Practical application of colour theory to jewellery design

Lahti University of Applied Sciences

Degree Programme in Jewellery Design

Bachelor's Thesis in Jewellery design

Spring 2018

Ivan Lavier

Instructor: Pekka Koponen

Opponent: Yuka Ito

ABSTRACT

The purpose of this work is to explore the principles of colour theory and practical application of colour theory to jewellery design, using coloured gemstones as source of colour and a tool for expressing artistic vision, rather than being source of value in its traditional understanding

The goal of my thesis is to explore the colour studies in the context of jewellery, practice colour use according to the principle of visual colour mixing, examples of which can be found in great works of Neo Impressionists; and apply the principles to the fine jewellery pieces that will be made using traditional jewellery making techniques.

Key words: Jewellery, colour theory, stone-setting, gemstones, pavé, colour, Divisionism, Neo-Impressionism

1 CONTENTS

INTRODUCTION

In the jewellery field nothing represents colour better than gem stones. When we think about gemstones the first thing that comes to mind is colour. When you hear words ruby or sapphire, amethyst or emerald what do you see? No matter what shape they may take in your imagination, one thing remains universal: the gem's colour. If you imagined ruby as red, and sapphires as blue it is because the gems and their colours are often synonymous. In the book Grammar of painting and engraving Charles Blanc says that only by means of colour alone certain gems can communicate to us whether it is sapphire or an emerald. (Blanc, 1867, 4)

In the gemstone trade, colour alongside the clarity, carat weight and cut, determines the value of the stones. Some gems are seen as more valuable than others, because of the colour they possess.

Gemstone trade is an essential part of jewellery industry and its rules and values often dictate what the jewellery is, however jewellery is so much more than just a final step in processing and refining of precious materials, it is a cross-section of disciplines, it is a blend of art, design, sculpture and painting and therefore should communicate the values of the artistic expression before the values of materials it contains.

When we think about art and how it is created the process often is intuitive, and cannot be measured or explained. There is however a set of rules and principles that can be measured, such as principles of composition, golden ratio, chiaroscuro and rules of colour theory.

Use of colour is one of the biggest hurdles that artist faces. Knowing how to use colour effectively, to adjust a mood and the atmosphere, or simply choosing the colours that go well together involves understanding colour.

This work revolves around practical application of colour theory to jewellery design. I believe that sophisticated use of colour and strong connection with the art world is a great competitive advantage and value creating factor in the jewellery industry.

The research will be conducted through looking into the colour theory, extraction of its principles, analysing of art works and final implementation of the principles on to the jewellery design

As the result we can establish a stronger connection between the jewellery and the world of art, which can also help re-evaluate the values of the trade and find new spot on the market place for the colours and stones that were over looked due to traditionally accepted opinions.

WHAT IS COLOUR

English Oxford dictionary defines colour as the property possessed by an object of producing different sensation on the eye as a result of the way it reflects or emits light (Oxford dictionary, 2018).

In physics colour defines as a wavelength of light: different objects reflect different wavelengths of light, when these wavelengths enter our eyes we call these wavelengths colours.

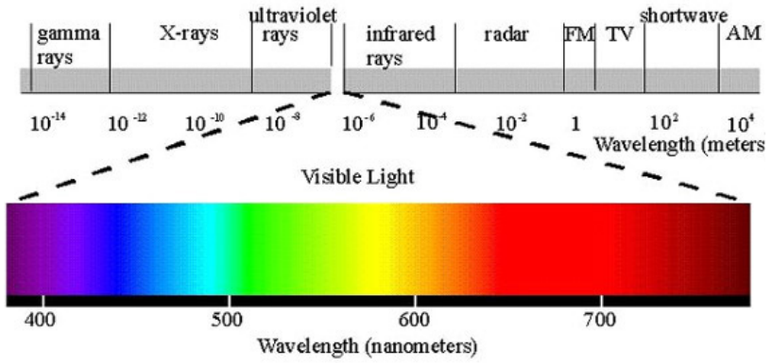
Colour perception is always dependant on the observer. Without an observer there would be no colour. Human eye contains specialized light receptors that are activated when the light reaches them. The human eye has three types of different receptors that react either to red light, green light, and a third to blue light. Together they stimulate the brain to produce the impression of colour. (Solid colour, BYK-Gardner GmbH, 72) Therefore colour is physical, biological and psychological phenomena created by light.

The most common source of light is the sun, we call the light that comes from the sun in the form of radio-magnetic rays a white light and it contains all the colours of visible spectrum.

Full radio-magnetic spectrum ranges from high energy short length waves like gamma rays to low energy long length waves like radio waves. The light we are able to see ranges from violet light that has a length of about 400 Nano meters to red light that has a longer wavelength of about 650 to 700 Nano meters, as shown in the picture above.

The colours always appear in the same order, because each colour has its own wavelength and frequency. Due to higher count of the receptors in the human eye we perceive and distinguish warm colours like reds, oranges and yellows much easier than violets and blues. (Glenn Elert 2018)

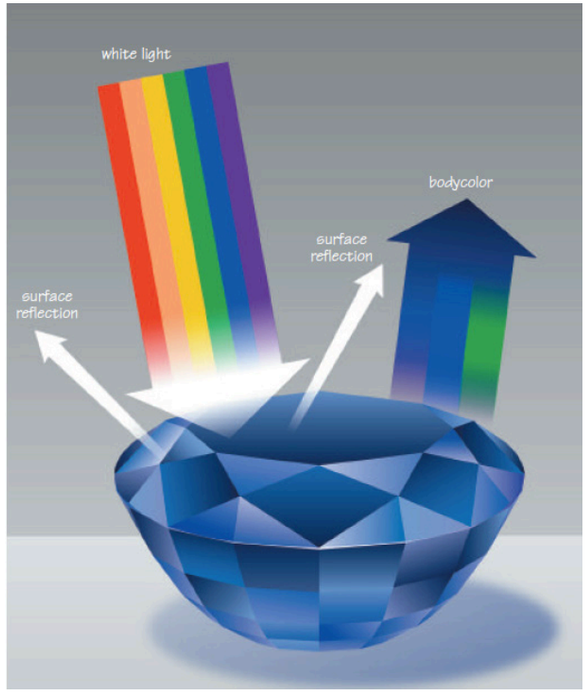
Since this work focuses on the implementation of the colour theory to jewellery design, it is important to look into the formation of colours in the gemstones, that will be the primary source of colour in final jewellery pieces for this project.



VISIBLE SPECTRUM

HTTPS://CFIALABIOASSIGNMENT.WIKISPACES.COM/FILE/VIEW/SPECTRUM.GIF/76509733/SPECTRUM.GIF

Gemstones like any other objects have a property of colour. When light reaches the gemstone depending on the transparency, part of the rays penetrate the stone and part is reflected from the surface. The part of the rays that gets reflected within the stone is called body colour of the gemstone. Bodycolor—A gemstone's basic color, determined by its selective absorption of light. Other important criteria in gemstone's colour are: Hue—The first impression of gemstone's basic color;Tone—Degree of darkness or lightness of a color, and Saturation—A color's strength or intensity. (GIA 2002, 3)



COLOUR NATURE PETER JOHNSTON/GIA

Gemmological Institute of America in its guide to coloured stones

COLOUR VALUE IN GEMSTONE TRADE

Different species of the gemstones have different colour range in which it occurs, and the colour range can be either broad or narrow.

As an example of narrow colour range we can name peridot, that occurs in the yellowish green colour, where tourmaline on the other hand, comes in broad variety of colours from pinks and greens, yellows and oranges, to vibrant blues.

