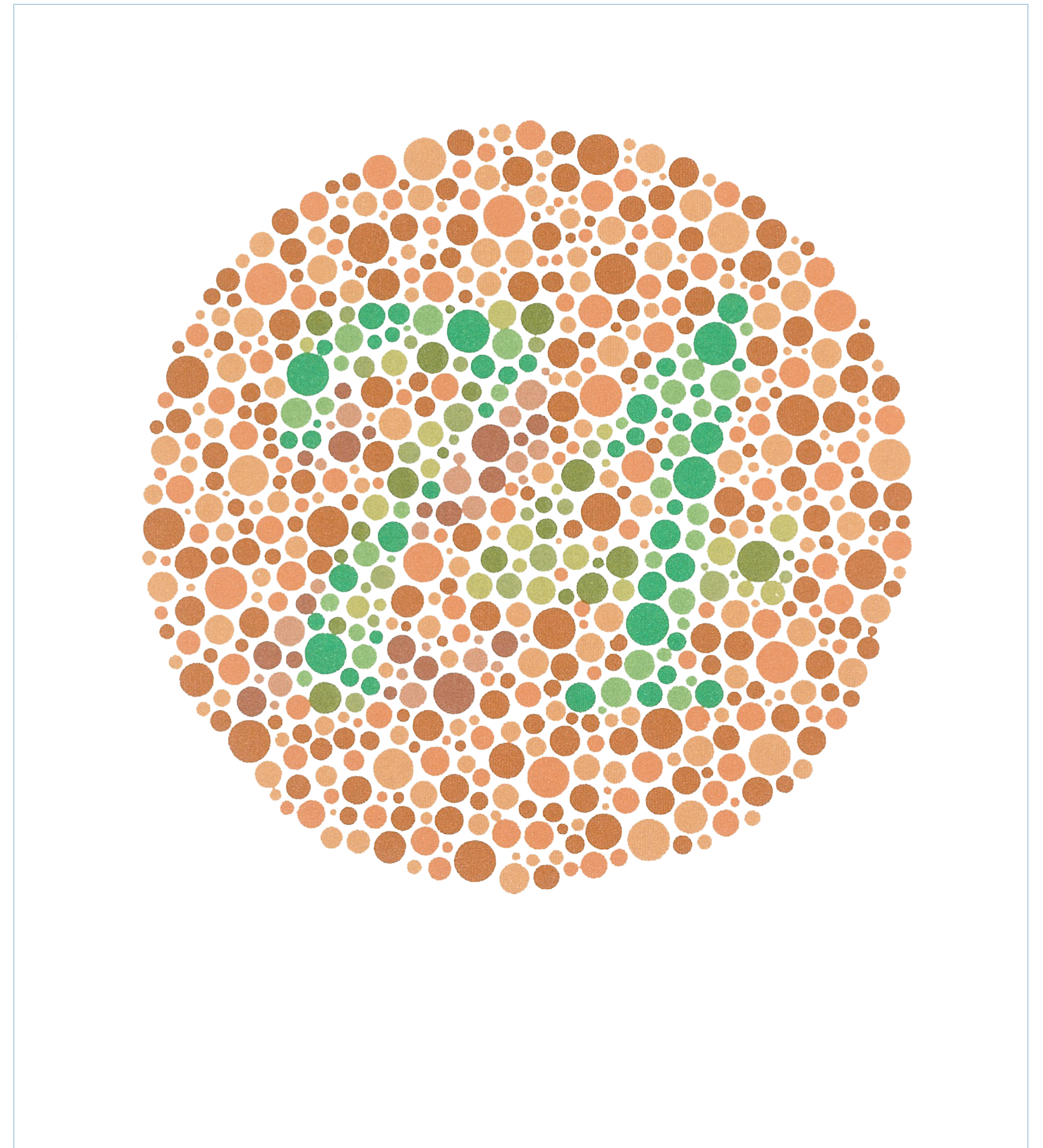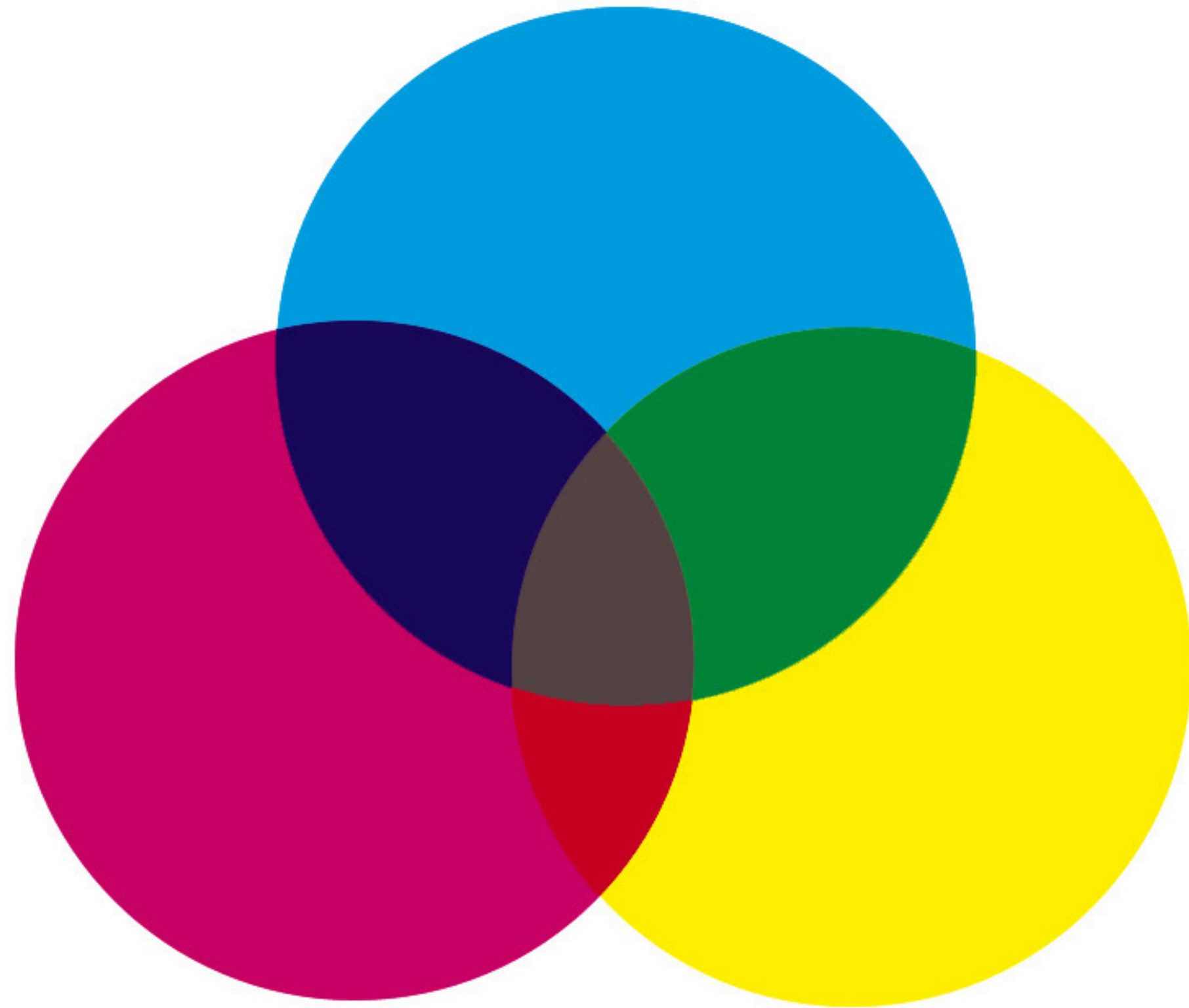
Subtractive color (CMYK)

Additive Color (RGB)

source: http://blog.thepapermillstore.com/wp-content/uploads/2014/09/Additive-vs-Subtractive.jpg

RGB

(R) Red   (G) Green   (B) Blue

CMYK

(C) Cyan   (M) Magenta   (Y) Yellow   (B) Black

PrintGiant

source: http://4.bp.blogspot.com/-VSPzeu_Z-Ok/UUHf1a0iCFI/AAAAAAAAAIg/L5Y1T8GqD5A/s1600/RGBuCMYK-Codes-SQUARE.jpg

source: https://fashionsolutions.files.wordpress.com/2015/01/pantone-rainbow.jpg
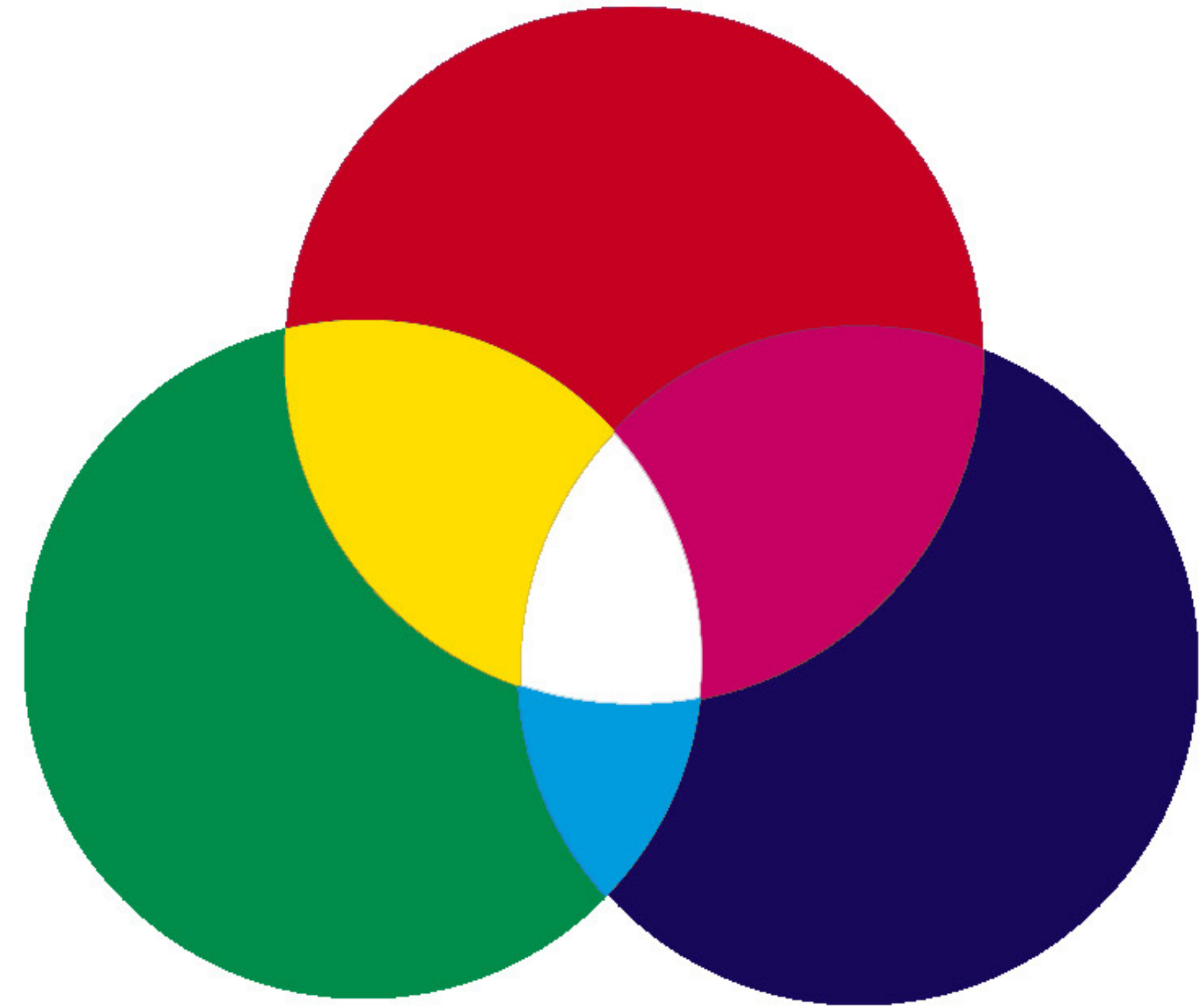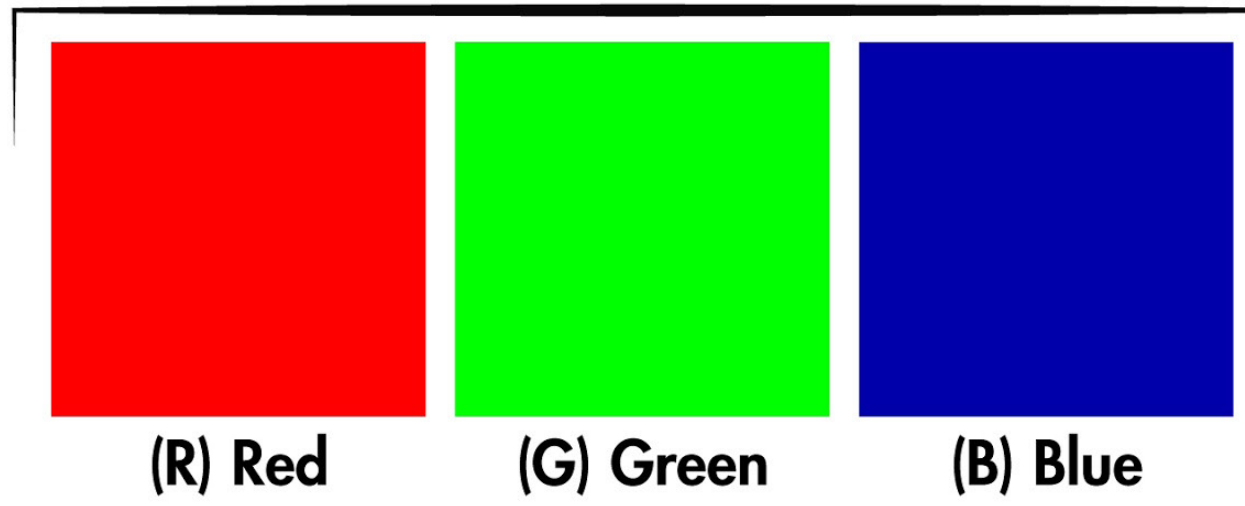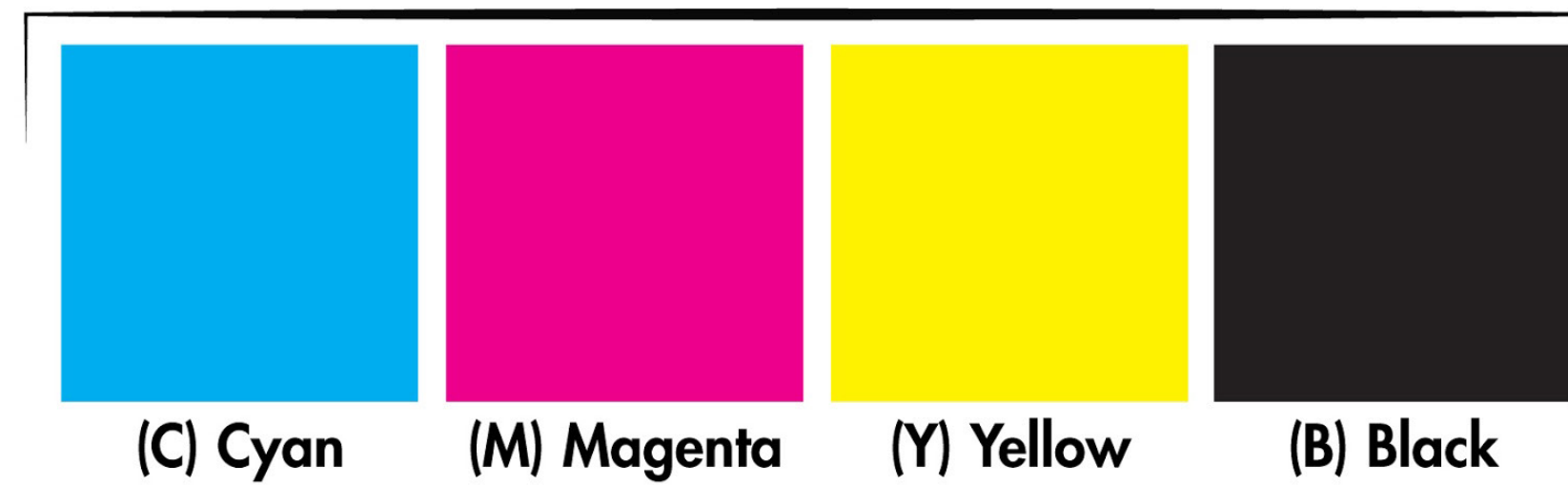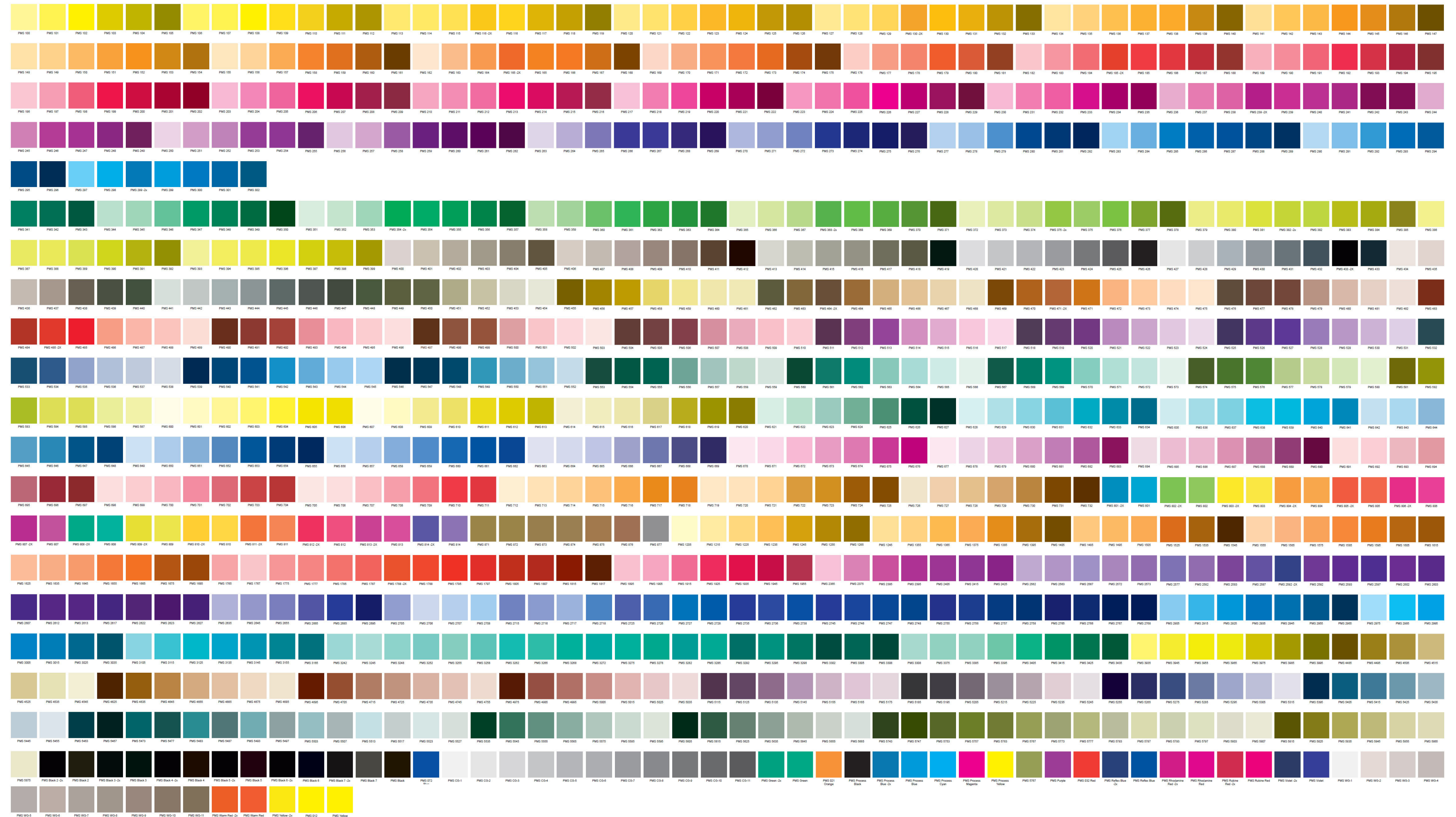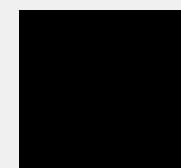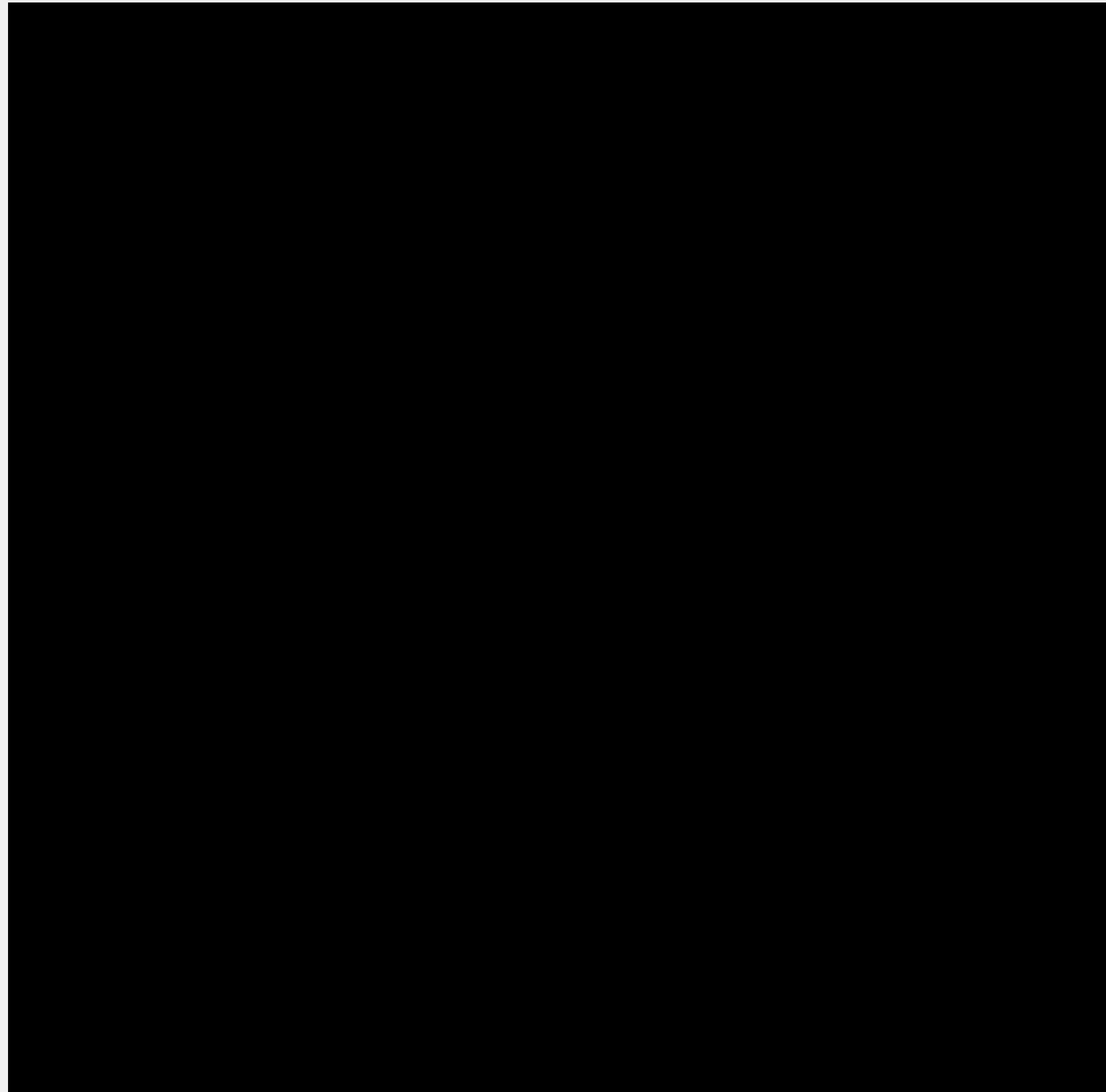
CONTRAST

Contrast can be achieved with the simplest means of expression - black and white. It stems from the natural relationship of light and shadow. It can also be created with the implementation of a scale - whether large or small. The contrast of scale can be achieved by using all the means of art - not only typography. It can easily be achieved through color combinations with the most powerful setup produced by complementary colors pairing: red - green, yellow - violet, blue - orange.

„There are dark shadows on the earth, but its lights are stronger in the contrast.”

Charles Dickens

CONTRAST

CONTRAST

small

BIG
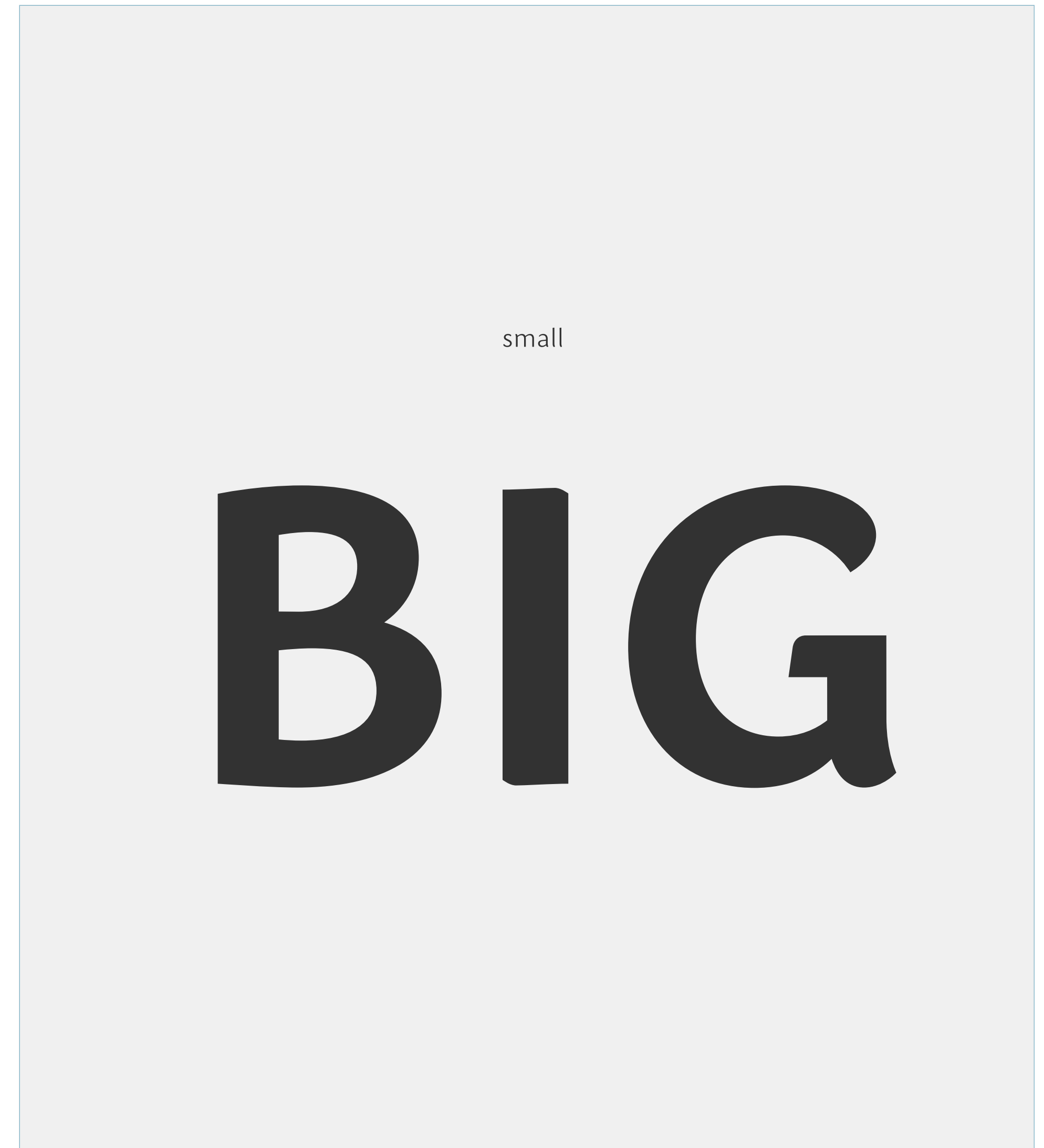
In graphic design, as well as in other areas of the visual domain - composition is a way to organize elements that compose an image.

„Eye movement. Composition is all about the way a viewer's eye moves through the page. You can control this. Deciding composition is deciding which direction to lead the eye, what to stop on, and where to go next."

source: http://lulie.deviantart.com/art/The-Secret-to-Composition-272036625
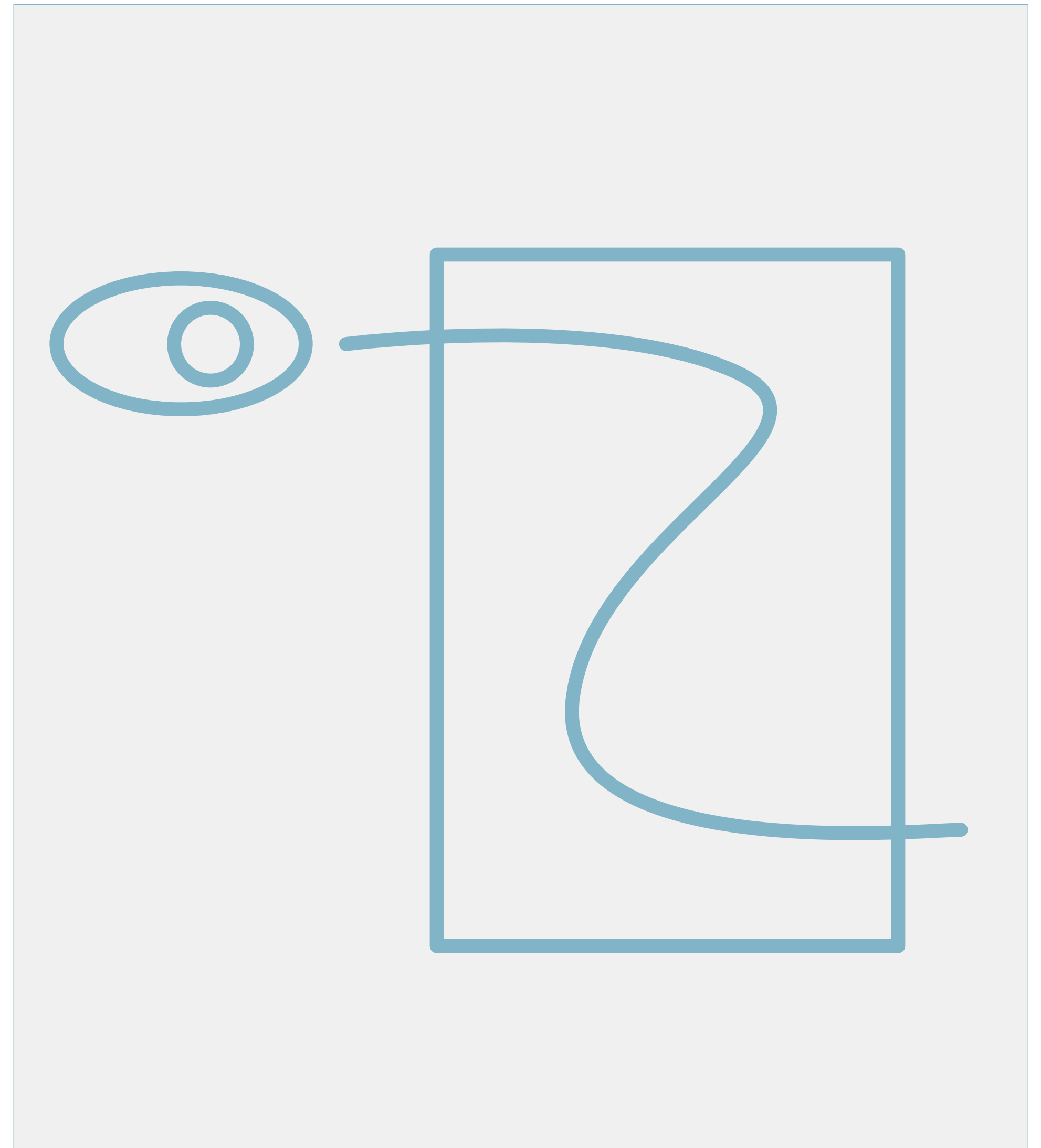
Symmetrical composition gives the impression of plan and purpose. Symmetrical sys-
tems allow to control the chaos, however in the long run may appear to be boring.
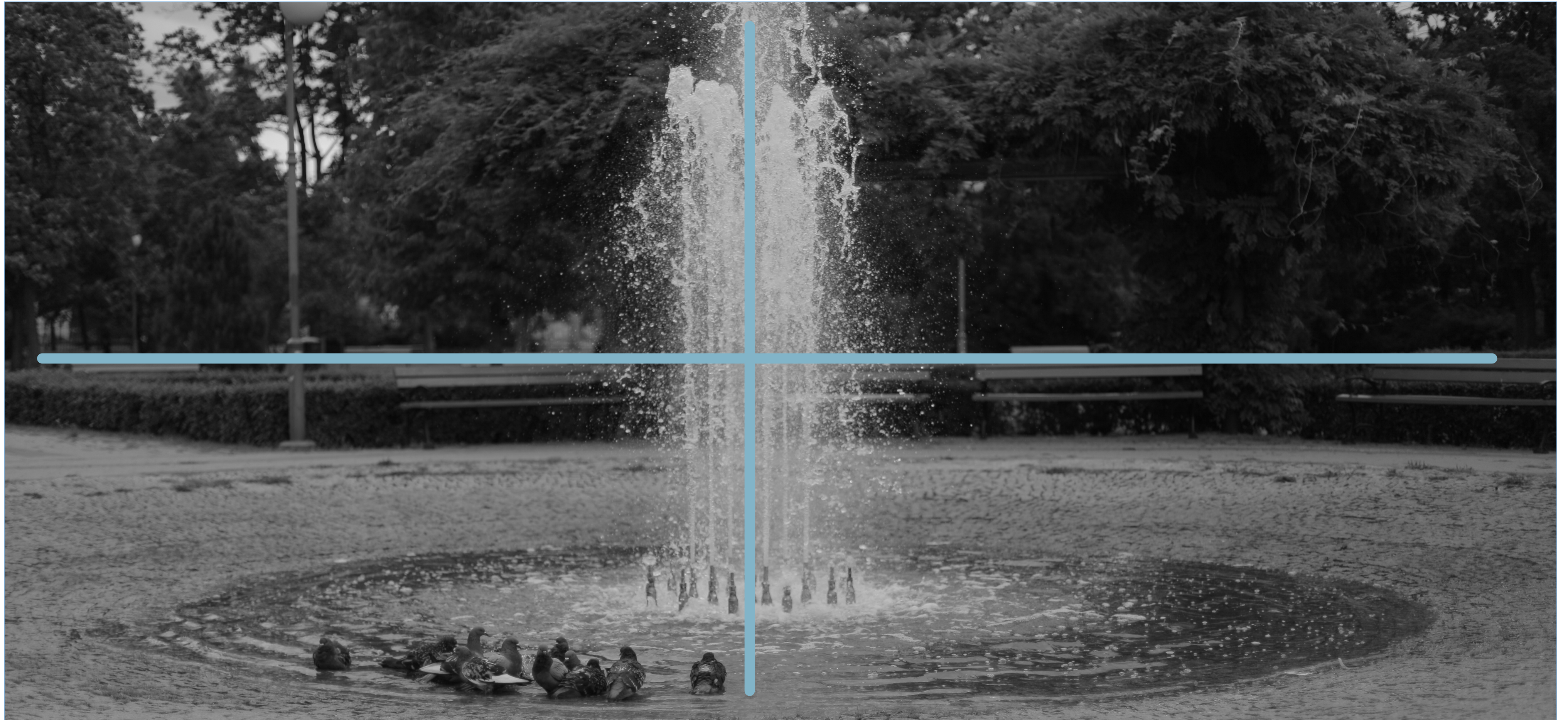
Slant-based composition feels very dynamic, as opposed to axial, symmetrical compo-
sition. Such an approach introduces a sense of movement. In cinematography this manner
of framing is known as Dutch Tilt.

Compositions based on a steady perspective give the impression of planned and inte-resting;
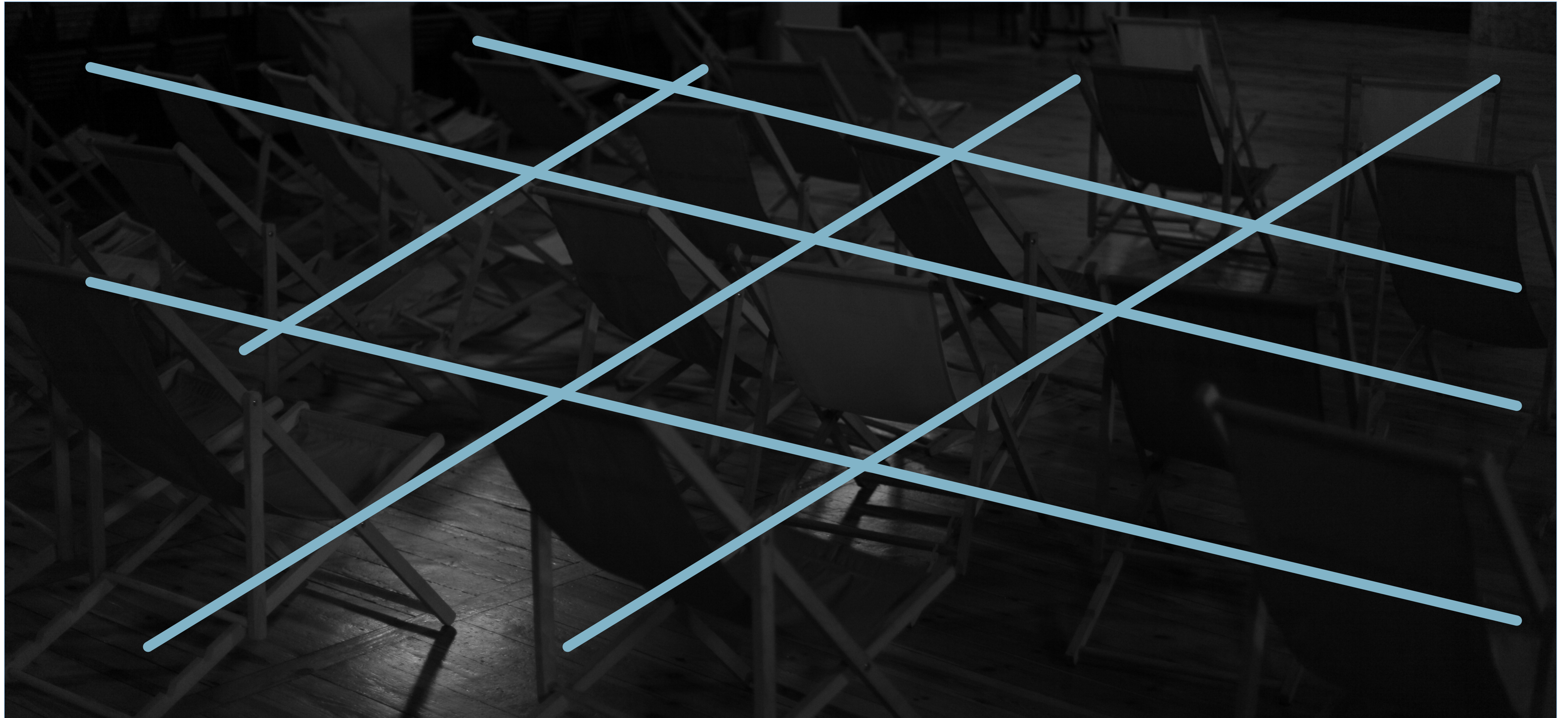
The depth of field allows you to extract the selected plan in a photograph or a drawing, bringing other parts of the image to a blur. A sharp object in the foreground, background or placed somewhere inbetween may become a focal point as a result. This is a good way to highlight the most important and meaningful elements of created image. In photography, the depth of field of an image can be achieved taking photos with a maximum possible aperture of f/1.2 or f/1.4.

The image, in which there is a large number of components can create the impression of mosaics, pattern, without clear compositional axis.

In contrast to the compositions consisting of many elements, you can use a lighter composition with the use of free space in the frame. The lightness and transparency of the composition allows to distill the most important elements of an image. It is worth remembering that in graphic design an element which should be at the center of the document should be positioned slightly higher than indicated by the axis of symmetry. Such method gives the impression of supporting the object by larger space at the bottom.

The Rule of the Thirds divides the frame into nine equal parts. Their intersections are called power points (or crash points).
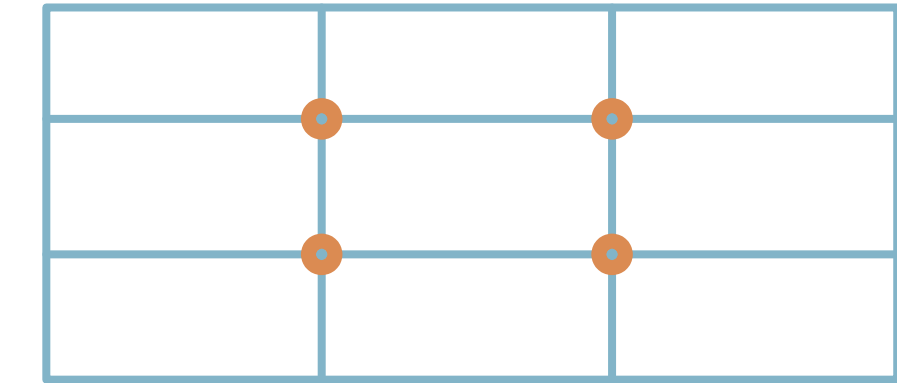
By setting the most important element in the power point we give it more meaning
via the composition. In photography and film, placing the hero in power point gives the
viewer better way into his psyche and emotional states.

