

RESEARCH PROJECT

SYNAESTHESIA



GRATITUDS

I would like to thank a few souls for helping me out with this project. In first place some teachers for technical support. I appreciate the moral support from my family, because I know it is difficult sometimes to understand me. A special thanks, of course, to my friends, because everything is a lot easier next to you.

And last but not least, a sincere thanks who has made this project possible.

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1. INTRODUCTION

1.1. MOTIVATION

I never thought about the smell of blooming flowers until last spring. I was walking back home when I went through a field full of violets. I had never noticed the color of these flowers; a combination of green and purple, but not just any purple, rather a unique violet. I could not help myself from picking one up and just observe it, it had such a smooth tact; as a just made bed. There was only one sound surrounding me, which was the sound of nature. It was a pleasant moment; a peaceful environment. It took me back to my infancy, when I played in parks with recent cut grass and it smelled like a sunny moment. It was a special voyage to the past, with a different baggage than usual; I traveled only with my five senses.



Suddenly my mobile made me return to reality with a missed call long enough to be heard. On my way back home, the piece that was left, I kept on thinking on our senses and how strange life would be if I would not have them. I could neither imagine myself not being able to see the sun set and its beautiful red, orange and yellow

colors, nor could I imagine a world without a rhythm to live. What would it be without being able to feel my fingers in between the coffee beans or bare pips? How would life change if I were not able to taste anything? Not even a lollipop or a kiss?



I started thinking about all these possibilities when I arrived to the conclusion that if it is possible the existence of a blind man or a deaf woman would it be imaginable a person with more than five senses? Could a sixth sense exist? Right then, I remembered an article I read a few weeks ago in “El País”, which explained how a woman saw colors to sounds and tasted sour to rough textures. It was amazing and unexplainable; it was called synaesthesia.

Life is a continuous synesthetic experience, seeing, smelling, touching, hearing, tasting; the world discloses itself to us through our senses, so why not try to know more about this subject, or in other words, about life and how everybody perceives it? Could it be that synesthetes had the sixth sense? Could it be that the sixth sense is only a mixture of our five senses? If it were possible, what would we call it; a gift or a disease? Can we consider it a blessing or is it rather a malediction?



1.2. METHODOLOGY

In order to have a good research project it is essential to have the theory part, which will be elaborated with the information found in internet, the possible consultation of encyclopedias and reading novellas, and a practice part, which will be graphics made from surveys.

On one hand, to create the theory part, I have already looked for information and surprisingly I have found a lot. It is a subject which is very interesting and Scientifics are striving to unfold what exactly happens in a synesthete's brain and what does synaesthesia actually mean. I have found articles, expositions and even some activities organized for synesthetes to feel right at home. The problem was when looking in encyclopedias; the subject is rather recent and I have only found the definition of synaesthesia as a literature figure. However, looking for books has been an easy task. There are a lot of fiction novellas explaining this phenomenon and even more scientific books trying to describe what happens to a synesthete. I have chosen one; *A Mango-Shaped Space*, by Wendy Mass.

On the other hand, the practice part is a little more difficult. I have already started to give out surveys and from three hundred only twenty have answered. I have three different surveys prepared. One of themⁱ, which I have e-mailed, has questions such as the general knowledge of synaesthesia and the understanding of its definition. There are also two types of test; one to figure out if the person has color synaesthesia and another one, to demonstrate that, more or less, synaesthesia is present in our lives. To complete it, it has about twenty questions in order to find out different types of this neurological condition, such as tact-> taste or sight-> tact synaesthesia. The second oneⁱⁱ is a general survey, which has two parts; the first has different questions from some types of synaesthesia in order to find out if the person has any of those type of synaesthesia and the second part are questions related to the quality that synesthetes normally have. In last place, I have prepared a very specific surveyⁱⁱⁱ for a specific person with synaesthesia.

In general, just to know if somebody has synaesthesia around me, I have prepared a "game". It consists in saying the primary numbers in one order one week, asking the people participating to write down the color it evocates and repeat it three weeks after changing the numbers' order. If it coincides it means that that person has synaesthesia, but if it does not, it means that that person only associates colors to numbers arbitrarily in a specific moment.