According to the Gemmological Institute of America in its guide to coloured stones: within any gem's colour range, some colours are more desirable than others. These top colours fall within limits that are generally accepted in the trade. A gem that features what the trade considers the most desirable colour or colours is described as having fine colour. (GIA 2002, 3)

Blue sapphire is an excellent example that illustrates the value of the stones based on the colour. Although blue sapphires range in colour from violet blue to strongly greenish blue, only a small portion of that range is considered fine colour. Sapphires of violet-blue to pure blue, are generally considered the best, and are valued much more highly than greenish blue sapphires.

When the colour of the gemstone specimen is evaluated it is compared to the colours of the stones from the same species, and consequentially through the comparison, the value can be determined. (GIA 2002, 3-4)

The stones that have lower value are very often overlooked by the jewellers and are less likely to be used in jewellery creations. It happens simply to ensure the stability and a value preservation through the materials used in the jewellery piece. However, the bias created by the trade often influences the quality of design, and to avoid the bias, we can focus on the perception of the value.

SELECTION OF COLOUR REPRESENTING A COLOUR RANGE OF A GEM STONE

HTTP://PIKE.COM.AU/STUNNING-SAPPHIRE-SEPTEMBERS-BIRTHSTONE/

If we think of the jewellery piece with a variety of colours, and shades, then the rules in which the stones are chosen must not rely solidly on the values of the trade but on the rules of colour studies. The colour of the stone should not only be compared to the colour of the stones of the same species but analysed in the context in which the stone will be used, taking into consideration its surroundings, the interaction of colours and possible outcome of the colour perception.

In order to find the solutions in colour use, we can turn for the answers to the world of art and through researching its rules we can find the principles that can be applied to jewellery design.

COLOUR IN ART

In art and in particular in painting, the colour is an essential, almost indispensable element, it is the means of expression (Charles Blanc, 1867, 4).

Classic school of academic painting used conventional colour schemes in art creation. The purpose of the colour was to imitation existing subjects and their qualities as close to the original as possible. The goal was precise transferring of colours from real world on to the canvas. As an example could be using green colour for green grass or blue colour for the sea and the sky.

Modern movements like Impressionism and Expressionism challenged traditional point of view, placing colour perception in to the centre of their focus. In Impressionism the focus was to communicate by the means of colour what the artist saw and in Expressionism how artist experienced colour and felt about it. As an example could be using unconventional colour choices like painting the grass with red colour. (Neil Collins,2018)

In 1880s colour use in painting took new turn in the form of Neo-impressionist, guided by the scientific theories, rules and principles. In its core Neo-Impressionism also known as Divisionism is based on the principle of colour separation in to small dots of colour and its optical interaction instead of physical mixing.

In 1884 Georges Seurat, a French artist of a conventional academic training, after being introduced to the theories of colour and vision through the work of Charles Blanc's Grammar des arts du dessin, created his greatest masterpiece, A Sunday Afternoon on the Island of La Grande Jatte. In his work he applied the principles of the colour theory defined by Michel Eugène Chevreul and Eugène Delacroix, which marked the beginning of Neo-Impressionism movement.

COLOUR IN ART AND COLOUR THEORY

The main goal of the Neo-Impressionism was to refine the impulsivity of Impressionism through the application of scientific studies and bringing organization to the colour use, incorporating the explanation of optic and colour perceptions through the method of applying individual strokes of complementary and contrasting colours. (Roslac 2007, 17)

Followers of divisionism movement believed that optical mixing would produce more vibrant and pure colours than the traditional process of mixing pigments.

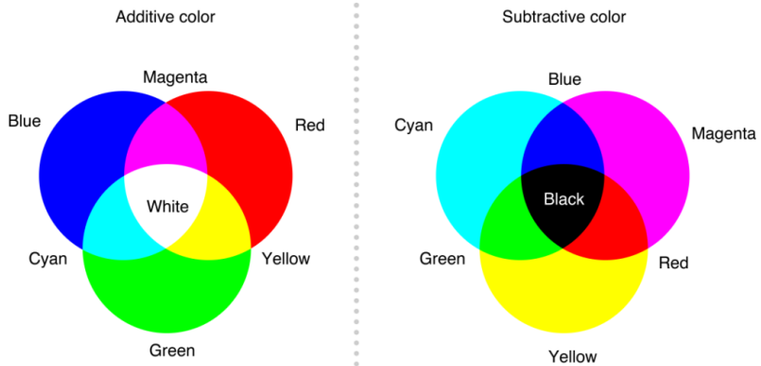
When colours mixed together physically it is called subtractive mixing method with Cyan, Magenta and Yellow being the primary colours also called "CMYK"- where K stands for Key meaning Black.

When coloured light is mixed together it is called additive mixing where the primary colours are red, green and blue. "RGB"

The method of visual colour mixing used in divisionism, of juxtaposing pigments differs from additive and subtractive methods, however the method of mixing colours optically uses additive primary colours.

For Seurat the main goal of using visual colour mixing was to engage the viewers. Where the painting is created in such a way that in order to create a sensation of colour, dots of contrasting colours are placed side by side which intensify their relationship but preserve their separate identities. (Roslac 2007, 16)

There is a variety of contexts in which the colour is used in Divisionism.



SUBSTRACTIVE AND ADDITIVE COLOUR MIXING

(HTTP://BAHIAIMPLEMENTOS.COM/ADDITIVE-VS-SUBTRACTIVE-COLOR/ADDITIVE-VS-SUBTRACTIVE-COLOR-LIGHT-AND-COLOR-FLASHCARDS-QUIZLET/)

Firstly, the colour can be used as a local colour to represent a true colour of an object. Secondly, colour can be used to imitate the sunlight by using warm tones of yellow and orange on the most illuminated spots. As an opposite of light, an impression of the shadow can be done by use of the colours that are the opposite of colours representing light such as blues and greens, as well as reds and purples that are perceived as dark. Another context could be the reflected light of the objects it is the colour of an object that is reflected backwards from the direction of light to its surroundings. And finally the use of contrasting colours placed side by side, for creating the effects described in the Chevreul's theory of simultaneous colours.

All these contexts can be used either within general colour theme, or in the network of separate colour themes in the same painting, to create a cohesive impression. Further we will look closer in to the colour themes, also known as colour harmonies that are generally considered to be the best way of choosing appropriate colour combinations that can give desirable effect to the artwork.