Principles of composition used in the design can be translated into typography, the typesetting of books, newspapers, pamphlets or even posters. Designing with the compositional grid allows you to arrange the elements and introduce the principles which the reader/viewer follows.
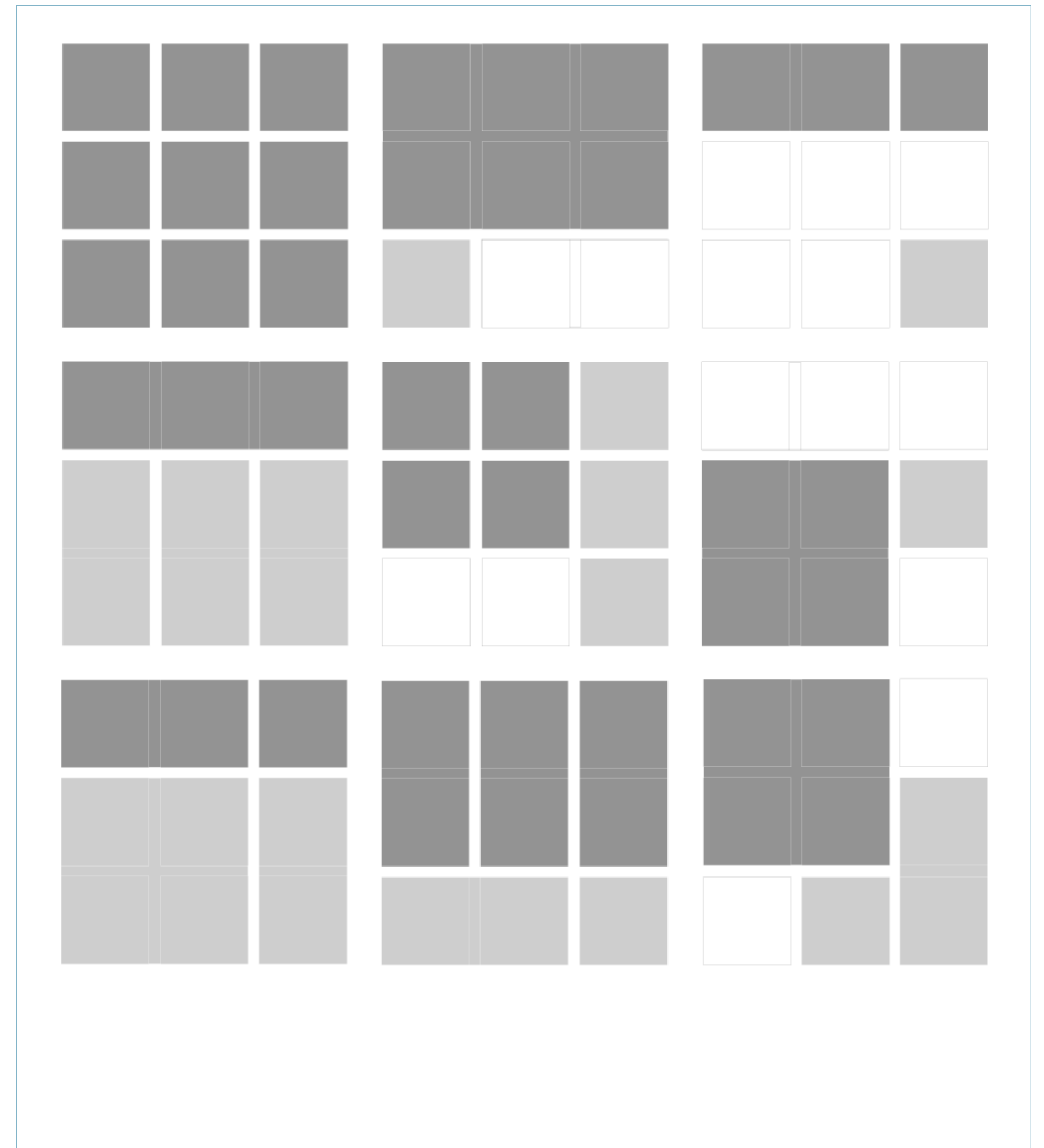
http://www.thegridsystem.org

To maintain clear, aesthetic principles of the perception of text on the page one can apply a system of lines. Construction and auxiliary lines develop architecture design of a page. Fixed aligning can be developed and used throughout the whole printing material, it can also be deliberately broken, allowing for an interplay between given text and its reader.
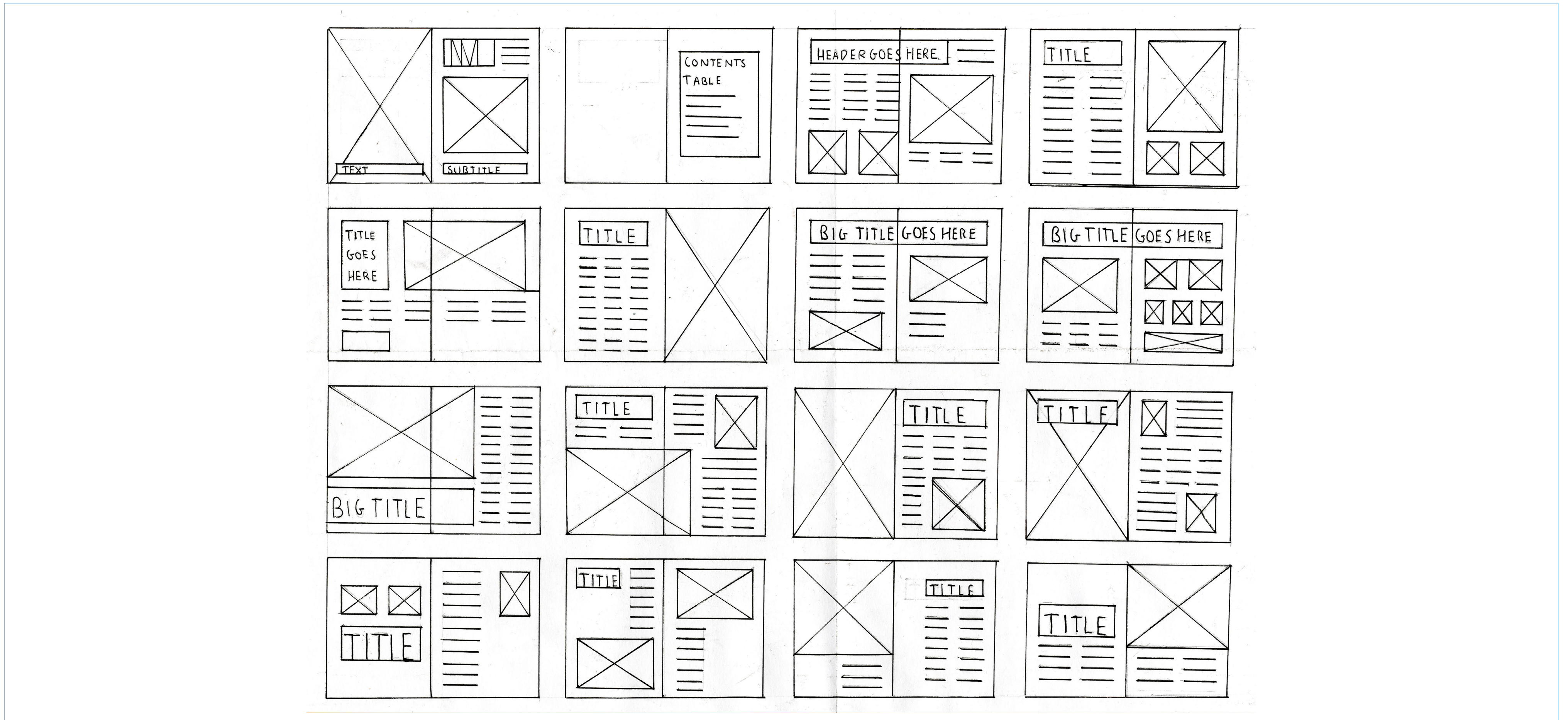
Russian artist and important figure of Russian Constructivism, El Lissitzky, created many great graphic design and typographic layouts. His compositions, though very dynamic and expressive, were not based on grids. However, their impact is a good counterpoint to the design with the use of grids.
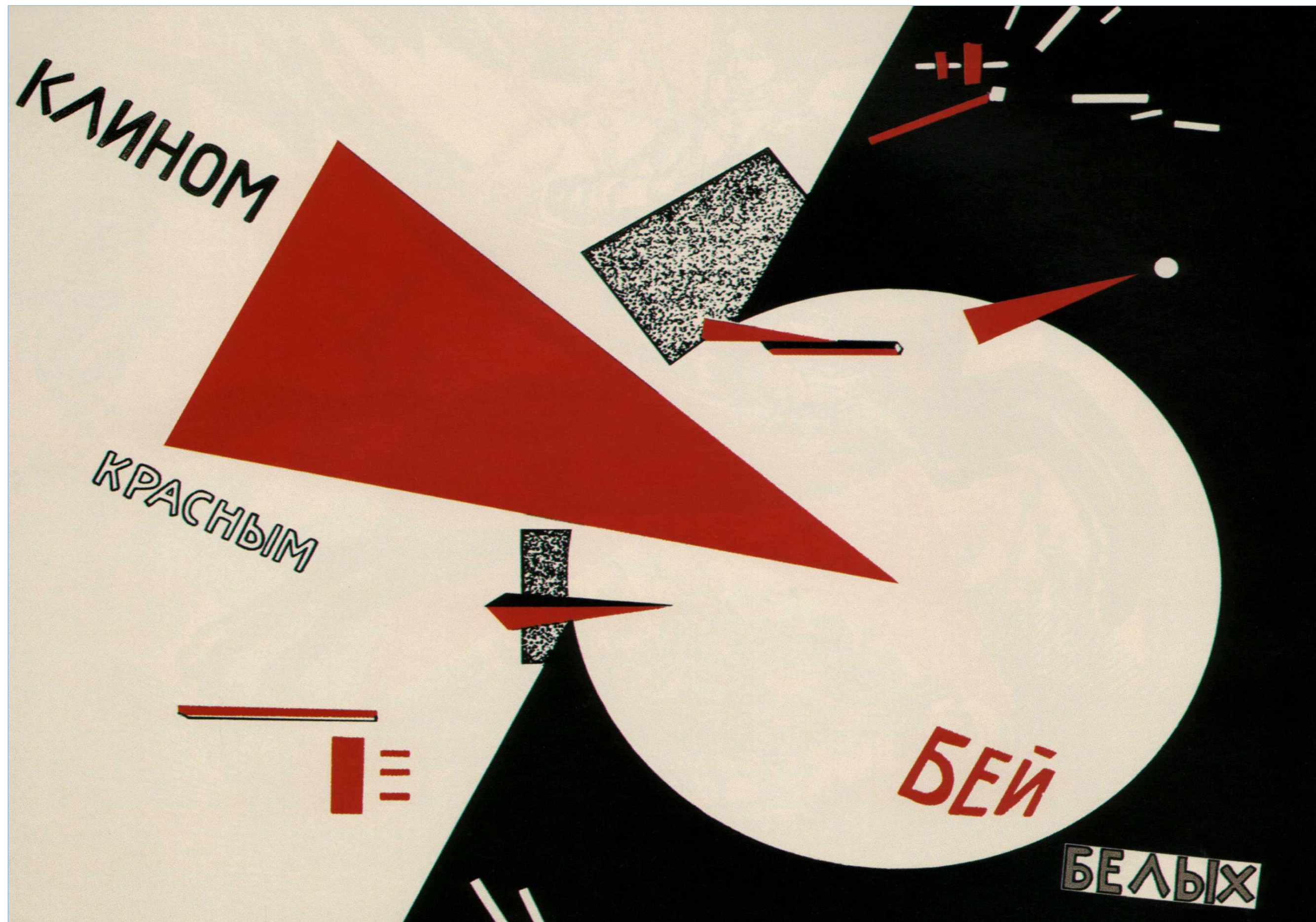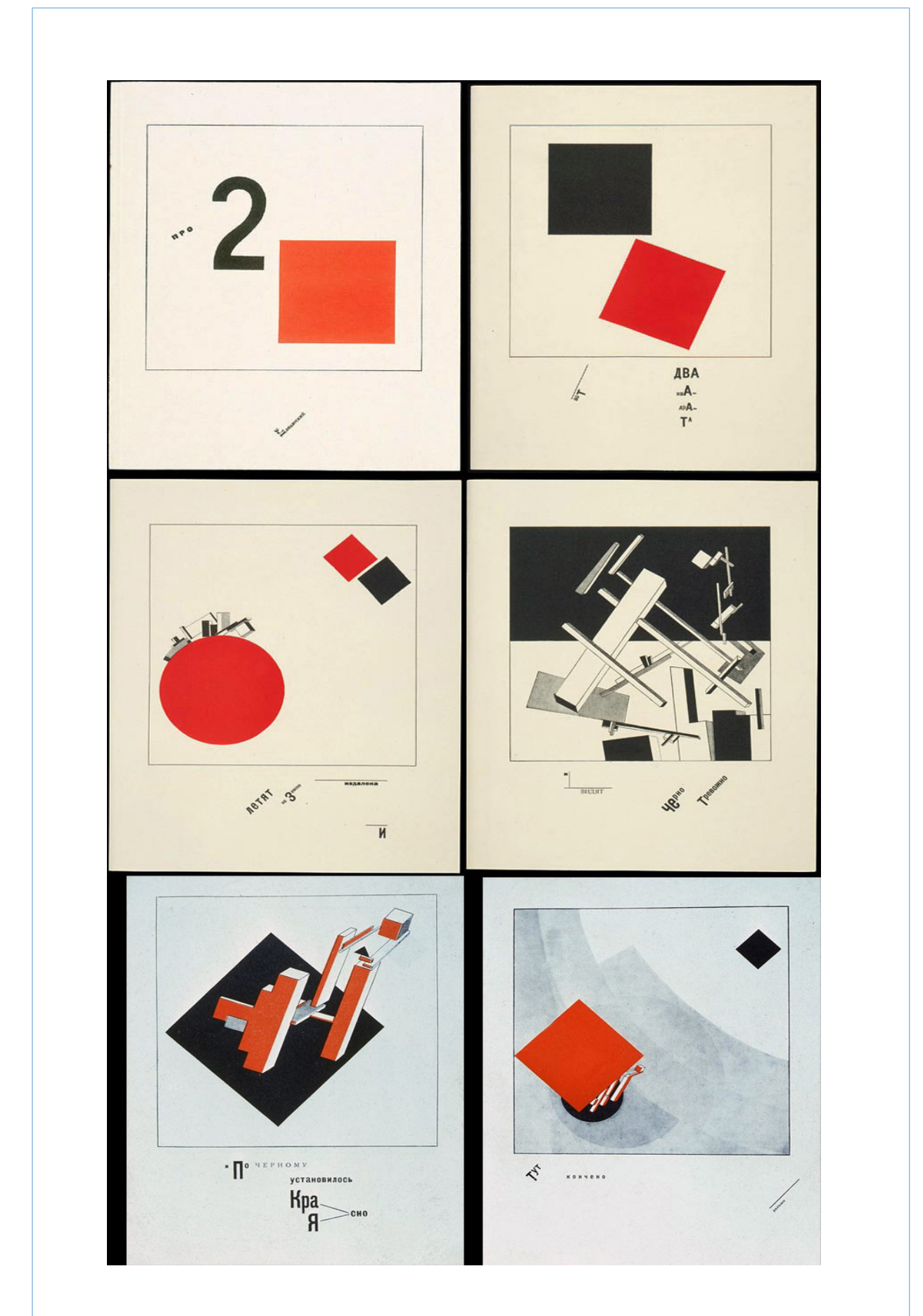
The cover of the newspaper, magazine, book or other publications including digital media, is designed with the use of grids and relation between the vignette, photos and headlines. The cover is a design structure with a highly visible design idea put to the forefront.

To better understand the presented material you will find a small glossary below. A typeface is comprised of partially repetitive elements that make up its character. Each of these elements has its own individual name. A letter is based on the horizontal lines: baseline, x-height, ascender height, cap height (capital letter height) and descender, which is the lowest line corresponding to the length of letters with descenders.
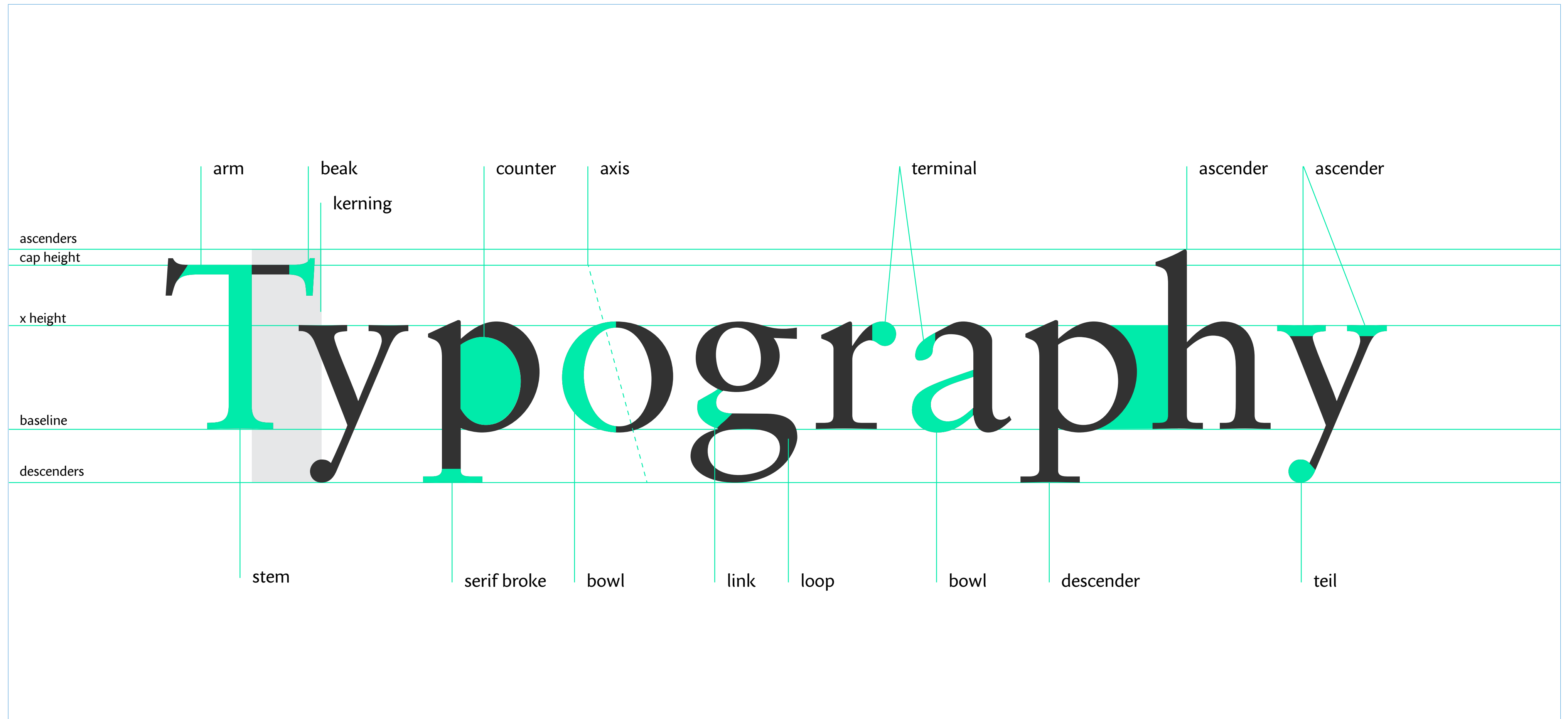
In the twenty-first century it is difficult to establish a unified classification with dozens of typefaces appearing every day

Compared with graphic design, typography is a relatively narrow domain. Nevertheless, the classification of typefaces is much more complex than it may seem at first glance. In the twenty-first century it is difficult to establish a unified classification with dozens of typefaces appearing every day. Trends and styles intermingle – there are many new opportunities attributed to the development of technology.

For the purposes of this presentation I have classified different types of typefaces into wider subgroups. As a result, we differentiate 3 main groups of typefaces: Serif, Sans-serif and a joint group together with Display typefaces, which are mainly used for headlines, posters and large format printing.

In each of these groups I have identified 4 subcategories, which show wide variety of available typefaces. Information regarding each of these examples was limited to basic data such as characteristics of a given group and the most common areas of their use.
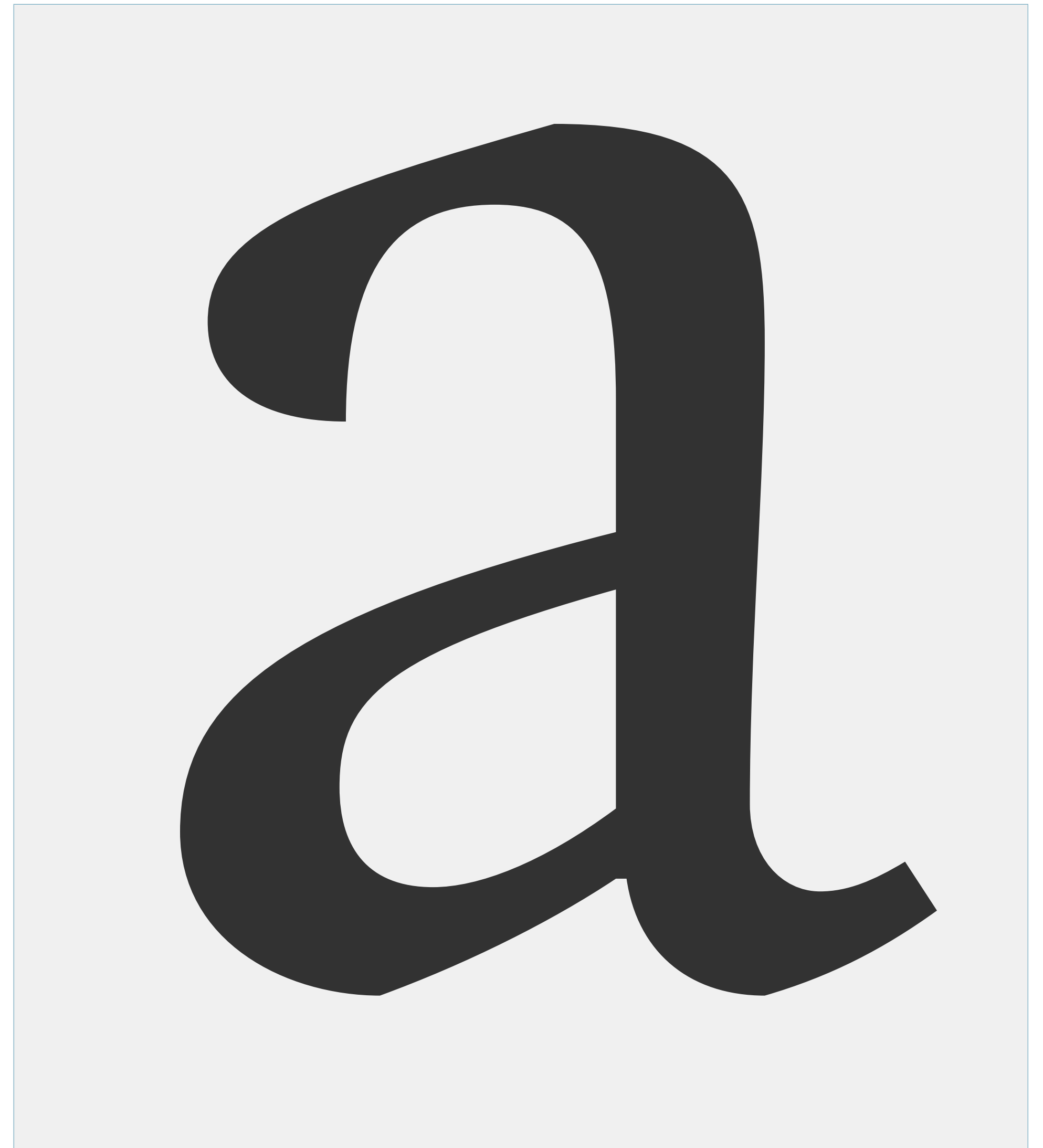
The first group are Serif typefaces. In typography, a serif is a transverse or slanted end of a stroke in a letter or symbol. Their form was applied for the first time on Trajan's Column – it turned out that the chisel could not cope with the sharp end of the letter, so the stonemason adorned ends of letters with serifs. In addition to the purely visual function serifs lead the eye through the text, making the reading experience better and more smooth. We can distinguish countless number of different serif styles, depending on their design and character.

New Wave Skolar Hamburgevons

Neo classical Didot Hamburgevons

Old style Adobe Garamond Hamburgevons

Slab Brie Serif Hamburgevons

New Wave is a name for a group of serif typefaces produced today. They are rooted in the history of typography, but frequently employ modern solutions. These typefaces often have a calligraphic detail, so that the letter acquires lightness and familiar style. They usually have low stroke contrast and a relatively large x-height. Serifs in such typefaces are often asymmetric – adding dynamism in the text. Ascenders go beyond the height of the capital letter (cap height).

Skolar

Neo Classical typefaces are mostly digitized old typefaces – developed anew with the help of a computer. They usually have a very high stroke contrast between horizontal and vertical lines. Depending on the context they may emphasize tradition, conservatism or fragility. Because of Neo Classical typefaces' timeless elegance they are often employed in visual identification of fashion houses and luxury goods brands.

Didot

Similarly to Neo Classical typefaces, Old Style typefaces base on the achievements of old typographers – the old solutions for readability and proportions of the characters are still valid. Typefaces in this group are characterized by symmetrical, softly outlined serifs, high out-stretched ascenders of "b", "d", "l" and "k" letters and small x-height – set by the upper part of the letter "o". This type of typefaces is used in printed texts. They are frequently used for various logos in order to emphasize elegance and tradition.

Garamond

The last group of serif typefaces are Slab-serif fonts. These typefaces are characterized by virtually zero contrast (the line of the letters is the same in each place) and very thick serifs. Due to their relative novelty Slab-serif typefaces are utilized when there is a need for a modern look of a given text or logo. For this reason, Slab-serifs are frequently chosen as typefaces for websites dedicated to design. They are also used by startups and similar enterprises.

Bree Serif

Sans typefaces emerged much later, in the early twentieth century. In most cases they are characterized by a more modern look. Similarly to Serif typefaces, Sans can be divided into 4 main sub-categories.

Humanist Gill Sans Hamburgevons

Geometric Futura Hamburgevons

Grotesque Helvetica Hamburgevons

Mono PT mono Hamburgevons

Humanist Sans-serif fonts are usually two-linear which means they incorporate gradation of lines. Precursors of this kind of typefaces are British font designers Eric Gill and Edward Johnston. The letter of this type is characterized by a strong and identifiable detail. The slightly higher stroke contrast makes them great for continuous texts and at the same time does not cause eye fatigue. Typically, the proportions of these types are similar to Antiqua, therefore typefaces such as Gill Sans are called Sans-serif Antiqua.

Gill Sans

Geometric typefaces, unlike Humanist, are based on clearly defined modules. Due to their monolinearity there is practically zero stroke contrast. Because of the similarities between the letters, it is very hard to read continuous text created with geometric typefaces.

Such typefaces are employed whenever we want to emphasize modernity and independence. With emergence of the new trends Geometric fonts are very frequently used for products targeted for urban youth.

Futura

Grotesque fonts, which are the most commonly used typefaces, have many applications. They have a modular design, but with some slight optical adjustments work for places with pure and simple ambience. In addition to visual identification they are frequently utilised in wayfinding and signage. The most famous representative of Grotesque typeface is Helvetica designed by Max Miedinger. In Grotesque proprtions of capital letters are very similar, eg. usually narrow letter "S" and wide letter "O" have a similar width in Helvetica.

Helvetica

The last group are Monospace typefaces. These are the fonts used for special purpose, for example they are used by computer programmers. Their trademark, setting them apart from other typefaces, is the fixed width of characters. For example, usually wide letter "M" takes exactly the same amount of space as small letter "I". Apart from their application in IT, such typefaces are increasingly used for various design projects since they easily create a very original atmosphere. Monospace typefaces emphasize modernity and avant-garde.

PT Mono

The last and most numerous group are Display typefaces – the fonts at large sizes, 18 points and larger. These include Ink and Grunge typeface, as well as various experiments.

Script Zapfino Hamburgevons

Decorative Curlz MT Hamburgevons

GROUNGE WOOD TYPE COLLECTION BANGER HAMBURGEVONS

Blackletter Brie Serif Hamburgevons
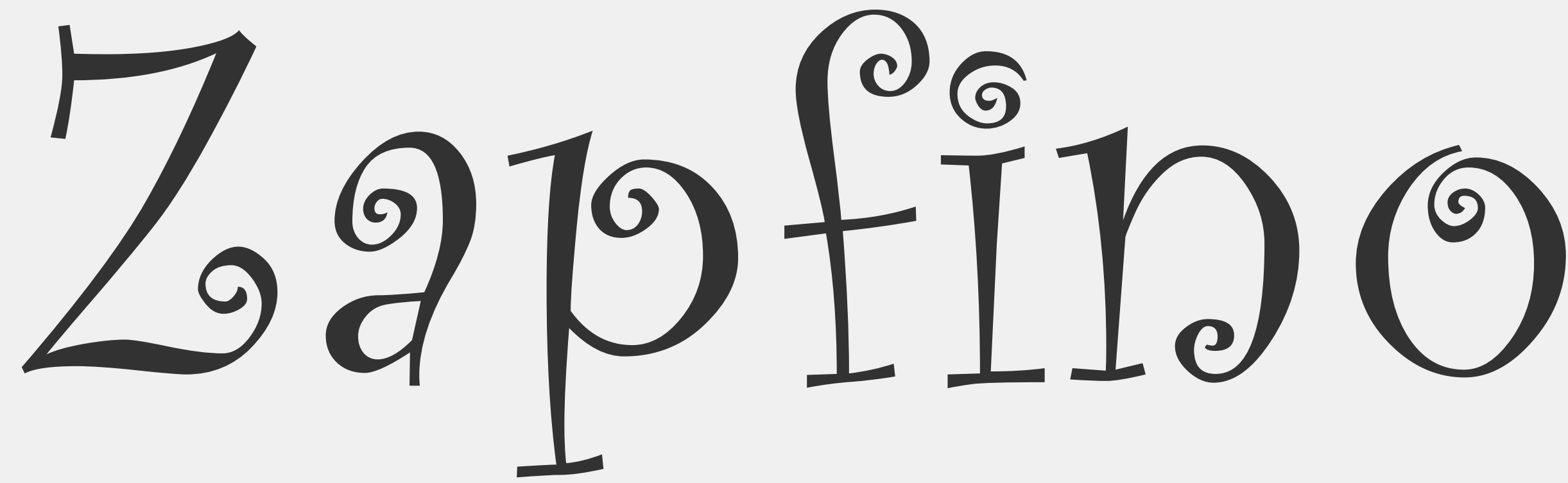
Typefaces from script category imitate handwriting. They are mainly a digitized calligraphy modified in font editing software. They are used in materials where there is a need to emphasize their original character, style and elegance.

Decorative typeface is used whenever there is a need to amplify the mood. Therefore this category of typeface will mostly be used in materials for children. Decorative typefaces are usually a caricature of letters with hilariously exposed details.

Zapfino

Grunge typeface look is a result of manual activities and the use of stencils, cutouts, handmade prints with wooden fonts. Such handmade letters are ideal for communicating everything associated with anti-corporate message. An important factor in emergence of such typefaces was the lack of budget and focus on home-printing methods. Grunge typeface was mainly associated with punk posters in the 1980s. Today we can observe the typeface in various eco-friendly webstores or used for hand produced leather belts.

Another set of typefaces is based on historical scripts. Blackletter are fonts that were created after digitization of gothic calligraphy. Due to their overuse by certain extremist political groups and communities, such typefaces are heavily charged with emotions.

Typeface design is a very complex process. We can distinguish main stages that always take place in the design process – keeping in mind, however, that every typographer has his own individual approach to typeface design.

MAKING OF TYPEFACE

Typeface designing process always begins on a single piece of paper. The initial sketches, often expressive, are intended to identify the mood of the typeface. This stage is obviously preceded by a careful assessment of what is to be designed – precisely how many varieties the typeface will have, the type of Italics we want to design and the set of characters the typeface will support.
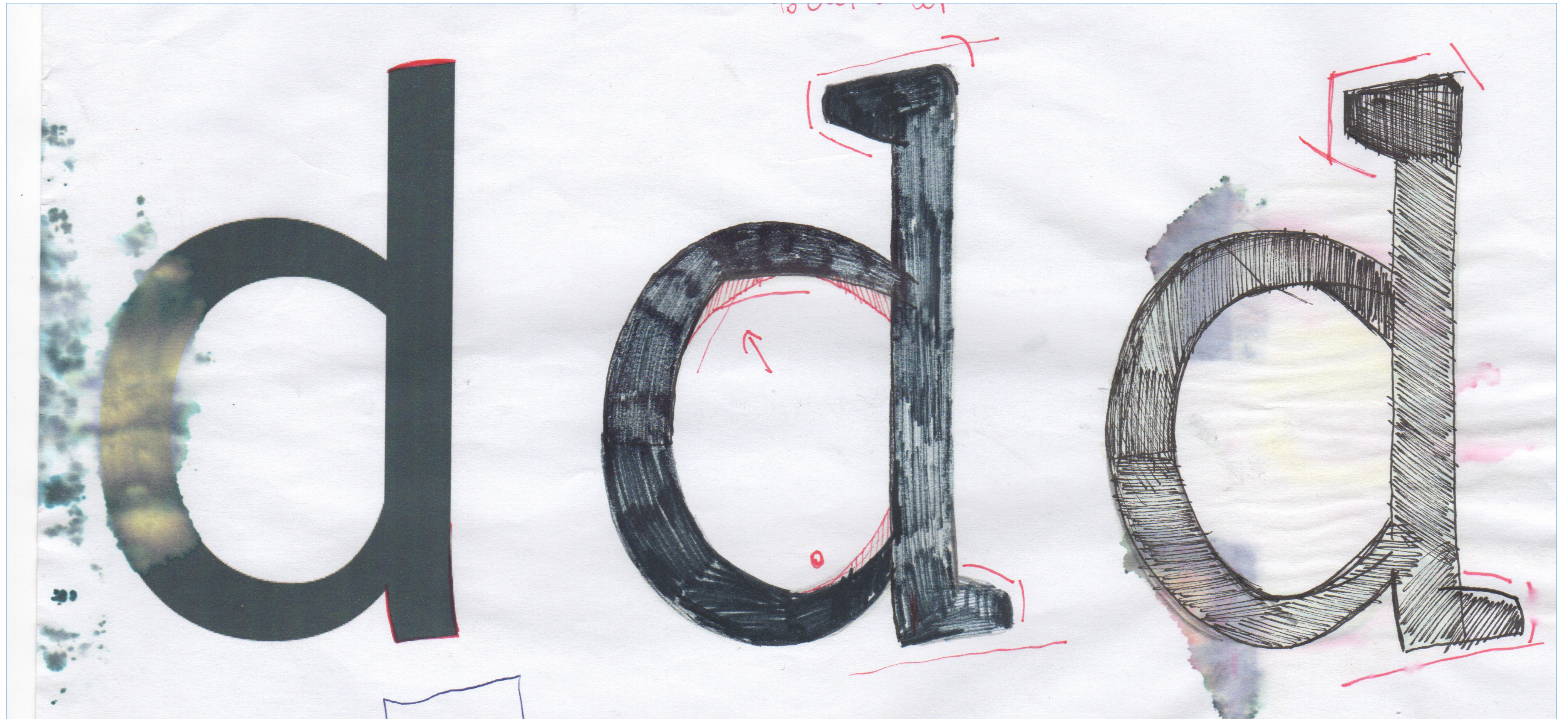
During the first stages of design work we determine the look of ensuing details, rhythm and proportion so that we can create the DNA of a given font. Initially work focuses on a narrowed down character set in order to implement changes more easily.
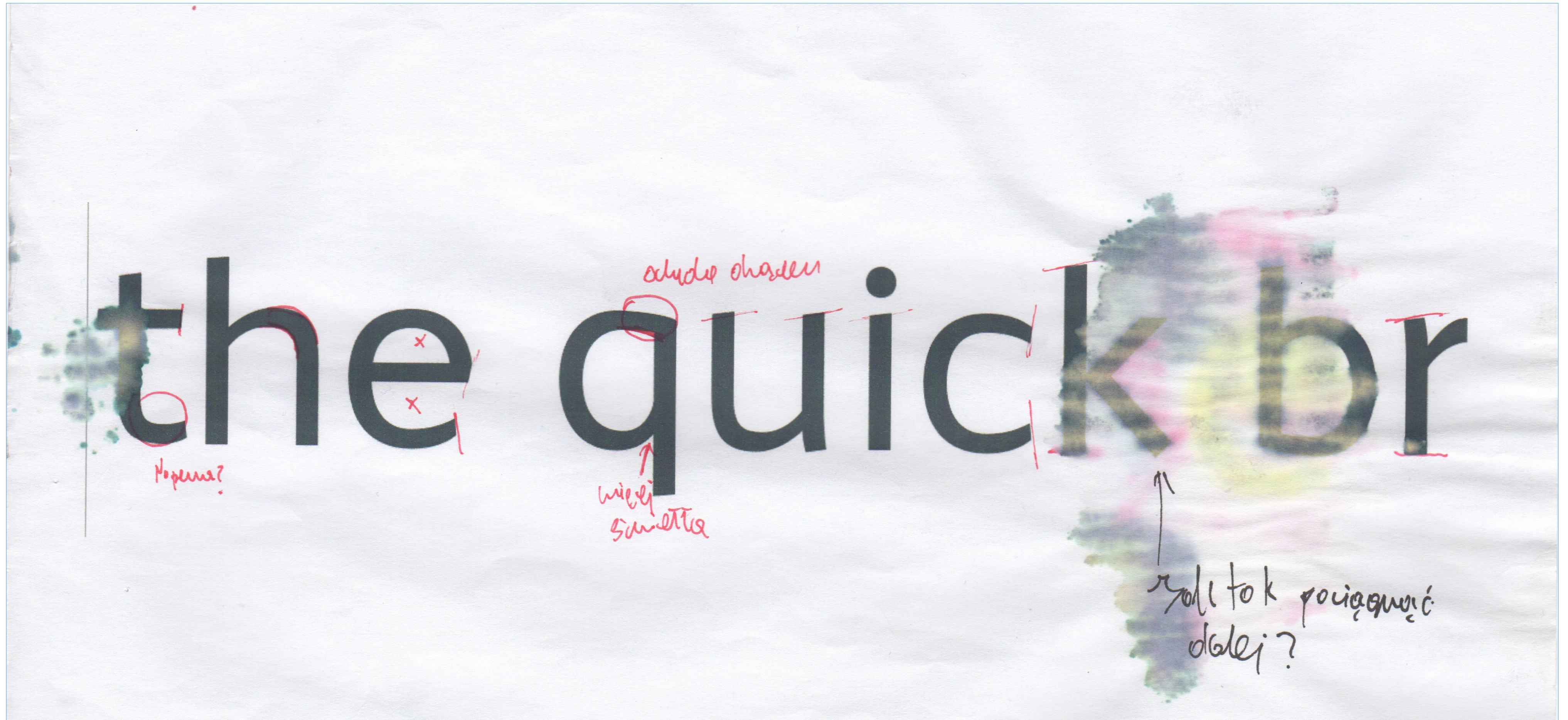
Another step moves the designing process to the PC. For this purpose, we use specialist software to create fonts. The most popular font editors and converters are: Glyph, Robo-font and FontLab.

The basic palette of font editing software consists of windows, each corresponding to one letter. The number of characters of a given typeface depends on the typographer's plan. A final font consists of over 400 glyphs, allowing it to represent most European languages.
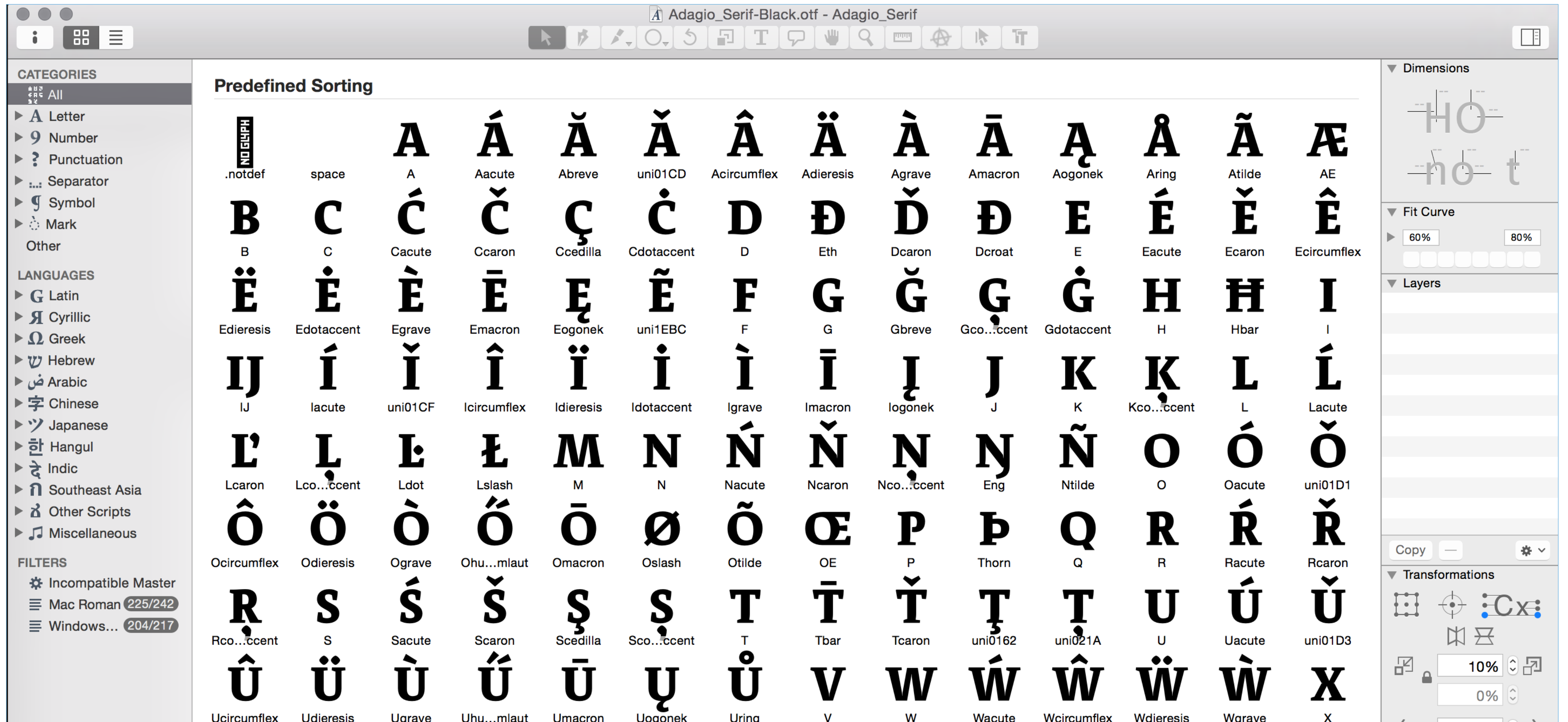
Work on a font requires creation of 3 master fonts that correspond to ultralight, regular and heavy lines of a font. As a result, in the subsequent steps, it is possible to generate all the variants of the font that are interpolated from the master fonts.

Here we can see the way master fonts (black colour) and exported instances (i.e. line variants) look like. As a matter of fact, a typographer can generate an infinite number of instances interpolated from master fonts – which is usually established earlier during planning stage.

During the entire design process the designer uses countless testing print outs of a font where he can mark a place requiring further changes. The next 3 pages show a basic set of characters for three master fonts.