Synaesthesia is a very complex subject, for this reason, I have organized this project with roman numbers as a super index in order to amplify the information, which is not essential, but is interesting. It can be found in the annexes.

When having all this prepared, the only thing left to do is start.

2. SCIENCE AND SYNAESTHESIA

2.1. INTRODUCTION

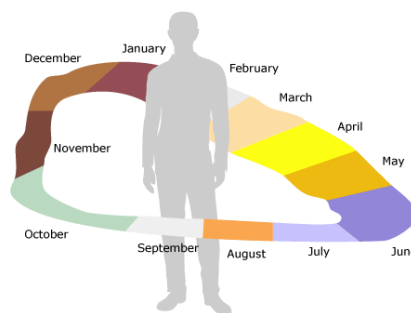
This neurological condition is often confused with other concepts, such as associations based on memory or as in literary figure. When talking about associations, some stimulus can be associated to particular colors. It is normal when one asks to a person what the word banana suggests to him or to her, to be answered a fruit or a yellowish color. The same happens with the literary figure, used to embellish a composition. However there is a big difference between a literary figure and a way of perception and life.

Synaesthesia etymologically comes from the Greek word *syn* (together) and *aisthesis* (sensation). It is a very rare condition. Synesthetes see sounds, smell colors and taste shapes. Simon BaronCohen¹ estimates that one out of 2.000 copes with this different way of perceiving reality; in a different way in every synesthete. It is more often in women than in men.



It is a merging of our five senses in a very sensible way. We tend to think that everybody perceives the world as we do, but synaesthesia is the perfect example to demonstrate that the truth is just the opposite. Pat Duffy² explains that in life there is a very important question: "Do you see what I see?" The answer to this question joins human beings socially. Having very different perceptions can make one feel strangely alone, "left in their own private island of pale yellow 'p' and turquoise Thursday". That is what proves that "we don't see the world as it is, but as we are".³

There are a lot of different types of synaesthesia. Some experiences are produced by external stimulus, like for example the sensation of forms and ghostly textures felt on their skin, when seeing an object. However, some are as vivid and internal as the conception of Pat Duffy, of which a year is a "chain of colored rectangles". The most common one is seeing colors in numbers or letters. The color they see is not just a green, for example, but a specific green. Sean Day⁴ iv agrees with Baron, even synesthetes of a same family rarely coincide with their colors.



¹ He is a Professor of Developmental Psychopathology and Director of the Autism Research Centre at the University of Cambridge

² Author of *Blue Cats and Chartreuse Kittens: How Synesthetes Color their Worlds*

³ From Immanuel Kant, who was an 18th century German philosopher

⁴ He is a synesthete who studies this condition. He has analyzed about sixty different types of synaesthesia, which are in the annexes.

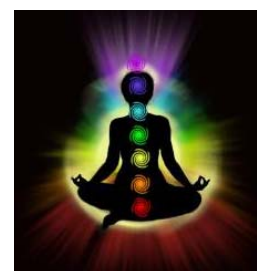
Nobody that has a “normal” perception can describe or understand their experiences. At first, professionals did not take it seriously, but with time they have realized that it can be a different, true, reality. However, the option of thinking that synesthetes can tell the future is completely absurd, such as other false religious opinions. Many romantics considered synesthetes a spiritual avant-garde of humanity. In other words, they thought they were nearer to God than those who have segregated senses. Investigators see it as an open window to how human conscience works.

An interesting aspect is the way synesthetes live with their peculiar way of perceiving everything. It is different in every synesthete, but it is basically three ways: those who are not conscious that they are the only ones who have this perception, those who are ashamed and those who know, but are not ashamed.

2.2. THE AURA AND SYNAESTHESIA

The Aura is a color and light reflection, which bodies detach, only seen by some people, without scientific evidence. Some articles have reported that there may be beginnings of tiny energy fields around the human body.