ON THE PREVIOUS PAGE

A SUNDAY AFTERNOON ON THE ISLAND OF LA GRANDE JATTE.1884-1886,

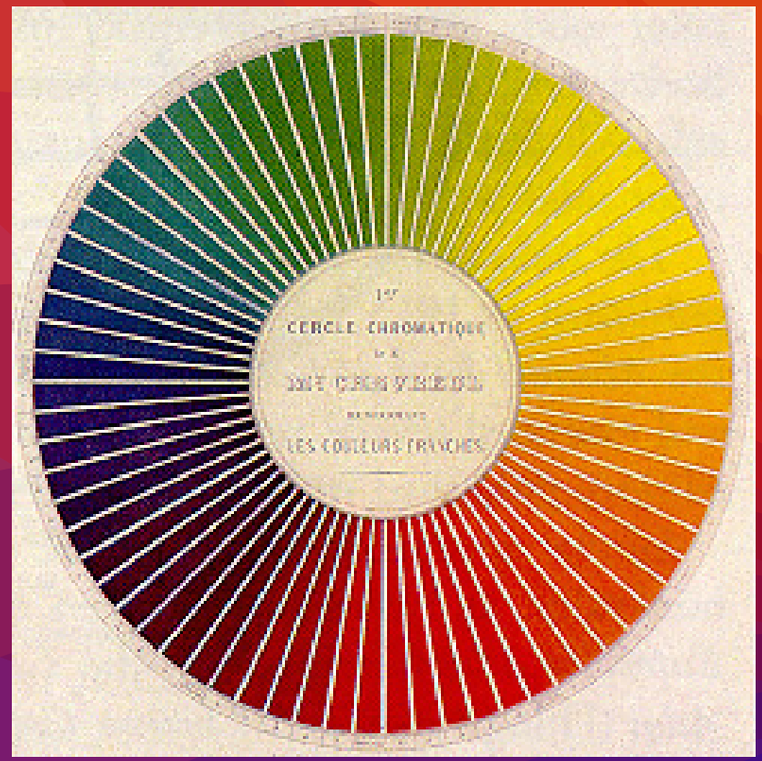
GEORGES SEURAT

HTTPS://UPLOAD.WIKIMEDIA.ORG/WIKIPEDIA/COMMONS/6/67/A_SUNDAY_ON_LA_GRANDE_JATTE%2C_GEORGES_SEURAT%2C_1884.PNG

COLOUR WHEEL AND COLOUR HARMONIES

Over the years many great thinkers who researched light and colour, tried to organize the knowledge through the visual representation of the concepts. As the result we have plenty of different models of colour wheels that are used not only to represent visual spectrum of colour, but also serve as a basis for creating colour combinations, that can be directly implemented to art in order to ensure harmonious use of colour. (Westland, Laycock, Cheung, Henry, Mahyar 2007. 6-7)

This chapter uncovers the principles of combining colour that are believed to provide the greatest aesthetic value



CHEVREULS COLOUR WHEEL

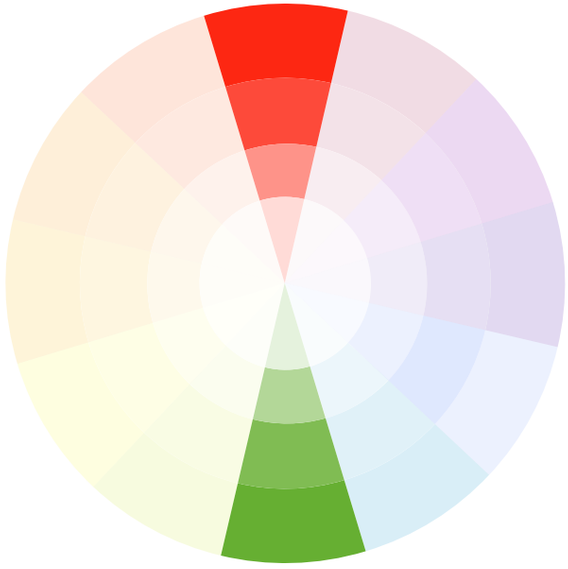
HTTPS://WWW.COLORSYSTEM.COM/?PAGE_ID=792&LANG=EN

1.1.1 monochromatic

1. Monochromatic colour harmony (where colours are chosen with the same or nearly the same hue)

1.1.2 analogous

1. Analogous harmony (where colours are chosen with similar hues)



1.1.3 Complementary

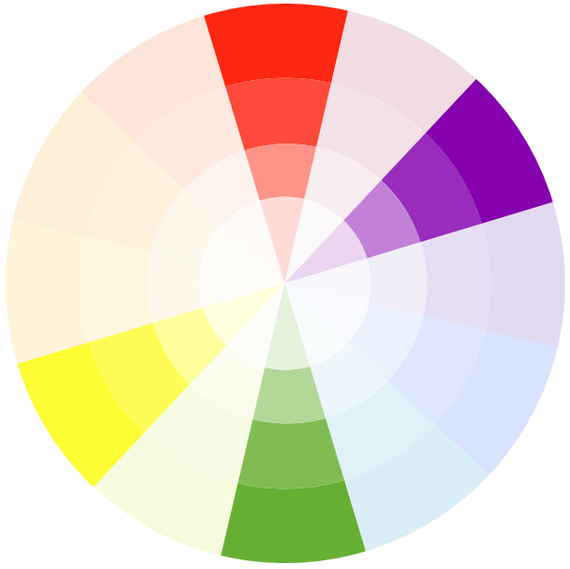
1. Complementary colour harmony (this is always represented as referring to opposite colours on a hue circle)

1.1.4 split-complementary

1. Split-complementary harmony (where there are basically three colours, with two being either side of the complement of the third in the hue circle).

1.1.5 Triad

triadic colour harmony (three colours whose hues are each separate by about 120 degrees in the hue circle)



1.1.6 Double complementary

Two neighbouring colours with their opposites

Colour harmonies allow us not only to create, but also to analyse the colours used in any given art piece.
In the next chapter we will look closer into the jewellery making technique that will be used for practical application of colour combinations as well as the method of the artwork analysis based on the colour combination and colour context.

IMPLEMENTATION

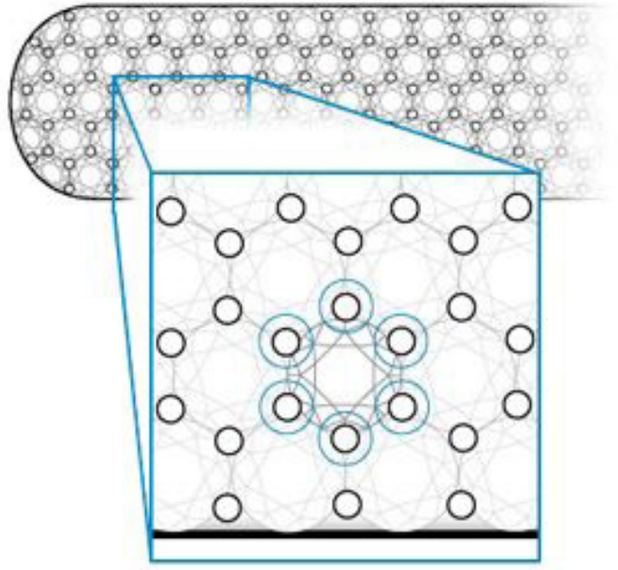
One of the characteristic features of divisionism paintings is that the colour pigment is applied in the form of distinct small dots placed side by side covering the whole canvas.

In the jewellery design there is several techniques that are similar in its principle, and could be used as an equivalent, like micro mosaic or pavé stone-setting technique.

Pavé-technique is used to cover the whole available metal surface with stones and is technically challenging in its execution.

There are two main variations of this setting the old-fashion pave, where the stones are placed side by side in the straight lines, and the second type is modern pave, in which the stones are placed closely side by side in the line and the next row of stones is placed in such a manner that they fill the voids between the stones in the previous row (Lahtela. 2013. 90).

To test the practical application of the principles on jewellery here is a detailed description of the stone-setting technique that will be used in creating the prototypes.



PAVÉ SETTING TECHNICAL DRAWING

HTTPS://WWW.BRILLIANCE.COM/EDUCATION/GUIDES/SETTING-TYPES

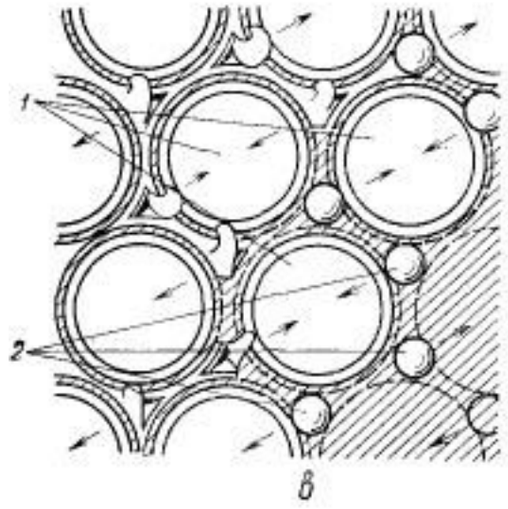
TECHNIQUE AS A FRAMEWORK

Covering the surface with stones means tiling them up in a pattern. Since the stones are round and to lay them across the surface closest to each other we can use hexagonal pattern. Hexagon is the closest geometrical shape to the circle and hexagonal pattern has rotational symmetry and regularity to it. Hexagonal pattern has 6-fold symmetry, from the centre of hexagon there is 6x 60˚ folds that divide 360˚equally. (Penrose,2014)

When we place the circle insight each hexagon, that is going to be our future round stone, we have very little surrounding material that we can use to create a bead that will hold stones in place. For example, if we want to try placing pentagons in a similar pattern we will face difficulty, unless the shape of an object will support the design or in hexagonal pattern pentagons will always be used on the edges, but not more than that. When the stones used are of the same round shape and size, hexagonal pattern is an ideal solution. The shape of an object may influence pattern itself, that's why the simple shape of a hexagon was chosen or a basis and hexagon can be easily and uniformly covered in regular pattern.