ABCDEFGHIJKLM
NOQRSTUVWXYZ
abcdefghijklm
noqrstuvwxyz

ABCDEFGHIJKLM
NOQRSTUVWXYZ
abcdefghijklm
noqrstuvwxyz

ABCDEFGHIJKLM
NOQRSTUVWXYZ
abcdefghijklm
noqrstuvwxyz

At this stage countless versions of the same letter are created. The following picture shows the way the letter "a" changed – starting with the first clumsily plotted sketch until the final version in the finished font.
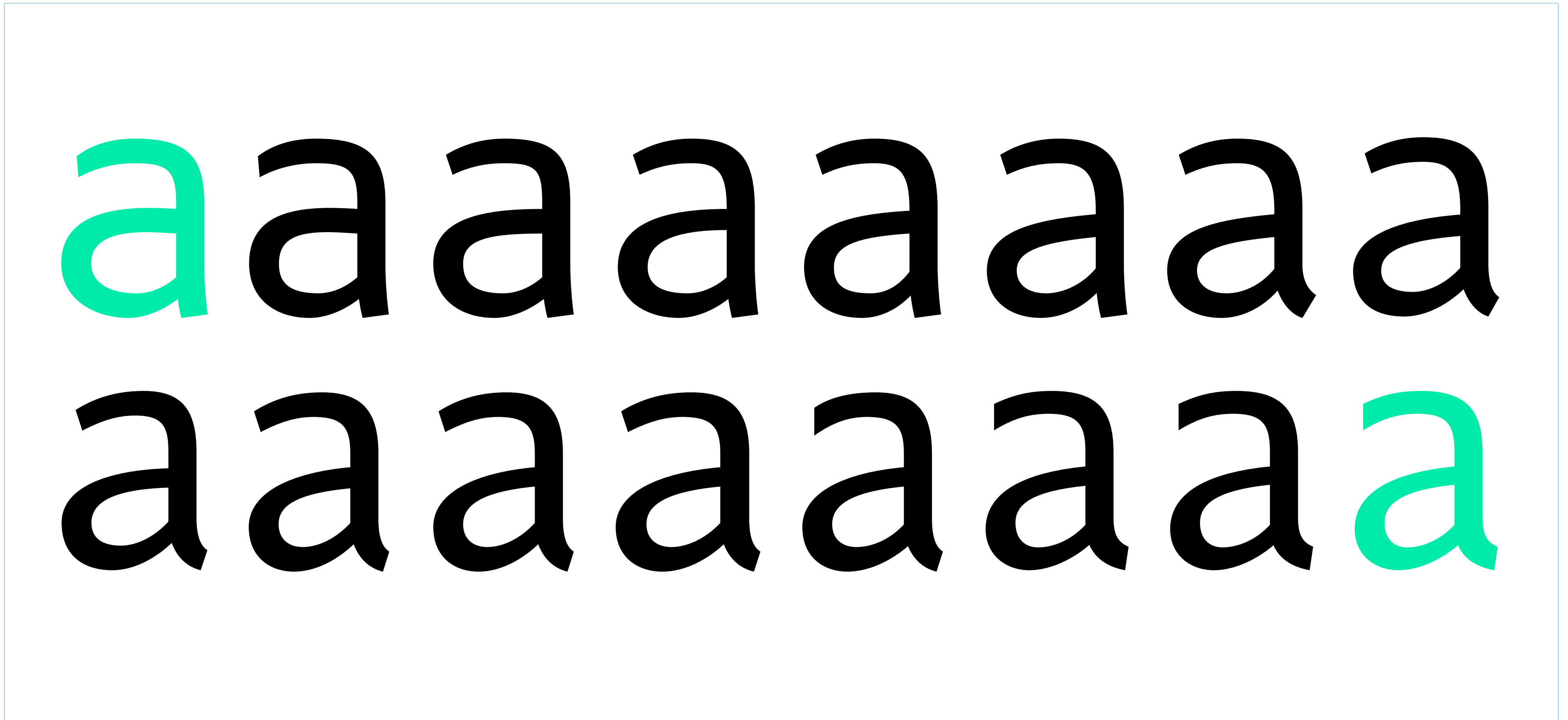
To notice the real difference a zoomed-in sketch of letter "a" on the left is paired with the final version in large-scale. One can easily notice a lot more harmony of the curves and definitely better applied proportions.

Once a complete set of A–Z and a–z characters on all 3 master fonts is ready we can follow with work on diacritical marks. Typically, these are sketched on the printed letters in the early design phase to establish their initial look.
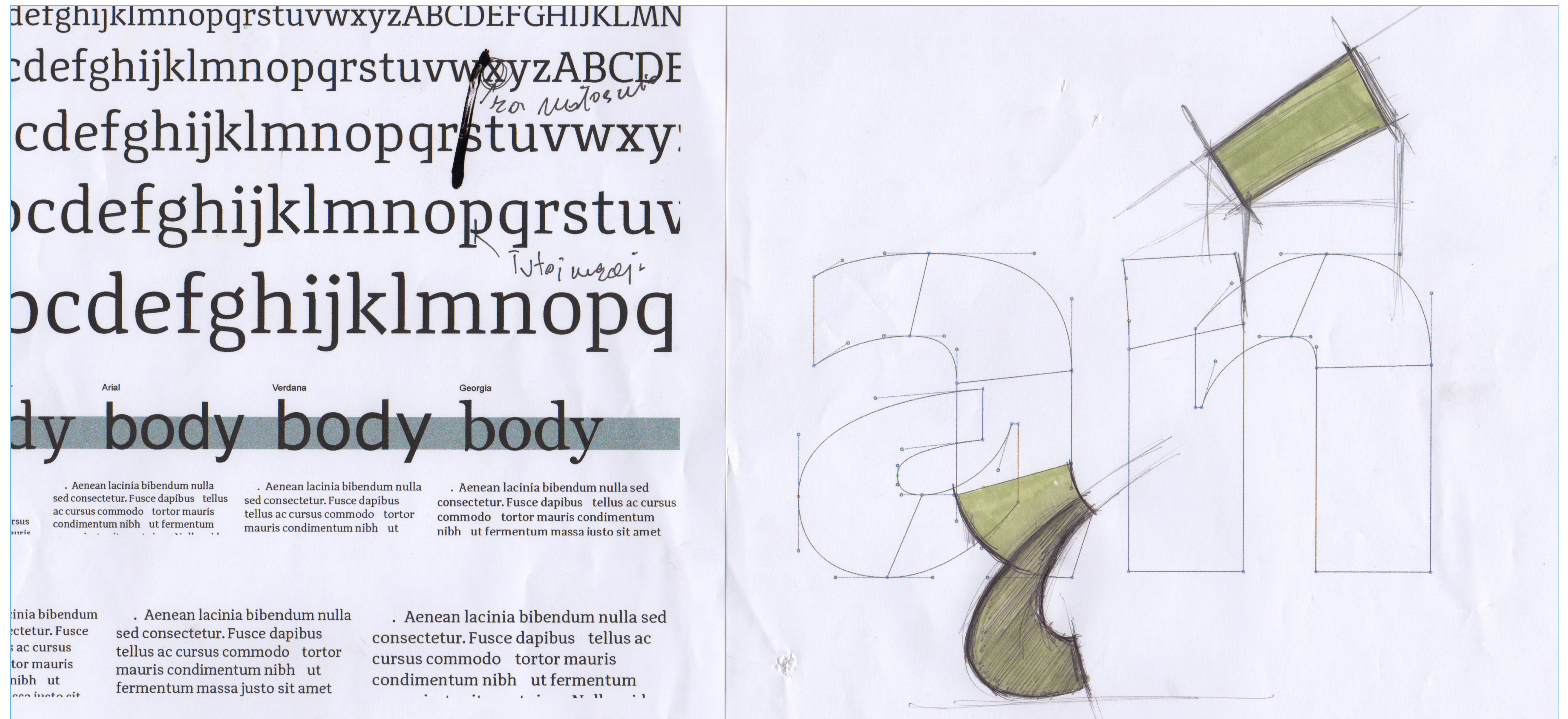
Newly designed diacritical marks are anchored by the software in the selected location.
Such feature saves a lot of tedious manual work.
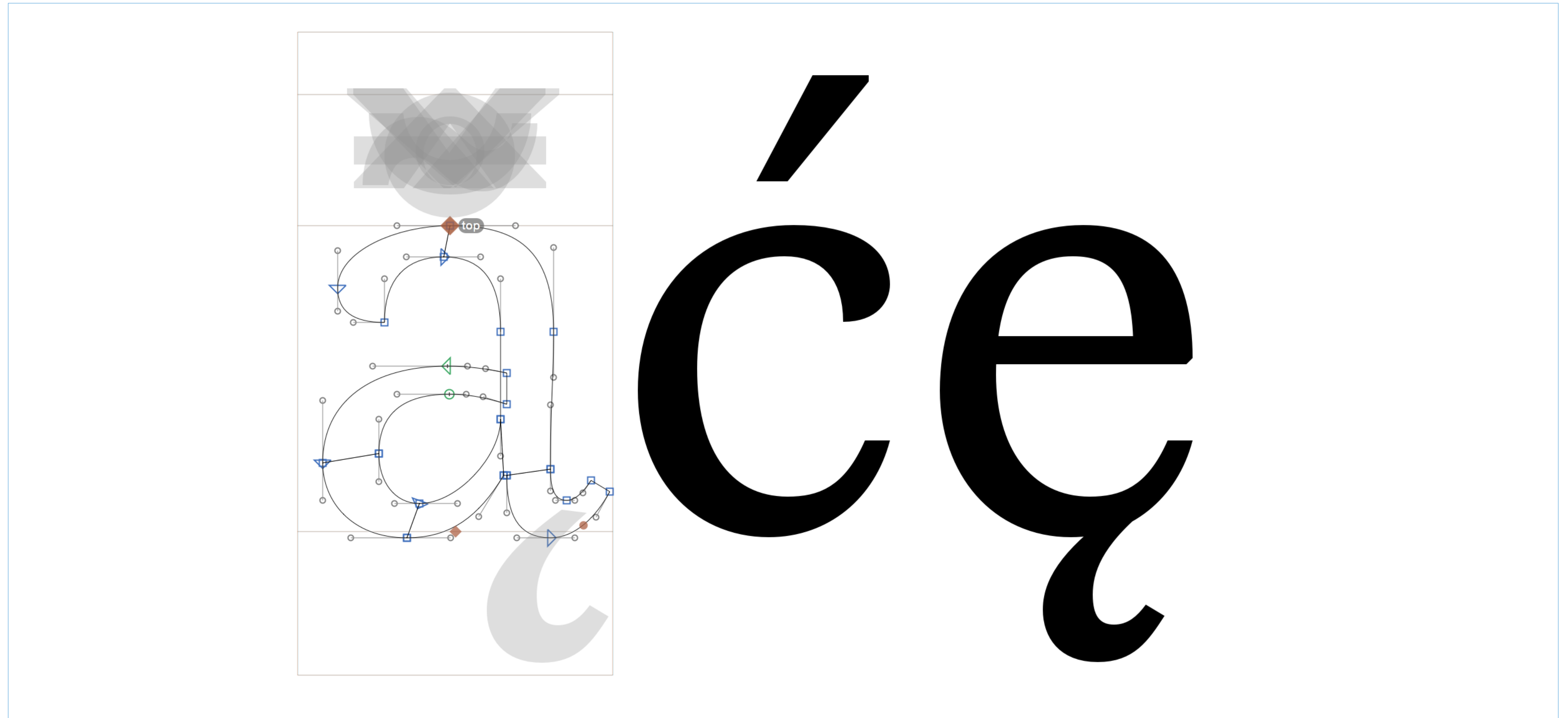
It is advisable at this stage to envisage the next version of the typeface called Italic. There are various kinds of Iitalic – from those generated automatically (Slant) to separately designed typeface characterized by greater dynamics (True Italic).
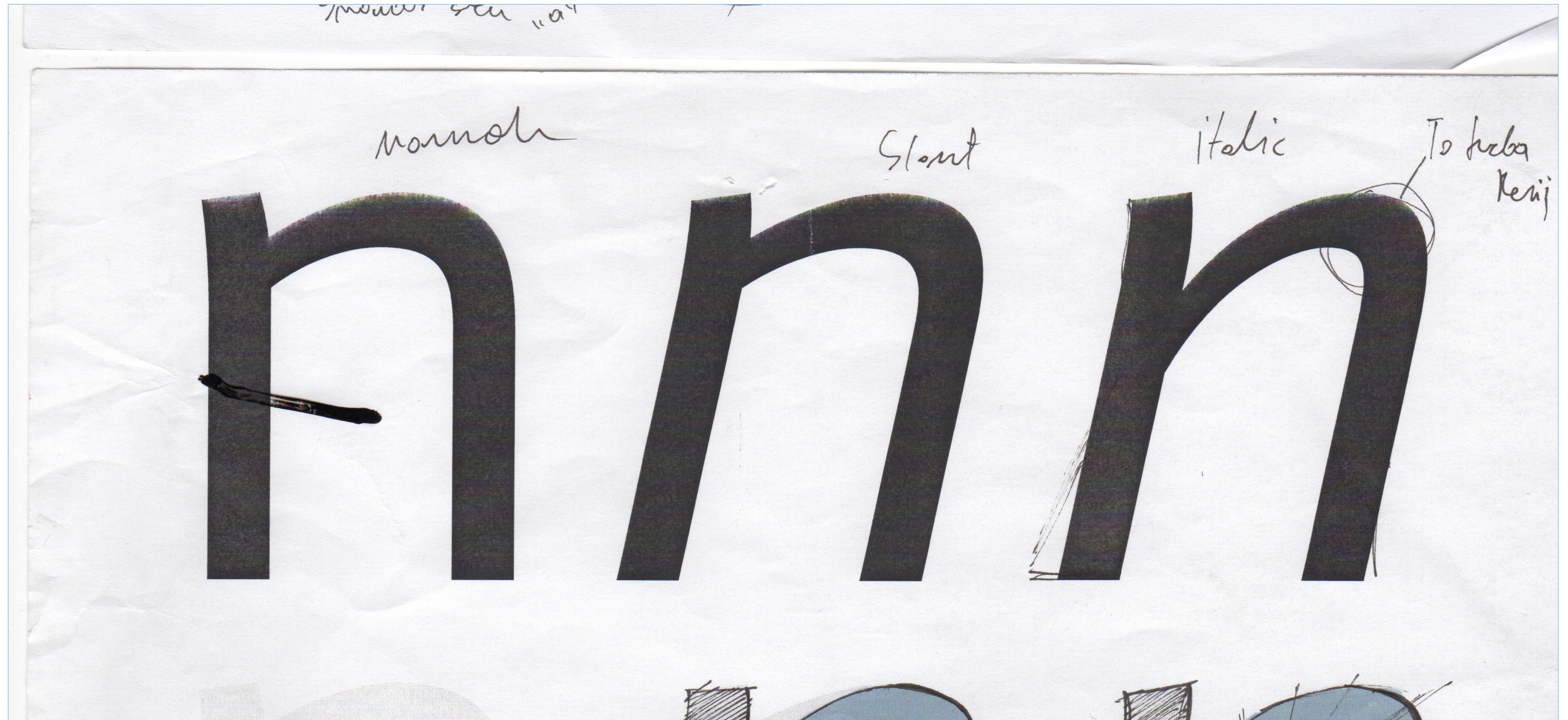
NThe following stage is devoted to design of ligatures i.e. a combination of two characters into one glyph. Ten most popular ligatures are fi, ffi, fb, ffb, fh, ffh, fk, ffk, fl, ffl.

Subsequent adjustments take place simultaneously at different sizes – from 12-point text to a hefty 48-point headline. Size variations allow a typographer to notice errors more quickly and determine which letters require further adjustments.

DRIEËRLEI

Genießen

Pääministeri

Ohjauspyörä

þjóðdirnar

Some impacts of climate change include a higher risk of flooding and changes to crop yields and water availability. Humans may be able to adapt to some of these changes, but only within limits. An example of an adaptation strategy would be the construction of sea walls and levees to protect against flooding. Another might be introducing more efficient irrigation for farmers in areas where water is scarce. Natural systems are currently bearing the brunt of climatic changes, but a growing impact on humans is feared. Members of the UNs climate panel say it provides overwhelming evidence of the scale of these effects. Continue reading the main story. Start Quote Nobody on this planet is going to be untouched by the impacts of climate change. Rajendra Pachauri Chairman, IPCCOur health, homes, food and safety are all likely to be threatened by rising temperatures the summary says. The report was agreed after almost a week of intense discussions here in Yokohama, which included concerns among some authors about the tone of the evolving document.

Hamburgevons now

Whereas recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world Whereas disregard and contempt for human rights have resulted in barbarous acts which have outraged the conscience of mankind, and the advent of a world in which human beings shall enjoy freedom of speech and belief and freedom from fear and want has been proclaimed as the Highest aspiration of the common people, Whereas it is essential if man is not to be compelled to have recourse, as a last resort, to rebellion against tyranny and oppression, that human rights should be protected by the rulit is essential to promote the development of friendly relations between nations, Whereas the peoples of the United Nations have in the Charter reaffirmed their faith in fundamental human rights, in the dignity and worth of the human person and in the equal rights of men and women and have determined to promote social progress and better standards of life in larger freedom Whereas Member States have pledged themselves to achieve, in cooperation with the United Nations, the promotion of universal respect for and observance of human rights and fundamental freedoms, Whereas a common understanding of these rights and freedoms is of the greatest importance for the full realization of this pledge, Now, therefore, The General Assembly

Some impacts of climate change include a higher risk of flooding and changes to crop yields and water availability. Humans may be able to adapt to some of these changes but only within limits. An example of an adaptation strategy would be the construction of sea walls and levees to protect against flooding. Another might be introducing more efficient irrigation for farmers in areas where water is scarce. Natural systems are currently bearing the brunt of climatic changes but a growing impact on humans is feared. Members of the UNs climate panel say it provides overwhelming evidence of the scale of these effects. Continue reading the main story. to be untouched by the impacts of climate change. Rajendra Pachauri homes food and safety are all likely to be threatened by rising temperatures the summary says. The report was agreed after almost a week of intense discussions here in Yokohama which included concerns among some authors about the tone of the evolving

Whereas recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom justice and peace in the world Whereas disregard and contempt for human rights have resulted in barbarous acts which have outraged the conscience of mankind and the advent of a world in which human beings shall enjoy freedom of speech and belief and freedom from fear and want has been proclaimed as the Highest aspiration of the common people- this Declaration constantly in mind shall strive by teaching and education to promote respect for these rights and freedoms and by progressive measures national and international to secure their universal and effective recognition and observance both among the peoples of Member States them-

In order to quickly find errors a typographer can use a piece of paper to write down and keep track of changes intended for a given letter.
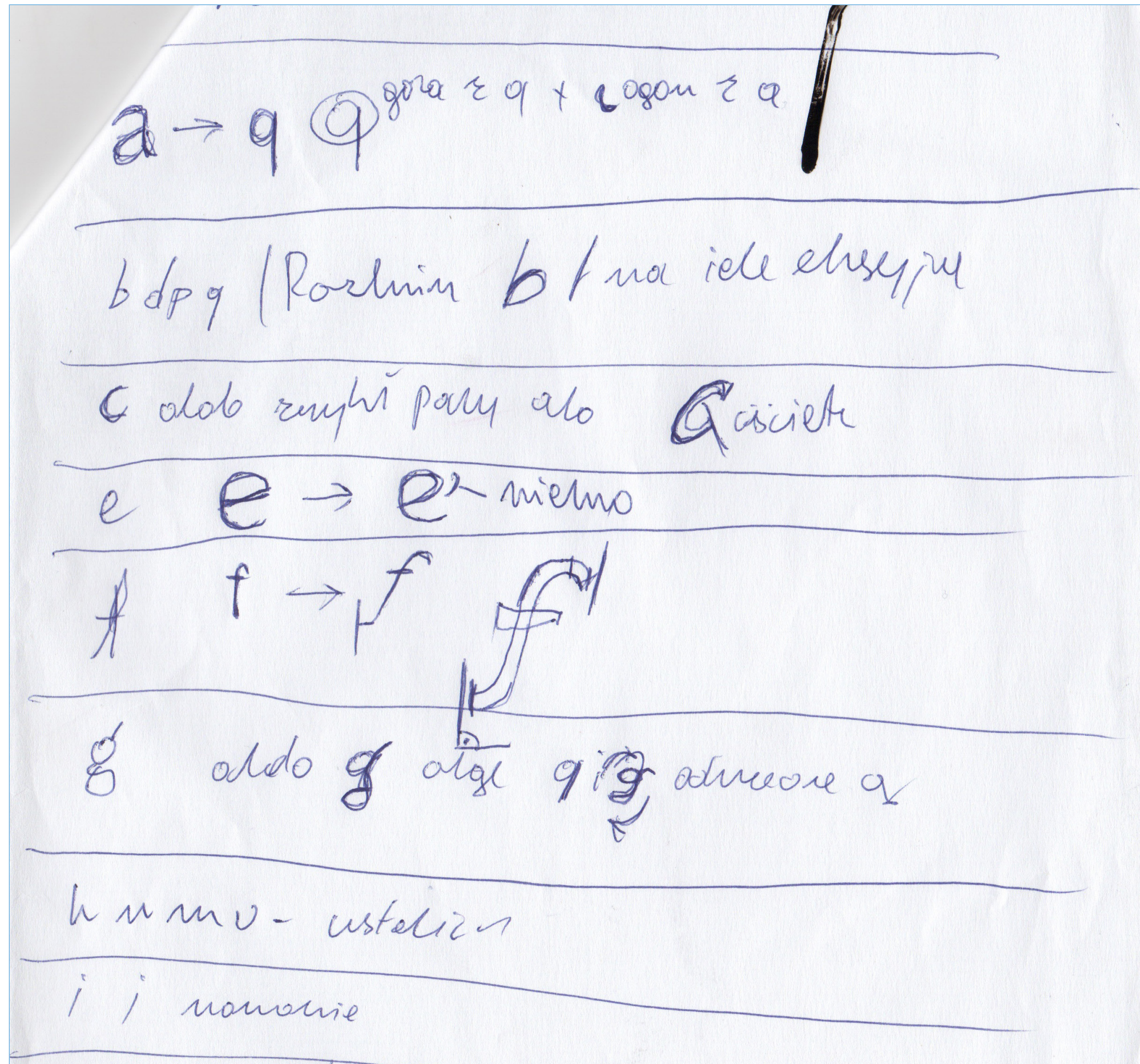
EU leaders are to begin an emergency summit to decide how strongly they should respond to Russias troop deployment in Ukraines Crimea region Some members particularly from Eastern Europe want tough sanctions while others led by Germany seek mediation Ahead of the talks the EU said it had frozen the assets of 18 former Ukrainian officials, including ousted President Viktor Yanukovyc Pro-Russian forces are in de facto control of Crimea A tense stand off continued overnight across the southern region where Ukrainian troops remain blockaded in their bases In other developments British Prime Minister David Cameron is hoping that in alliance with Sweden Poland and other Eastern European countries he can persuade their colleagues of the need for Russian President Vladimir Putin to pay a price for the occupation of Crimea the BBC political editor Nick Robinson reports They will push not just for the suspension of EUwide agreements with Russia on visa free travel and energy but also the explicit threat though not the implementation of targeted sanctions he adds Sergei Lavrov refused to allow the new Ukrainian foreign minister to join the talks but he did hold a series of intense discussions with his EU counterparts and John Kerry and they have all agreed to keep talking Afterward Mr Kerry was cautious but positive It had been a long and difficult day of negotiations he said But he did now have something to take back to President Obama tion Ahead of the talks the EU said it had frozen the assets of 18 former Ukrainian officials, including ousted President Viktor Yanukovyc Pro-Russian forces are in de facto control of Crimea A tense standsion of EU wide agreements with Russia on visa free travel and energy but also the explicit threat though not the implementation of targeted sanctions he adds Sergei Lavrov refused to allow the new Ukrainian foreign minister to join the talks but he did hold a series of intense discussions with his EU counterparts and John Kerry and they have all agreed to keep talking Afterward Mr Kerry was cautious but positive It had been a long and difficult day of negotiations he said But he did now have something to take back to President Obamacials, including ousted President Viktor Yanukovyc Pro-Russian forces are in de facto control of Crimea A tense stand off continued overnight across the southern region where Ukrainian troops remain blockaded in their bases In other developments British Prime Minister David Cameron is hoping that in alliance with Sweden Poland and other Eastern European countries he can persuade their colleagues of the need for Russian President Vladimir Putin to pay a price for the occupation of Crimea the BBC political editor Nick

Once all the characters are designed, the designer has to focus on kerning pairs. These are two-character sets that require individual approach, such as slanting letters "A" and "V". (AV without kerning on the left; AV after kerning on the right).

Once the kerning pairs are finalized, there is a time to determine whether export process remained error-free and all the letters export properly.
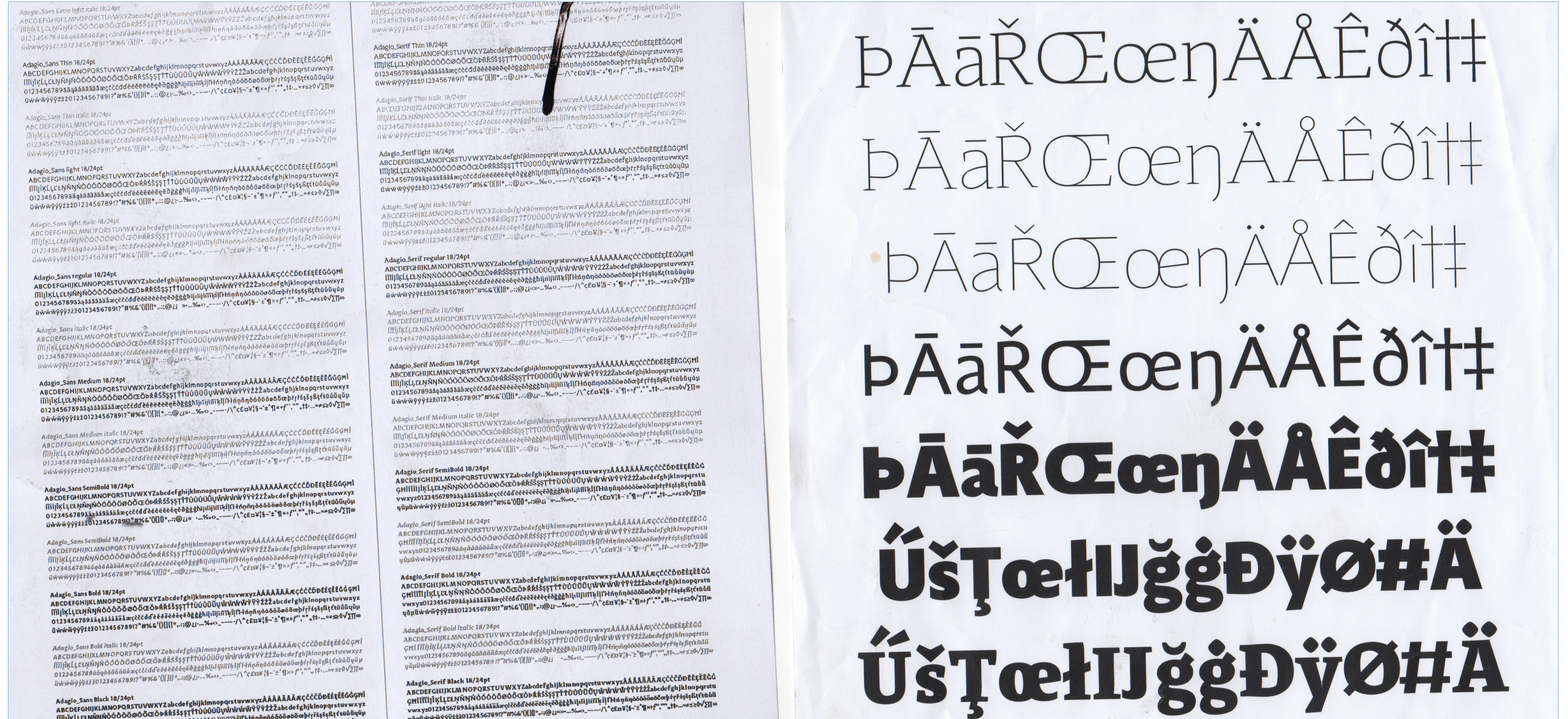
Next, if everything is okay, you can safely export the font family to OTF. OTF is a format for scalable fonts, which allows every person who buys or receives such a file to install ready font on their computer.
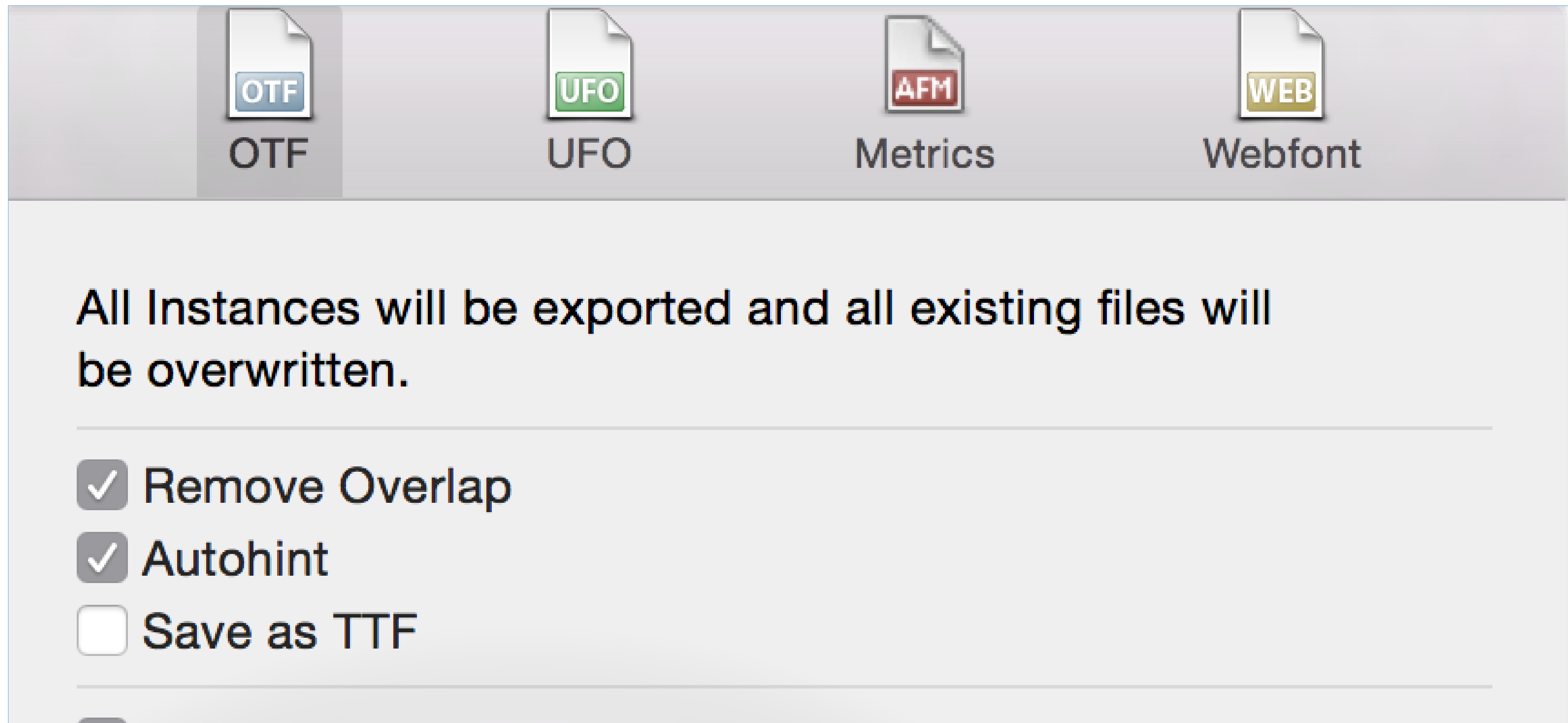
Most of the typefaces are accompanied by presentations showing various applications of a given font. They serve primarily as a reference for future users so that they were able to assess the usefulness of a given typeface before buying the set.

The last step is introduction of a typeface to the market. In order to do so you need to prepare the package of fonts, banners, as well as font description and pricing policy.

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THE **BRANDON GROTESQUE** TYPEFAMILY

BRANDON GROTESQUE WORDING
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TYPOGRAPHIE **Zirkuszelt**
Handsetzerei

The whole typeface design process shown in this guide is based on my diploma project Adagio Type System. Below: 7 posters with the presentation – the background is created by sketches arranged in chronological order.

The following picture presents a useful set of reading materials that will surely help in taking the first steps in typeface design.
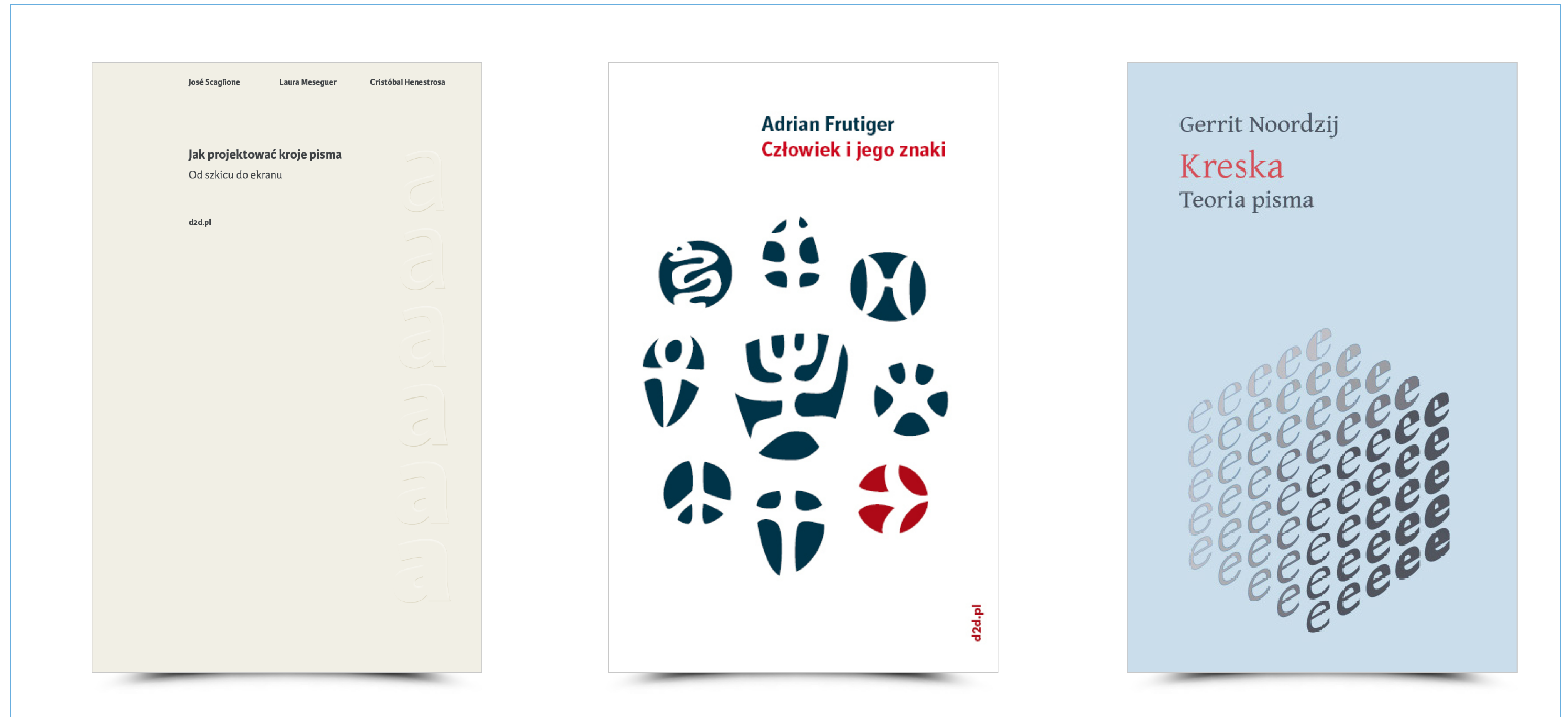
José Scaglione   Laura Meseguer   Cristóbal Henestrosa

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Od szkicu do ekranu

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Adrian Frutiger
Człowiek i jego znaki

d2d.pl

Gerrit Noordzij
Kreska
Teoria pisma

LETTERING

Table of Contents

The purpose of this paper is to show how significantly the selection of characters determines the kind of transmitted message. A well-chosen typeface can amplify information, while a poorly chosen one leads to confusion and lack of understanding. The nature of the character and the way we perceive it are both related to its context and historical background. The following chapters attempt to depict the way typography is embedded in culture.

Typography (derived from Greek Typos "impression" and Graphein "to write") — stroke, reflection, painting, statue, form, shape, model, type. Typography denotes a number of related meanings associated with the use of writing characters in many dimensions.

Imagine an elegant restaurant in Paris, which uses a fanciful typeface in its logo. As a result, there is an immediate dissonance in the perception. Expressive details, lack of a common baseline and negligent ratio of the typeface fail to build elegant image of the restaurant. This kind of typography would rather be fitting for a taco selling street-food joint.

Dostojny

Another example is the use of a very distinct Art Nouveau capital letter. Imagine a modern bank with online services that uses this typeface in the headlines of its advertising materials. Strongly rooted in history details of the letters and their proportions make us immediately think about tradition, Viennese elegance and aura of exclusivity. Therefore, the typeface would be more fitting to advertise private banking services rather than a modern online bank.

NOWOCZESNY

Another example shows the use of Comic Sans typeface. Would you buy an insurance policy from a company that uses such typeface for its logo? How seriously would you take this company based on its image? Snippy, childish and casual look of the typeface immediately brings particular associations. Therefore, the typeface can be used whenever there is a need to emphasize some carefree, infantile character or idea.

Zaufanie

The following example shows how a specific typeface brings out particular political associations in a given culture. Right-wing extremists in Poland have embraced Gothic typeface. For this reason, a newly-formed left-wing party using this typeface in promotio-nal materials would produce misleading opinions regarding the party's political views and program. It is worth noticing that Polish right-wing troops are willing to reach for aggressive Gothic typeface of German origin...

Polska Lewica

Classic Avant Garde typeface was designed in the 80s by Herb Lubalin. The premise of the project was to produce an avant-garde, tradition breaking, Sans Serif typeface based on the basic geometric figures. Here, the modernist nature of typography stands in opposition to the intended message that should refer to tradition. In typography tradition is associated with Antiqua, Carolingian minuscule scripts copied by monks, Gothic script (Blackletter), or other typefaces strongly rooted in history. The typeface used below would rather go well with some modern message.

TRADYCJA

All of the above examples show how a particular typeface may actually stand in opposition to the message.

Adequate selection of a typeface is important to properly understand the content. The first information we notice is usually the look of a typeface, followed by the actual reading of the message displayed by the typeface. This frequently results in situations where readers anticipate the content of the message after a quick look at the text. Designers are

The first information we notice is usually the look of a typeface, followed by the actual reading of the message displayed by the typeface.

aware of this mechanism and can purposefully reinforce the message or, depending on the nature of the project, they may play with the form giving way to emergence of new values. The following section will take a closer look at the way typeface has developed over the centuries and illustrate its connections with art and culture of particular regions.

Dostojny

NOWOCZESNY

Zaufanie

Traditionally, the symbolic beginnings of Latin typography are traced back to the inscription from Trajan's column (113 A.D.). The column gave birth to Roman square capitals and many typefaces use letter forms based on its inscription.

The typeface was composed solely of majuscules (capital letters) and employed neatly arranged proportions — each character was based on one of four geometric figures: square, circle, triangle and the double square (1:2 rectangle, employed for letters B, E, F, P and S).

source: http://www.polskalitera.pl/wp-content/uploads/2011/06/Kolumna_Trajana.jpg

The classic Antiqua typeface is still a grateful subject for designers and countless versions of the typeface appear. The image below shows Cinzel Regular typeface, designed a few years ago. All the characteristic features of a capital letter, such as high contrast, softly marked serifs and proportions based on the previously mentioned geometric figures are still very prominent. Due to their historical context and ancient Rome origins Anitqua typefaces are frequently used to emphasize tradition, seriousness and classic look.