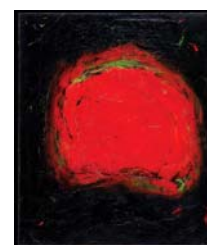
Nevertheless, this perception does not necessarily have to do anything with the "energy fields". Jamie Ward has established that the auras vision around the human bodies can be owed to a simple phenomenon of synaesthesia. That is why it has been established in a British study, that synesthetes can see colors as an answer to people whom they meet or in reaction to words like "love" or "hate". Therefore, these colors do not always reflect the supposed energy fields that the organisms express, but are created in the brain of those who see the aura.^v



2.3. CHARACTERISTICS

Synaesthesia has a lot of different characteristics, but the most important and the ones that stand out the most are the following⁵.

It is stable in time. The same answers are given every time, even if a long period of time from one evaluation to the following has passed. This way of responding is just the opposite from a person who does not have synaesthesia. "I have been going to acupuncture treatment for 15 years", points out Steen⁶. "It always makes me see the same colors"⁷.

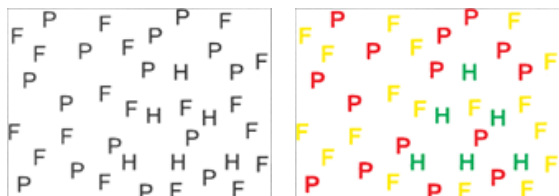


⁵ I use color synaesthesia as an example in most of the cases

⁶ Synesthetic artist who lives and works in New York City

⁷ Recording #2

Synesthetic sensations are a perceptual character; they are not based on memory. Those who have color synaesthesia perceive and process these colors like if they were, in fact, written on a piece of paper, on a screen, etc.



If we were to ask a person who does not have color synaesthesia what form the letters draw, he would have to think before realizing that the "Hs" make a triangle. Nevertheless, a color synesthete sees the

"Hs" as shown in the right image, so he would quickly see the triangle, seeing clearly that Ps and Fs do not make any form.

We can classify it as an idiosyncratic perception. Although the colors that a synesthete perceives for a group of letters and numbers remains constant with time, his group of colors is completely different from another color synesthete.

It is automatic and involuntary and can not be suppressed; they simply happen. However, synesthetes can learn how to ignore them with major or minor success. It is important to point out that the concentration grade will do that these perceptions will be experienced in a more or in a less vivid form.



If you try to say the color of the words, instead of reading them, you will find it surprisingly difficult. The right half of your brain is trying to say the colors and the left half is trying to say the written word. The consequences of the "Stroop Effect" are that you say much more slowly the colors⁸, because you are not reading, rather thinking and interpreting.



When we see a specific color, certain neurons are activated in the visual area of the cerebral cortex. These will be deactivated, on the other hand, when a color of the opposite extreme appears. This way, a neuron that is activated when blue appears, will be deactivated when its' opposite, yellow in this case, dominates the visual field.

Synesthetes, with this effect ,have a lot of problems on naming the red color of the letter J, since (in this case) they would see this letter, in addition to as a "J", as GREEN. In these experiments you see that, naming the ink color, synesthetes are much faster in answering it when the word is colored

⁸ <http://facutly.washington.edu/chudler/java/ready.html> (you can do the experiment for yourself), reading I took 10 seconds, but interpreting I took about 36 seconds; almost four times more.

by the color of their specific way to see colors⁹ for this stimulus, than when it is presented in a different color, as the image shows.

Another curious characteristic is that they are very generic. When a word gives place to a color perception, this one is simple; it is one color or a small group of them, not of an elaborated perception. For example, experiencing forms on having tried different flavors, they are like lines or spirals or soft or rough textures. They do not see a castle or touch a cow.

We can consider it basically "one-way". However, there have been a few rare cases that it is «bi-directional», but that is not the same in both directions.

It is an additive perception; which means that it adds to the primary sensory perception, rather than replacing one perceptual mode for another. For example, when experiencing colored musical instruments, they both hear and "see" the sounds; the visual images do not replace the audio sensations.

It is generally memorable. Synesthetes usually remember the secondary perception more vividly than the primary one, even if it does not replace it. For example, they do not remember a telephone number or a name, but they know that the number started by blue or that the name was green.