If the stones are of a different size the pattern will not have symmetry, this technique is called random pave, in this technique stones of different sizes are mixed together and set girdle to girdle. Random pave could be the next stage of exploring possibilities of colour combinations, and the trials can be conducted outside of this work later on.

To carry out trials a selection of synthetic stones will be used. All stones are of the same size 1,5mm and are Cubic zirconia, synthetic spinel, synthetic sapphires and synthetic rubies. All together making 16colours to choose from.



PAVÉ SETTING TECHNICAL DRAWING

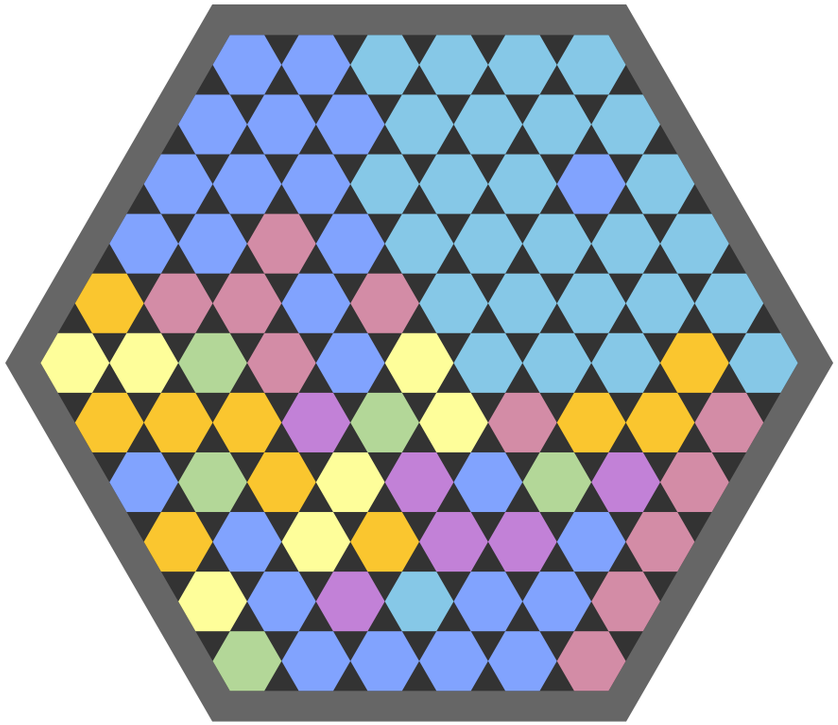
HTTPS://UVEANNA.BY/ZAKREPKA-I-PODBORKA-DRAGOTSENNYKH-KAMNEJ.HTML

CREATING THE BASE

The base of a jewellery piece is a hexagon that was created out of 2mm thick silver plate. The hexagon derived from a circle with a radius of 11mm, sectioned using a compass. The size was determined by the amount of the stones that will be used: 60 stone sample is big enough to show the possibilities of colour combination, and small enough to be worn as a casual everyday piece.

After the hexagon is sewed out of metal with a handsaw and each side is filed and polished. The piece must be hallmarked at the beginning stage since after prongs are cut, it will become unnecessarily difficult or impossible. After hallmarks are set the piece is ready for marking. Firstly 1 mm distance is marked along the edge on the front of the piece, on each side using a compass. Now alongside the edge of that line there is a space for placing 6 stones with an equal distance, same applies to each side. In total the piece will contain 60 stones that are spread across the surface in the pattern with hexagonal symmetry. When the stone placing is distributed each place is marked with marking tool and then drilled half-way using 0,8mm twisted drill. After every hole is done, it is enlarged with ball-bur of the size of the stone. The edge of the outer row of holes is cut with engraver along the length of each side all around the surface are. The outer layer of prongs are formed, using the engraver, every prong should be of exactly the same size to ensure the aesthetic quality as well as technical purpose. The space in-between every hole can be cut with the variety of methods using different tools depending on the availability, preference, and desired result, from hand engraver to a variety of cutting burs. After every prong is cut the piece can be polished with brushes and cotton polishing discs.

The pieces that are created for this project are simple pins that can be worn either separately or all together, covering the surface with hexagons. The base is designed to be universal, and same base can be turned in to any piece of jewellery depending on the desired result, from pendants and earrings to ring or cufflinks. The mechanism that will determine the purpose can be soldered to the base before or after prongs are cut.



TECHNIQUE TIPS

Pave technique involves a lot of drilling. Sometimes if you use too high speed or accidentally change the angle of penetration Drill can break down and get stuck in the metal. In the best case scenario, it will have enough length to hold on with pliers (use technical pliers for steel or other non-precious metals and not the ones you use for working on silver). If the breakage leaves no significant length you can try to drill the metal from the opposite side if it's possible. When you reach the hard part and notice that drill just stays in place and does not go further stop drilling and try to beat the remaining of the drill with a piece of HSS shank with a pointy end.
If the above methods do not work, or are accessible, the silver piece into the hydrochloric acid of about 15% concentration for couple of days, periodically checking the process. Acid must dissolve HSS bead completely. Acid should be used only on jewels without gems already in place.

If while setting you accidentally break a prong, remove the remaining of the prong and clean the surface flat. Drill the hole on the middle where the prong must be located. I used the wire of 1mm thickness, it is slightly wider than a prong which leaves the space for finishing. Insert the wire in the hole leaving extra length that can be cut later. If the stones that you are setting can withstand high temperature you can solder directly. like in my case synthetic rubies and zirconia have melting point above 2000°. What I was cautious about was colour change, to avoid overheating 'cool paste' can be used to cover the surrounding areas, it can prevent melting or discoloration. After soldering a piece with a cool paste, remaining of the paste should be rinsed off with water and the piece should be placed separately in the jar with small amount of acid. Placing piece directly in a pickle can cause wide contamination with extra particles.
If during the setting structure of the ring gets compromised and weakened by the holes and accidentally break along the seam, stones that were affected or moved should be removed and then piece can be solder as normally.

TWIST DRILL

HTTP://WWW.NANCYLTHAMILTON.COM/WP-CONTENT/UPLOADS/2012/11/BROKE-BIT.JPG

THE METHOD

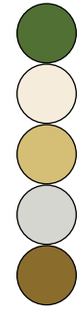
The method of implementation of colour into the jewellery piece is very simple and logical. The colour scheme for jewellery piece will be created based on the artwork, that will be analysed from the perspective of colour use from the colour relationship used in the artwork, to the context in which colour is used. The contexts of colour are listed below:

- Local colour
- Direct sunlight
- Shadow
- Reflected light
- Contrasting colours

Here is an example:

Painting La Lucerne, Saint-Denis 1885-1886 by Georges Seurat:

The colours that are used in this painting are primarily shades of green, yellow and orange that represent analogous colour harmony. The main subject of this painting is a field of grass and landscape in perspective. The painting is light however there is no source of direct sunlight or source of shadow, the main colour context is a local colour of the grass that is painted in equal proportions of green and yellow-orange tones.