ABCDEFGHIJ
KLMNOPQR
STUVWXYZ

There are approximately 200 000 fonts available in the twenty-first century. One may ask a valid question regarding the necessity of creating new typefaces — after all the current volume should be enough for any kind of design project. However, each style has a different number of characters and varieties. It is very frequent that a preferred typeface does not have italicised version that is needed. That is why we keep on looking... In addition, constantly changing fashion, design styles and technology facilitate further creative explorations in typeface design.
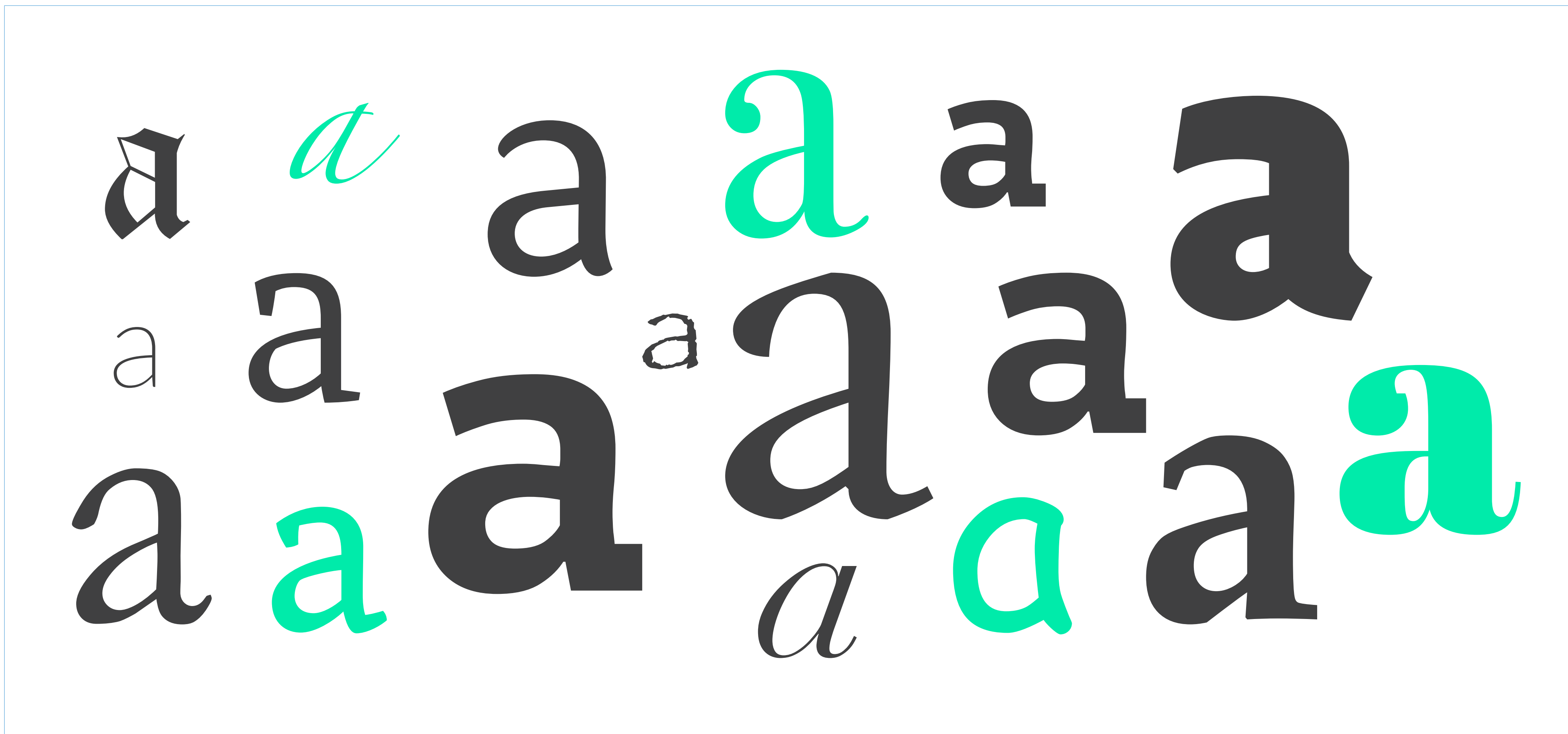
Below image allows to compare Gothic cathedral with the letter "R" from the same period. We can easily observe similar formal features — openwork, well-defined directions as well as high contrasts between vertical lines and details. Similarity is so striking, that one may consider the letter to be taken from flying buttresses of the cathedral. Shared formal solutions are very common for all artistic areas of a given period.
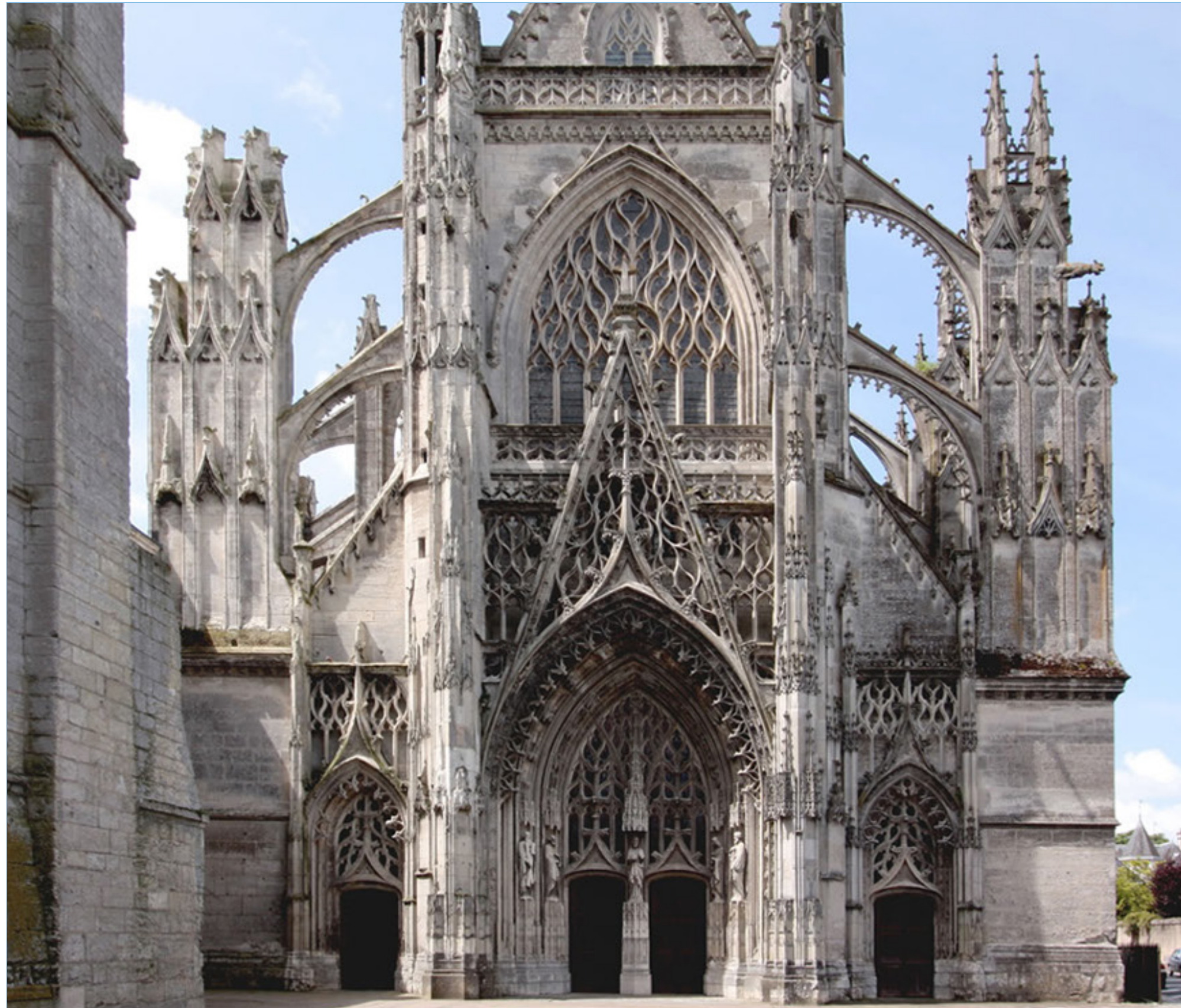
Picture below shows comparison of the Vitruvian Man and Humanist Antiqua. The common denominator for both images is their unmistakable harmony and the need to outline everything against a meticulously designed plan.

Many formal features tie up Arabian architecture with the script. Arched shapes of domes and vertical towering minarets are reflected in typography. Both are designed with the utmost attention to detail. Calligraphic character gives a unique oriental flair — typefaces that employ this style will always appear exotic. Another important element is a large contrast between the squat and soaring typeface elements reflected in architecture.

The relation between traditional Chinese architecture and sign is also very noticeable. Both are characterized by similar proportions, corresponding posture of arches and overall order complemented with well-designed details. In each case the design is compact and openwork.

źródło: http://www.pielgrzymki.info/pielgrzymka/pielgrzymki_chiny7.jpg

Angkor Wat and Khmer script also share the same formal similarities. Rhythmically appearing base elements are combined with strong organic detail. Despite its modularity, each character has a large amount of details and intricate endings, which lined together — just like Angkor Wat — represent a homogeneous and coherent whole. Architectural ornament becomes a typographic detail preserving precision and clarity of the design.

źródło: http://mandalay.pl/kambodza/angkor

Baroque interior of the temple, compared with Antiqua font from the same period. Both examples characterized by sumptuous forms, large contrasts and numerous arrangements based on diagonal lines. The interior of the baroque temple arouses amazement and employs rich details in every part of the structure — Antiqua shares the same approach. Modular treatment is difficult to notice as each letter has its own rampant, nuanced character resulting in an elegant, rich look of the whole.

Rag

Art Nouveau is an art style embracing not only art and architecture, but also typography. Art Nouveau typographers drew inspiration from floral motifs, organic shapes and interweaving spiral lines. Typefaces of this kind are associated with lightness, pleasant elegance, attention to decorative detail and unique lush nature.

źródło: http://art-we-hate.com/pl/8-art-we-hate?start=20

Pantheon and Greek letters display a clearly defined geometry.

Cyrillic and Orthodox church building are both characterized by enormous richness of detail and variety of shapes.
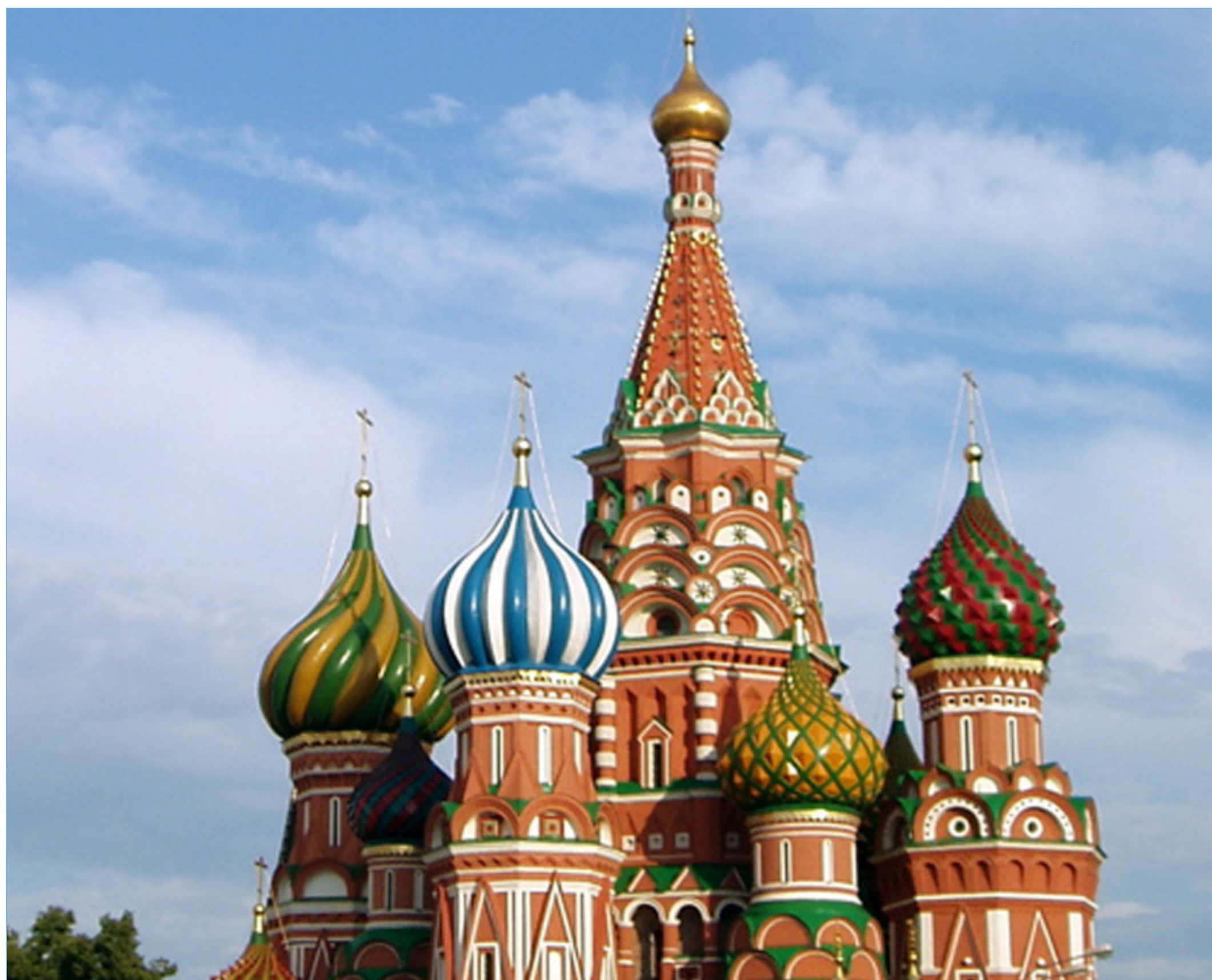
АБВГДЕЖЗЙКЛ
абвгдеёжзийклмн
МНОПРСТУФХ
опрстуфхцчшщъ
ЦЧЩЪЫЬЭЮЯ1
234567890ыьэюя

źródło: https://en.wikipedia.org/wiki/Russian_architecture

Comic books are a source of typography enhnacing the message. Everyone is familiar with the "BOOMs" and "WHOOPs" of a comic book. Such typefaces are ideal for informal as well as vibrant situations that require a dynamic looking letter.

źródło: http://roguecomics.com

Helvetica — one of the most famous typefaces shown side by side with a classic Swiss Army knife. Relationship between the character of particular object and typography can reach much deeper than their formal features. In both cases we talk about multi-purpose tools — a pocket knife and a typeface which perfectly works out in many diverse projects. Modular and neutral nature of Helvetica makes it perfect for visual identification, wayfinding systems and signage.

ABCDEFG HIJKLMNO PQRSTUV WXYZ
Helvetica

 Typography may also be national. There are countless examples of typefaces that could clearly be associated with a given country. Poland had its own Pułtawski Antiqua, hailed as a national typeface. Putting it aside The Battle of Grunwald by Jan Matejko is not accidental — artists of that period sought as much Polish character as possible wherever they could to render and strengthen patriotism.

Polska
Pułtawski
Gruby

Classic London double-decker bus and Gill Sans small letter "g". In addition to formal similarities in the look of double decks, Gill and Johnson activities made London the cradle of humanistic sans-serif typefaces.

 Interesting comparison of Givenchy fashion house collection and historicizing Antiqua of Jonathan Barnbrook's Mason font. This example shows that the same esoteric influences can equally inspire fashion and typography designers.

British luxury fashion house Burberry paired with didot-influenced Abril Fatface. Both convey timeless elegance. Abril typeface easily produces classic look and refinement.

BURBERRY
Abril Fatface
Hamburgevons

Steve Jobs (founder of Apple) versus Myriad Pro typeface. The typeface is very universal and characterized by a light detail and capital letter proportions. Clear dual structure gives the typeface humanistic and friendly feeling. Normcore fashion trend, employed

by Jobs, shares the same neutrality and non-pretentious attitude. The typeface does not have unnecessary ornaments and focuses on functionality — just like Apple products.

WISER MAN
0123456789@!£$
box of tricks
SUGAR?
Queen & Country

źródło: http://autokult.pl/23754,normcore-czyli-moda-na-pospolitosc

This section focuses on the way a seemingly small intervention and typeface substitution in the look of well-known logos changes their message and character.

CHANGE OF MESSAGE

PKO Bank Polski has radically changed the style of visual communication after a facelift by White Cat Studio. PKO refreshed colour pattern and typography of its logo communicating the image of a modern 21st century bank perfect for a conscious contemporary customer. Soft sans-serif typeface with modern detail perfectly emphasizes novelty, freshness and friendly image of the bank. Rounded details correspond perfectly with the signet designed by Karol Śliwka. This is an example of a comprehensively tailored visual communication which, combined with excellent implementation, has brought the desired results.

Valuable typography in sync with the signet can enhance the message, while the one selected randomly and clumsily quickly destroys the message and introduces dissonance.

What would happen if PKO logo had the classic Serif typeface with high contrast? In this case we would immediately notice the dissonance between the signet and typography. There are two reasons for that. Firstly, the use of classical in its form Serif typeface immediately gives the impression of something serious and based on traditional values. The typeface would be more suitable for visual identification of a bank focusing on private banking, not the one targeting general public.

Its formal look is inaccurate as well. Serif typeface looks vey much out of sync with the signet. Sign and typography compete with each other lacking formal relations unlike the original version.

Another example is PKO in Comic typeface. In this situation the contrast between the signet and typography is smaller since both have a soft finish. However, the very style of the typeface — childish, incompetent, not inspiring any trust — raises a strong dissonance with the gravity of a project. It would probably work with a banking division created for children. These 3 examples show how important the choice of typography is for logotype design. Valuable typography in sync with the signet can enhance the message, while the one selected randomly and clumsily quickly destroys the message and introduces dissonance.

source: http://www.pkobp.pl/static/_front/_img/_layout/logo_pkobp_dzien_dobry.png

The image shows the logo of a German railway company Deutsche Bahn AG in three versions. The first one is an original 1993 design by Kurt Weidemann and employs a simple sans-serif typeface — DB Sans designed by Erick Spiekerman. The typeface creates the feeling of something reliable, firmly set and modern.. Its virtually zero contrast, utilitarian character and lack of detail bring obvious associations with the character and activities of the railway company. Whether we look at German, Polish or Dutch railways we quickly recognize familiar look and quality shared by railway companies in their visual identities. Railways usually choose strong, simple signs that create confidence and emphasize focus on modern technology. The other two versions show how typography changes perception of a brand. A sign based on a typeface looking like typescript brings clear association with something old and historic (center). This version is probably more reminiscent of a railway museum, rather than modern railway companies. The last example is based on a somewhat grotesque typeface of oriental style. A large number of details, exaggerated arches and ephemeral mood are typical for a spa center or some Asian restaurant rather than something meant to be durable and reliable.

source: http://www.bahn.com/common/view/static/v8/img/logo-db-bahn.png

AAllegro logo employs typography only. The need to publicize modern online shopping services required a modern, friendly and efficient typeface. Simple geometric letters communicate modern character, speed and safety.

The change of the typeface to a classic Serif Antiqua would bring a change in communication. Clearly defined serifs and high contrast definitely do not relate to easily accessible online shopping for the masses. This version of Allegro could probably be an online auction house with luxury goods. Similarly to previous examples, strongly simplified serif fonts are typically used when we want to emphasize conservative character or something deeply rooted in tradition. The last example of Allegro is presented with the thinnest version of Helvetica Neue. Just like the original logo, this one employs monoline typeface. Here Allegro completely loses its character due to its neutral look.

The following examples show how with a change of typeface we are able to change the context and easily modulate or alter the content of the message. This practice makes use of the previously mentioned process of decoding the nature of the information during the first-look stage.

CHANGE OF CONTEXT

ONR, extreme right-wing group, usually uses Gothic typefaces in its messages. Aggressive details and robust design of the font will always be perceived as militant and masculine.

The same message in elegant italics completely loses its power. Soft shapes combined with subtle detail evoke more feminine and docile connotations.

Imagine a leaflet advertising kindergarten. The typeface on the left is characterized by its modular design as well as stylized Cyrillic characters and for this reason perceived as more aggressive and powerful. Slight wiping brings out even more character. The pleasant

nature of the information needs typefaces of a friendly and neutral character. Therefore, if we were to choose a kindergarten for our child solely based on the very nature of the message we would undoubtedly choose the second option.

zabawy
dla
dzieci
zapraszamy

Typography may also affect the credibility of the message. Headlines announcing military invasion utilize two different typefaces. In the first example, we have a modular header typeface of neutral nature — its appearance similar to the ones used in newspapers.

Information submitted with this typeface builds more credibility than the same message presented on the right. In this case the use of decorative, carelessly drawn letter suggests lack of seriousness and ensuing disregard for the information...

Jihad Legia is a visual and verbal play where typography highlights the content of the message. In need to emphasize their fanatical support football fans refer to holy war rhetorics. In order to give the message a more authentic look the letters were stylised with calli-graphic details. Duplicated dots and applied proportions give the letters a very Arabic look. Together with green and white colours they create a consistent graphic message.

In a similar fashion, example below shows the message with the letters stylised to re-semble Greek. In fact, even without the additional Greek Tavern part we immediately recognize what kind of regional cuisine is waiting for the customers of this restaurant.

źródło: http://www.athensrestaurantcanton.com/

Calligraphic typeface with a very high contrast and strong dynamics immediately suggests the region of its origin. Even if it said the cuisine is Polish below the logo, the very nature of the typeface makes us think about a traditional sushi place.

   The following 2 images show pictures with a playful quote. The first picture used elegant Serif typeface in italics — such typefaces usually help to emphasize authenticity.

Combined with a black and white photo the quote produces certain gravity, while the playful nature of the message is completely lost.

Krowa krowie mleka nie wypije.

-Charles

In contrast, the picture below (also black and white) shows a person usually associated with fancy and slightly pompous comments — that is why Comic sans typeface combined with a statement from the popular author produces a caricature look of the entire picture.

Krowa krowie mleka nie wypije.

-Paulo

We have to keep in mind that most people do not realize the origins of various typefaces, as well as the important role of their appropriate selection. This paper should shed some light on the issue and help to understand the deep roots of letter in culture.
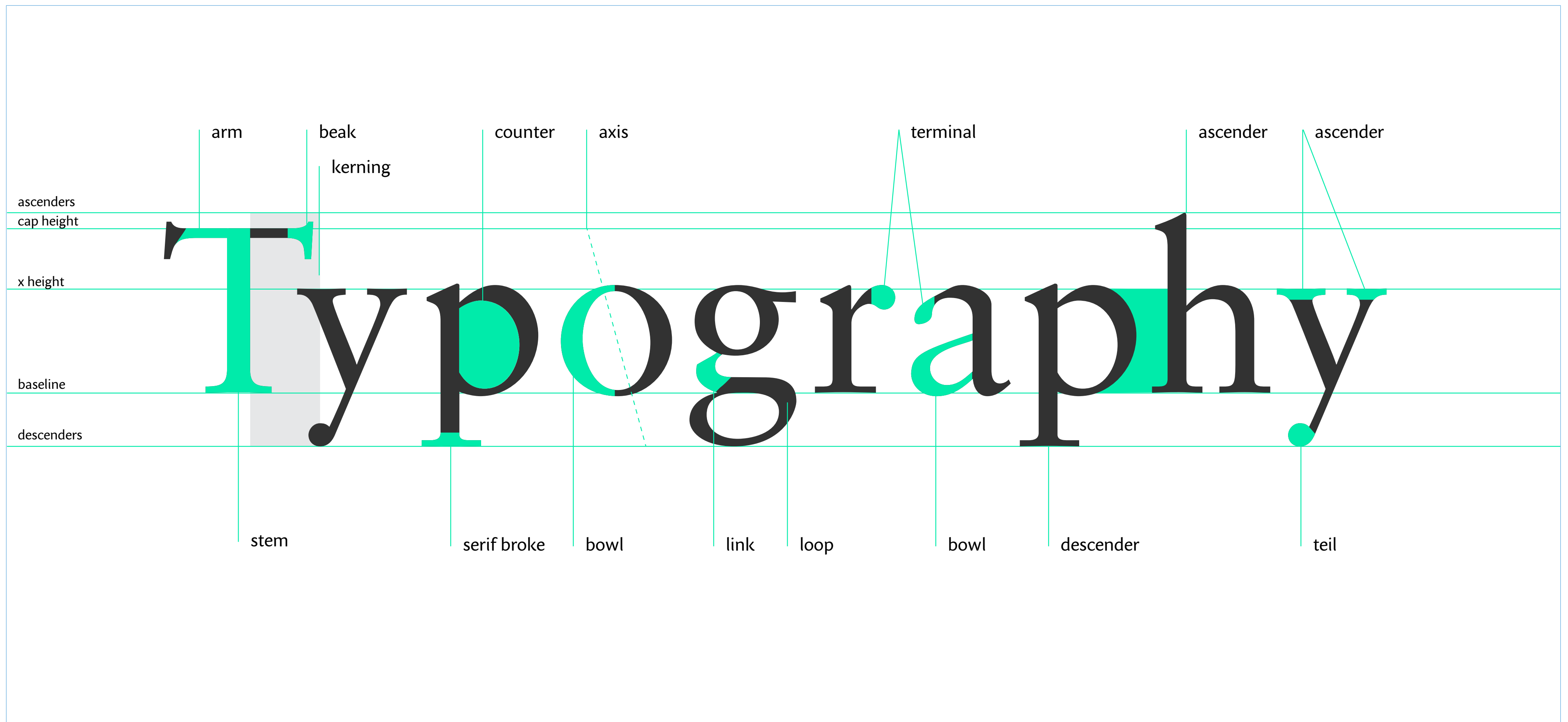
arm   beak   counter   axis   terminal   ascender   ascender

kerning

ascenders
cap height

x height

baseline

descenders

stem   serif broke   bowl   link   loop   bowl   descender   teil

TYPOGRAPHY

Table of contents

This paper focuses mainly on logo design and its role in visual communication. A short introduction on the nature of sign gives way to the discussion on the broad principles of company logotype and visual identification.

In order to talk about logo one has to look at the definition of sign as it will allow to better understand the genesis, character and different variants of a logo.

Sign — (Latin: signans, French: signifiant) In semiotics: is an observable (perceived) part of reality, that is important not because of its own features, but rather for its relation to another element of reality to which it refers (Latin: signatum, French: signifie).
Sign is a carrier of information which functions based on natural, instinctive/intuitive knowledge about existing cause-effect relations resulting from one's own functioning in an environment.
Sign can become a part of or a whole of a formulated message. In this case we are talking about a signal which is intentional, has its own sender and recipient and functions based on some accepted convention — hence we talk about conventional signs. Awareness of convention conditions the ability to receive the message. For example, in Europe the owl is associated with wisdom and foresight, therefore this bird of prey can become a symbol of both notions. For an Egyptian owl means death and magic, something to avoid — therefore he might have problems with understanding why the protagonists of "The House at Pooh Corner" listen to Owl's advice and treat him with fondness. This may deliberately affect the reception of an otherwise innocent literary work (...).

source: http://www.pts.edu.pl

Conventional signs can be divided into motivated (iconic) and unmotivated (arbitrary). Iconic signs base on the similarity between the sign's form and the item or principle it signifies. For example a road sign warning about children crossing the roadway shows an ideographic picture of two children. On the other hand, No Entry sign is by no means associated with the message it conveys — hence it is an arbitrary sign.

Arbitrary signs include symbols — signs that replace certain values, notions (such as "x" and other numerical signifiers in mathematics or colours of particular countries on political maps). In cultural terms, symbol is a phenomenon (image or object) that refers to some more complex part of reality, which is hard to convey in a more direct way. In this case, despite full convention we cannot talk about full arbitrariness since there is a clear, culture based sense of a given symbol, conditioning emergence of associations between the symbol and its referent, without which our understanding and proper recognition is impossible.

Symbol — is a semantic stylistic device containing one literal and multiple hidden meanings. It is an object that represents or suggests an idea, visual image, belief, action or material entity. Symbols replace one notion with another — more clear and direct one — to convey ideas and the nature of depicted phenomenon. Sometimes this symbol can be less abstract than what it refers to. For example, a symbol of lion does not only represent a given animal but also strength and power. Symbols are conventional and may carry different meanings in various cultures. This is what differs signs from unequivocal allegory. Alphabetic letters are symbols for sounds, orders are symbols of victory, royal or imperial regalia in European culture (orb and cross, sceptre, crown, spear) are symbols of power and sovereignity. Numerals are symbols for numbers and properties (length or mass), while ∞ symbol would stand for infinity. Confession, on the other hand, would be a symbol of faith in Christianity.

Logo — term popularized in 1930ies — is a graphic mark, emblem or symbol representing brands, commercial enterprises, organizations, products, services, events, projects, ideas or even individuals. Logo may represent practically any aspect of social or economic

source: http://cocacola.com

Similarly to other graphic forms logo has clearly defined constituents — in general however, everyday we see numerous signs that avoid classification. A look at its constituents should help understand the role of a logo and visual identification.

NAGRODA SOLIDARNOŚCI

im. Lecha Wałęsy

Sygnet

Logotyp

Slogan / dopisek

Can typography become a logo? Examples below show that a characteristic set of letters combined with good typography may at some point become recognized as a sign.

Panasonic logo created with Helvetica Bold (the most popular typeface) has become so well known it is almost synonymous with this particular typeface.

Contemporary process of logo design has not changed a lot from the one employed decades ago. The tools may be different — French curves and ruling pens have been replaced by computer software, but the same principle of aiming for a simple message remains largely unchanged. A large difference can be seen in an approach to the logo and its function today. In the past logos usually acted as the main part of brand identity — today they are typically one of the components of the entire communication alongside typefaces, layout, illustrations, etc. A good example of this phenomenon is a comprehensive branding of PKO bank. The logo is always somewhere to the side — the main message is conveyed in distinctive illustrations and complementary headers.

Each well-designed sign has colour versions, which are used for specific applications. Typically, such a set is composed of a coloured version, monochromatic one (mainta-ined in grays), achromatic (black and white without any tonal transitions) and a separate variant of the sign for use on a dark background, known as negative space.

NAGRODA
SOLIDARNOŚCI
im. Lecha Wałęsy

NAGRODA
SOLIDARNOŚCI
im. Lecha Wałęsy

NAGRODA
SOLIDARNOŚCI
im. Lecha Wałęsy

Often signs, apart from various colour versions, are available in many records. For example, Coca-Cola is available in every corner of the world and everywhere it reaches it utilizes a dynamic and soft lettering recognizable regardless of the script in which it is edited.

source: http://www.geminitranslations.co.uk/blog/the-kekou-kele-and-the-grains-of-corn/

Change of sign may take place for various reasons, from the desire of mild refresh of a visual image of a brand, to a total change of strategy which forces the implementation of a new graphic face.

REBRANDING

The first example would be rebranding while maintaining a similar signet. PKO during its rebranding made by White Cat Studio decided to leave the signet (a very distinct money-box designed by Karol Śliwka). Of course, the sign was drawn again — a gradient was added, the orange coin was replaced with a red one and the typography was changed to the one more in sync with the signet. We receive a similar sign but with much more modern character.

Modification of a sign could also be a result of changes in the direction of a given company. In 2015 Axtel decided to expand its offer to other areas. This was obviously an impulse to refresh the sign so that it would not confuse the company's clients — a strong lettering and headphones of the original logo have been converted into a distinctive Ax ligature which introduced the modern spirit replacing the old-fashioned sign.

old Axtel

new Axtel

The last kind of rebranding is a change of a sign due to the change of ownership. Warta insurance company quickly underwent redesign after its purchase by a foreign corporation and since then its logo is the word warta with a characteristic Greek letter tau, and a red dot at the end referring to its mother company logo.

Subsequent images show a very simplified process of logo design — from a graphic artist's sketch, through work on successive versions, until the final draft and creation of a brand book.

LOGO MAKING OF

Each sign carries particular thought and message. The signet created for KISSPRINT (Association of Polish Graphic Artists) associating mostly young people interested in technology and centuries-old tradition needed some kind of connection between the two worlds. Therefore, two initial themes were chosen — a kiss emoticon (consisting of a colon and an asterisk) and a cross section of graphic press. Their coupling resulted in an interesting and suggestive sign.

kiss

prasa

KISSPRINT
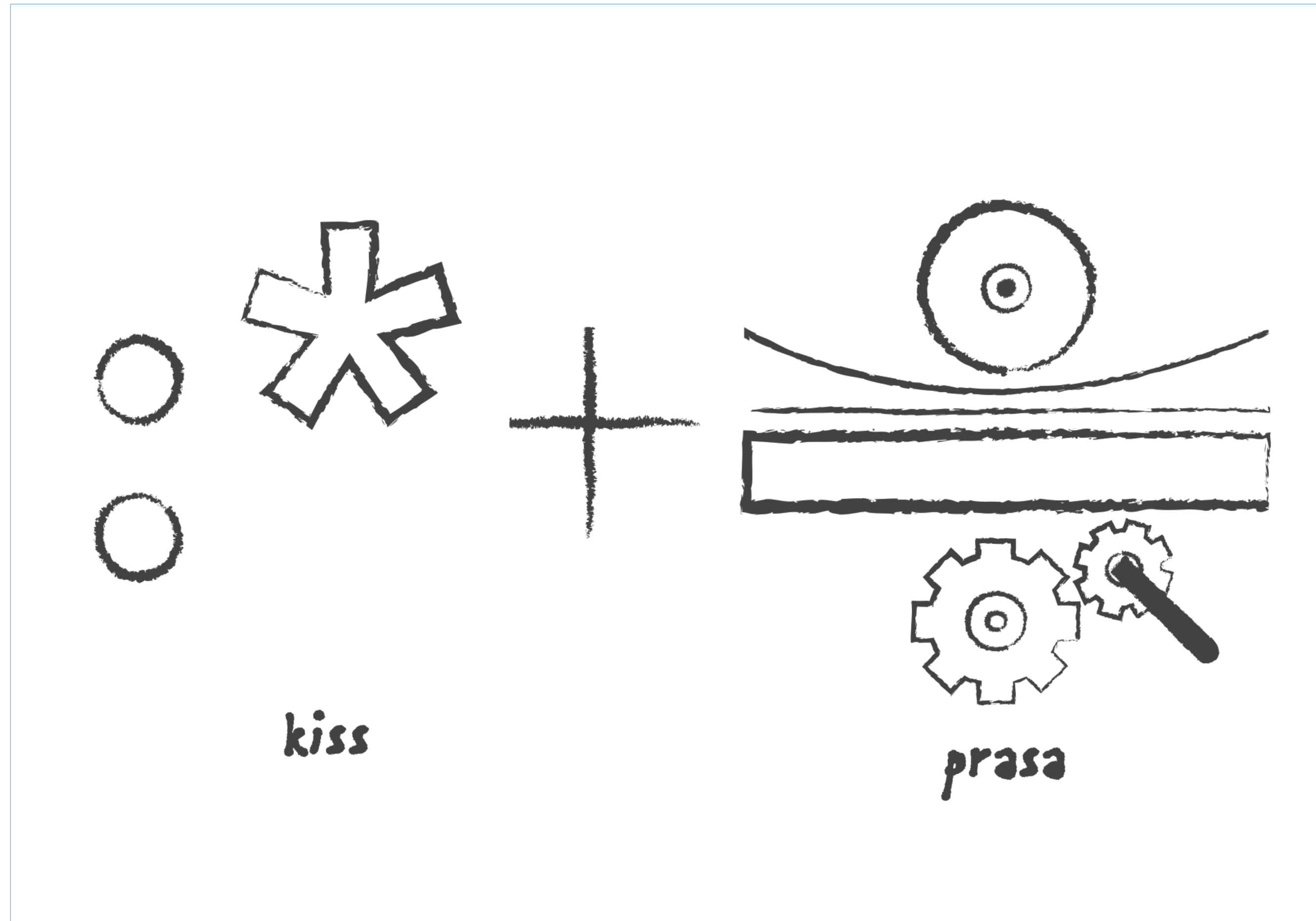
The way from the chosen theme to the final version of a sign leads through dozens of sketches in order to find the best solution and the best look. The logo of Minister of Culture Award needed to combine the symbols of a lily flower and a crown. Even such simple and played-out motifs leave enormous space for stylistic exploration.

DOROCZNA NAGRODA
MINISTRA KULTURY
I DZIEDZICTWA NARODOWEGO

As was mentioned earlier, a sign can aslo be purely typographical. The trick is to breathe some sort of idea into the shape of letter. The logo design project for Coming Out (an exhibition of the best works of the Academy of Fine Arts in Warsaw graduates) had to

be presented in a hand-made and vigorous typography that would fully convey youthful vitality. Because of the fairly traditional character of the exhibition itself, classic tools — brushes, ink, knives and correction pen — were chosen to create the logo.
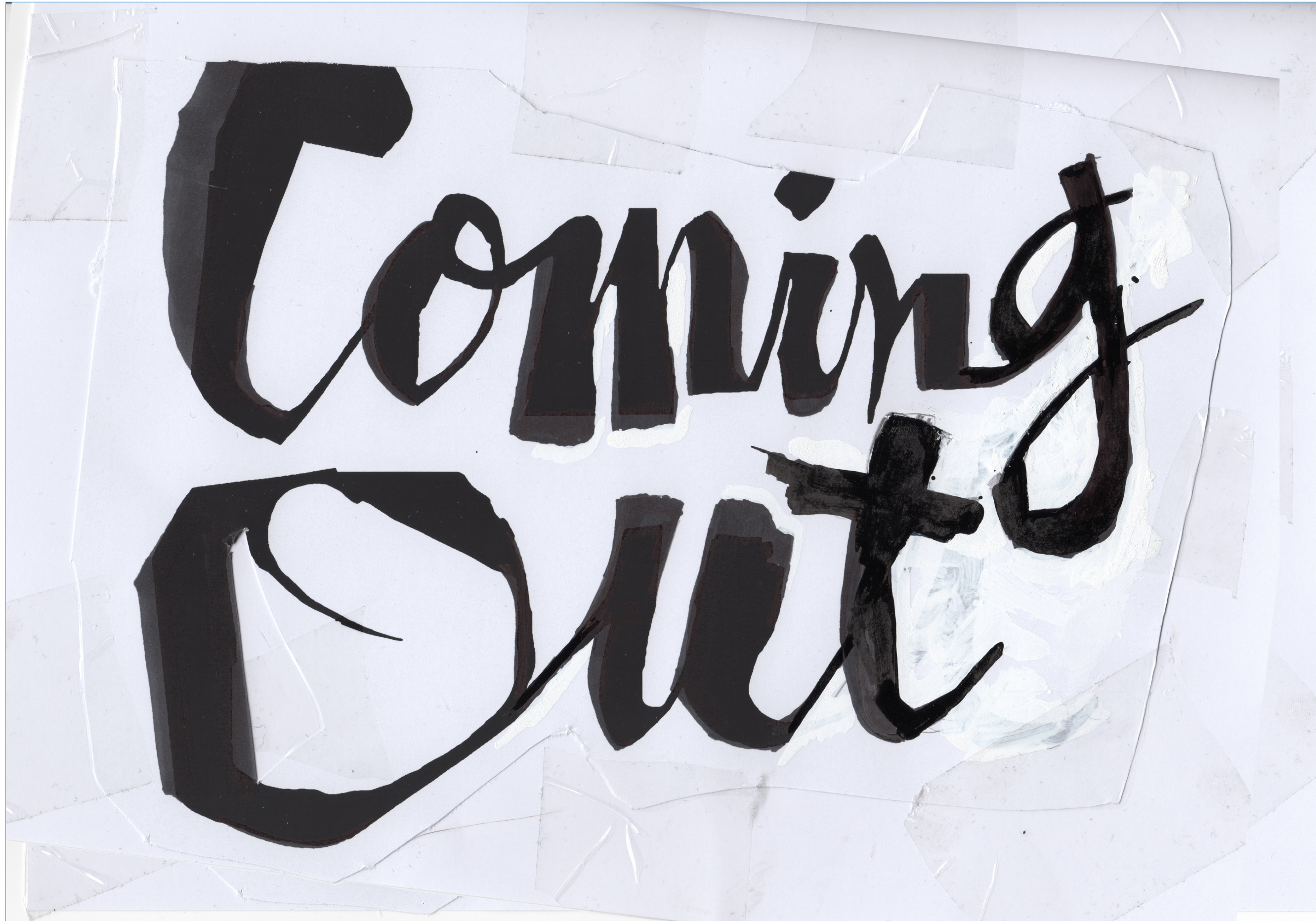
Each emblem is drawn in a special computer software — vector graphics editors, such as Adobe Illustrator, Glyph or FontLab. Design projects are created with the use of Bézier curves (3rd degree parametric curves widely used to model shapes of figures and surfaces). The curve consists of a stroke, anchores and nodes which are edited with the use of handles.
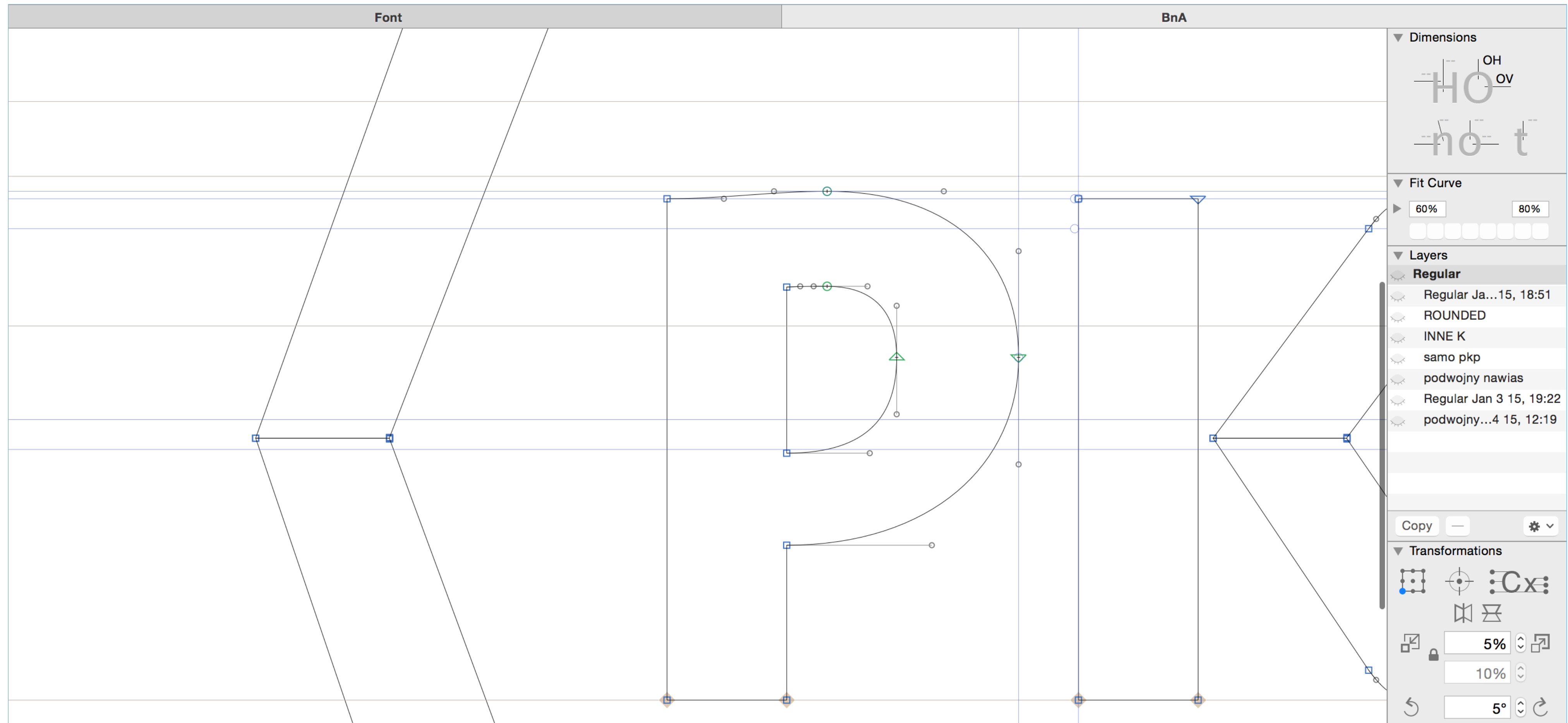
It is advisable to always test how a sign we design would work in various areas of use such as business cards, company letters, notebooks or posters, as well as some large scale applications. The example below presents a sketch prepared for a customer to show how the sign works in the context of full brand identity.