2.4. SYNAESTHESIA & MEMORY

Some synesthetes mention that it is a great help in their everyday life, basically for memorizing, as I have explained previously. When numbers appear in a different color from the ones that their synaesthesia evokes their memory diminishes drastically. The diversity of sensations that only one stimulus can produce helps them gain memory capacity. That is why, for example, «James» is simply a name for a non-synesthete and it is the only information they can remember, but for a synesthete, «James» can also be, olive green, brilliant, sweet, or rough, etc.

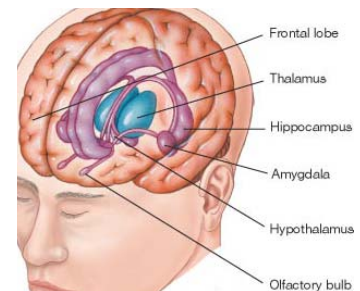


2.5. DIFFERENT THEORIES

Synaesthesia is a special condition that is still hard to define. For that reason, there are a lot of theories. Investigators are trying to discover the cerebral mechanisms that sustain these abnormal connections.

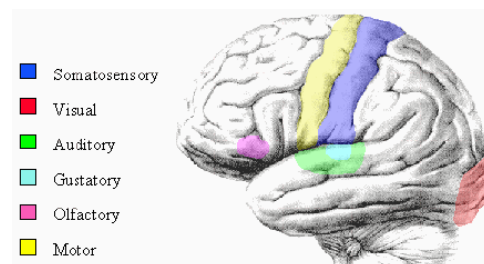
⁹ the color perceived by the person sinestésica for this letter o word

Michael Watson¹⁰, two decades before Cytowic's¹¹ experiments, inhaled gas radioactive xenon, which quickly went on to his blood. Watson smelled several fragrances and felt cones, spheres and invisible columns pressing against his skin. The blood flow to the cerebral cortex¹² was practically congested. Although Watson had a quotient of intelligence of 130 and seemed healthy, he had the type of cortical blood circulation that is seen in people who have incurred severe cerebral losses. This experiment helped Cytowic theorize that synaesthesia is based on the limbic system¹³, placed on the spine.^{vi}



In 1995, British and Italian investigators used a sophisticated skill to measure the cerebral flow, in order to investigate the brains of some who were not synesthetes and some who had color synaesthesia, while they were listening to a group of words. Their results were contrasted to Cytowic's theories: the cortical flow did not diminish; on the contrary, it hastened. A possible explanation can be that different forms of synaesthesia arise from different cerebral anomalies. They also discovered that not only the areas of the crust that process the language were activated (in both subjects) but in the brains of the synesthetes some areas used for processing sight and color were also activated for a moment. Baron¹⁴ suggested that the key of synaesthesia is a "none habitual anatomical connectivity", between different sensory modules.

There are other theories. Grossenbacher, moves forward an alternative theory: Synesthetes present abnormal intense activities in the sensory routes of the crust. In all human beings, the sensory stimuli¹⁵ go from the mono sensory cortical areas up to the multisensory areas. These allow a person to see a ball and later, with their eyes closed, take this ball between several buckets. There are also feedback routes that go the other way around that in almost everybody is inhibited, nevertheless, in synesthetes it is not like that.



Another point of view is what doctor Ramachandra¹⁶ defends; the crossed activation of adjacent areas of the brain that process the information related to the physical aspect of numbers and letters and with those which are related to colors.^{vii}

¹⁰ A synesthete

¹¹ A neurologist

¹² It is where the sensations are processed and the abstract thought

¹³ It is the part of the brain that is evolutionary primitive and controls our emotions

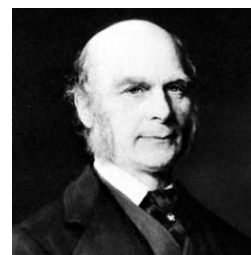
¹⁴ A magician who took part in the experiment

¹⁵ Which is language, vision and tact

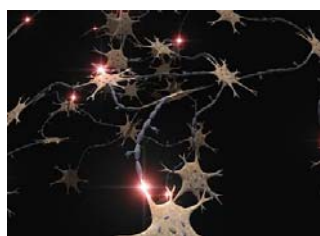
¹⁶ neurologist born in 1951, known for neurology, visual perception, phantom limbs, synaesthesia, autism

2.6. INHERITED CHARACTER

Even though synesthetes have a rare cognitive faculty, it does not mean that they are more vulnerable to perturbations or mental illnesses than the rest as some people tend to believe. A recent research reveals that synaesthesia seems to be hereditary, suggesting that a genetic component exists.