After we identify the colour relationship and colour context we can match the colours available in the gemstone colour selection, to the colours in the art piece.

It is worth mentioning that the gemstone selection differs from the shades of colour used in an art-piece, therefore an art piece will serve as a general guideline for creating colour combinations not a model for direct copying, and the results will differ from the example.

After stones are chosen we recreate the colour pattern used in the painting, adjusting it to the hexagonal framework of pave setting, and integrate the pattern to the jewellery piece.

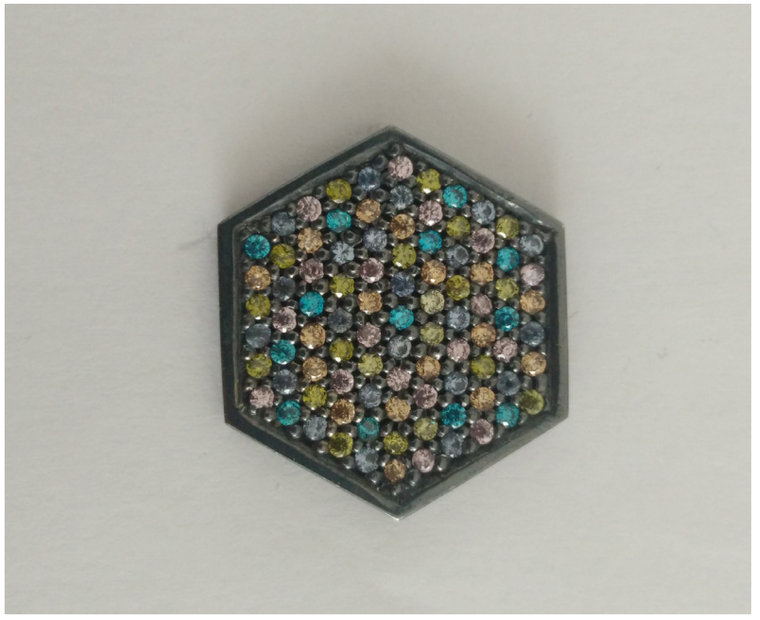
PAINTING LA LUCERNE, SAINT-DENIS 1885-1886 BY GEORGES SEURAT:

HTTPS://WWW.WIKIART.ORG/EN/GEORGES-SEURAT/ALFAL-FA-ST-DENIS-1886

WORKS

This chapter contains an analysis of the chosen artworks and the description of the colour combinations implemented onto the jewellery piece.


C. Pissarro. 1888



WORK I

Camille Pissarro, L'Île Lacroix, Rouen (The Effect of Fog) 1888

The first work is based on the colour scheme used in the painting by Camille Pissarro.

The colours Pissarro used for the depiction of the view on the foggy shore of Lacrtoix Island are blue, pink and yellow at their pure form. We can say that the combination of those colours is the local colour of the object. The more defined objects closest to the viewer are mixed with black colour to enhance the definition, and the further away, the more undefined objects become. It perfectly reflects the foggy air on the shore of an island, the water and the sky are inseparable and achieved with generous mixing with white.

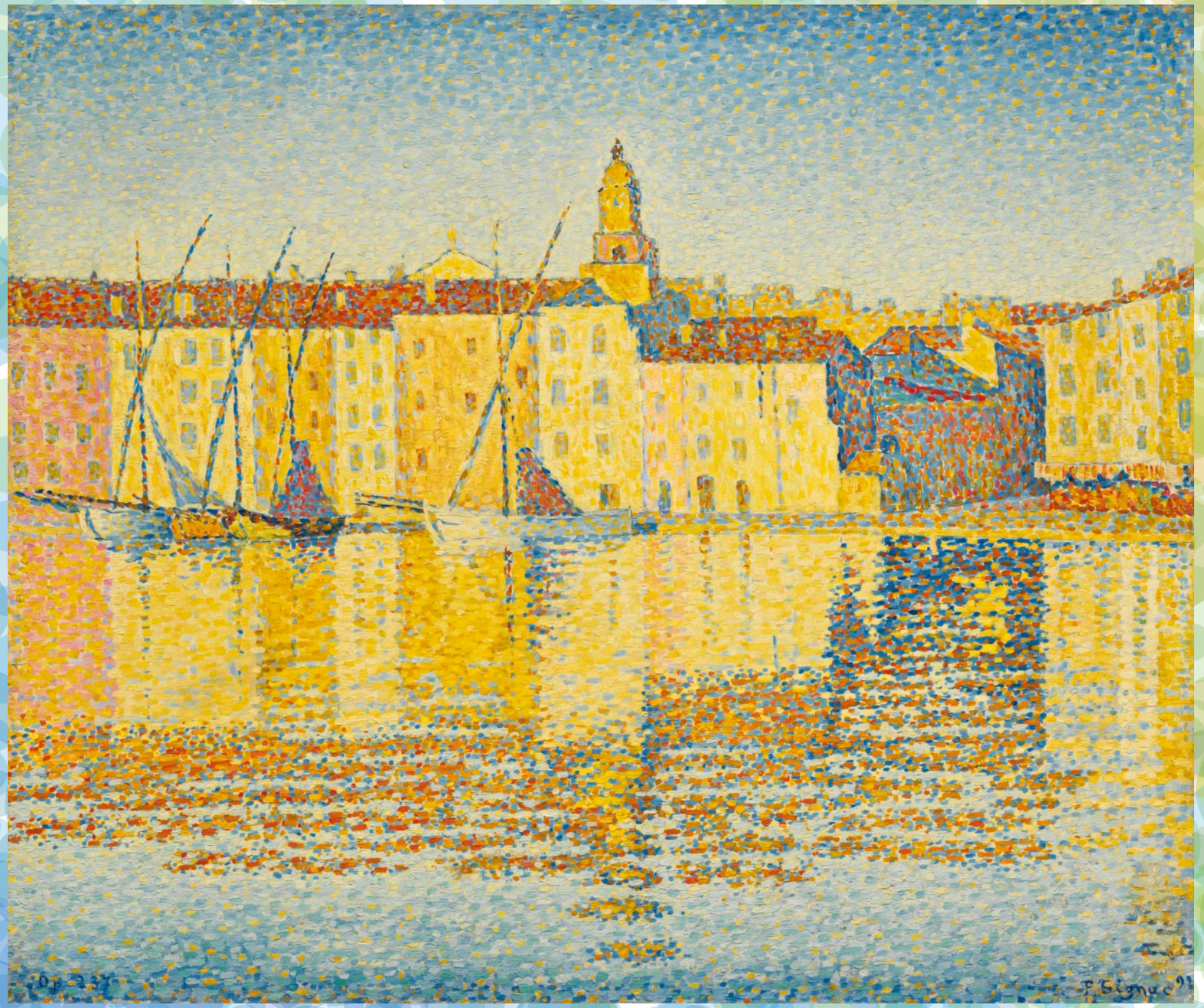
The shapes in this paintings are vague and not descriptive, the silhouettes are blurred out to imitate fog and it gives certain two-dimensionality to the objects. In this painting there is no direct sunlight and therefore the local colour of the objects and the colour of the shadow is almost inseparable. There is also no separation between the colours of the reflections and the objects. Overall use of shapes and colours creates peaceful and soft atmosphere, that is however expressive and full of character.