Fidning a proper structure for a sign is very important. A designer has to avoid careless tracing on modules and add optical adjustments if needed. Below: recreated Potocki family coat of arms.
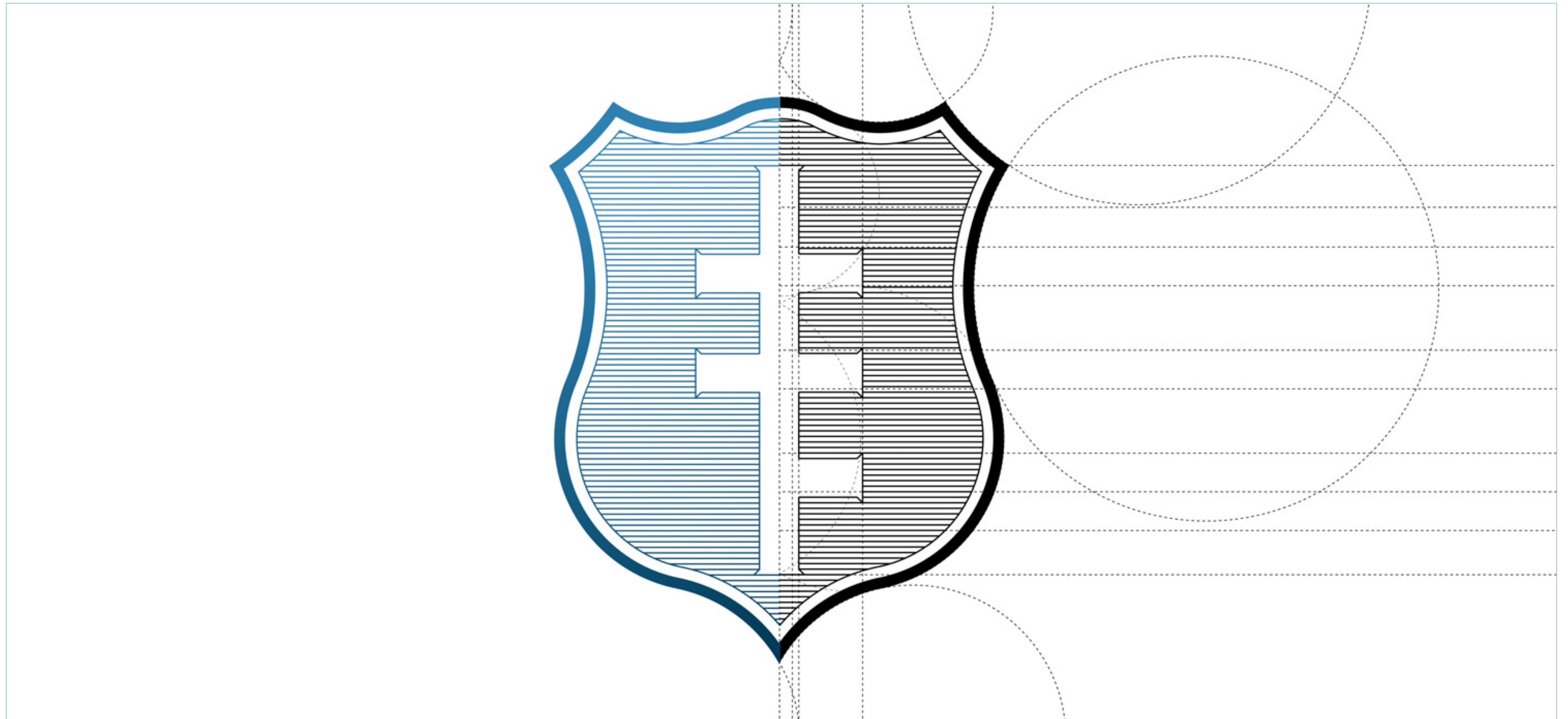
Three main stages of sign design — from a preliminary sketch to its digitized version later on. The sign is drawn after establishing a proper grid. At this stage a colour of the signet is chosen. The following stage allows for a choice of typography.
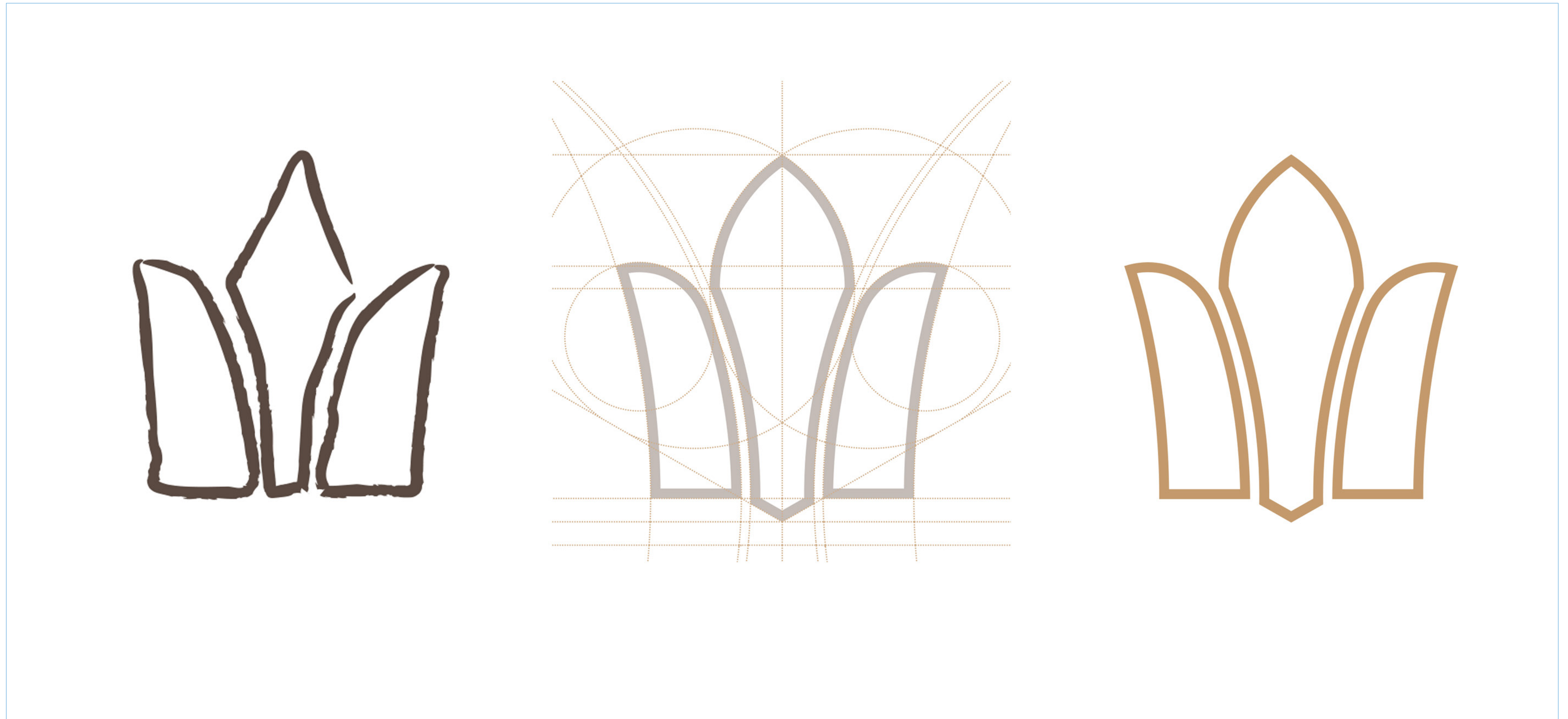
Typography can enrich a message conveyed by a sign. The following illustration shows the logo of iMe app for solving IT issues. Since the whole project refers to the world of

8-bit graphics typography of the final version of the sign refers to monospaced typefaces used by computer programmers.
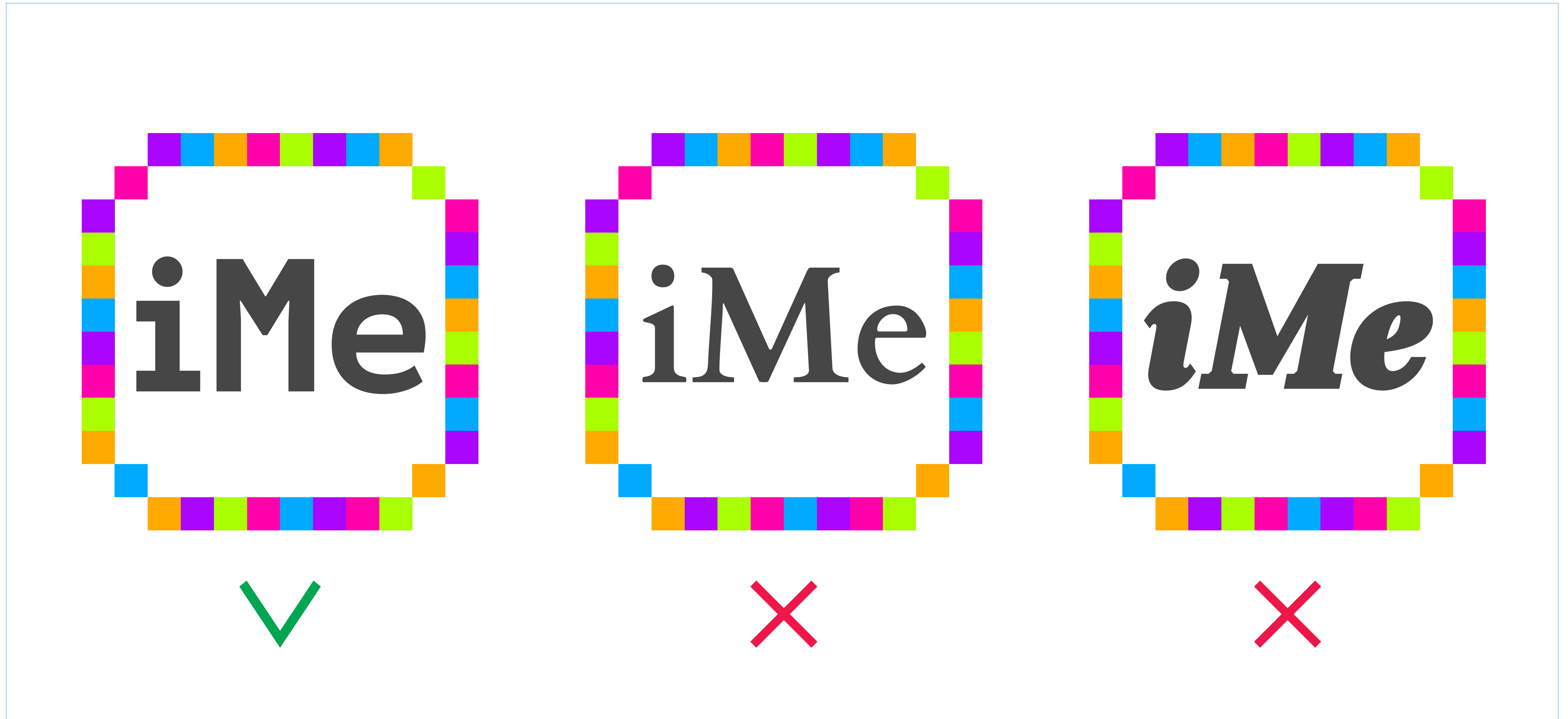
The complete look of the signet and accompanying typography should be based on
a logical and well-balanced grid. Below: Handroll logo and its design.

Handroll Brand Book | **Księga standardów wizualnych**

Logo Handroll ma starannie opisaną konstrukcję, bazującą na modułach. Pole ochronne znaku – czyli minimalna przestrzeń, jaką logo musi posiadać, wyznacza wysokość wielkiej litery "H". Wszelkie dodatkowe elementy graficzne powinny znaleźć się poza tym polem.

Handroll
Grab & Go

A proper delivery of the ready project is of utmost importance. The logo and its colour variants should be clearly specified in folders in order to facilitate their use. For example, a horizontal RGB colour version should have a corresponding file name.
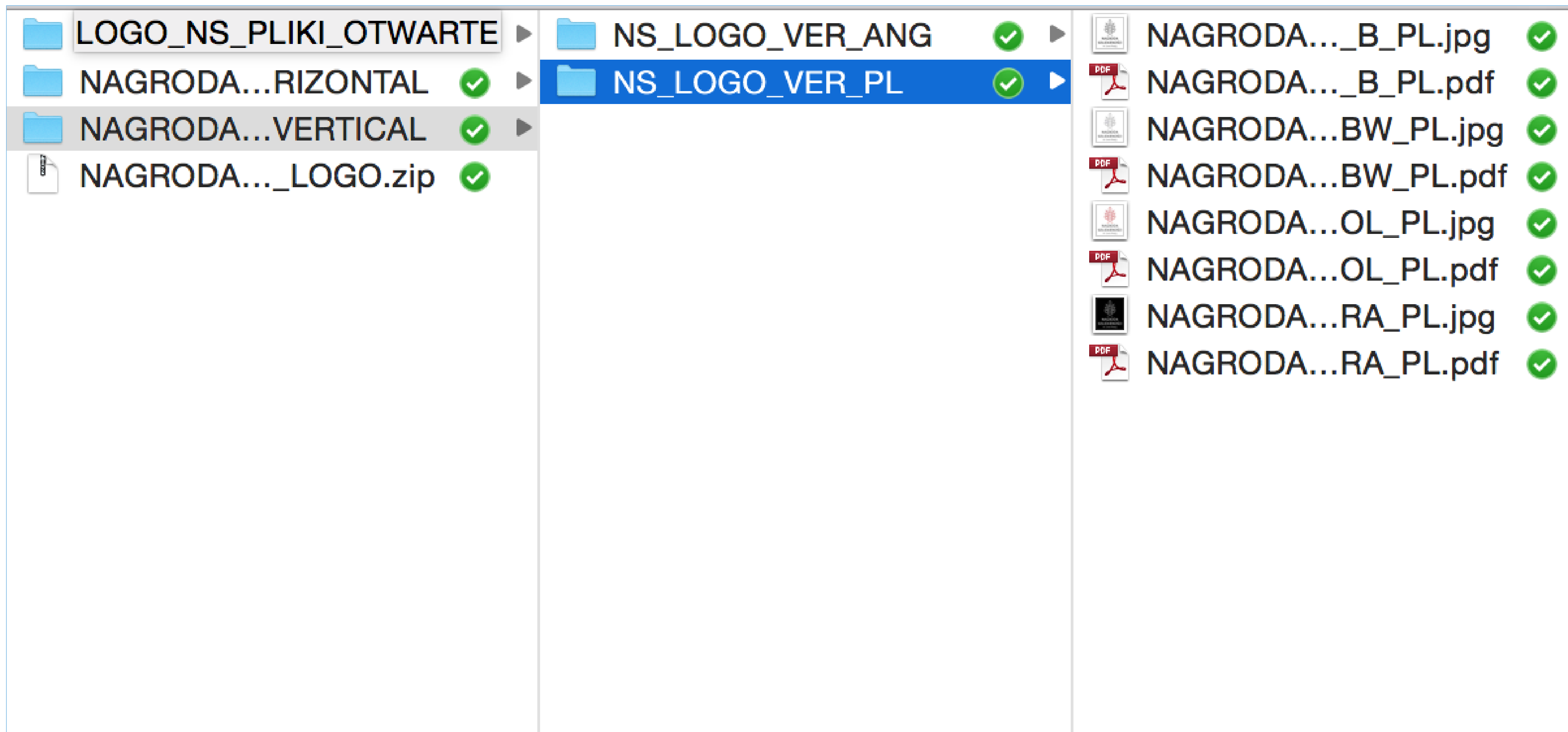
The design project should be concluded with corporate identity brand book which allows every user of the logo to follow the specifics of its usage, such as the instances of monochromatic or achromatic versions use of the logo. The following images show selected pages from a brand book.

Bio Brain — Identyfikacja wizualna marki

Handroll
Grab & Go

Handroll Brand Book | **Księga standardów wizualnych**

— Brand Book   *Felou*
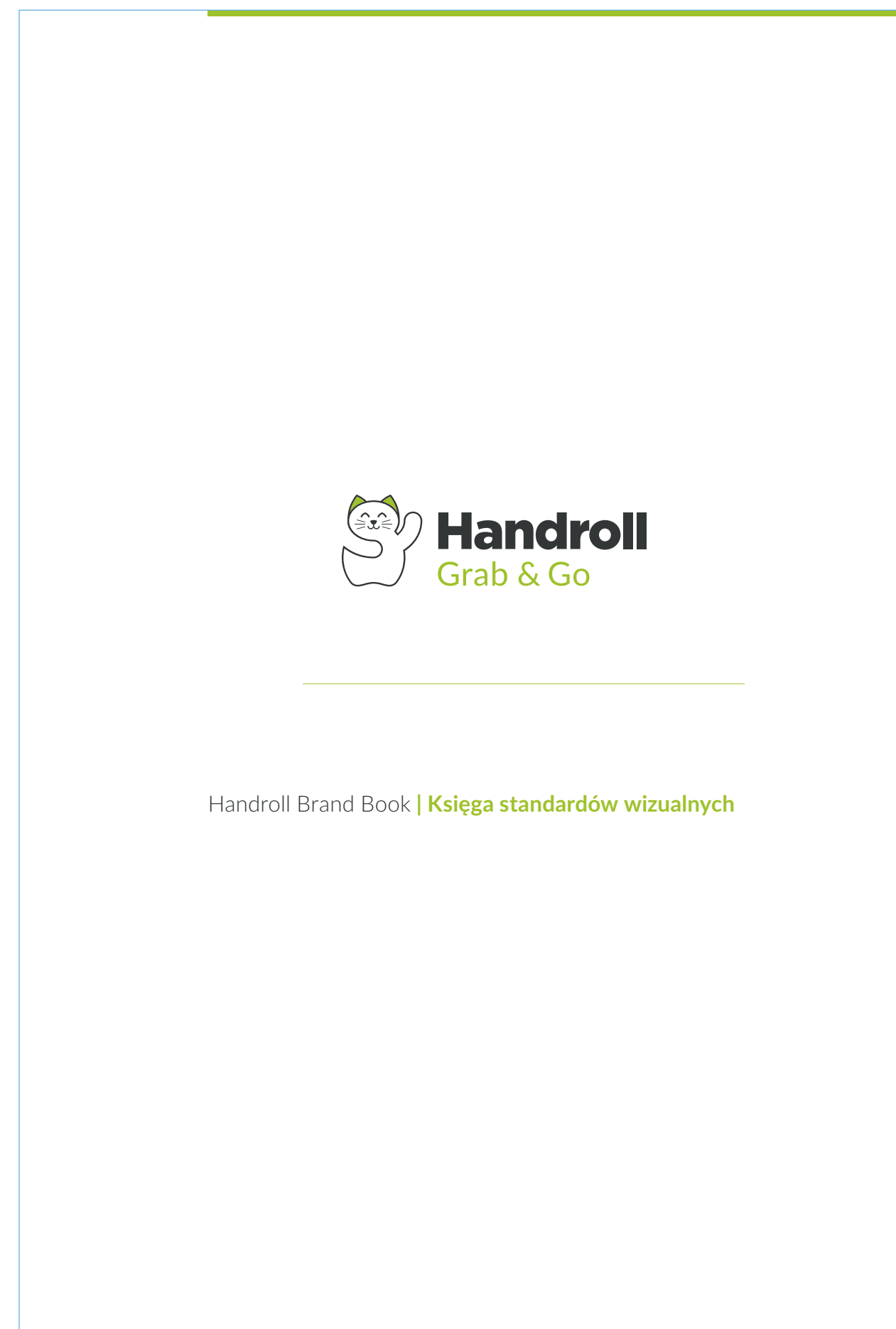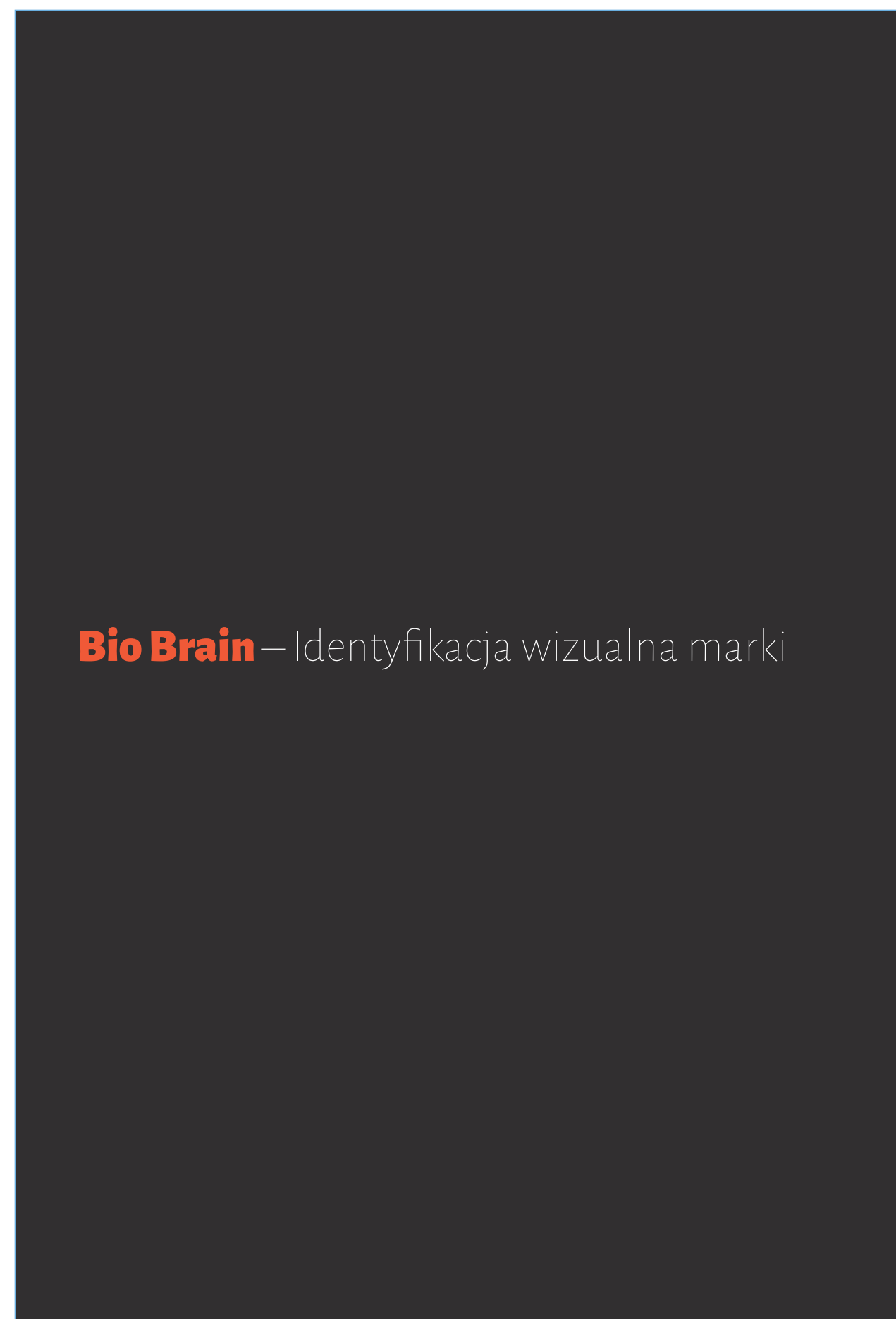
Protective field — is an area surrounding the logo, containing no textual or graphical elements which could obstruct the logo visibility. It is usually established by a modulus selected from the logo, eg. the height of the logo.

Impermissible logo modifications. It should be noted in a brand book that every interference and modification on the logo aside from the ones covered in the brand book, is forbidden.
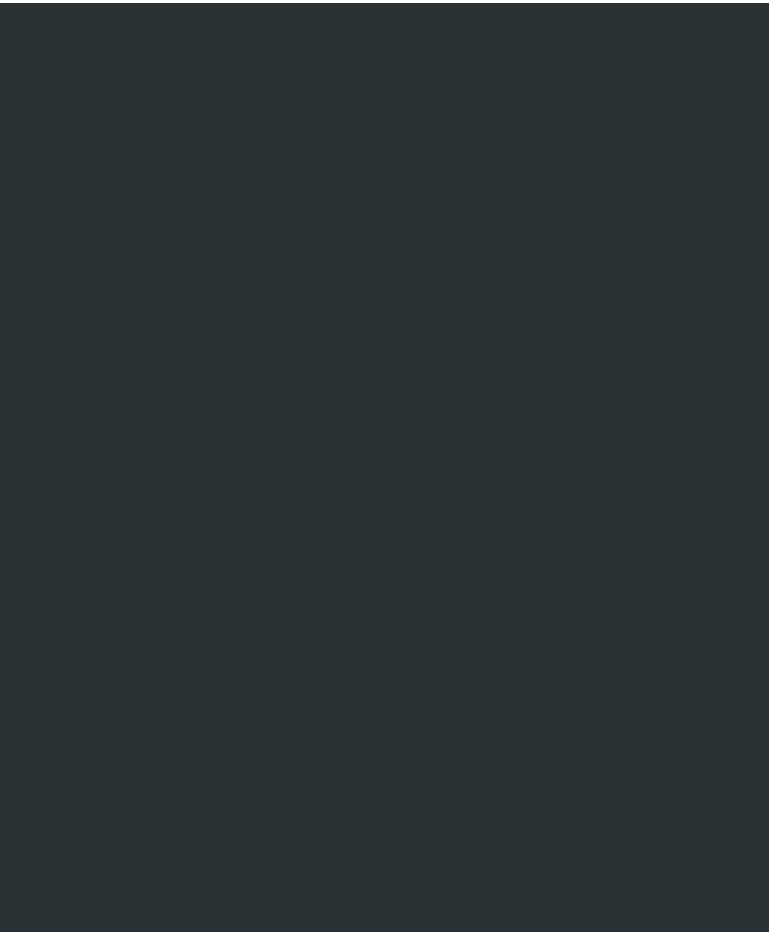
Layout and size description of a logo.

Precise description of colour patterns and options used for a logo is of utmost importance. The colours should be specified in CMYK, RGB, SAFE WEB as well as according to Pantone Color Chart. Such a move should guarantee the use of a proper reprinted colour exactly as the one stated in the design.

RGB: 245/120/30	RGB: 150/50/0	RGB: 15/55/70	RGB: 190/190/190	RGB: 65/65/65
WEB: ff6633	WEB: 993300	WEB: 003333	WEB: cccccc	WEB: 33333
CMYK: 0/65/100/0	CMYK: 0/80/100/50	CMYK: 30/0/0/100	CMYK: 0/0/0/30	CMYK: 0/0/0/90
PANTONE: Orange 021U	PANTONE: 167U	PANTONE: 5463U	PANTONE: Cool Grey 3U	PANTONE: Hexachrome Black U

SIGN

AUGMENTED REALITY IN PRACTICE

Marcin Wichrowski

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INTRODUCTION

The technology of Augmented Reality makes it possible to smoothly combine real and virtual worlds. It is done by overlaying real image with computer-generated elements. As a result, thanks to precise mapping of principles of perspective and adjusting virtual objects to the geometry of the real world, a viewer experiences the feeling that these two worlds interpenetrate. Virtual elements can take on many forms: 2D and 3D objects, audio-visual material, animation, text or even advanced games and interfaces connected to the actual environment. AR provides new options for interaction with digitally-generated information which is invoked and transmitted by the user's environment and objects surrounding him/her. Thanks to the perfect integration, access to knowledge becomes pervasive and its presentation attractive and uninterrupted. That fits perfectly with the concepts of Tangible User Interface and Ubiquitous Computing where the real world is used as a basis for interaction and communication with the user and where mobile devices are ubiquitous, yet unobtrusive.

REALITY – VIRTUALITY CONTINUUM

In order to explain the technology of AR it is worth discussing the Reality – Virtuality Continuum proposed in 1994 by Milgram and Kishino. At one end we have Real Environment and at the other – Virtual Environment (previously dubbed Virtual Reality). These worlds are opposites – the former familiar to us all, the latter generated by a computer, without any connection to reality. Between these extremes lie two types of augmented worlds: Augmented Reality (AR) and Augmented Virtuality (AV). AR which is the subject of this chapter only adds computer-generated elements to the real world and is tightly connected with it. According to the 1997 definition of Azuma, AR should fulfil three conditions: combine real world with virtual elements, provide interaction in real time and be nested in the 3D space. AV, on the other hand, provides access to a computer-simulated world with additions of real-world elements. An example here could be a sports game with the environment simulated by a computer and controlled with the sensors operating in the real world (e.g. measuring the force applied by the player).

Source: Mixed Reality- Milgram, P., Kishino, F.: A taxonomy of mixed reality visual displays. IEICE Transactions on Information Systems, 77(12) (1994)

The research and development of technologies necessary for the creation of AR started already 4 decades ago (beginning with the Sensorama project completed in 1955 by Morton Heilig), but it was only in 1990 that the term "Augmented Reality" was used for the first time, by Tom Caudell. In 1992 Louis Rosenberg built Virtual Fixture, which is considered to be the first functional AR system. However the dramatic increase in popularity of AR technology has been observed only in the few recent years. That is due to the fact that AR finally appeared on PCs in Internet browsers, then in mobile devices, with the growing number of applications using this technology. This has led to a much easier access to AR and its greater availability. AR is used in the ever increasing variety of contexts: advertising, marketing, architecture, entertainment industry, tourism, education, training, books, computer games, modelling, art., social services and many more. Let us take a closer look at the technical conditions connected with AR technology.

TECHNICAL ASPECTS OF AR

To experience AR it is necessary to possess equipment detecting the elements of the context (e.g. a camera registering images in real time) and a monitor presenting the final augmented effect to the user. This can be a computer, tablet, smartphone or HUD (Head-up Display)/HDM (Head Mounted Display). In the environment of the device there is an application responsible for recognising the context in which a user has found himself/herself, adding and presenting relevant multimedia to the picture of the real world. The triggers of the added multimedia can base on image analysis in search for relevant markers stored in the device's memory, or be based on the analysis of the user's location. In the former case the program recognizes a marker and then is able to calculate at what angle and distance it is seen. Next calculations are done using these coordinates, as well as information from the camera and the generated object. As a result, the position and size of a virtual object are adjusted to create an impression that it fits in closely with the real world. There are two types of triggers using image/picture analysis:

· Based on markers – markers are computer-generated two-dimensional codes (e.g. QR codes) or other binary patterns (e.g. black and white mosaics) which are often have black frames. The frame is used to show the plane of the marker in relation to the viewer in order to ensure proper AR projection/display. Algorithms recognising this type of marker are very efficient from the computing point of view, however sensitive to occlusion and changes in illumination. They also stand out against the environment, which might make them unsightly.

„Augmented Reality is used in the ever increasing variety of contexts: advertising, marketing, architecture, entertainment industry, tourism, education, training, books, computer games, modelling, art., social services and many more. "

· Without markers - Natural Feature Tracking (NFT) – it is possible to track objects which occur naturally in the given space. We can make use of the unique nature of pictures and objects around them which are then subject to augmentation. Objects such as buildings, architectural elements, logotypes, pictures or posters are so unique visually or spatially that it is possible to identify them unambiguously, basing only on their appearance as registered by the used device.

In the second case (position analysis) we take into consideration:
· Triggers basing on data from GPS, compass and accelerometers – based on tracking the position of the device with the help of GPS, which can be helped with a compass and accelerometers.
· Triggers based on the position from WIFI (inside buildings) – the position of the device is calculated on the basis of the differences in the strength of WIFI signals of local hotspots.
· Bluetooth beacon – a special device or a computer with a Bluetooth modem which finds smartphones, tablets and laptops in its vicinity and sends a request to them to receive a message. When transmission is accepted by the receiver, the device will send a multimedia message.
· RFID (Near field communication) Tags – technology using radio waves to transmit data and power an electronic circuit (RFID tag). RFID tags are placed in the close proximity of an object with the view to its identification. A mobile device of a viewer equipped with the NFC module will read the information from the tag from a distance of several dozen centimetres to several meters from the reader's antenna.

GOOD PRACTICES IN DESIGNING AR APPS FOR MOBILE DEVICES
Bearing in mind that for many users AR might be a novelty, it is worth ensuring high standard of user-experience of the applications so that their use is not distractive or complicated. In order to achieve it we should take three aspects into consideration while designing AR – hardware and physical factors, design of application interface and ways of supporting users. Let us discuss these aspects in more detail. Hardware and physical factors are:

Context of application use – in order to characterise it the following questions need to be answered:
· Where will the application be used (public/private space, open/closed space)?

„Bearing in mind that for many users Augmented Reality might be a novelty, it is worth ensuring high standard of user-experience of the applications so that their use is not distractive or complicated."

· What could be the purpose of application use (e.g. instant information, education, entertainment)?
· How much time will a user spend with the application (incidental/longer use)?
· Does the user have previous experience with AR?
· Can s/he count on help with application use (built-in help/ mentor in new technologies)?
· What is the screen size of the device a user will use (smartphone/tablet)?
· Is it better to use the vertical (portrait) screen orientation, of horizontal (landscape) screen orientation (ease and convenience of use, amount of information on the screen)?
· What operating system does each device have?

Space and ways of using AR – In the case of an open public space it is more convenient to use the "search" mode to find interesting points (POI-Point of Interest). The user will see the picture of the immediate environment through the camera lens and is not forced to look for markers/triggers in the real world. S/he can also look for these by choosing names, distances, opinions etc. That, in turn, promotes incidental use of the app when a user does not have enough time to perform a given task or the conditions make it impossible to concentrate on it. In order to use this solution it is necessary to use GPS/ WiFi localisation/beacon. In closed/private areas a user may use the standard model of tracking markers/triggers placed in the direct vicinity. The user will see the picture of his/ her surroundings though the device's camera and point it to objects, invoking additional content. The environment should also be ready for the use of AR and provide:
· Easy to find information identifying elements acting as AR triggers,
· Sufficient space – the user must be able to move freely in order to find the best picture,
· Proper positioning of AR markers (triggers) so that each marker can be watched by many people simultaneously,
· Stable lighting conditions ensures the best AR experience on different devices.

Energy – AR technology consumes energy in many forms – mental, physical and electric. Introducing it might put psychological and physical strain on users. They need to be properly educated how to use the new technology – which software to install, how to use it, how to identify AR elements and interact with them. We must take into consideration also typical habits of mobile device users. For example, they like to hold a smartphone/ tablet in a position comfortable for them (usually close to the body) for a relatively short time. If they need to use the device for a longer period, they would rest the hand holding it

„AR technology consumes energy in many forms – mental, physical and electric. Introducing it might put psychological and physical strain on users. They need to be properly educated how to use the new technology – which software to install, how to use it, how to identify Augmented Reality elements and interact with them."

e.g. on a table and use the second hand as well. When using AR apps, the very movement with the device and pointing it towards interesting objects might be strenuous, especially for tablet users, who might even grow discouraged. Therefore it would be prudent to limit the time AR is used to situations where it might add new quality to information visualization and perception.

The second aspect under consideration is building user interfaces – a challenge which might be difficult to meet. AR apps often occupy the main part of the screen of a camera and are enriched with 2-D objects. In addition, a 3D interface could often be seen, directly on the original picture. It will entail the need to build both interfaces in a way so as to make them complement each other without ruining perception. Since it might prove difficult to foresee or monitor user's location it may lead to unexpected and unwelcome situations (e.g. overlaying elements of both interfaces, problems with legibility, etc.). One solution could be the centralisation of the 3D interface in relation to a marker/trigger in such a way that its content does not disappear from the screen. That would improve interface legibility and help keep the stability of additional elements on the screen. In the case of 2D interfaces overlying a camera picture what works best are minimalistic projects which allow for directing user's attention towards AR elements. Another issue is the limited range of thumb operation on a touch screen. It is important to design key interactive elements in places where they are most accessible. It would be wise to assume that the user will use his or her smartphone with one hand.

The last aspect of good practices in mobile AR design is proper support for future users. What seems to work are uncomplicated visual instructions which present AR technology in an intuitive manner. They can be placed in physical environment, e.g. in the form of a poster or catalogue entry, etc. It is necessary to show subsequent steps in experiencing AR with clear descriptions of elements triggering additional content. In the case of an application, a short description of how it works can be displayed upon initialisation. Some apps delay slightly camera initialization process to show the most important instructions. Since navigation of the space registered by the camera and displayed on the monitor might be non-intuitive, it may help to include visual prompts, e.g. in the form of clouds of points on the screen 'attached' to certain elements of the environment. Animating those points (dots) in the place where an object is functioning as trigger could help with interaction. Just like in the case of standard applications it is advisable to add typical elements helping

„It is important to design key interactive elements in places where they are most accessible. It would be wise to assume that the user will use his or her smartphone with one hand."

users, such as FAQ and contextual help, which will help solve current issues quickly (e.g. messages with tips related to the loss of a marker/trigger from view, etc.).

AR STORYTELLING

Users quickly adapt to new technologies, therefore simply adding virtual elements to the real world does not evoke such emotional reactions as was the case in the not so distant past. How to ensure that the AR options available to us have been fully deployed to enhance information retention?

One of the answers to the above dilemma is to introduce story telling. According to Walter Fisher people are "storytelling animals". We listen to, read, tell and make up stories. It is an integral part of being a human. By listening to and telling stories we keep in touch with our environment, take decisions and live - surrounded by this form of communication. Storytelling facilitates remembering information, building relations, transmitting emotions, explaining and learning.

We can wonder why storytelling is so powerful and influences our perception to such a large degree. Let us look at a typical example – when we are reading an instruction manual of a device, only the left hemisphere of our brain is activated. When we are listening to someone's experience connected with using the same device, both brain hemispheres are engaged because such stories are laden with emotion and have rapport-building potential. Stories facilitate the building of social connections.

Similarly to storytelling, AR can enrich the message and the environment of a user by opening access to multiple-layered exploration of a given story/space. Elements of the virtual layer will transcend and combine with the real world. The merging of technology with imagination creates the opportunity to tell stories in a novel, exciting way, more engaging and memorable for the receiver. At the same time, we must remember that creating good AR experience requires, just like any other storytelling endeavours, conscious and deliberate narrative effort, plus technical expertise in action.

AR IN A MUSEUM

One of the most interesting and popular practical uses of AR is presentation of works of art with storytelling and mobile apps accompanying exhibitions. Visitors use their mobile devices while watching the presented works in order to experience enriched contact

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with art. The additional benefit is the unique and often fascinating new method of art education they are exposed to.

Examples of uses of AR scenarios may look as follows:
· Presenting works in their original contexts/environment, which is visualised around the piece using 3D elements.
· Showing invisible elements, e.g. those hidden from view due to their size, hidden inside the work etc.
· Presenting changes in time, e.g. showing how the background of the painting has evolved over the centuries.
· Visualisation of damaged/missing parts of a masterpiece.
· Adding descriptions in the form of infographics/animation directly to the work. These would explain e.g. the meaning of symbols, the process of creation, etc.
· Adding audio/visual materials about a work of art in the form of documents, author's, curator's or critic's comments, curator's comments, etc.
· Integrating social media, which enables e.g. inform the public about exhibitions, enter opinions, etc.
· Adding links to additional information in the Internet.
· Using educational games/quizzes referring to a given work (also for youngest users).
· Using tags for orientation on the map of a museum.

When building such applications it is advisable to follow the above guidelines regarding ensuring high level of user experience and the role of storytelling. It might help to analyse existing applications and to study research results from the field of AR. For example, a German company Metaio, which is the world leader in AR solutions, conducted an experiment in January 2014. The research involved using AR to create an application – a guide to the National Museum of Bavaria in Munich. An application was created which described different works of art - statues, sculptures, models, etc. The following technologies were used: Metaio SDK, programs Metaio Creator, Metaio Toolbox and the latest techniques for tracking objects developed by the company. The application was available for Android/iOS platforms and worked offline (without downloading additional content during use). One of the key goals of the experiment was to test what forms of augmentation of objects and interaction are best liked by the users. 35 persons tested the app simultaneously; they were equipped with various mobile devices: smartphones, tablets, Google Glasses. The researchers concluded that:

„One of the most interesting and popular practical uses of Augmented Reality is presentation of works of art with storytelling and mobile apps accompanying exhibitions. Visitors use their mobile devices while watching the presented works in order to experience enriched contact with art. The additional benefit is the unique and often fascinating new method of art education they are exposed to. "

· AR Technology should only be used where it contributes to the quality of presentation of a work of art.

· It is advisable to preserve the balance between the works and their augmentation (it is important to remember that AR must complement and not interfere with or distort the perception of a work).

· The biggest advantages of AR, as seen by the users were: the presentation of a given work in its original 3D context (e.g. a sculpture against the original altar), showing the hidden elements of the work (e.g. when an object needs to be opened to see its insides) and visualisation of changes in time (e.g. how the city's architecture evolved, basing on the model in the museum).

· The biggest disadvantage connected with the use of AR was, according to the users, presenting too much information (text and graphics) on/around the works. AR turned to be superficial in many cases and could be replaced by traditional descriptions placed near the given works.

· Thanks to the offline version there was no problem with Internet access in the museum, which helped avoid delays in interface response.

· Combining the use of the application with the use of a professional guide (a person) led to distractions, therefore it is advisable to choose only one of these two options.

· It is crucial that the visitors be informed about the project and a clear instruction for application use placed in a visible place.

· Places and objects acting as AR triggers should be clearly marked.

· It is necessary to provide sufficient lighting (of exhibits and their surroundings) in the museum.

· Objects placed behind glass panes can be difficult to recognise by algorithms looking for triggers.

· It is necessary to run a series of tests in the target location, at different times of day, on different equipment (many producers, operating systems, varied capacity of devices, quality of cameras, parameters of monitor, etc.).

· If audio component is envisaged in the application, users must be equipped with headphones.

· Ensuring no copyright is infringed regarding the works and their descriptions used in the application can prove to be a lengthy process.

Technological issues presented above are subject to constant change, therefore they should not be seen as definite obstacles. However, one thing remains constant – the user

„Augmented Reality technology should only be used where it contributes to the quality of presentation of a work of art."

is most important in all cases – his/her experience of a story told with the aid of AR must be fascinating, suggestive and intuitive enough to encourage him/her to follow it and see how it progresses.

AR IN THE NEAR/FORESEEABLE FUTURE

Many research projects connected with AR involve the development of algorithm for advanced image processing. They allow for the recognition of increasingly complex 3D objects in real time and in varying lighting conditions without the need for texture analysis (Edge Based Tracking).

It is worth noting new applications of SLAM (Simultaneous Localization and Tracking). It is an advanced NFT algorithm able to orient and map the space surrounding a device. Thanks to it, beside the detection and tracking of objects the device, on the basis of image analysis, aggregates also information about its position. In practice that would help in full mapping of a position and relative movement of augmented content to the user without the need for keeping the marker/trigger in the view of the camera. It gives to the user the freedom of exploration.

Currently work is being done on the development of SLAM in order to use it in complex 3D reconstruction of large spaces. That could be done while moving in the environment, with a mobile device registering in real time the characteristics of the environment. The 3D object thus created could act as a reference model and be used instead of GPS in closed quarters.

Another development is RGB-Depth SLAM. The algorithm spots objects in the vicinity of a user and remembers their 3D characteristics. The space thus mapped can be used dynamically and integrated with the presented multimedia content. It will be useful for placing elements from analysed environment directly on the presented image. One example is a situation when a virtual object should be behind another element of the scene (e.g. a virtual chair should be behind a real table at a certain angle).

More and more emphasis is placed on making virtual objects in AR look credible. One way to ensure credibility is providing sufficient lighting of an object in accordance with conditions in the surrounding environment. That is achieved by analysis of lighting in the real environment and basing the illumination of objects in the AR on the resulting data (Coherent Illumination).

We are still waiting for a breakthrough in hardware which would let people use AR in

„The user is important in all cases – his/her experience of a story told with the aid of Augmented Reality must be fascinating, suggestive and intuitive enough to encourage him/her to follow it and see how it progresses."

as many situations as they are using smartphones and tablets now. Work is being conducted on new versions of AR glasses meeting several key requirements – they must be ultralight, efficient, provide high quality images displayed straight in front of the user, and fast Internet connection, allowing for natural reliable interaction with environment filled with virtual objects.

 Observing the current research and experiments we may conclude that we are still to expect the best. However, even now we can experience what was once the domain of science-fiction. Therefore it is advisable to include tasks connected with AR in the curriculum in order to prepare young designers to collaborate with IT specialists in building new forms of interaction and interfaces of the future.

„Observing the current research and experiments we may conclude that we are still to expect the best. However, even now we can experience what was once the domain of science-fiction."

Augmented Reality (AR) applications and services are becoming very popular mainly due to expansion of powerful mobile devices and new concepts such as Project Glass by Google. AR projects are no longer just laboratory concepts but existing solutions supporting a constantly growing number of complex tasks, navigation systems, education, entertainment etc. Therefore AR is very close to becoming a house-hold term and is visible in audio-visual media like games, TV, e-learning etc. According to the 2013 Horizon Report, the use of wearable technology increases and will accelerate the expansion of such technologies as Augmented Reality in the consumer market and educational sector.