Already at the end of the XIX century, Galton discovered that synaesthesia was more common between the members of a family than appearing sporadically. Afterward, other theories have suggested that synaesthesia is related to the domineering gene placed in the X-chromosome¹⁷. It is believed that for every six women only one man has it and a third of the synesthetes have a relative who also has it.



There are other theories. It seems that we are all synesthetes when we are born, because the nervous system has not matured completely. We should not forget that in the beginning all cells (included neurons) are undifferentiated. It is with the maturation that they adopt a specific role. BaronCohen points out that in the child's development there is a selective cellular death; the neurons that die create discreet sensory islands in the brain. However, in synesthetes that synaptic linkage stays, for an unknown reason, more or less intact.

In the case of synaesthesia these extra connections that we all have when we are born do not disappear, remaining active the whole time. These active connections are what we call synaesthesia.

2.7. SYNAESTHESIA AND EMOTIONS

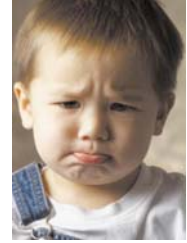
Frequently, synaesthesia is an accepted and wanted neurological condition. Some affirm that loosing this gift would be like loosing one of their senses, but others do not feel the same. People tend to say that synesthetes incline to arts, but there is no evidence. Some artists speak more about their experiences than synesthetes, who feel ashamed of their condition. As I have said, it is difficult to explain what it is. Kids, when they are a little bit older, can feel excluded or strange. For that reason, some never talk about it; to prevent others from thinking that they are crazy. Ashamed or proud, in spite of the pleasure that the color perceptions can produce, a feeling of sadness and isolation is common in any synesthete's biography.



¹⁷ transmitted by the maternal line



This type of perception usually provokes emotions according to the stimulus that the synesthetes face. For example, when talking about color synaesthesia, when the color coincides with the one evoked synesthetes mention that they are colored correctly and that produces a positive sensation and a certain well-being. Nevertheless, when it is just the opposite they see incorrectness and feel annoyed for such discrepancy between the visual stimulus and their internal perception.^{viii}



Another task consisted in classifying the same words as fast as possible as positive or negative, where, once more, the color in which the words were written were an influence. Nevertheless, in this occasion, this influence depended on the semantic meaning of the word. In other words, in those cases in which the evaluation proceeding from the meaning¹⁸ was one way and the evaluation proceeding from the color¹⁹ another way, synesthetes were a lot slower than non-synesthetes. At the same time, they were slower than themselves when the evaluation proceeding from the meaning and from the color was either negative or positive.



Nowadays, they are investigating the influence of the colors evoked by synesthetes in their emotional answers. They measure the electro dermal²⁰ answers placing electrodes on the hand fingers to register the changes when sweating. Afterwards, electro dermal answers are studied to see if the emotional answer associated with a stimulus is of a major magnitude than another. They have a more raised electro dermal answer in cases in which the positive words were appearing in an incongruous color or the other way around.^{ix}

These different emotions that synesthetes experience are real and they influence, as we have seen, when they evaluate their environment.

2.8. SYNAESTHESIA FROM THE COGNITIVE NEUROSCIENCE

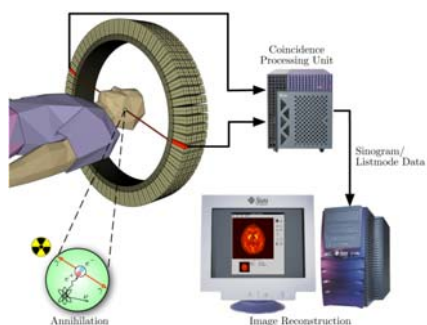
Most of the current studies on synaesthesia can be included inside the paradigm of the cognitive neuroscience; a re-arisen technique in the last centuries from the synergy between the cognitive psychology and neuroscience. The main achievement is to study the relation mind-brain.