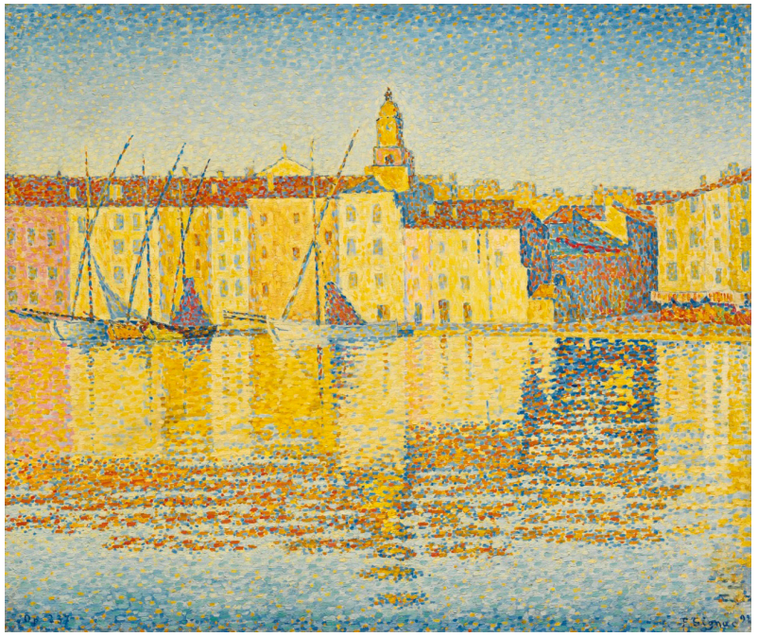
To imitate the effect Pissarro achieved we will use the split complementary colour relationship with pink and champagne- coloured stones against blue, aquamarine and peridot-green coloured stones.

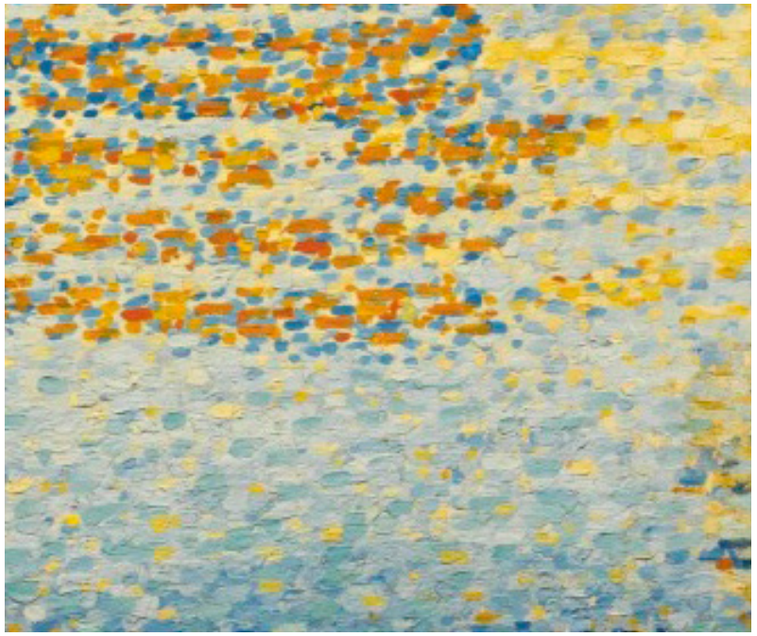
This sample imitates the colour palette of the building that is seen in the right up corner of the painting . This area has been chosen since it shows clearest colours not diluted with additional highlights or shadows. Same colour combination can be diluted with colourless stones to simulate lighter areas of the painting, either exposed to the light or blurry effect of the perspective far away, or with black stones to imitate shadows or object located closer to the viewer within the frame which gives sharpness. Overall in this painting contrasting colours are not clearly assigned for the role of the high light. The weather on this day is gloomy, the clouds are covering the sun and fog raises up above the water, light is spread and broken by the fog in the air, that's why no particular object is illuminated or remains in the shadow. Since this sample contains peridot-green colour, when combined together with less intense shade of blue it gives this gloomy even muddy darker feeling, that wouldn't be as noticeable without the green that has been enhanced by pink colour. The colours used in more or less equal amounts and spread with certain regularity to imitate absence of direct sunlight and uniformity of local colour.

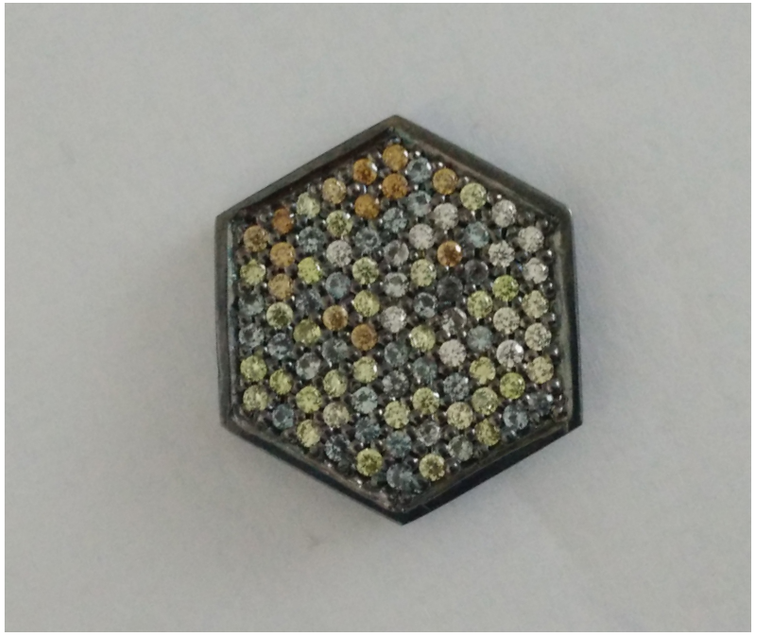
CAMILLE PISSARRO, L'ÎLE LACROIX, ROUEN (THE EFFECT OF FOG) 1888

HTTPS://COMMONS.WIKIMEDIA.ORG/WIKI/FILE:CAMILLE_PISSARRO,_FRENCH_-_L%27ÎLE_LACROIX,_ROUEN_(THE_EFFECT_OF_FOG)_-_GOOGLE_ART_PROJECT.JPG









WORK II

Paul Signac (French, 1863-1935), Maisons du port, Saint-Tropez, 1892. Oil on canvas, 46.5 x 55.3 cm.

Paul Signac is another significant member that influenced the development of Neo-Impressionism alongside Georges Seurat. He is famous for his colourful landscapes and seascapes which are always colourful and precise.
The painting of the houses in the port of Saint Tropez has three primary colours yellow, blue and orange, together forming split-complementary relationship colour scheme.
The colour of water and the sky is blue and is used in the context of local colour.

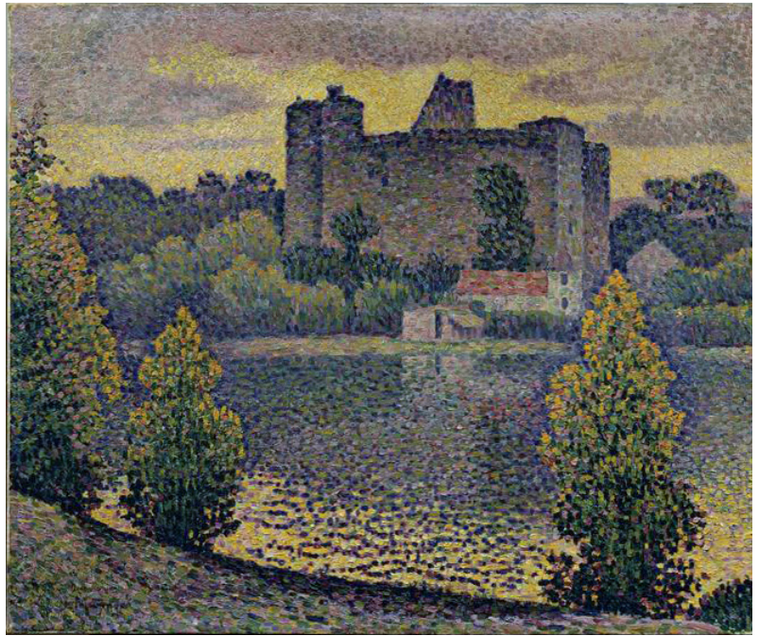
When we look at the houses they are orange yellow which can be a local colour accentuated by the colour of the direct sunlight that could be either the sunset or sunrise, we cannot know for certain. The houses do however have a point of the shadow created by strong combination of dark blue and reddish orange, which proves that the front of the houses is strongly illuminated.