Nowadays creating AR projects is much easier and does not always require very specialized equipment or individually tailored applications. Wide range of new software and hardware solutions (editors, services, SDKs, high quality mobile devices) for AR, dedicated to users with different levels of computer skills, open great possibilities to applying this technology to own experiments and works.

An example of solution that allows to easily create AR scenes is Aurasma. This AR user-friendly online platform was created in Cambridge by software company Autonomy and launched in 2011. With its ultra-easy working environment even people who have never used the AR technology before are able to create, publish and manage AR projects in a few minutes.

Aurasma offers two solutions for quick authoring of AR scenes:
· Aurasma Studio – free web editor and content management system (CMS) for creating highly interactive AR projects.
· Aurasma - free mobile application for experiencing AR projects (created in Aurasma Studio) and producing very simple non-interactive AR scenes.
Before creating your first AR scene let's have a closer look at basic terminology used in Aurasma platform and best practices for preparing assets.

„Augmented Reality (AR) applications and services are becoming very popular mainly due to expansion of powerful mobile devices and new concepts such as Project Glass by Google."

Term	Description
Aura	Unique AR scene that appears when a real world Trigger launches digital Overlay.
Channel	Folder available online with AR scenes created and saved by users (Auras). It is possible to search for and follow Channels to check its contents.
Trigger	The image, photo, object or location in real world recognized by Aurasma and used to activate AR content in form of digital Overlay
Overlay	The digital elements – image, photos, videos, 3D, websites, that are displayed when Aurasma recognizes a Trigger.
Actions	A group of commands which determine interactivity with an Aura.
Aurasma Account	Personal access to Aurasma Studio (online editor) and Aurasma mobile application with user's library (Triggers, Overlays, Auras) and set of Channels (saved AR scenes).

Best practices for preparing good Triggers

Trigger Images

Preparing good Triggers which could be easily analyzed and recognized by Aurasma applications is one of the most important steps in process of creating AR projects. Thanks to good Triggers Auras activate immediately, work smoothly and stable in many conditions.

Examples of good Trigger Images:
· Many details across the entire image
· High contrast and tonal variations
· Unique elements and shapes

Examples of bad Trigger images:
· Basic graphic forms like simple logos
· Dark images with low contrast and no tonal variations

· Recurring graphic features like identical patterns, text
· Blurred images
· Gradients
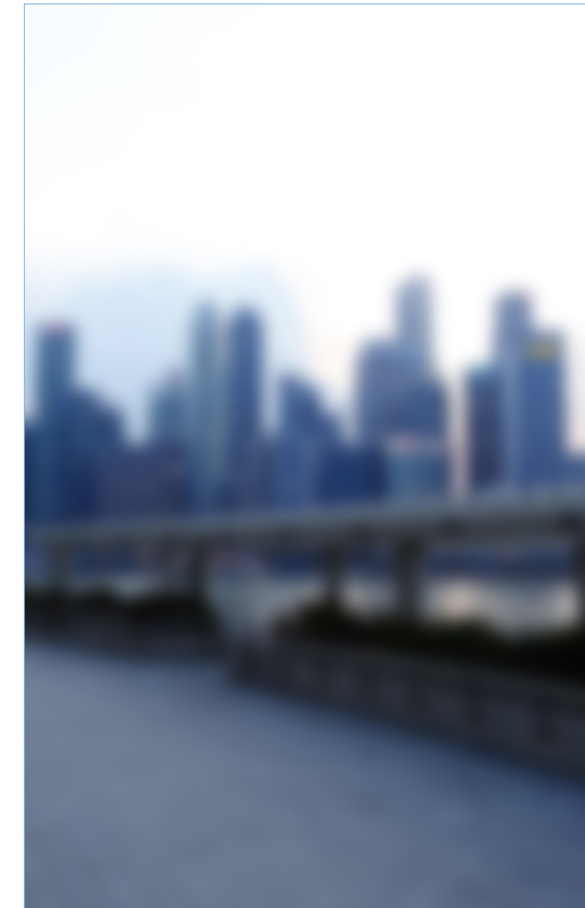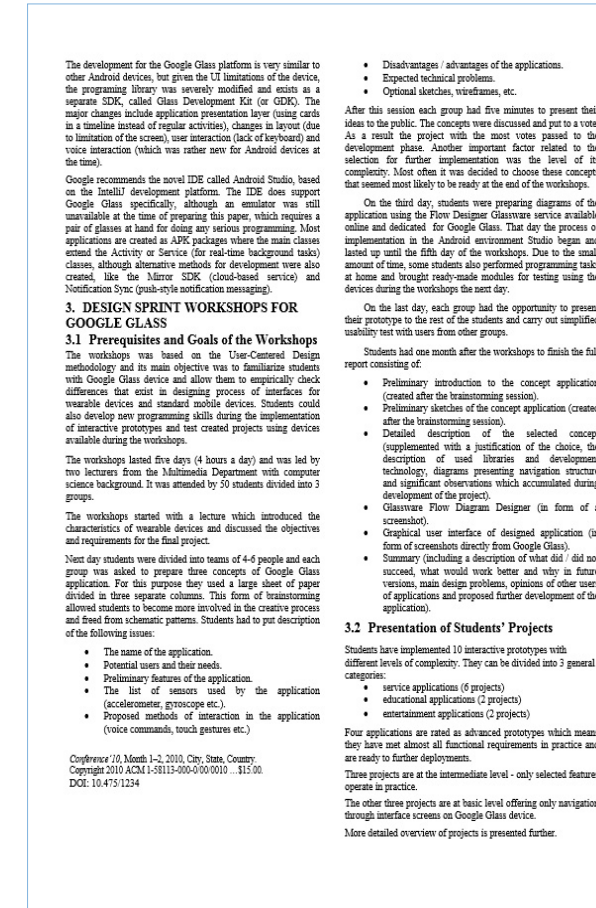
· Resolution of Trigger Image should be no more than 500,000 pixels (width x height).

· If you are going to print Trigger Image use exactly the same image you have uploaded to Aurasma Studio (without any changes like stretching, cropping etc.). Remember that image quality in paper magazines and billboards may be worse. In this case it is better to photograph real printed image in neutral light and use it as final Trigger in Aurasma Studio.

· Trigger Images should be tested carefully in different lighting conditions and from different camera angles to check how they work.

· You have to be aware of the availability of a huge number of different mobile devices (smartphones/tablets), which can cause different artifacts/perception of the same scene. Find out how your scene looks on devices with small/large screens and portrait/horizontal aspect ratio.

Masking and cropping of Trigger Images

Some elements on the Trigger Image may cause problems and it is better to exclude them from the process of tracking. Most often it refers to:
· Elements that change over time like trees, cars, pedestrians etc.
· Empty areas
· Large areas of text (but be aware that occasionally unique typography may improve tracking process
· Recurring and common elements like patterns and brand logos

To improve recognition and tracking processes it is recommended to mask aforementio-ned features. You can do this using Masking Tool available during adding Trigger Image in Assets and My Auras sections. It allows to draw shapes in order to mask areas which should be ignored. In our example it is good to mask trees, people and water (because of reflections):

   If you have image with a lot of empty space or very little graphical details it is better to crop it first leaving only important features (marked with a red on the exemplary image). Then upload it to Aurasma Studio as Trigger Image.

   In case of multiple version of the same image with different cropping it is recommended to select most common area that exists in all variations and upload it as final Trigger Image.

Aurasma Studio allows to add geo location tag to Trigger Images. In this case user must be at physical location and search for Trigger Image in real world to activate Aura. You can add location information during standard creation of Trigger by clicking View Map and entering address or post code into the search box:

The Trigger Image connected with Location Trigger should:
· Be made in neutral light
· Do not have reflective areas like windows
· Avoid elements that change often (e.g. trees, cars, pedestrians – use masking for this purpose)

Example of good Trigger Image for geo location:

Example of bad Trigger Image for geo location:

Best practices for preparing good Overlays
Image Overlay specifications

Aurasma Studio accepts 2 image formats – JPG and PNG. Only PNG offers transparency. Below you can find technical specifications and guidelines for using iamges as Overlays in Aurasma Studio.

	JPEG	PNG
Dimensions	512x512 pixels minimum. 500,000 pixels maximum. In instances where a smaller image is being purposely used, such as buttons, 256px or 128px should be sufficient.	512x512 pixels minimum. 500,000 pixels maximum. In instances where a smaller image is being purposely used, such as buttons, 256px or 128px should be sufficient.
Size	Up to 100MB	Up to 100MB
Supports Alpha	No	Yes

Image Overlay specifications

Aurasma Studio accepts 2 video formats – MP4 and FLV. If you plan to present longer material it is better to use MP4 format. It offers streaming which means that video starts very quickly after loading an Aura. FLV format is especially recommended for videos with transparency (it supports alpha channel). This format is very well suited for adding video avatars who will blend seamlessly into a real world in AR scene. However, it is worth remembering that such material must be much shorter in comparison to MP4. Below you can find technical specifications and guidelines for using videos as Overlays in Aurasma Studio.

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	MP4 (h.264 formatting)	FLV
Dimensions	512x512 pixels minimum. Remember to maintain the aspect ratio you require, making sure that the smallest dimension is no less than 512 pixels. For example: 16:9 video would be 936x512 px 4:3 video would be 683x512 px You can also upload portrait videos (to match a full page ad for example). For this the width should be no smaller than 512px and the height whatever is required to maintain the aspect ratio.	512x512 pixels minimum. Remember to maintain the aspect ratio you require, making sure that the smallest dimension is no less than 512 pixels. For example: 16:9 video would be 936x512 px 4:3 video would be 683x512 px Using FLV videos of an irregular size may cause Artifacts to occur. To avoid this you should stick to FLV videos that are regular in size (16:9, 4:3 or square, i.e. - 512 x 512).
Size	Up to 100MB	Up to 100MB
Bit-rate	3 MBPS	10 MBPS
Frames Per Second	15 or 25 FPS recommended	15 or 25 FPS recommended
Length	3 Minutes or less recommended	30 seconds or less recommended
Audio	Yes	Yes
Supports Alpha	No	Yes
Streams	Yes	No
Notes	MP4 and similar formats can stream. This means that as soon as the Aura starts, the video will start playing and continue to stream as it plays.	FLV format does not stream. This means that the entire video downloads before it starts playing, which may provide a poorer user experience.

Aurasma Studio accepts the Collada format (v1.4 or v1.5), as exported by Maya 2012 and 3DS Max 2012. Aurasma supports the OpenCOLLADA Exporter and the Autodesk Collada Exporter. For best results, the most compatible package is 3DS Max 2012, using
The OpenCollada Exporter.
3D models for Aurasma Studio may have to be uploaded as compressed TAR files. This file should consist of:
· DAE (exported scene/model using OpenCOLLADA or Collada exporter)
· PNGs (textures)
· PNG thumbnail (256x256 pixels) named 'thumbnail' with a .PNG extension
· MP3 (if sound is required)
Below you can find technical specifications and guidelines for using 3D model videos as Overlays in Aurasma Studio.

	Specifications
Models	Under 15,000 triangles
	Scene should be centred around the world origin (0,0,0) to ease placement
	Meshes must not have any non-uniform scaling
	Meshes must be triangulated
	Maximum of 20 objects with geometry in the scene
Textures/ Shaders	One material per mesh. If you need two materials then use multiple meshes
	Individual texture maps must be no larger than 512x512pixels and supplied in .png format
	In total, all texture maps together must fit into a 1024x1024 pixel area
	Emissive, ambient and diffuse materials are supported as well as specular colour
Rig	Bone names must not contain spaces
	The export rig should contain a maximum of 50 bones
Animation	Only linear and step interpolation curves are supported
	Animation must have a key on the first and last frames
	When exporting a .dae, it is advisable to resample keys (in the Collada options)
Lights	Scenes must be lit
	Standard point/spot/directional lights are supported
	Ambient light is supported

Nowadays creating AR scenes that rely only on displaying Overlays on Triggers may be no longer sufficient to attract the attention of customers. Therefore it is important to plan how to create engaging and inspiring AR experience. Auras which offer interesting interaction and content are becoming more popular and ensure that viewers will come back to them frequently. This will guarantee more views and sharing on social media and may affect the success of the project.

Intros and alpha channel in videos

Using FLV video with alpha channel offers the ability to have an object or a character without a background. Transparency and fade-in option are very useful solutions for preparing intros that blur boundaries between the real and virtual worlds.

Sequenced Auras

Auras may contains many Overlays and use them in different combinations for building galleries, instructions, automatic presentations etc. The process of seamless and smooth transition from one object into another is often very impressive for end users.

2.5 D

Simple 2D images/photos and videos could be placed in 3D space and create 2.5D scenes. It builds illusion of depth and gives users possibility to observe/explore AR scenes from different angles.

3D

As usual 3D models and 3D virtual characters offer the most immersive experience for users. AR is a great way to bring these three-dimensional digital objects to physical world.

Interactivity and advanced actions

Combination of commands allows to create very engaging interactive experience for all users. You can start with simple actions like pausing and playing video Overlay or showing/hiding elements and then try to add more sophisticated actions. It is possible to build multimedia presentations/catalogues/microsites with different content and menus, simple quizzes/games, interactive storytelling with the user deciding what will happen next etc. and bring these ideas to life.

Geo-location Auras

It is an ideal solution for geo-tagging competitions, commercials, urban games etc. as users need to be standing at a specific physical location to view specific Auras.

You will create an AR postcard with some images displayed on top of it which trigger different actions. For this purpose we will use Aurasma Studio which allows us to upload a Trigger (photograph) and other obejcts as Overlays.

The AR postcard will allow to:

· See additional features on the postcard in form of images, typography and interactive menu with 5 actions.
· Visit website of presented place in built-in browser.
· Check position of presented place using Google Maps in built-in browser.
· Watch short video of presented place (after tapping the video it will go to fullscreen mode).
· Change randomly photo visible in the background.
· Display information screen (after tapping it will disappear).

Greetings from Billund!

watch movie
visit website
change photo
view map
read info
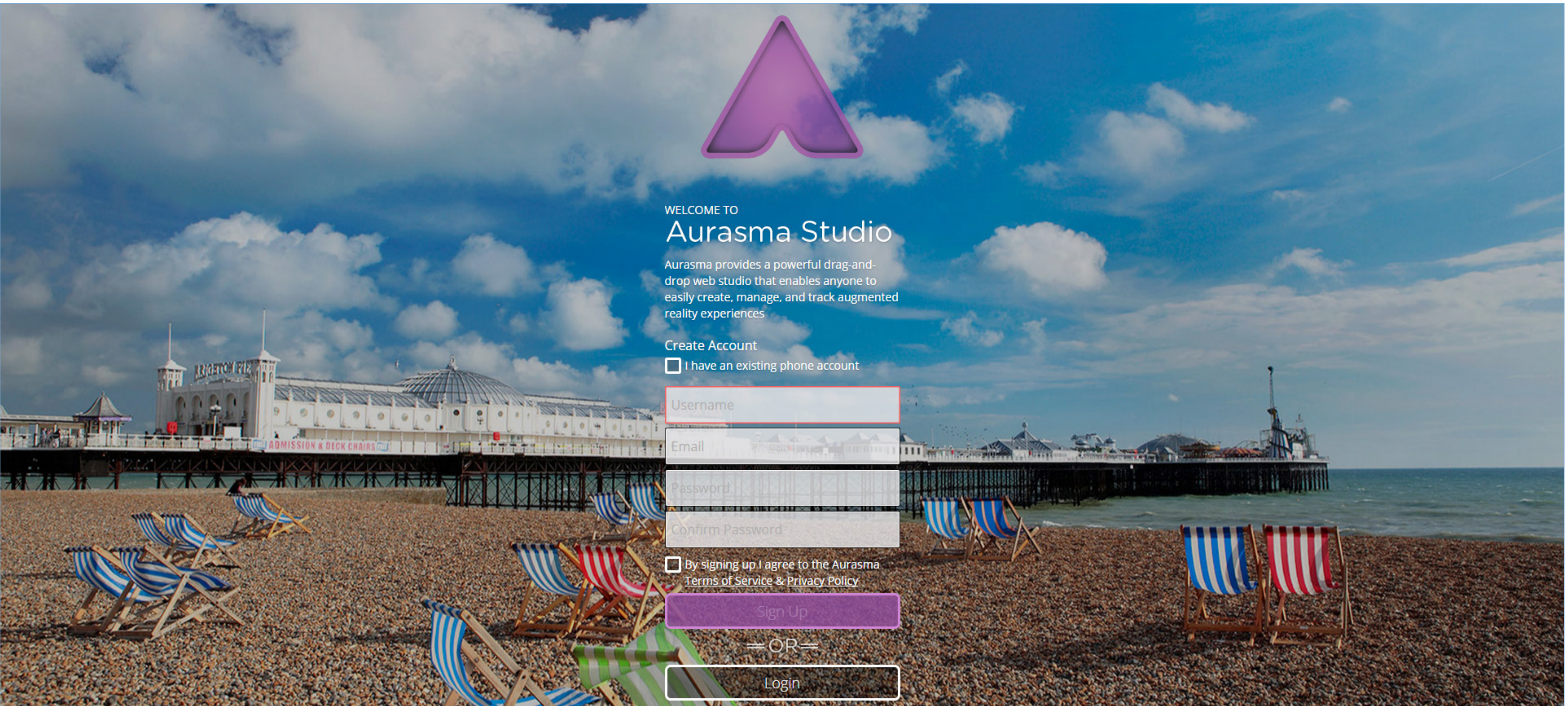
WELCOME TO

Aurasma Studio

Aurasma provides a powerful drag-and-drop web studio that enables anyone to easily create, manage, and track augmented reality experiences

Create Account

☐ I have an existing phone account

Username

Email

Password

Confirm Password

☐ By signing up I agree to the Aurasma
Terms of Service & Privacy Policy

Sign Up

=OR=

Login

After registration you will be redirected to default Explore section which consists of different AR channels (Featured, Popular, Following and History).

Now you are ready to create your first AR project. Typically process of building Aura in Aurasma Studio consists of 3 steps:

1. Uploading Trigger image - JPG or PNG files.

2. Uploading Overlays - images (JPG, PNG files), videos (MP4, FLV files) or 3D models (TAR files).

3. Creating an Aura – determining which Trigger Image will launch what Overlay and where it will be displayed. Besides displaying Overlays on Triggers it is possible to add interaction with Aura (eg. When an Overlay is tapped, launch a website link
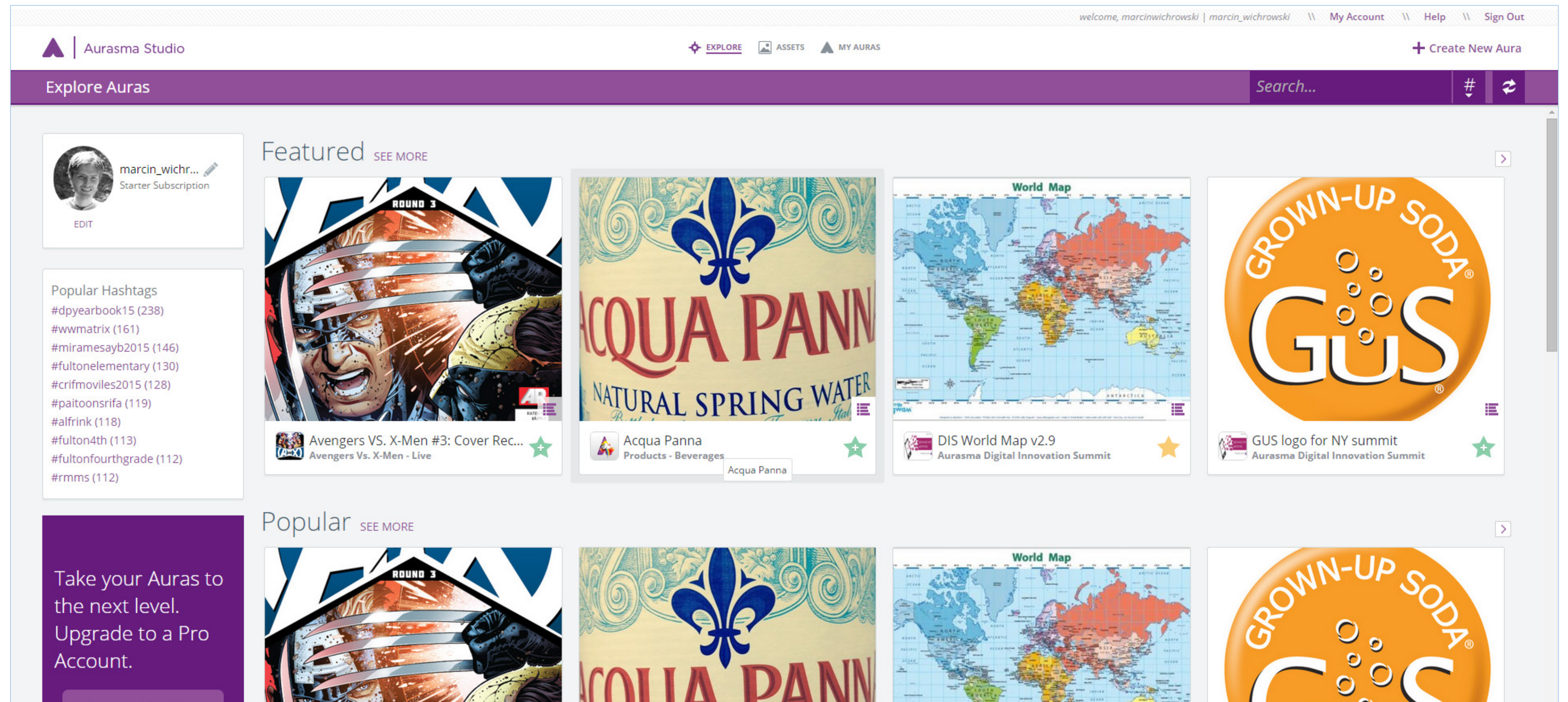
We will start with uploading Trigger Image which will activate an Aura.

1. Search for global menu which is located at the top of the screen. In addition to the default **Explore** section there are two more options - **Assets** and **My Auras**.
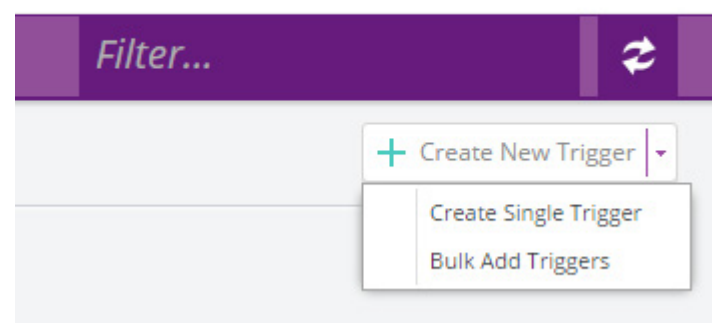
2. Click **Assets**:

✦ EXPLORE   🖼 ASSETS   ▲ MY AURAS

3. This section is divided into **Triggers** and **Overlays** available at the left part of the screen. They could be sorted alphabetically.

All Triggers *(0)*

▶ Triggers ⚹ Overlays | Alphabetical (A-Z) ⌄ |
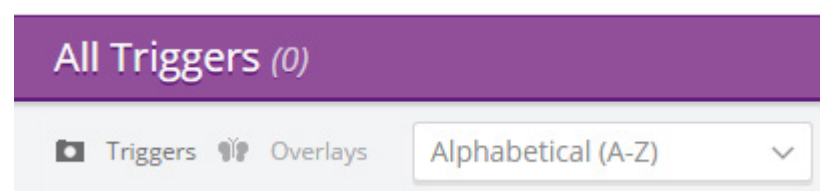
5. At the right part of the screen you can find Triggers **Filter** and **Create New Trigger** button (it is possible to upload single Trigger or multiple assets in compressed .tgz, .tar. gz., or .tar.bz2 format).

6. Click Create New Trigger:

➕ Create New Aura

| *Filter...* | ⟳ |

➕ Create New Trigger ⌄
Create Single Trigger
Bulk Add Triggers

7. A new modal window will appear on top:

Upload Trigger Image ✖

Name: [   ]

Folder: My Triggers   🗀

Coordinates: [View Map...] [   ]

Trigger Image: [From File] [From Dropbox]

Press [Browse...] to add a Trigger Image file...   Browse

Description: [   ]

[Save] [Close]

8. Enter name of a new Trigger.

9. Select **Browse** button to upload Trigger Image from disk. If you have Dropbox account it is also possible to use it for uploading needed images.

10. Entering description and Coordinates (Location Trigger) is optional.

11. Click **Save.**

Use above steps to upload this photograph
as a Trigger 1:
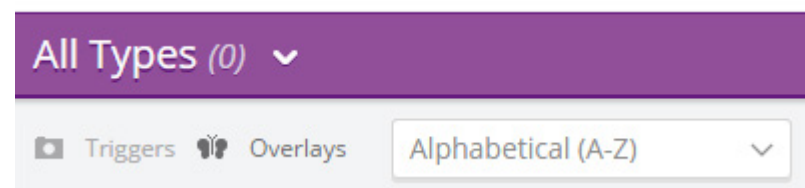
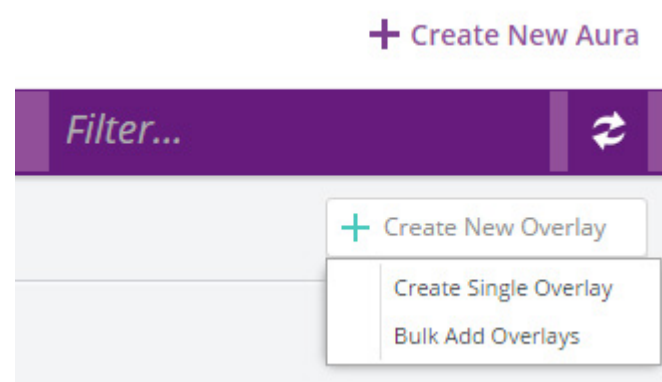Let's upload Overlays elements which will be displayed on the Trigger Image.

1. Make sure you are in **Assets** section:

✦ EXPLORE   🖼 ASSETS   ▲ MY AURAS
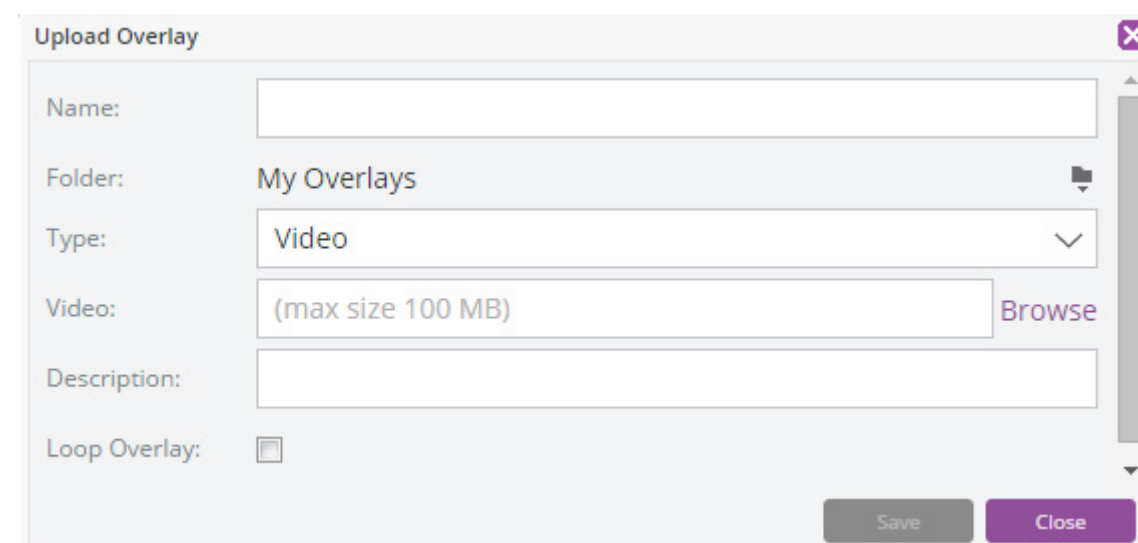
2. Search for **Overlays** at the left part of the screen and click it:

All Types (0) ⌄

▶ Triggers 👥 Overlays   Alphabetical (A-Z) ⌄

3. At the right part of the screen find and click **Create New Overlay** button (it is possible to upload single Overlay or multiple assets in compressed .tgz, .tar.gz., or .tar.bz2 format):

➕ Create New Aura

Filter...   ⇄

➕ Create New Overlay
   Create Single Overlay
   Bulk Add Overlays

4. A new modal window will appear on top:

Upload Overlay ☒

Name:	
Folder:	My Overlays
Type:	Video ⌄
Video:	(max size 100 MB) — Browse
Description:	
Loop Overlay:	☐

Save   Close
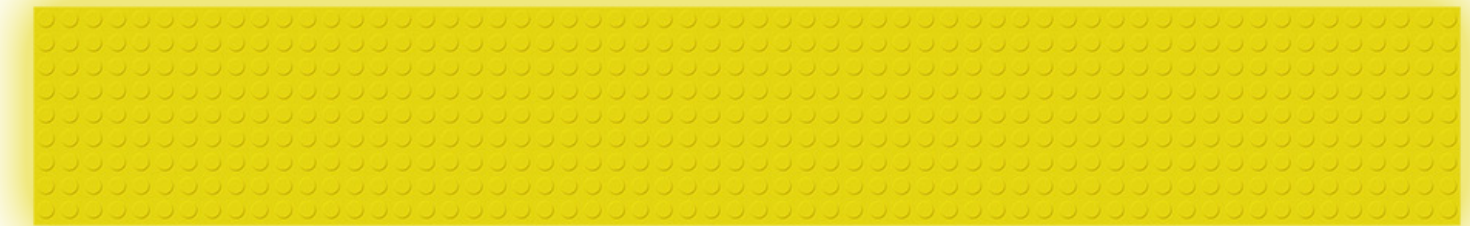
5. Enter name of a new Overlay.

6. Select type of the Overlay (Video, Image, Web Page, 3D Model).

7. Select **Browse** button to upload the Overlay from disk.

8. Click **Save**.
Use above steps to upload these objects as Overlays:
· Overlay 1 (JPG) – yellow bar on the top as Image

· Overlay 2 (PNG) – title on the yellow bar as Image

Greetings from Billund!

· Overlay 3 (PNG) – bricks with buttons as Image

· Overlay 4 (MP4) – short movie presenting place of visit as Video
· Overlay 5-7 (JPG) – photos for changing background photo as Images

· Overlay 8 (JPG) – info screen

Legoland Billund, the original Legoland park, opened on June 7, 1968 in Billund, Denmark. The park is located next to the original Lego factory and Denmark's second busiest airport Billund Airport. Over 1.9 million guests visited the park in 2011 and since the opening more than 50 million guests have visited the park. This makes Legoland the largest tourist attraction in Denmark outside of Copenhagen. The Legoland parks that have since been built are modelled upon Legoland Billund, most noticeably the Miniland area which is made up of millions of Lego bricks.
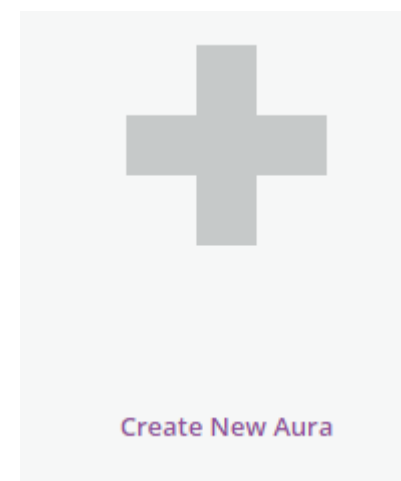
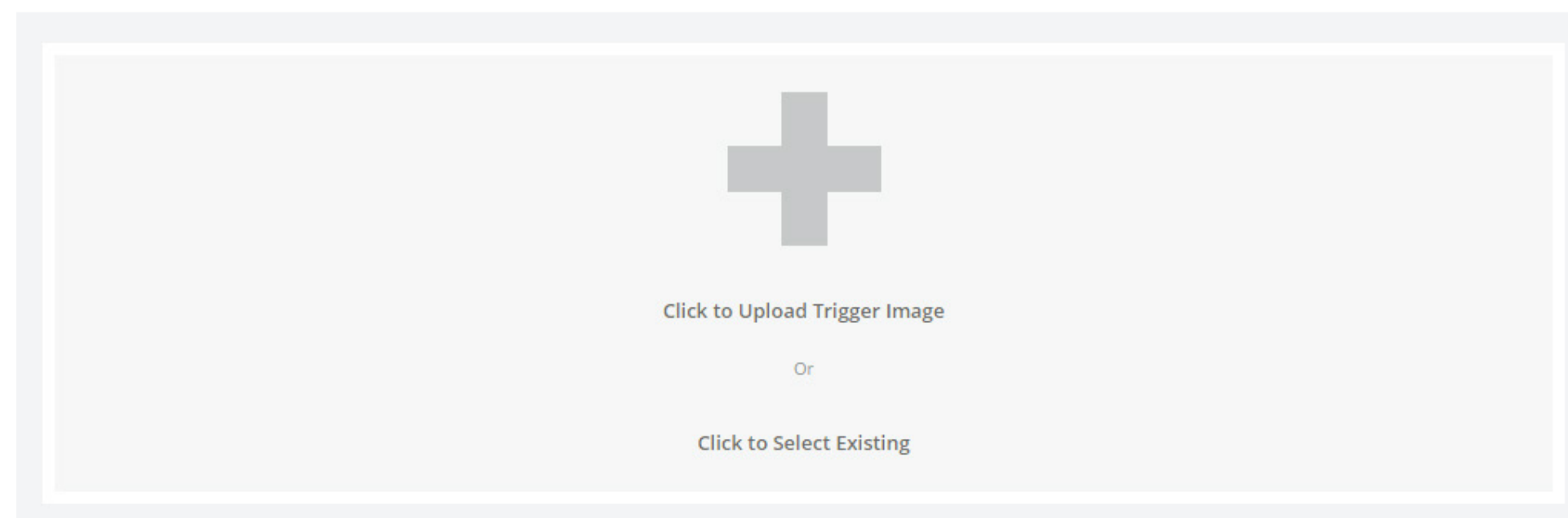It is time to merge together loaded objects and create an interactive Aura.
First steps
1. Make sure you are in **My Aura** section:

✦ EXPLORE   🖼 ASSETS   ▲ MY AURAS

2. Click **Create New Aura** button in the middle of the screen:

➕

Create New Aura

Now you are in the edit mode of your Aura. At the left part of the screen you can find 3 steps (Upload Trigger, Create Overlays, Finalize Aura). Control buttons are located at the right part of the screen. It is possible to cancel editing, navigate through steps, preview AR scene, save it and share it.

STEP ONE   STEP TWO   STEP THREE
Upload Trigger Create Overlays   Finalize Aura   Cancel Back Next Preview Save Share

➕

Click to Upload Trigger Image

Or

Click to Select Existing

Adding Trigger Image

1.Choose **Click to Select Existing Trigger Image** (if you have not uploaded any Triggers you should select **Click to Upload Trigger Image**).

2.Select base photograph as Trigger and click **Next** to go to Create Overlays step. You should see this:

STEP ONE   STEP TWO   STEP THREE
Upload Trigger Create Overlays   Finalize Aura

➕

Click to Upload Overlay
Or
Click to Select Existing
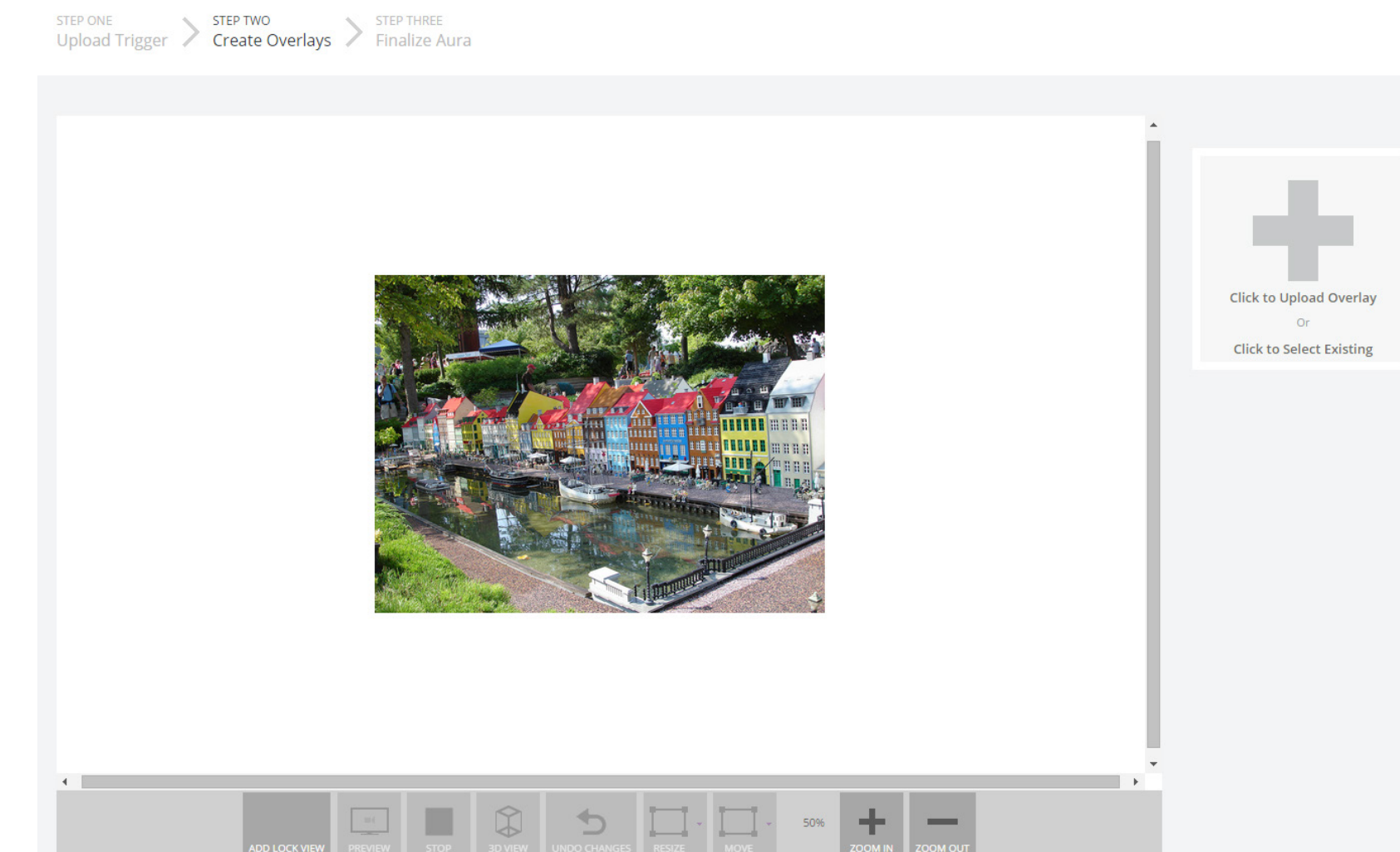
3. Check controls available at the bottom of the preview window.

1. Choose **Click to Select Existing Overlay** (if you have not uploaded any Overlays you should select **Click to Upload Overlay**).

2. Using this method upload Overlays 1 to 3 (yellow bar, title, bricks with buttons) and position them correctly. If you want to change the hierarchy of objects in the scene you have to change the position of the control window on the right side of the screen). You should create similar configuration:
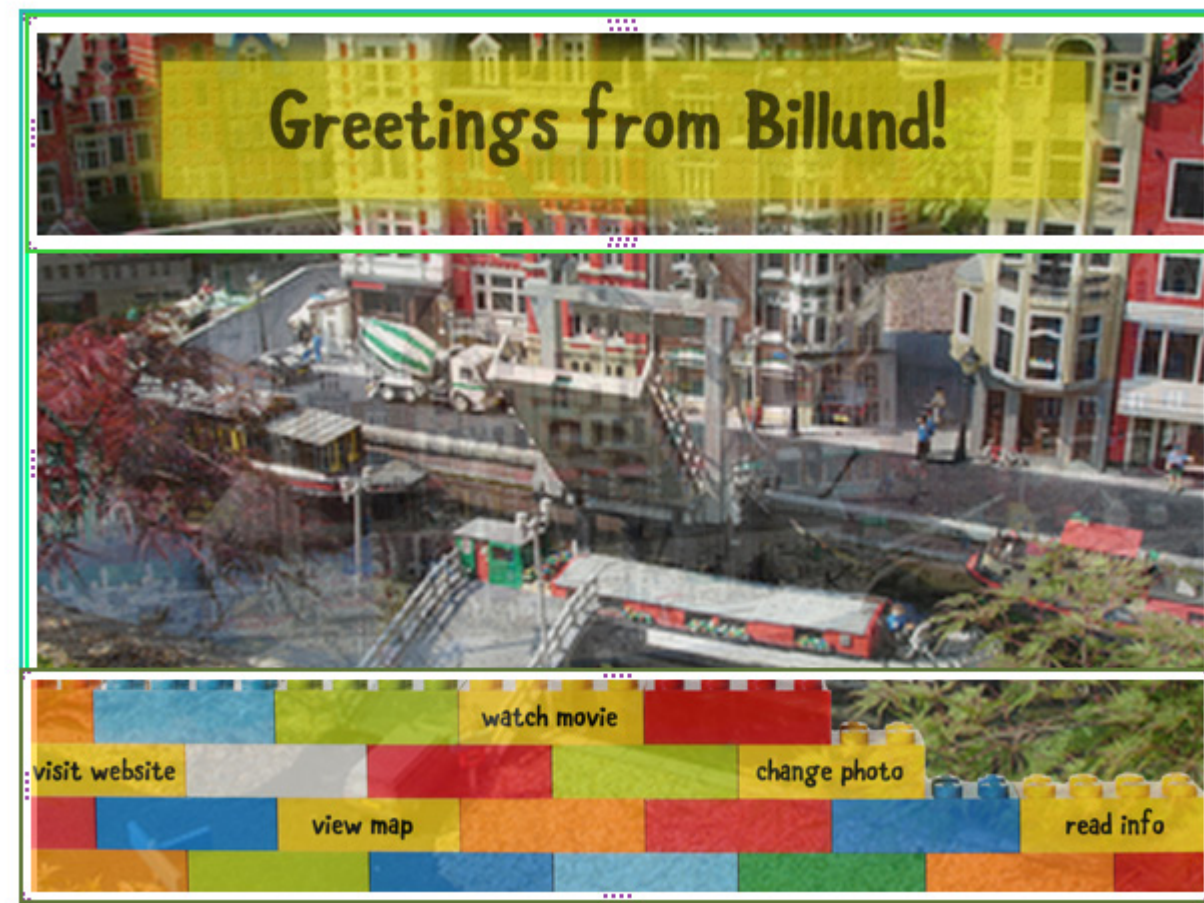
3. To set position of the Overlay in 3D space you have to select it first and then click **3D view** button at the bottom of the screen.