¹⁸ Positive word vs. negative word

¹⁹ "Correct color vs. "incorrect" color

²⁰ When somebody experiments positive or negative emotions, our autonomous nervous system is activated and that is reflected with a very small change in the person's sweating level of the skin.

Nowadays, cognitive neuroscience is provided with technology originated from the psychological tradition and the modern skills of neuroimages²¹ as in PET²² (image) Functional MRI²³, which allow to measure and visualize the activation of different cerebral areas that are activated when a person makes a certain task. ^x



2.9. BUILDING BRIDGES BETWEEN SCIENCE AND ART

If you try to describe this painting by Christopher Reiger you see the slim silhouette of a *Little Dancer*, eclipsed by the incongruously heavy head of a moose. But if you take another look, you see that those “antlers” are actually sprawling dendrites of giant neurons. This piece of art, entitled *Synesthesia #1*, captures one way in which art can be invaluable to science. The metaphor seen on this painting is not really synaesthesia; it is what makes us focus our attention on the painting. That



is why artists try so hard to blur these borders between the senses; to create connections that usually do not communicate.

In Reiger’s painting, he recreates a visual metaphor between art and biology; both are products of the mind, represented by a crown of neuron antlers. Art helps us see these connections between things that seem unrelated. It helps us understand a little bit of synesthetes; beings an added dimension of perception.

²¹ Visual techniques of the cerebral activity at real time

²² Positron Emission Tomography

²³ Functional Magnetic Resonance Imaging

3. ART AND SYNAESTHESIA

3.1. INTRODUCTION

The best way to apprehend reality is experiencing it in as many forms as possible. Having synaesthesia is one of the best ways, but it is not an option for everybody. The origins of the synesthetic experience are found in art, which tries to represent this merging of senses, for those who do not experience it, but, of course, there are differences between '*personal synaesthesia*' and '*created synaesthesia*'.

Touching, tasting... our primary senses have synesthetic qualities in their interactive connections that art also has. They share a basic concept: new connections between the senses. In art it is essential to search these relations and find correspondences and complementarities between the senses. Artists bring '*synesthetic experiences*' to the surface.

Synesthetic art normally refers to a transfer of texture to tone or of tone to color. A transfer between two different contexts is called a metaphor. Meta is the Latin prefix for 'beyond' or 'transcending' and it is a figurative expression that, in addition to a blending senses, it associates feelings. Baroque writers and French poets already used this many years ago in classic literature; especially during the movement named symbolism, which in Spain was called the literary modernism.

Metaphors are not only a figure of speech, but also a figure of thought. For example: "*art serves as a portal to metaphors of imagination*". They are used to describe a crossover of modes, being a poetic comparison, visual or verbal, that uses one thing to represent another. It is a universal translator of sensory concepts. Synaesthesia and metaphor play an important role in the understanding of what goes on in our brains when we look at a work of art.

3.2. CONNECTIONS BETWEEN SYNAESTHESIA AND ART

Art is a representation of feelings and sounds. It is sensuous knowledge and it offers multisensory forms of knowing and communicating. One dimension is often evoked by another, when making new connections between senses. It is also connected to synaesthesia; both are two ways to challenge the classic view of perception and they are both the result of the united senses of the mind. A synesthetic approach to reality is one of the primal sources of art. It is possible to say that synaesthesia appears in all forms of art.



Works of art are literally pregnant with meaning. The highest form of symbiosis between synaesthesia and metaphor happens in art. Basically, science examines and explains 'how' and art, with a synesthetic representation, provides a clear vision of the answer to 'why'.

3.3. ART'S HISTORY

In the second half of the nineteenth century, a tradition of musical paintings began to appear, which influenced symbolist painters. The work of almost every progressive or avant-garde artist reveals an interest in the correspondences of music and visual art.