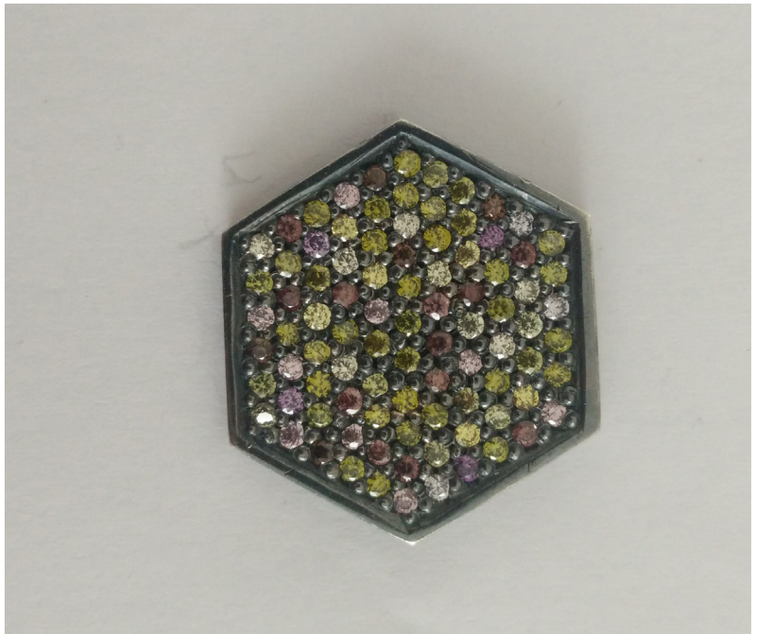
To create the colour sample, we will use the detail of the painting that has an impression of water and contains reflection of the houses and very bright part with reflection of the sky. The gemstone used in the sample below are light blue synthetic spinel, olive yellow, clear white and finally medium champagne-coloured stones that are used very moderately just to point out the presence of the contrast but to avoid making it a dominant colour.

Given use of colour creates fresh summery feeling and accentuates the lightness of pastel shades.

PAUL SIGNAC (FRENCH, 1863-1935), MAISONS DU PORT, SAINT-TROPEZ, 1892. OIL ON CANVAS, 46.5 X 55.3 CM.

HTTP://WWW.SOTHEBYS.COM/EN/AUCTIONS/ECATALOGUE/2016/IMPRESSIONIST-MODERN-ART-EVENING-SALE-N09497/LOT.8.HTML





WORK III

Jean Metzinger, 1904-05, Le Château de Clisson, oil on canvas, 54.5 x 73.5 cm, Musée des Beaux-Arts de Nantes

In this painting of Metzinger we see the view on to the Castle of Clisson. The painting appears to be dark and is predominantly created by use of violet and green tones, to communicate the darker time of the day. The colour of the trees is the local colour, everything else seen on the picture has violet tones of a shadow.

Highlighted parts of the waterway and the sky are of mustard shade of yellow which supports violets with the contrast. The tops of the trees have orange tone and and are supported by the blue tones inserted just around them. All together these colours create double complementary relationship.

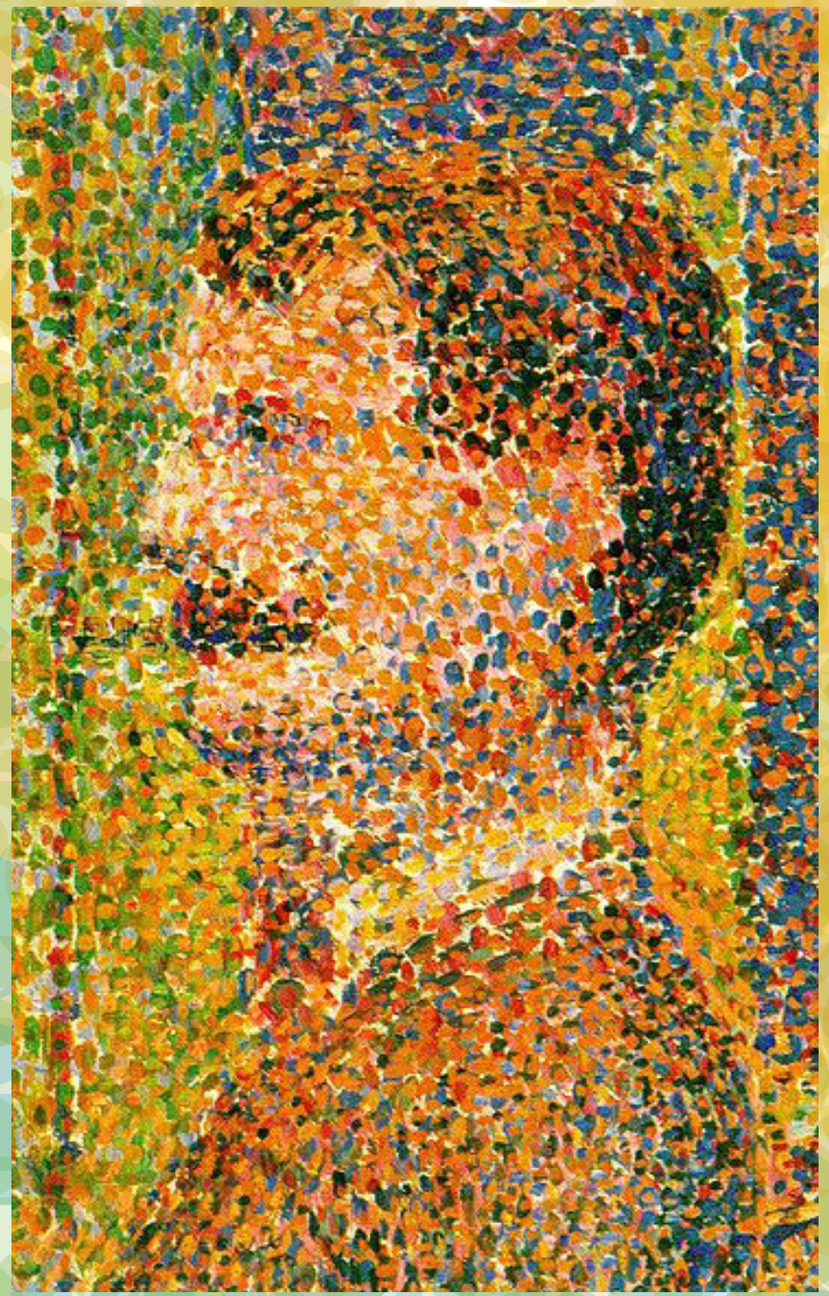
The detail that has been chosen for the next sample predominantly consists of peridot-green and violet colours which is complementary pair of colours.