4. In the 3D view mode hold **H** letter to bring up the list of available actions. For example to move the object forwards and backwards you have to hold down letter **Z** and move the mouse up and down:
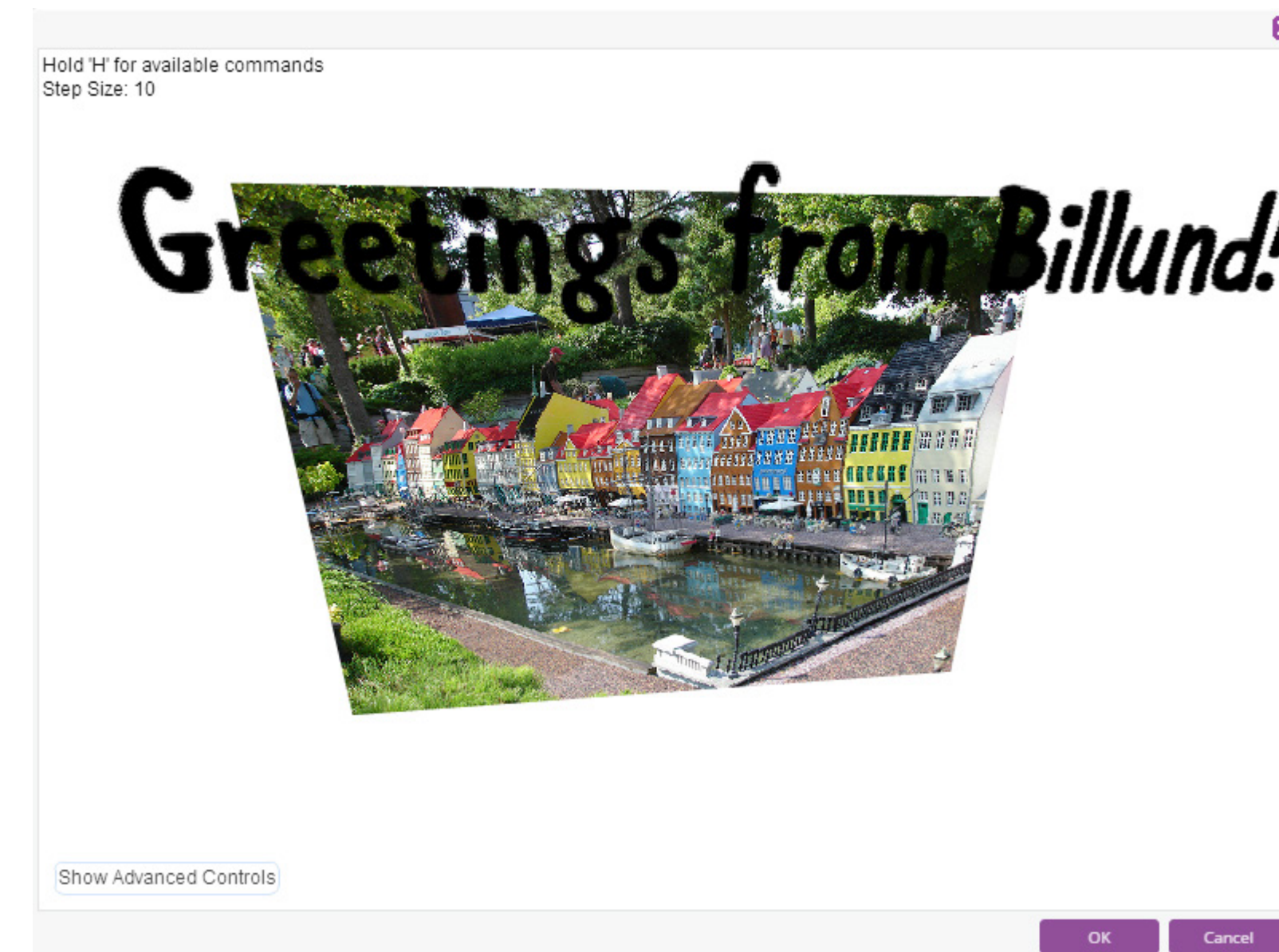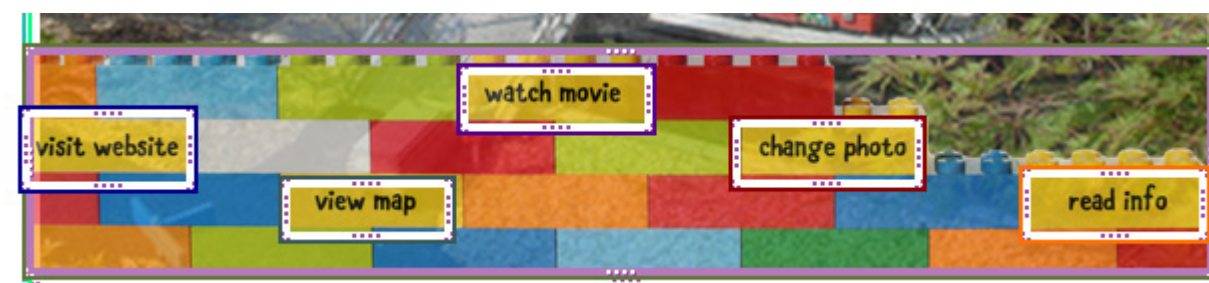

5. Click **OK**.

1. The bricks with typography on the bottom should be converted into interactive buttons. To achieve this result you have to add hotspots - press **Click to Select Existing Overlay** and **Add Hotspot** in opened window:
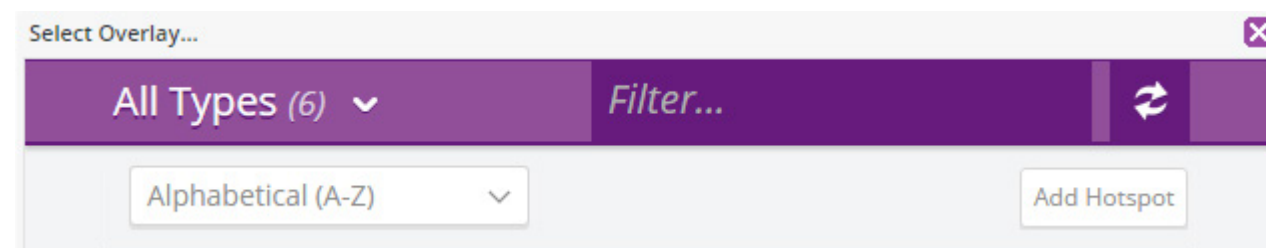
2. Repeat it 5 times.

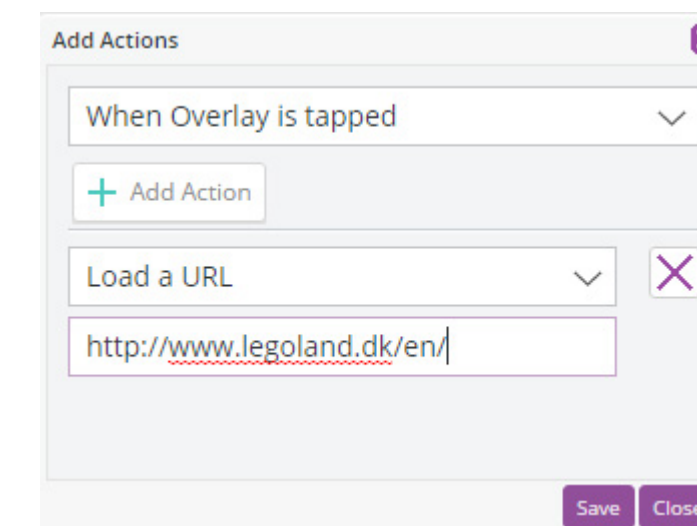3. Cover all 5 bricks with created hotspots to get similar result:

1. Select **Visit Website** hotspot and find highlighted control window on the right:


2. Click **Add Actions**.

3. Inside the opened window select **When Overlay is tapped**, then **Add Action>Load URL** and enter address of the website:
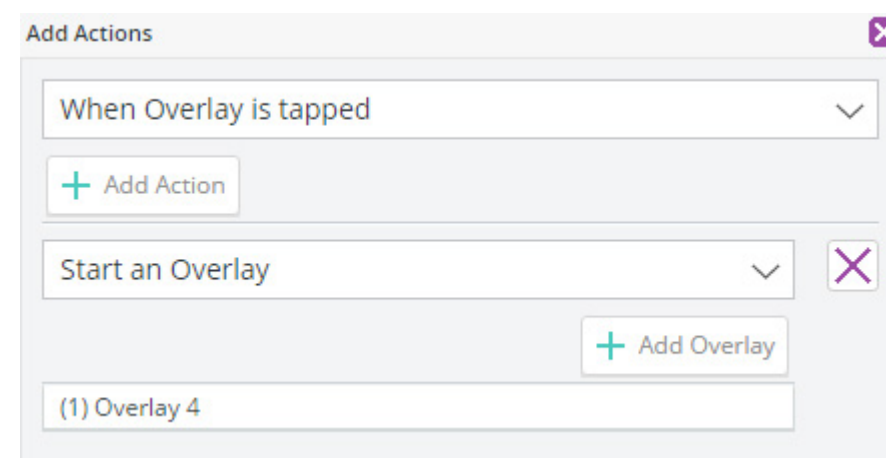

4. Click **Save**.

1. Select **View Map** hotspot in the preview Window and find highlighted control window on the right and Click **Add Actions**.

2. Inside the opened window select **When Overlay is tapped**, then **Add Action>Load URL** and enter address of the Google Map address:
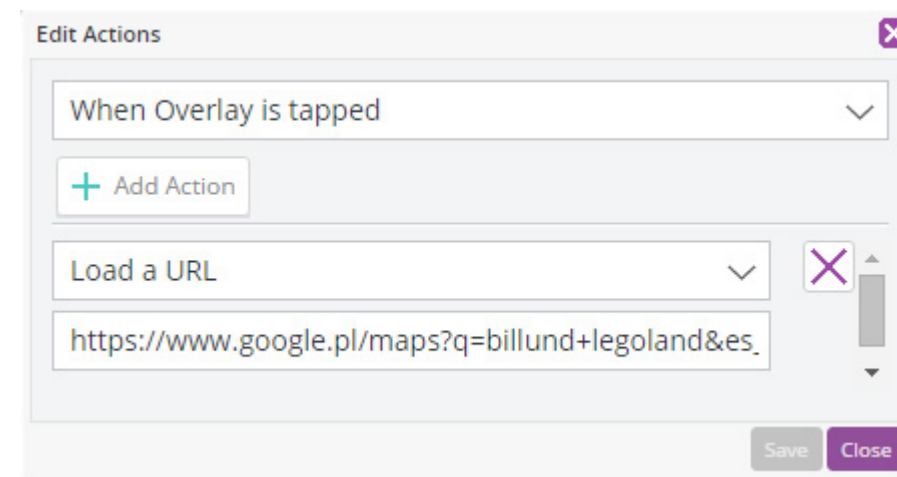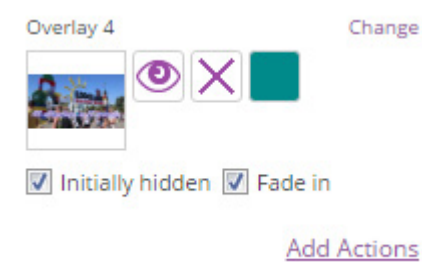

3. Click **Save**.

1. Choose **Click to Select Existing Overlay** (if you have not uploaded any Overlays you should select **Click to Upload Overlay**).

2. Upload Overlay 4 (short movie).

3. Select **Watch Movie** hotspot in the preview Window and find highlighted control window on the right and Click **Add Actions**.

4. Inside the opened window select **When Overlay is tapped**, then **Add Action>Start and Overlay**.

5. Click **Add Overlay** and select **Overlay 4** (short movie).
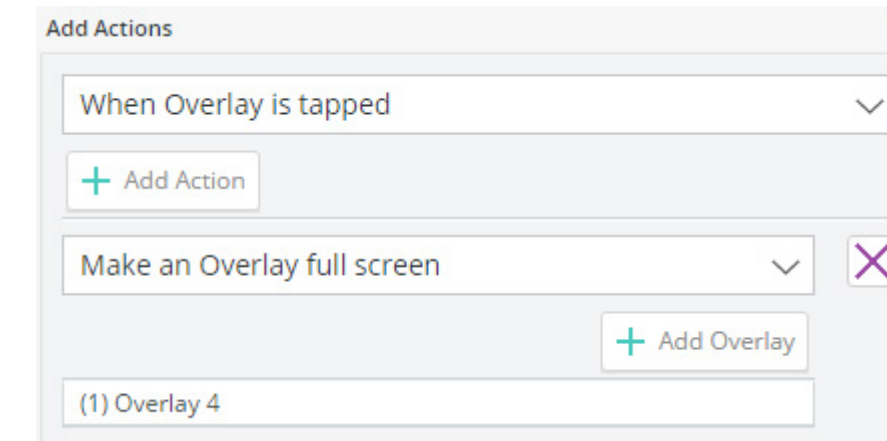

6. Click **Save**.

7. Select **Overlay 4** (short movie) and find highlighted control window on the right and turn on option **Initially hidden**:
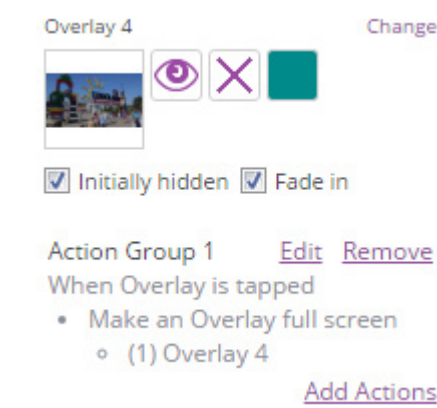

8. Click **Add Actions**.

9. Inside the opened window select **When Overlay is tapped**, then **Add Action>Make an Overlay full screen**.
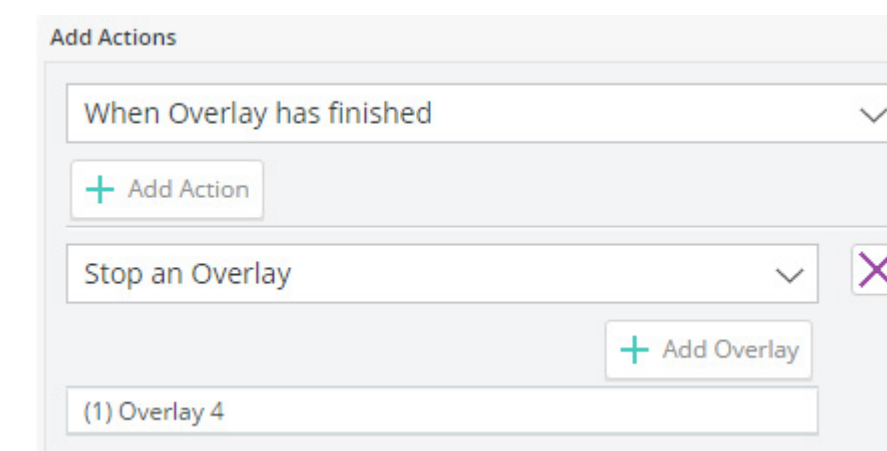
10. Click **Add Overlay** and select **Overlay 4** (short movie).

11. Click **Save**.

12. Once again click **Add Action** in the same control window:

13. Inside the opened window select **When Overlay has finished**, then **Add Action>Stop an Overlay**.

14. Click **Add Overlay** and select **Overlay 4** (short movie).

15. Click **Save**.

1. Choose **Click to Select Existing Overlay** (if you have not uploaded any Overlays you should select **Click to Upload Overlay**).

2. Upload **Overlays 5-7** (photos).

3. Use right mouse button on each photo and select **Fit to Trigger option**.

4. Move all control windows concerning **Overlays 5-7** (photos) on the bottom of the stack which is available on right part of the screen.

5. For **Overlays 5-7** (photos) turn on option **Initially hidden** and click **Add Actions**.

6. Inside the opened windows select **When Overlay is tapped**, then **Add Action>Stop an Overlay** for all photos with appropriate Overlay numbers.

7. Select **Change Photo** hotspot in the preview Window and find highlighted control window on the right and Click **Add Actions**.

8. Inside the opened window select **When Overlay is tapped**, then **Add Action>Perform a random Action**.

9. Click on **0 Action**s button.

10. Inside the opened window click **Add...**

11. Select **Start an Overlay** for **Overlays 5-7** (photos).

12. Click **OK**.

13. Click **Save**.
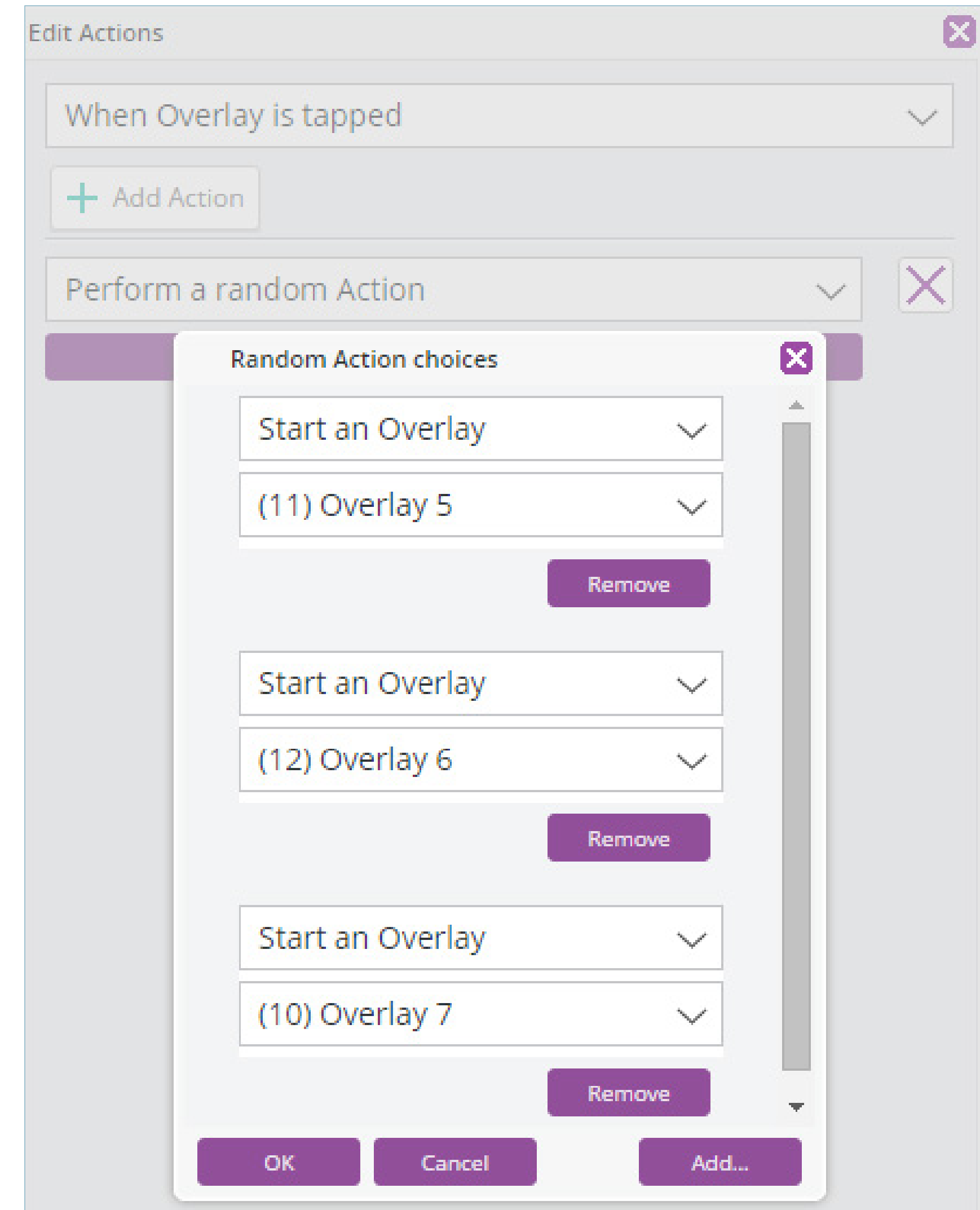
Adding Overlays 8 (info screen) and actions for Read Info button

1. Choose **Click to Select Existing Overlay** (if you have not uploaded any Overlays you should select **Click to Upload Overlay**).

2. Upload **Overlays 8** (info screen) and place it on the screen.

3. Select **Read Info** hotspot in the preview Window and find highlighted control window on the right and Click **Add Actions**.

4. Inside the opened window select **When Overlay is tapped**, then **Add Action> Start and Overlay**.

5. Click **Add Overlay** and select **Overlay 8** (info screen).

6. Click **Save**.

7. For **Overlays 8** (info screen) turn on option **Initially hidden** and click **Add Actions**.

8. Inside the opened window select **When Overlay is tapped**, then **Add Action> Stop and Overlay**.

9. Click **Add Overlay** and select **Overlay 8** (info screen).

10. Click **Save**.

1. On the top of the screen find controls for saving and sharing Aura:

| Cancel | Back | Next | Preview | Save | Share |

2. Click **Next**.

3. Enter **Aura name** (e.g. Legoland Billund AR Postcard) and Hashtags.

4. Click **Save**, then click **Share**.

Once you have shared your Aura in the Aurasma Studio other users may view it with the Aurasma mobile app available for iOS and Android platforms. It is possible to browse or search the Aurasma app for specific Auras or accounts. There is also option to follow account to view all other Auras from the same user. It also allow to automatically take updates (modifications of existing Auras, new Auras etc.).

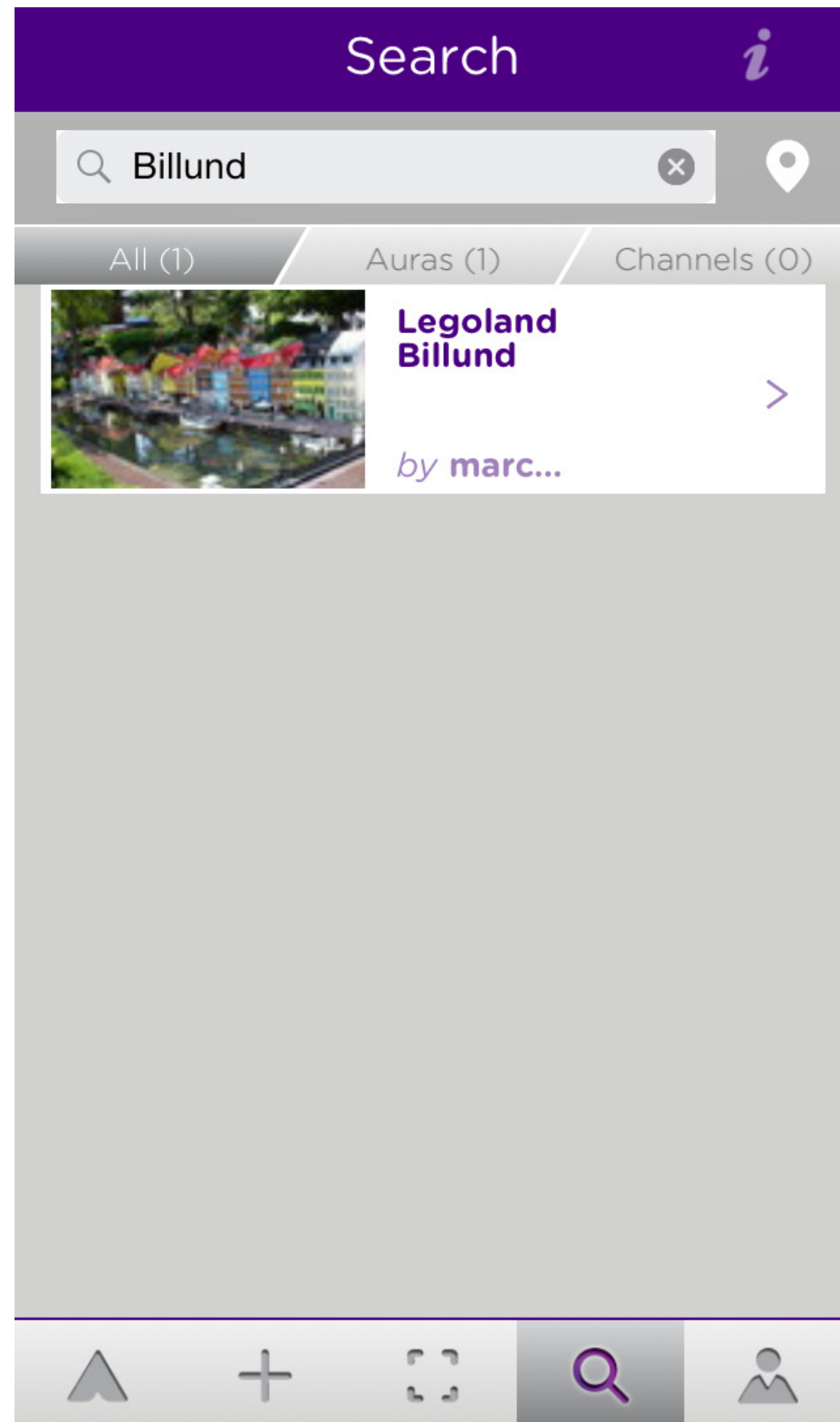1. Download and launch the Aurasma App - you will see the viewfinder.
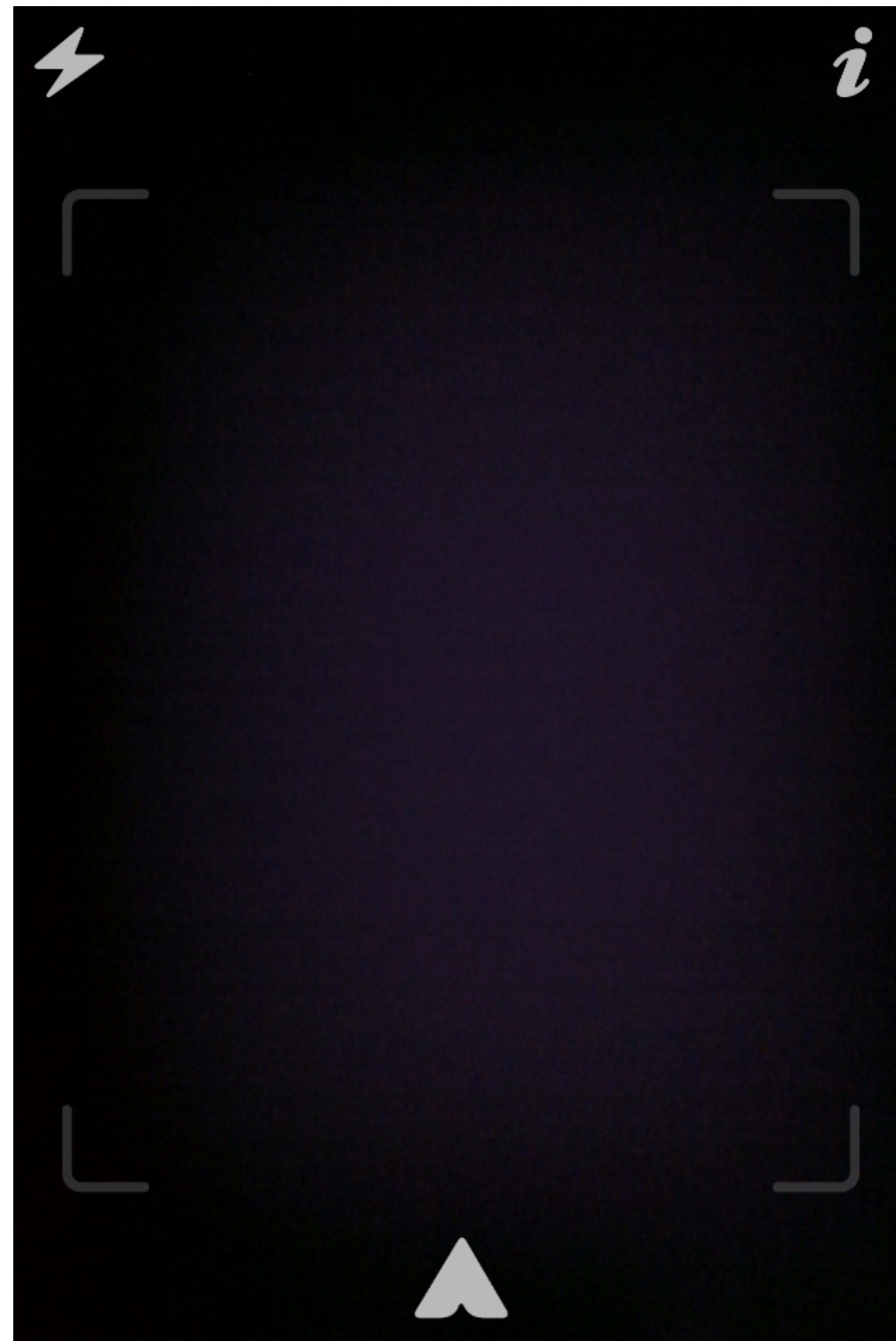
2. Tap ‚**A**’ icon in the middle of the lower part of the screen.

3. Tap **Search** button (the magnifying glass icon) from options along the bottom:
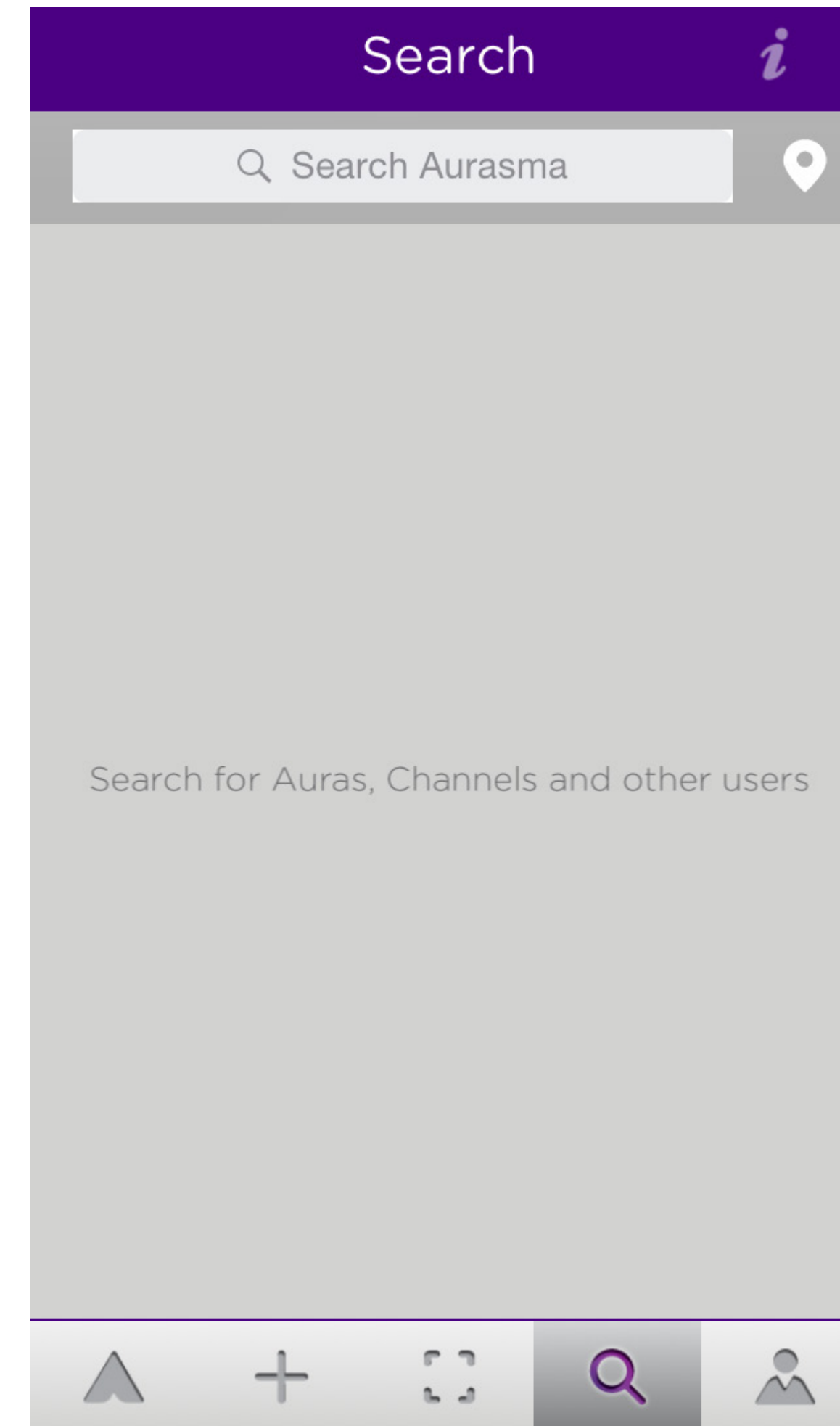
4. Search for specific Aura or account name:

5. Select Aura you want to load.

6. Tap **Following** button at the account home screen:
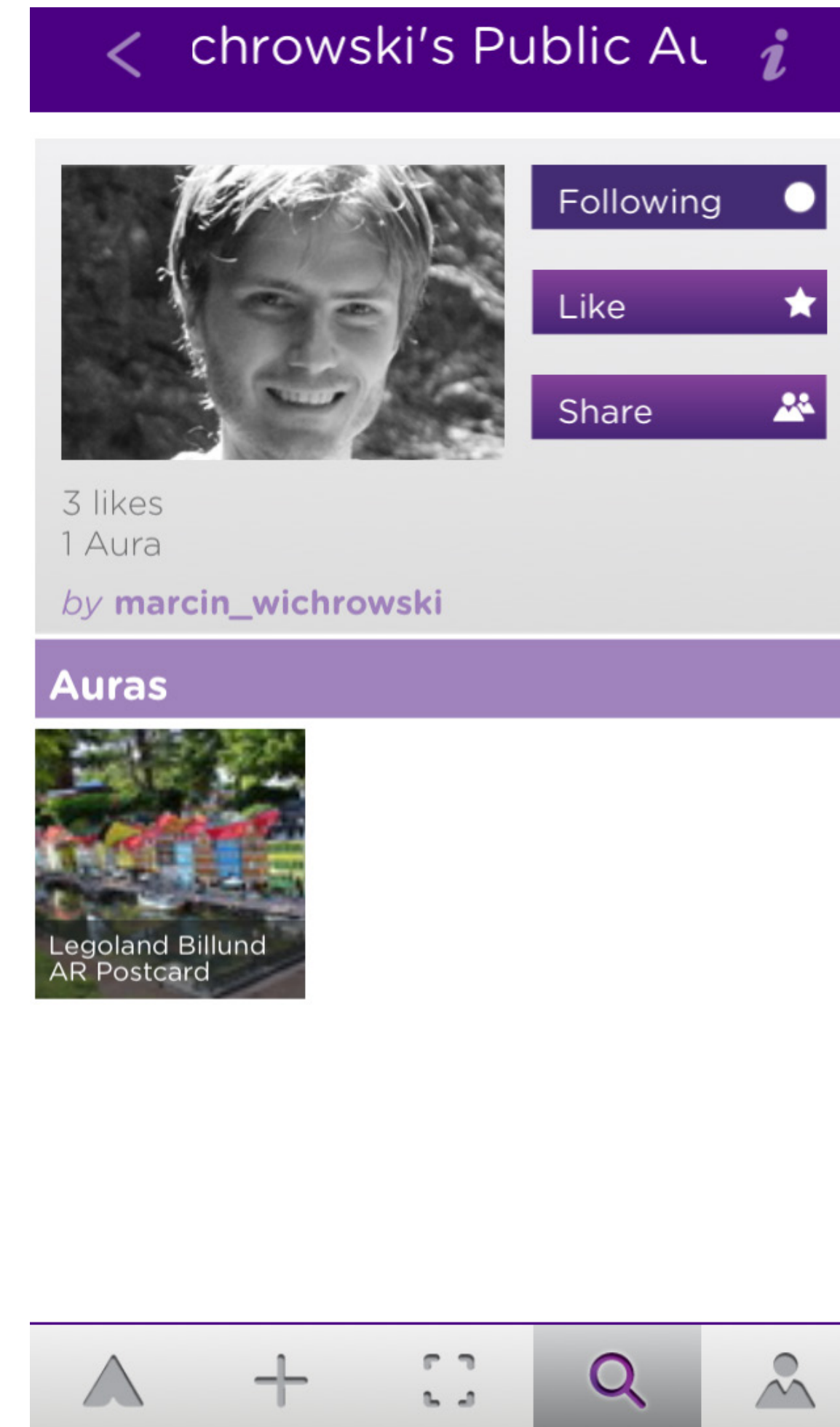
7. Tap **Viewfinder** icon to switch to camera mode.

8. Point the camera to Trigger Image to activate Aura.

9. Interact with loaded Aura.

10. You can share the selected Aura by taping **Share** icon (send link to the project by Email, SMS, Twitter or Faceboook).

The created link could be converted later to QR code – when scanned it will open Aurasma app and load Auras for specific account. In case the user does not have Aurasma, the link will automatically open the App Store/Google Play and install the Aurasma app.

panGenerator: Krzysztof Cybulski, Krzysztof Goliński, Jakub Koźniewski, Piotr Barszczewski

Table of Contects

PanGenerator is an interdisciplinary new media artistic group, which aims to unite design and artistic expression with new technologies, as well as operate in many domains frequently teaming up with representatives of various professions — engineers, fashion designers, musicians, software engineers, as well as many others.

The group was created in 2010 at the first medialab in Poland and since then regularly displays its artwork in galleries and presents installations commissioned for various cultural and music events, such as European Culture Congress or Selector Festival.

PanGenerator also conducts workshops dedicated to art and new media design. Members of the group are Piotr Barszczewski, Krzysztof Cybulski, Krzysztof Goliński and Jakub Koźniewski.

Krzysztof Cybulski

(born 1980) composer and creator of electroacoustic music, bass guitarist, maker of interactive objects and installations. Aluminus of The Karol Szymanowski Academy of Music in Katowice. Beneficiary of the 2nd edition of Composing Commissions held by The Ministry of Culture and National Heritage (2013). Maker of Spectral Score music and technology project. In 2011-2014 art director of Wef Laptop Orchestra - the only laptop orchestra in Poland. Experienced trainer and leader of art and technology workshops (held courses for the National Audiovisual Institute „Muzobus" workshops dedicated for teachers).

Krzysztof Goliński

Multimedia artist, maker of interactive installations. Alumnus of IT studies – Polish-Japanese Academy of Information Technology (Multimedia and Artificial Intelligence) and The Academy of Fine Arts in Warsaw (Media Art — with distinction). Multimedia artist specializing in producing algorythmic images, interactive installations and generative objects. His artwork frequently incorporates mathematical relationships between shapes and colors. Profesionally active in new media education.

www.golinski.org

Jakub Koźniewski

(born 1986) Designer and artist working in the new media area — the latest ones (installations, interactive objects, web design), as well as the more traditional ones (graphic design, poster, animation, motion design). Active coder, frequently marrying aesthetics and technology in their synergy. Leader of PanGenerator — the most active new media collective in Poland.

Piotr Barszczewski

(born 1985) Solution maker, software designer and electronics engineer focused on producing tools for creative and artistic expression.

www.1am.pl

The main, and only component of Constellaction installation/experience was a small, vacuum formed tetrahedron. Inside there were custom made electronics driven by ATtiny24A microcontroller which already included all of the things the team were looking for – it was working with voltages as low as 1.8V, consumed small amounts of current and had enough i/o pins. For light detection they used three standard photoresistors, each pointed to corresponding face and the same amount of SMD LED's were used for producing light. On top of that they added a tiny buzzer making some noise along with the blink. As for power supply two CRC2032 batteries were used, and thanks to heavy power consumption optimisations (such as utilising watchdog timer) the tetrahedrons

are working even today – a month after the event. The rules of behaviour are simple – if the tetrahedron detects sudden change of light intensity (caused for example by casting shadow or pointing a flashlight) it blinks for a short period of time with fixed delay, additionally making a sound. When there are other tetrahedrons nearby they might catch this light and pass it further, giving an effect of a "light wave". The high-level patterns are built upon this simple rule and are shaped by the participants playing with the installation consisted of 400 blinking tetrahedrons. In the result the Constellaction "shape" evolved and branched during the evening, depending on the collaborative effort of the whole audience, effectively showing what emergence is
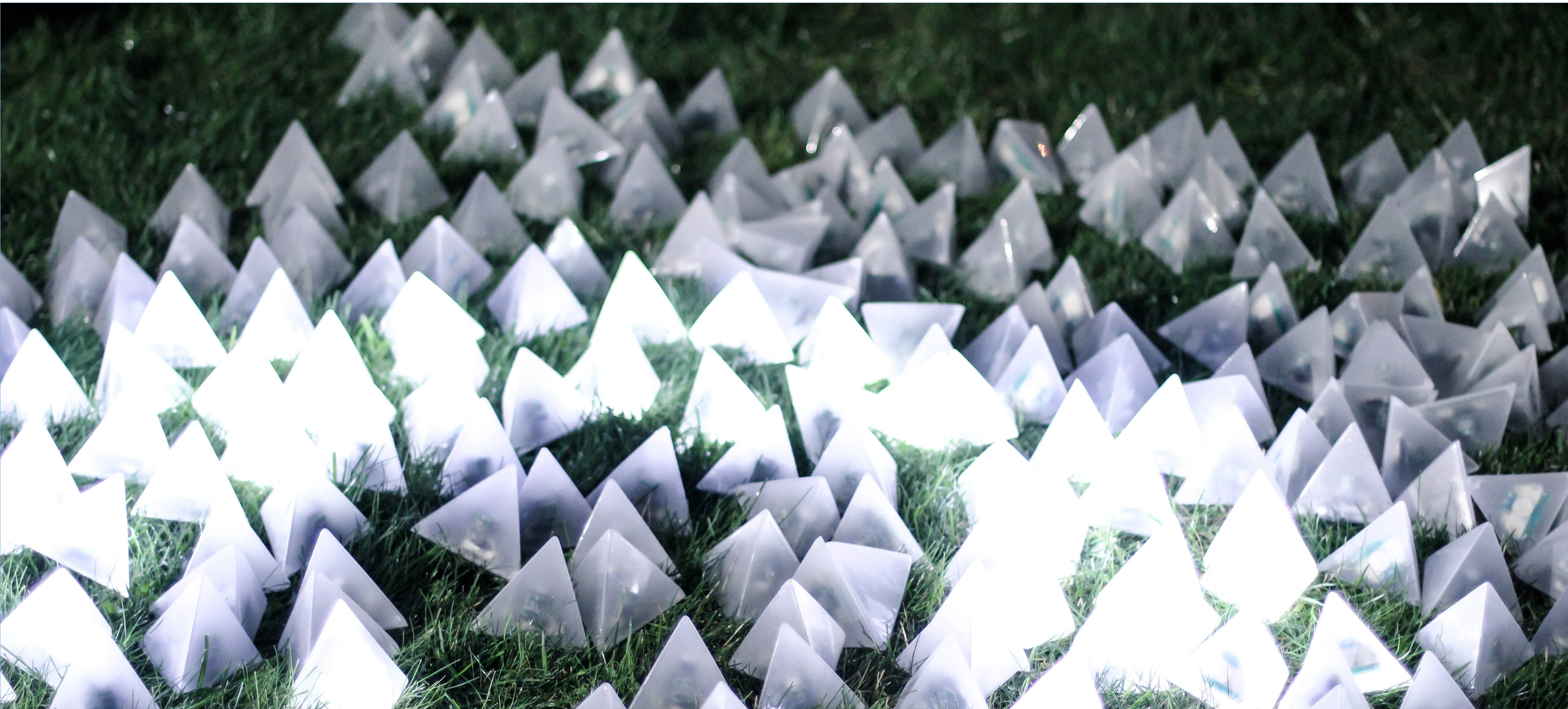
CONSTELLACTION
an emergent a/v installation for Copernicus Science Centre / Przemiany Festiwal 2013

Constellaction video: https://vimeo.com/76479685

source: https://vimeo.com/76479685

Build with:
ATtiny, custom pcb boards, leds, photoresistors.