A hundred years later, the 20th century began with vitality, fascination for machines, science and technology, change and innovation. Artists used the concept of synaesthesia to cross the borders in art. The new century turned into an exploration of new horizons and the liberation of the imagination.

Futurists brought together the elements of sound, noise and smell into their paintings. They believed that in order to achieve the total painting, which requires the active cooperation of all the senses, these elements have to be brought together.

In the modernist movement^{xi}, boundaries started to dissolve between the various artistic disciplines and an artistic quest for synaesthesia was widely pursued. It brought life and it expanded the cultural boundaries of art, meaning a new way of representing reality. Modernism created the conditions for a multidimensional pictorial autonomy; perception precedes meaning, and medium precedes message.

3.4. DIFFERENT MODERNIST ARTISTS

Modernism was a new style of art and life. A lot of artists began to be part of it.

Edvard Munch, landscapes of the mind.

If we stand in front of this painting, staring at it and listening to what it has to say, it is like hearing a silent, inner scream. Munch's expression of a 'synesthetic experience' was brought to a hallucinatory level, a pictorial metaphor of a primal fear: you scream and scream but no one can hear you. It is regarded as an icon of the existential despair of modern man.^{xii}



Munch was mainly concerned with universal themes of love, fear and death. He internalized his colors to a high degree.

Luigi Russolo, experiments with music, sound, noise and the voice.



The Italian Futurist, Luigi Russolo came to sounds from painting through poetry. He invented a series of individual instruments, which were named and categorized according to their sound, pitch, frequency, and intensity. He created a music that let the instruments "*speak for themselves*".^{xiii}

Umberto Boccioni, visual transcriptions of energy.

Boccioni looks for '*simultaneity*', and for a '*synthesis*' between what is remembered and what is seen. He gives this effect with speed and force into a sculptural form. The figure strides forward, surpassing the limits of the body; its lines ripple outward in curving and streamlined flags, as if molded by the aerodynamic of its passing. It is a fragment of a constantly changing visual experience, which reflects a desire to go beyond the world of machines and, perhaps, beyond ordinary senses.



Anton Bragaglia, photography of the invisible.



Anton Bragaglia's photography shows us what we can not perceive. This ambition, the '*Photodynamism*', was achieved capturing in a single image the flowing trajectories of objects in motion, made visible by long exposure times. Bragaglia advanced the theory that speed applied to actions or objects renders them immaterial and invisible: "*appearance is replaced by transparency*".

Marcel Duchamp, the creative act as a conceptual proposition.

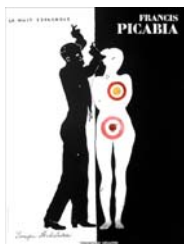
This is an image, where identity is questioned. Marcel Duchamp had taken a mesmerizing photograph of himself, gathered around a table in co-presence with his additional selves.^{xiv}



Marcel Duchamp's first "*readymade*"²⁴ (1913), contradicted all existing concepts of art. The source of inspiration was the opposite of synaesthesia; anesthesia, based on indifference, with absence of good or bad taste.

²⁴ He put a bicycle wheel upside down onto a stool, spinning it occasionally just to watch it, denying that its creation was purposeful,

Francis Picabia, a voyage into the unknown.



In *La Nuit Espagnole*²⁵, Picabia moved between figuration and abstraction, from the very informal to a highly personal iconography, where primitive symbols intermix with sexual images or symbols. He had an essential role in transmitting synesthetic ideas to the American art world in the 1910s.^{xv}

Paul Klee, one eye sees, the other feels.

In this watercolor we see an interaction between three forms; a configuration of growth, patterns and traces. It is possible that it represents the abstract sound patterns of three voices or three instruments. The allusion to music is stronger due to the rhythmic interplay of lines and forms. He has many spiritual correspondences between music and the qualities of color and form.



Paul Klee published his '*Pedagogical sketchbook*' in 1925, where his color theory, based on a continuous principle of movement, is explained. References to microscopic and biological processes are an integral part of Klee's world. His unique style takes in elements of primitive art, cubism, surrealism, naïve art and expressionism.

Man Ray, ambivalence of the senses, sign conventions and sensory energy.