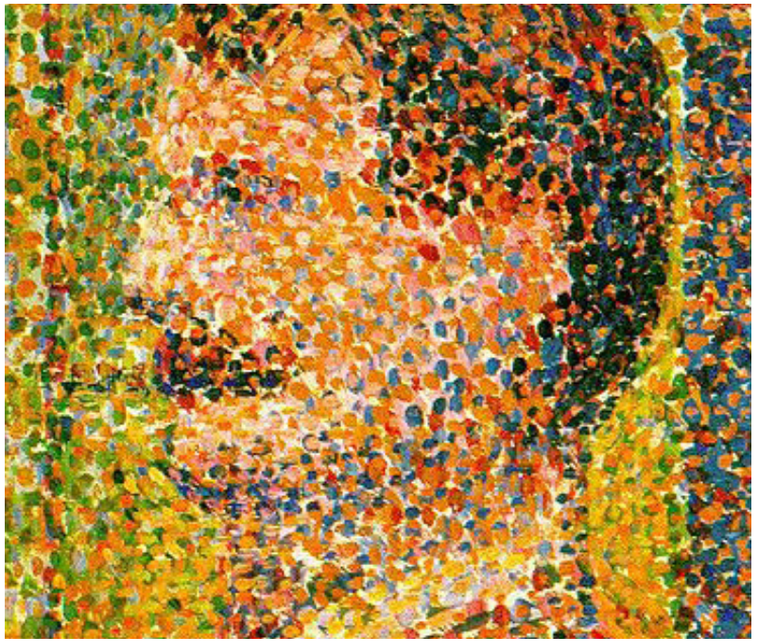
To make this sample, violet will be created out of two shades of purple and two shades of pink (light and dark). Green is created from combination of three shades of yellow (light yellow, olive yellow, golden yellow) and peridot-green.

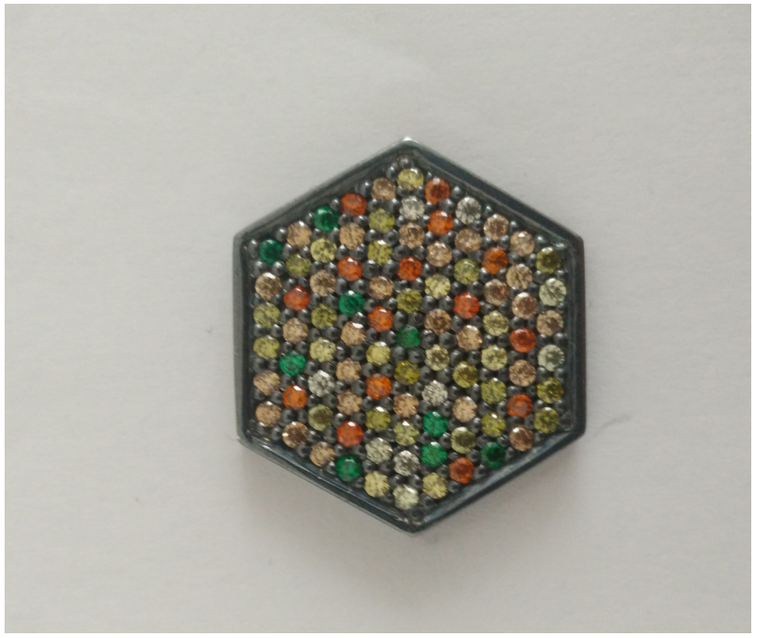
Pink and purple are quite close to each other and combined together are perceived as a same colour. Yellow and green melt together and the yellow colour disappears, creating a lighter yellow-green shade, since yellow is a complementary colour of violet its presence enhances the vibrancy of violet.

Jean Metzinger, 1904-05, Le Château de Clisson, oil on canvas, 54.5 x 73.5 cm, Musée des Beaux-Arts de Nantes

HTTPS://4.BP.BLOGSPOT.COM/-7ADC9CJY254/VUP0BHLM16I/AAAAAAAABBC/LSGJWCN0Y-STDVOTA8PBEZE1FK84DPKUW/S1600/JEAN%2BMETZINGER%252C%2B1905%252C%2BLE%2BCHA%25CC%2582TEAU%2BDE%2BCLISSON%252C%2BOIL%2BON%2BCANVAS%252C%2B54.5%2BX%2B73.5%2BCM%252C%2BMUSE%25CC%2581E%2BDES%2BBEAUX-ARTS%252C%2BNANTES%252C%2BFULL.JPG







WORK IV

Le parade du cirque. Georges Seurat 1887-88 (Detail)

The dominant colours in this detail are orange and green. Since the light is artificial and there is no direct light present the local colour and the colour of the source of light are intertwined and inseparable, however, there is a shadow present along the jawline and a shoulder of the man who is a subject in this detail. Shadow is created using blue colour that is an opposite of orange on the colour wheel.

For creating the sample, we will take the colour of the background that is created out of orange, green that are analogous colours

If two colours are both vivid and bright, when used together they create violent combination that is harsh on the eye. To avoid this effect, one of the colours can be used in softer intensity, to support and highlight its counterpart, instead of screaming at it.

In order to avoid the violent effect of these bright colours: emerald-green and bright orange were broken to two shades and the brightest and vivid ones are used in smaller quantities, when toned down champagne and peridot-green cover most of the surface.

This sample represents well the analogous colour harmony.

Le parade du cirque. Georges Seurat 1887-88 (Detail)

HTTP://BLOG.OCAD.CA/WORDPRESS/DRPT1C01-FW201201/2012/10/POINTILLISM-DIVISIONISM/SEURAT-LA-PARADE-DE-CIRQUE-1889/?DOING_WP_CRON=1522842889.0892980098724365234375

CONCLUSIONS

The purpose of this work was to explore the principles of colour theory and their practical application to jewellery design.

Firstly, the nature of colour has been defined from the perspective of physical properties and its perception. Then the connection between the value and the colour in the gemstone trade was established and the bias that influences the decision making in colour use was identified.
As a solution to avoid the bias, additional steps in the process of choosing the gemstones by colour were proposed: like the analysis of the context of colour, the interaction of colours and possible outcome of the colour perception.

Through the research of the concepts of the colour theory, that were adopted by the divisionism movement, the guideline for colour application has been established.
And finally, through the analysis of the artworks from the perspective of colour relationship and colour context, the examples were integrated to the framework of stone setting technique and practical trials of colour use were conducted.

This work can serve as an introduction to colour use in the context of jewellery, as well as a starting point for further development.

The concepts and the system used in this work can be endlessly applied in creating any piece of jewellery that contains a colour source.

Understanding of theoretical principles, associated with colour use, helps making deliberate decisions in the design process.

REFERENCES

Oxford dictionary, 2018 [20.3.2018]
https://en.oxforddictionaries.com/definition/colour

The physics Hypertextbook 1998-2018. Glenn Elert [31.3.2018]

https://physics.info/color/

Stephen Westland, Kevin Laycock, Vien Cheung, Phil Henry and Forough Mahyar, Colour: Design & Creativity © 2007 Authors. Journal compilation © 2007 Society of Dyers and Colourists [27.3.2018]

(http://www.aic-color.org/journal/v1/jaic_v1_review.pdf)

Roger Penrose - Forbidden crystal symmetry in mathematics and architecture. Published by The Royal Institution [20.2.2018]
https://www.youtube.com/watch?v=th3YMEamzmw&t=2791s

Grammar of painting and engraving Charles Blanc (Charles Blanc, 1867, 4)

Neo-Impressionism and Anarchism in Fin-de-Siécle France. Robyn Roslak First published 2007 by Ashgate Publishing. Published 2016 by Routledge

(Neil Collins,2018) (http://www.visual-arts-cork.com/art-evaluation.htm#colour)

Gemmologisal Institute of America in it's guide to coloured ston
(GIA 2002, 3)

Augusto Garau in his work Colour harmonies
(Solid colour, BYK-gardner GmbH, 72 [26.3.2018]
http://www.byk.com/fileadmin/byk/support/instruments/theory/color/en/Intro_Solid_Color.pdf

M.E Chevreul Principles of harmony and contrast of colours, and their applications to the arts. Second edition. Longman, Brown, Green, and Longmans. 1855

Immo Lahtela Kivenistutus: jalokivien istutus kultasepän työssä
2013 Opetushallitus