DODECAUDION
a project by panGenerator / HEDOCO product.

Dodecaudion is a spatial audiovisual controller based on such technologies as infrared distance sensors, arduino, bluetooth, processing and osc.

The project is in alpha phase right now but should be ready for production in following months and will be available via HEDOCO online shop.

Dodecaudion video: https://vimeo.com/28651568

source: https://vimeo.com/28651568

DODECAUDION
a project by panGenerator / HEDOCO product.

TEDx speech / performance here - youtube.com/watch?v=g1KTOXqj-6g
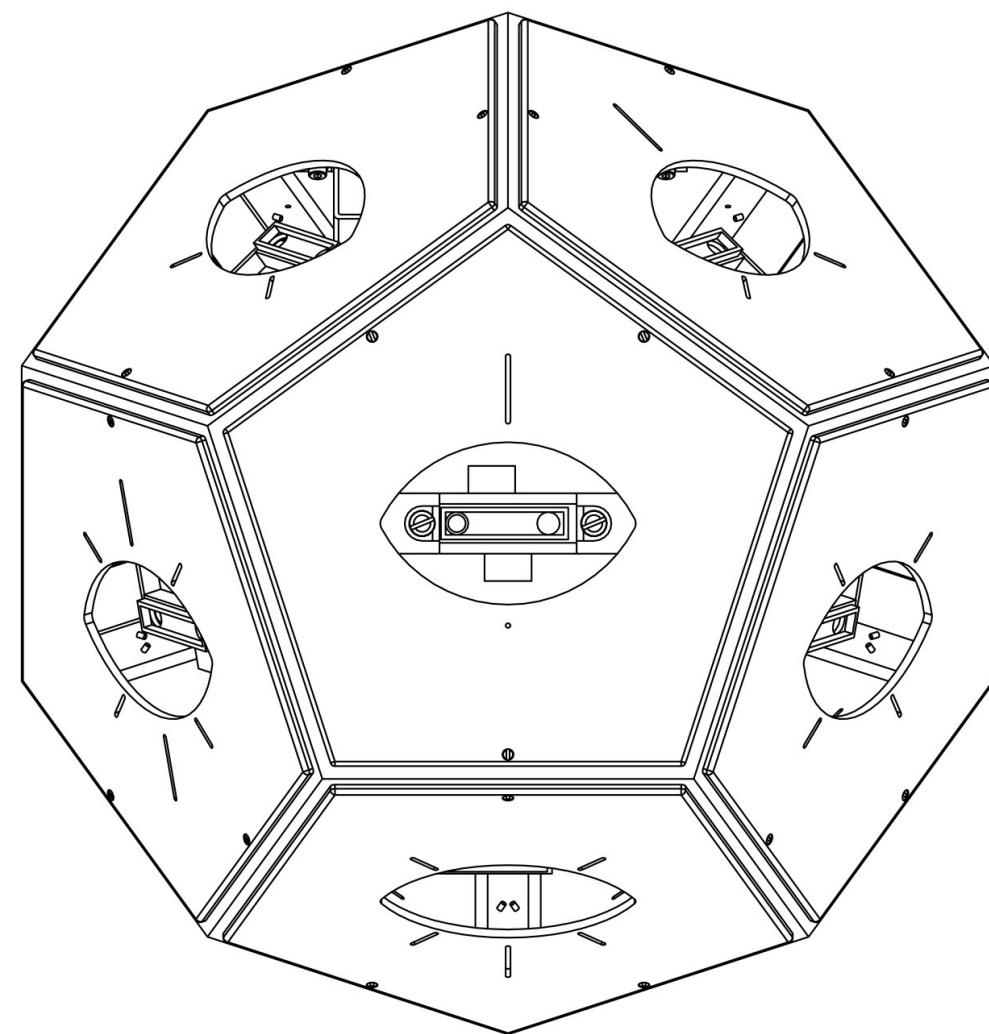

source: https://www.youtube.com/watch?v=g1KTOXqj-6g

Build with:
Arduino, openFrameworks, Reaktor5

DODECAUDION
spatial noisemaking device

a project by

panGenerator

5x 108°

3x 2,5

Pięciokąt foremny
(5x) 76

Projekt PCB warstwy multiplekserów

Projekt PCB shielda Arduino
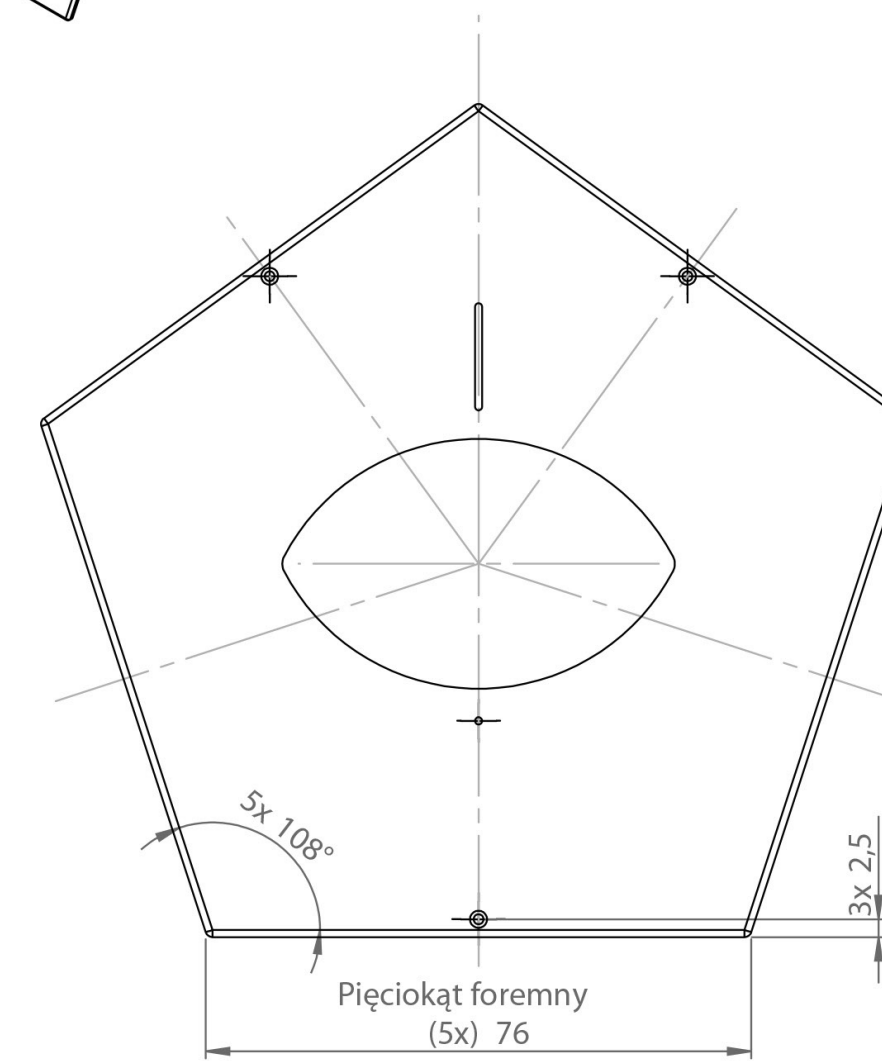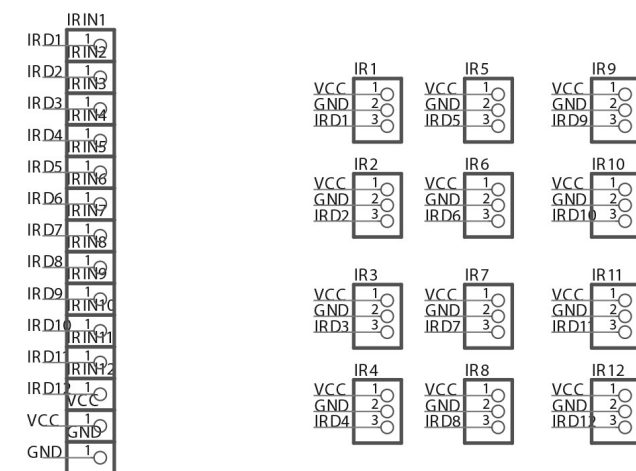
Schemat elektorniczny warstwy multiplekserów
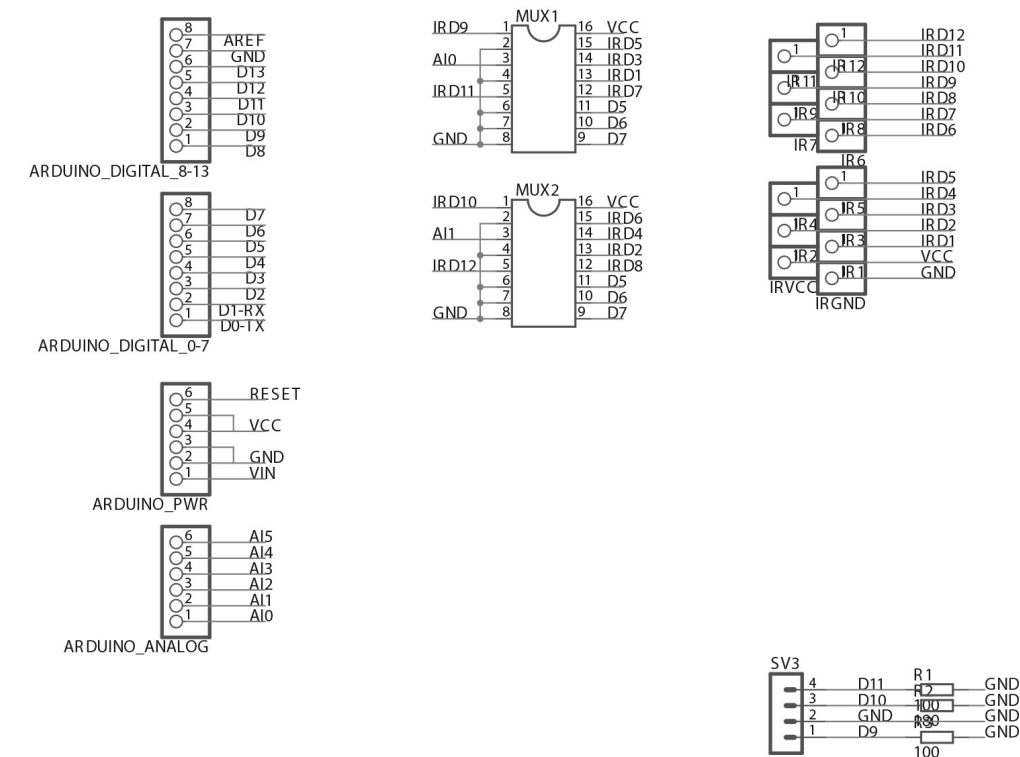
Schemat elektorniczny shielda Arduino

```
#include <stdint.h>
#include <avr/interrupt.h>
#include <avr/sleep.h>
#include <util/delay.h>


/**
 * Odczytywanie wartości z sensorów IR
 * i wysyłanie odczytów przez port szeregowy/
 * Wersja do z przerwaniami
 */

/*
 * wartości odczytów z uśrednieniem
 */
float val[] = {0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0};

/*
 * wartości odczytów, zmienna pomocnicza do uśredniania
 */
float val_next[] = {0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0};
/*
 * długość tablicy val
 */
uint8_t valCount = 12;

/*
 * numery pinów do któych podpięte jest kontrolowanie pracy multiplexera
 */
uint8_t MUX_CTRL_PIN_1 = 5;
uint8_t MUX_CTRL_PIN_2 = 6;
uint8_t MUX_CTRL_PIN_3 = 7;
/**
 * Wartości wysyłane na
 */
uint8_t multiplexerInput[] = {0, 1, 10, 11, 100, 101, 110, 111};

/*
 * Flaga określająca z którego multiplexera będzie odczytana wartość
 * jeśli false to z ADC0 (pierwszy mux)
 * jeśli true to z ADC1 (drugi mux)
 */
boolean secondMuxFlag = false;
/**
 * Licznik wykonanych odczytów (jeden odczyt = wartości ze wszystkich czujników)
 */
uint8_t readCounter = 0;
/**
 * Co ile odczytów wysyłana jest średnia wartość z sensorów
 */
uint8_t readMax = 5;

/**
 * Aktualnie odczytywany czyjnik
 */
int input = 0;

/**
```
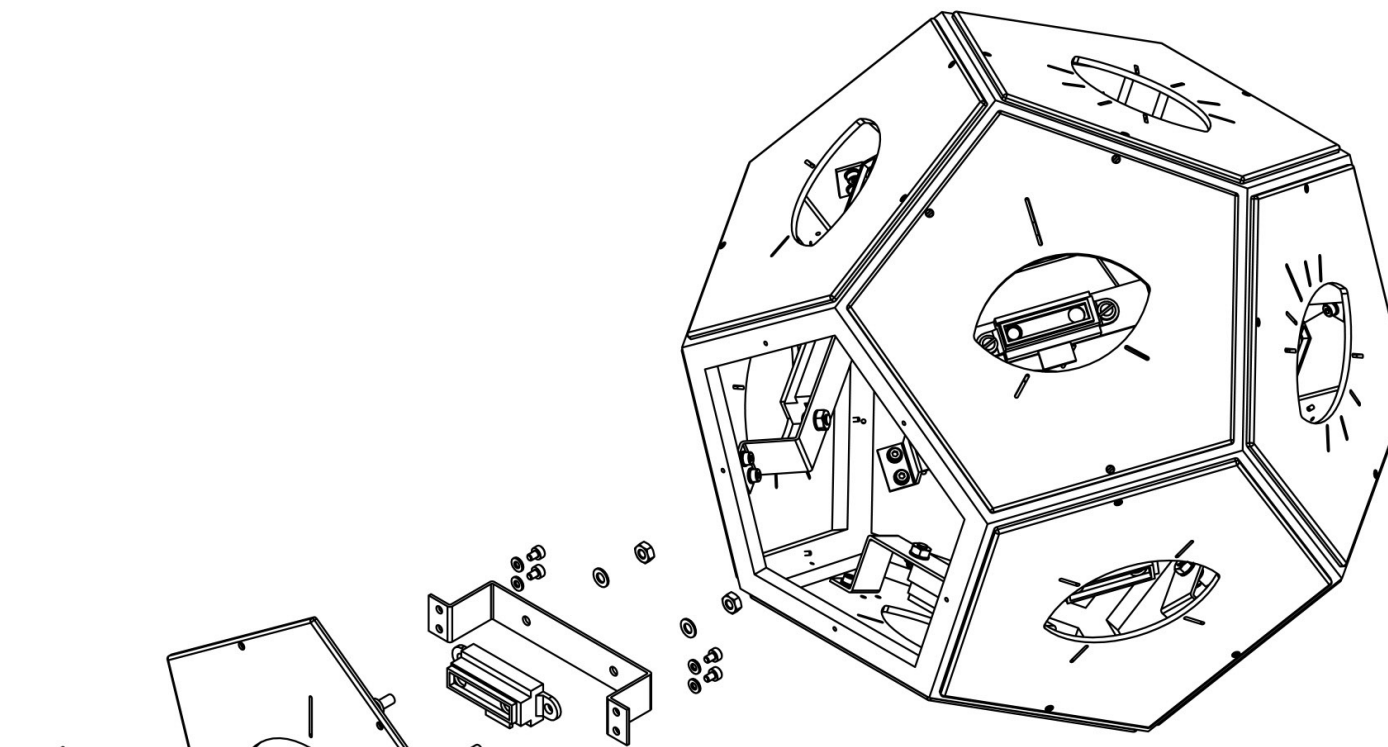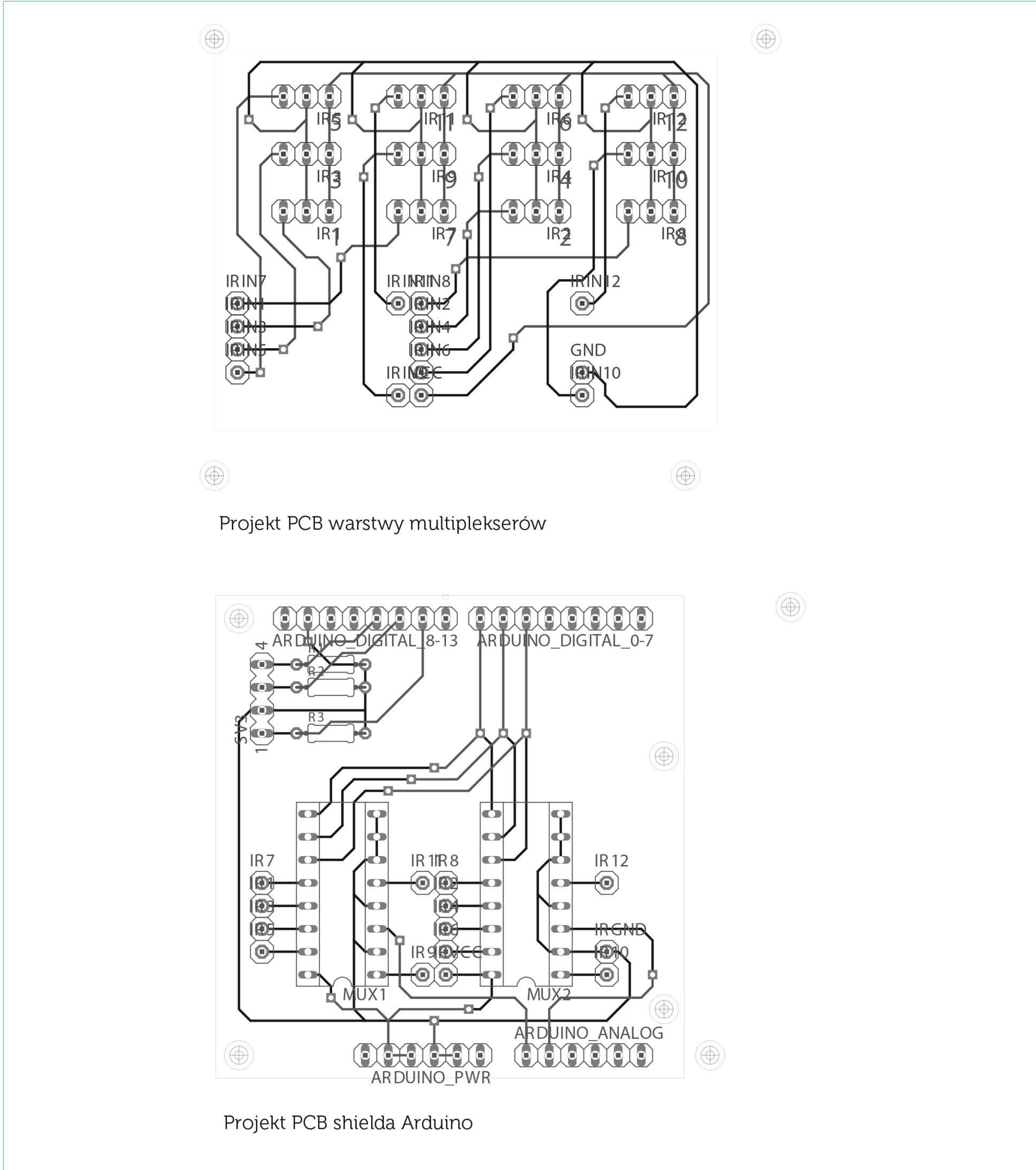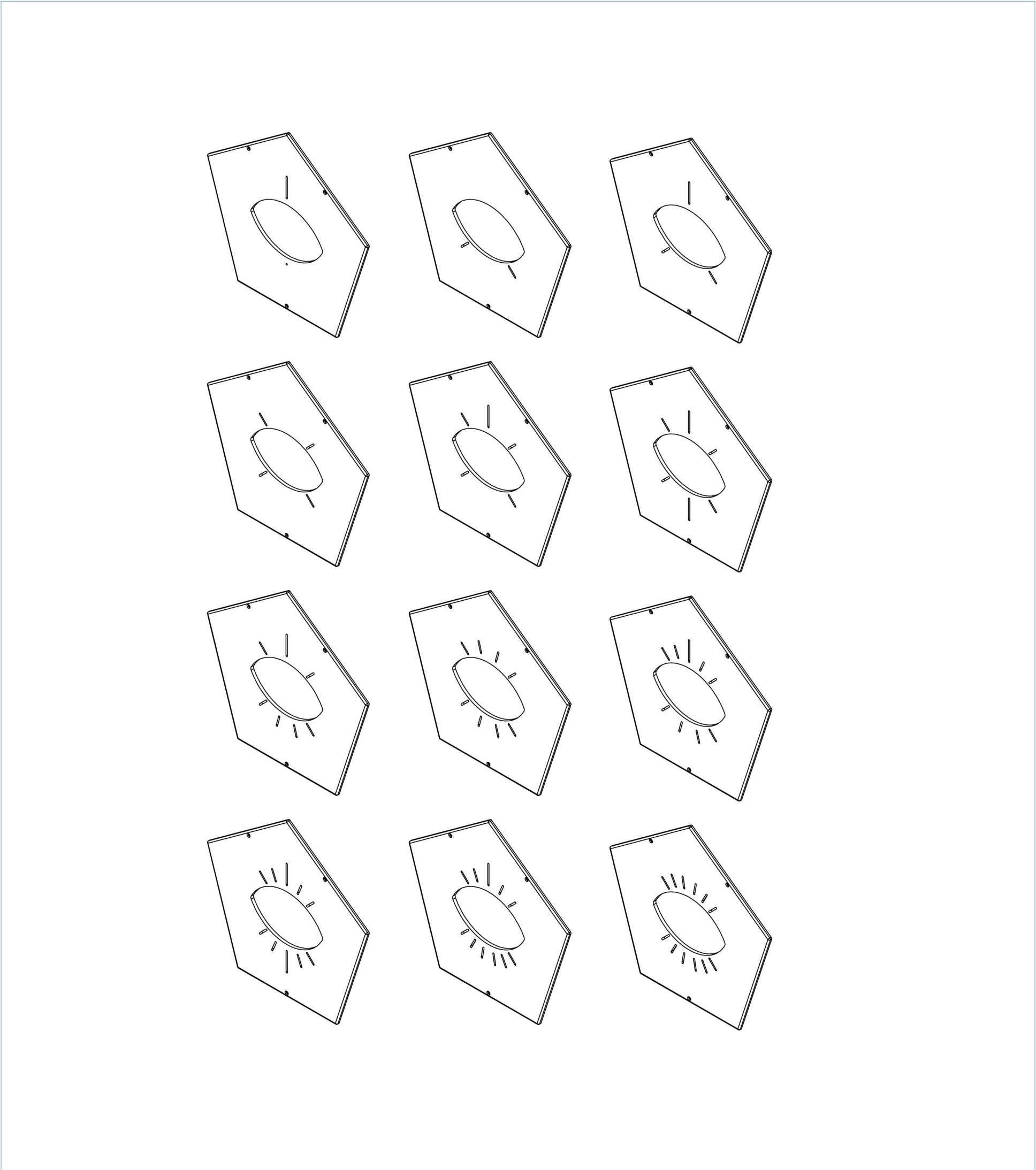
```
 * Startup
 */
void setup(){
  pinMode(MUX_CTRL_PIN_1, OUTPUT);
  pinMode(MUX_CTRL_PIN_2, OUTPUT);
  pinMode(MUX_CTRL_PIN_3, OUTPUT);

  analogReference( EXTERNAL );

  //setup timera
   //16-bit Timer/Counter1 with PWM
    //liczy do określonej wartości po czym się resetuje (CTC)
  TCCR1A = _BV(COM1A1);  //
  TCCR1B = _BV(WGM12);  //CTC = Clear Timer on Compare Match

  TCCR1B |= _BV(CS12) | _BV(CS10);   //prescaler /1024

  OCR1A = 1;          //CTC <- do jakiej wartości liczy

  TIMSK1 = _BV(OCIE1A);

  //odblokowanie przerwań
  sei();

  Serial.begin(115200);
}

void initADCRead(uint8_t adc){
  //wybranie odczytu z odpowiedniego ADC
  //parzyste: ADC1; nieparzyste: ADC2
  ADMUX = _BV(REFS1) | _BV(REFS0) | _BV(ADLAR);
  //Parzyste inputy z ADC1
  if( adc % 2 == 0 ){
    ADMUX &= ~_BV(MUX0);
  ;}
  //nieparzyste inputy z ADC2
  else{
    ADMUX |= _BV(MUX0);
  }

  //odblokowanie ADC
  //Prescaler czasu odczytu 128.
  ADCSRA = _BV(ADEN) | _BV(ADPS2) | _BV(ADPS1) | _BV(ADPS0);
  //odblokowanie wysołania przerwania po zakończonym odczycie
  ADCSRA |= _BV(ADIE);
}

/**
 * Wyzwolenie odczytu z aktualnego ADC
 */
void startADCRead(){
  //odblokowanie pojedyńczego odczytu wybranego ADC
  ADCSRA |= _BV(ADSC);
}

/**
 * Zakończeine odczytu z aktualnego ADC
 */
```

```
void stopADCRead(){
  //zablokowanie przerwania ADC
  ADCSRA &= ~_BV(ADIE);
}

/**
 * przerwanie timera
 * Wywołanie pojedyńczego odczyty z ADC: 0 lub 1 zależnie od stanu flagi secundMuxFlag (odpowiednio false lub
true)
 */
ISR(TIMER1_COMPA_vect){
  if( input >= valCount ){
    input = 0;
    readCounter++;

    if( readCounter > readMax ){
      sendReadings();
      readCounter = 0;
    }
  }

  //ustawienie multiplexera na wejście sygnału z dla inputa
  multiplexerSelectInput( floor(input/2.0) );

  if( secondMuxFlag ){
    initADCRead(1);
  }else{
    initADCRead(0);
  }

  //zablokowanie timera na czas odczytu z ADC
  TIMSK1 &= ~_BV(OCIE1A);

  startADCRead();

}

/**
 *Przerwanie zakończenia odczytu z ADC
 */
ISR(ADC_vect){
  val_next[input] = calcNewValFromDiff( ADC / (64*1024.0) , val_next[input] );
  input++;
  //zablokowanie odczytu ADC
  stopADCRead();
  //w następnym wywołaniu odczyt z drugiego multiplexera
  secondMuxFlag = ~secondMuxFlag;
  //Odblokowanie timera
  TIMSK1 = _BV(OCIE1A);
}

/**
 * Wysłnie odczytów via serial
 */
void sendReadings(){
  for( int i = 0 ; i < valCount ; i++ ){
    val[i] = calcNewValFromDiff( val_next[i] , val[i] );
  }
```

```
       for( int i = 0 ; i < valCount ; i++ ){
         Serial.print( val[i] );
         Serial.print( "," );
         val_next[i] = val[i];
       }
       Serial.println( "" );


     }

     /**
      * Wybranie inputu na multiplexerze
      */
     void multiplexerSelectInput( int in ){
       int row,r0,r1,r2;

       row = multiplexerInput[ in ];
       r0 = row & 0x01;
       r1 = (row>>1) & 0x01;
       r2 = (row>>2) & 0x01;

       digitalWrite(MUX_CTRL_PIN_1, r0);
       digitalWrite(MUX_CTRL_PIN_2, r1);
       digitalWrite(MUX_CTRL_PIN_3, r2);
     }
     /**
      * Wyliczanie nowej wartości na podstawie różnicy między wartością zadaną
      * a aktualną.
      */
     float calcNewValFromDiff( float valNew , float valCurrent ){
       float dv = valNew - valCurrent;
       return valCurrent + 0.9 * dv;
     }

     void loop(){
       //NOP::bez tej funkcji program się nie skompiluje ^_^
     }
```
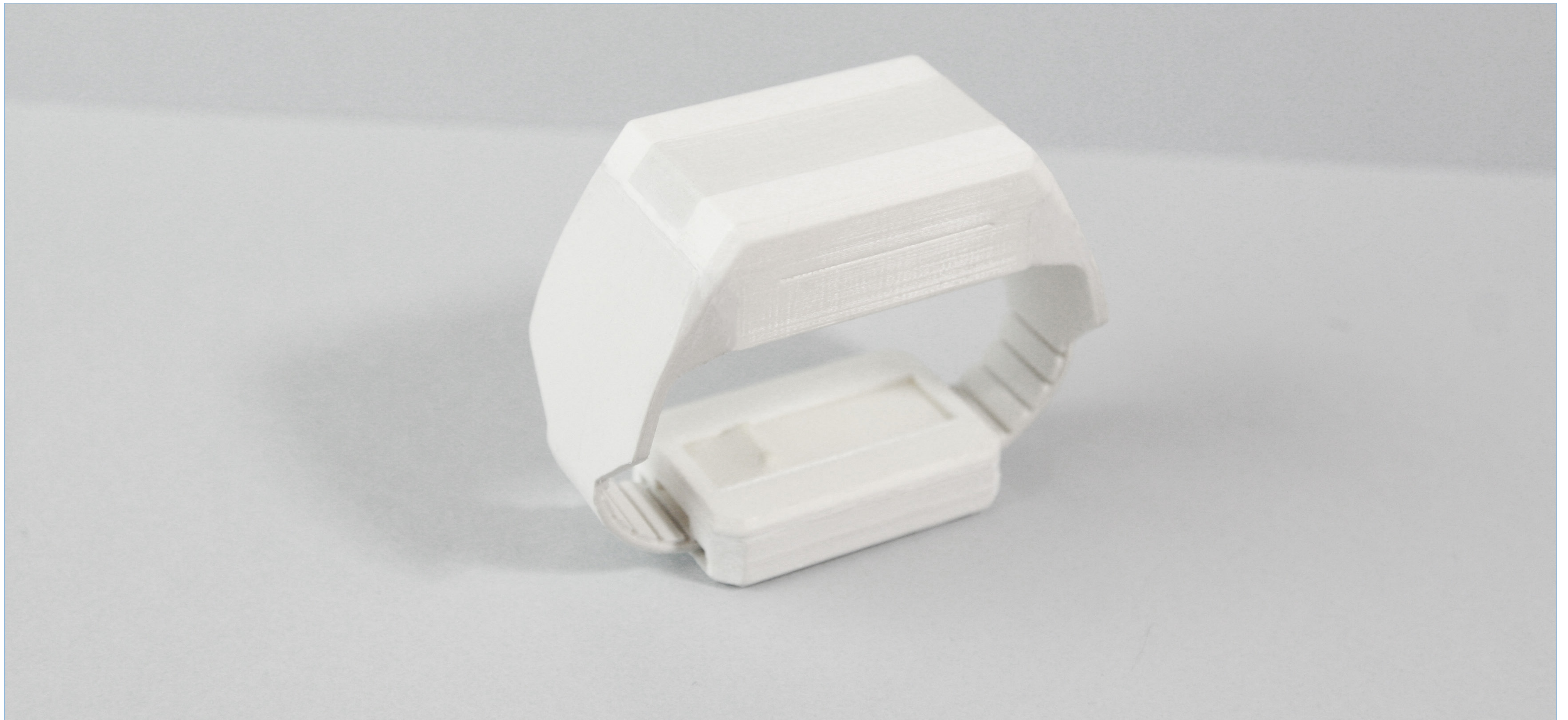
Jakub Koźniewski, Piotr Barszczewski, Krzysztof Szkubel, Krzystof Cybulski

www.pangenerator.com

Tytuł kategorii oraz działuCupta pre de volest **quiatibus sequaeptibus molo occus nistiae** volorroreic tectotasin rem restiatur? Ihit facimus se elitibus conseque plam estio dolo veruntem andus acculparum liqui volo maximende *sequassitis dolentum* ipic tet exerund
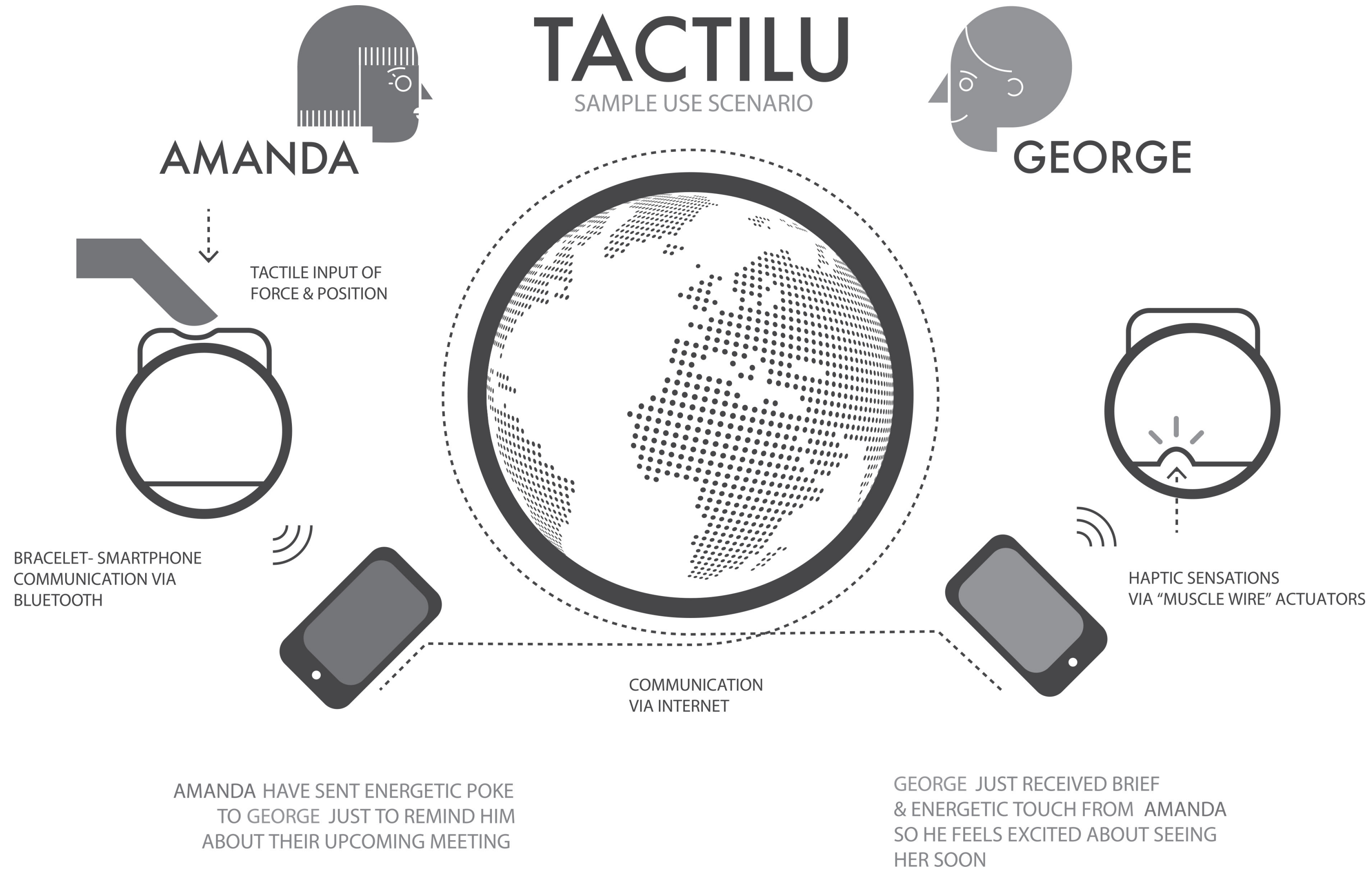
animi, si dol Tytuł kategorii oraz działuCupta pre de volest quiatibus sequaeptibus molo occus nistiae volorroreic tectotasin rem restiatur? Ihit facimus se elitibus conseque plam estio dolo veruntem andus acculparum liqui volo maximende sequassitis dolentum.

TACTILU
SAMPLE USE SCENARIO

AMANDA

GEORGE

TACTILE INPUT OF
FORCE & POSITION

BRACELET- SMARTPHONE
COMMUNICATION VIA
BLUETOOTH

HAPTIC SENSATIONS
VIA "MUSCLE WIRE" ACTUATORS

COMMUNICATION
VIA INTERNET

AMANDA HAVE SENT ENERGETIC POKE
TO GEORGE JUST TO REMIND HIM
ABOUT THEIR UPCOMING MEETING

GEORGE JUST RECEIVED BRIEF
& ENERGETIC TOUCH FROM AMANDA
SO HE FEELS EXCITED ABOUT SEEING
HER SOON

Build with:
Arduino, Flexinol (shape memory alloy), QTC(quantum tunneling composite)

the eight-channel robotic choir
performer's voice is processed in eight independent channels
and feeded to the speakers, movement of each speaker
is directly connected with frequency and amplitude
of the generated sound
THE PROJECT ORIGINALLY CREATED
FOR ART+BITS FESTIVAL AND PRESENTED AT RONDO SZTUKI GALLERY (3–5.10.2014)

PROJECT CREDITS:
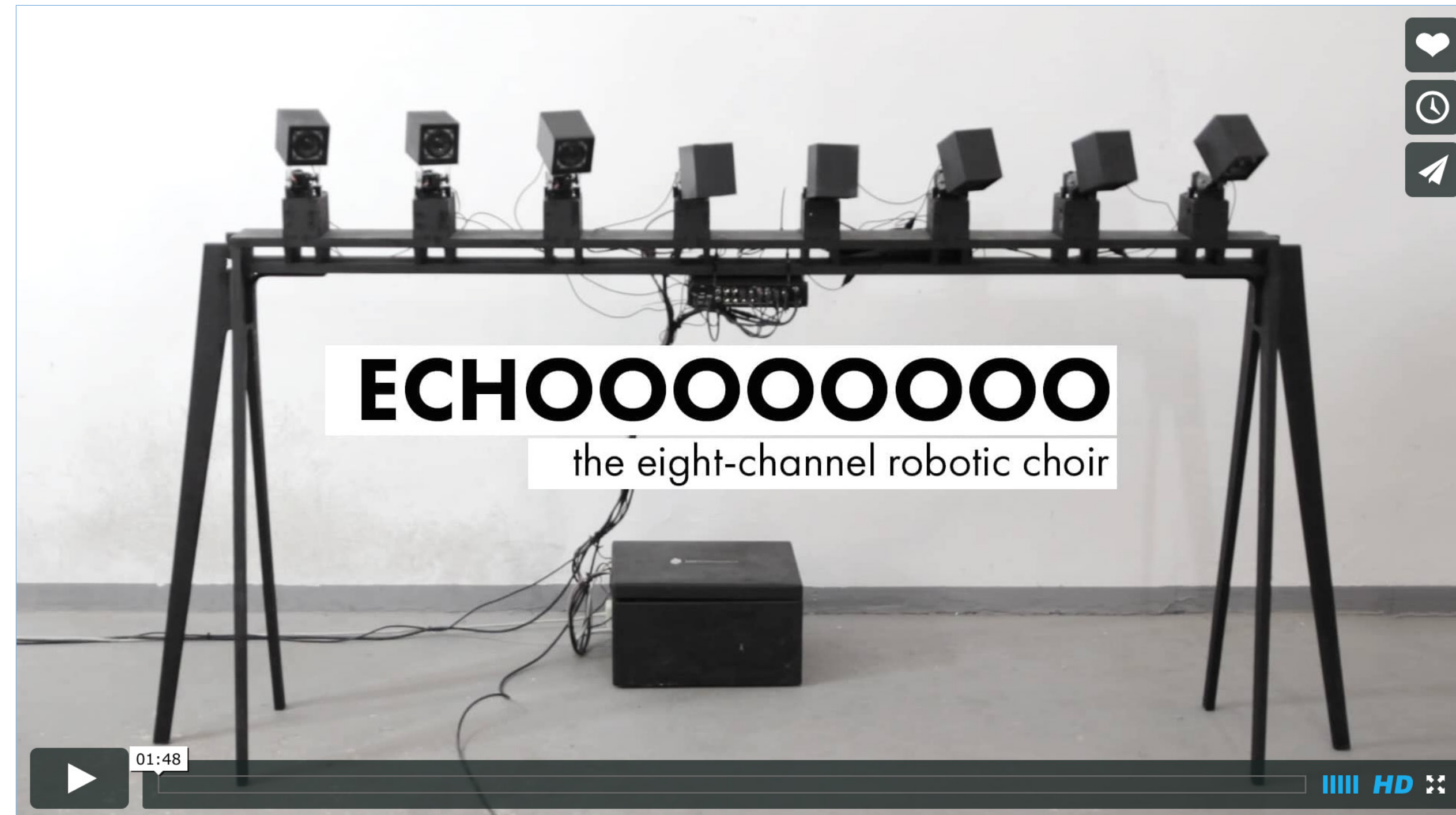Original concept - Krzysztof Cybulski & Jakub Koźniewski
Sound programming - Krzysztof Cybulski
Design, engineering, development - Piotr Barszczewski, Krzysztof Cybulski, Krzysztof
Goliński, Jakub Koźniewski,
Ewelina Rytel (studio intern)

Echooooooo vido: https://vimeo.com/114128574

source: https://vimeo.com/114128574

Build with:
PureData, node.js, servomotors, maestro driver, 8 channel audio interface

MACROFILM
a permanent interactive installation

„Tangible Storytelling Display Offers A New Way To Experience History At Jewish Museum" - thecreatorsproject.vice.com

Created by the panGenerator collective, Macrofilm is a permanent interactive installation for The Museum of The History of Polish Jews. The team was asked to create unique interactive installation for the Resource Center of The Museum that allows the visitors to browse through some stories of Polish Jews. Since they wanted to avoid any touch-screen interaction omnipresent all around us, instead something that would blend traditional, tangible experience of browsing through old archives and just subtly augment it with modern technology.

The installation consists of a ~9m long "ribbon" made out of two monolithic composite segments, wooden drawer, wooden RFID cards and the wooden central panel with big scroll wheel and a card slot. Interaction is intentionally simplified to the maximum

– the user is asked to browse through wooden RFID cards in the drawer, choose one, put it on the panel and then just scroll using the big wooden wheel. In the initial stages the team tried to add some haptic feedback (via specialised encoder) during the scrolling, but ultimately they removed this in favour of utilising natural inertia of the wheel – only rising the friction when user scrolled to the end / beginning of the presentation.

The whole mapping segment of the install is driven by a custom openFrameworks application generating real-time visual content for 3 WUXGA projectors – one for the central panel (where they needed more pixel density) and

two others for left and right "wings" of the "ribbon". Custom electronics for the wheel and RFID reader are based on Arduino and some custom shields and components the team

TURN THE WHEEL
TO THE LEFT

Macrofilm: https://vimeo.com/92073935

MACROFILM
PERMANENT INTERACTIVE INSTALLATION FOR
THE MUSEUM OF THE HISTORY OF POLISH JEWS

source: https://vimeo.com/92073935

Build with:
openFrameworks, optical encoder, Arduino, RFID, encoder with haptic feedback