Ironing can become violent and an iron is transformed into a new potentially threatening object, by adding a row of nails. The nails and the evocation of desire, violence, and hot metal, suggest a paradox with the piece's title, *Cadeau*²⁶. The idea is not only to make it useless, but also to counter its original purpose by an ambivalence of the senses.



Another work of Ray is this woman, who wears a turban and earrings and her head is turned to the left in profile. She is naked except for some fabric draped around her hips. What gets your attention are the two sound-box-signs on her back; as on a cello, transforming a woman's body into a musical instrument. It is a powerful image because of its several meanings at once and the conventions of signs.

²⁵ The Spanish Night

²⁶ French word for gift



Lee Miller's nude body represents another artwork of Ray. Her body is presented twice as a Greek statue in a modern context, surrounded by an electric pattern of light. With flashing rays, the image of the torso is charged with erotic tension. *Rayographs*, like dreams, do not represent the objects they capture, but rather evoke tones or moods.

Man Ray created a new photographic art, which emphasized chance effects and surprising juxtapositions. He focused on Dada and Surrealist movements.

René Magritte, the impossible and the freedom of thought.

Magritte makes us believe that seeing is touching at distance. He painted a visual metaphor about the tactility and softness of a woman's skin, transforming her body, gradually into the graininess of a wooden structure. The canvas becomes a living surface, representing a metamorphose; a morphing of meaning. Magritte creates multiple ways of seeing things simultaneously, showing us the impossible in the possible. His paintings emerge from the mysteries of reality and



the visible world around us.

If you look into someone's eye and you see an endless blue sky, you speak about the eye being the soul's mirror. The *'False Mirror'* allows the viewer to travel into the inner space of the mind. Magritte invented the double reality of images.

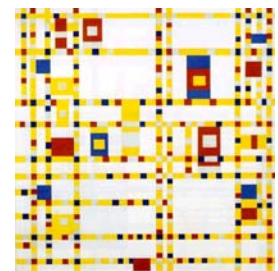
Meret Oppenheim, report from the unconscious.



Oppenheim's *'Fur Breakfast'*, recreates a variety of sensual pleasure; fur may be delightful to touch but not to taste. It makes the viewer imagine what the fur lined cup might feel like to drink from and forces the anti-graceful sensation on a mixture of the senses.

Piet Mondrian, visual rhythm.

Piet Mondrain's painting is inspired by an interpretation of the New York subway map and the Boogie-Woogie music that he loved to dance to. If you look at it long enough, it provokes a feeling of vital and pulsing rhythm, as if the composition is meant to resemble a dancing city. Using the dynamic contrast of oppositions, a resonant relationship is constructed between optical vibration and colorful visual music.



Mark Rothko, silent music.



If you take a chance to define this painting, you can say that it is a horizontal division of soft floating colored spaces, which are an invitation to enter into the depth of the color fields and become totally saturated with them. The undefined background evokes a spiritual feeling of infinity and an almost breathing energy, with an unreal back and forth movement produced by the luminous quality. His paintings seem to represent the emotional condition of music, suspending sound in color, as silent music. The sensibility of the color is real and abstract at the same time.

3.5. SYNESTHETIC ARTISTS



Carol Steen, *Clouds Rise Up*, 2004

Carol Steen²⁷ experiences multiple forms²⁸ of synaesthesia. She most often uses her music → color and touch → color synaesthesia to create her works of art, which often involves attempting to capture, select, and transmit her synesthetic experiences into paintings.



Marcia Smilack, photography of her reflection as she sees it.

On the other hand, rather than trying to create descriptions of what she experiences, "reflectionist" Marcia Smilack²⁹ uses her synesthetic experience in guiding her towards creating images that are aesthetically pleasing and appealing to her. She takes pictures of reflections, mostly using the surface of the water, whenever experiencing a synesthetic reaction.^{xvi}

Less famous, Simon Longo, sound artist, currently explores digital and organic aesthetics within sound and visual mediate by computer. His interdisciplinary artistic practices encompass and combine acoustics, psychoacoustics, neurosciences and synaesthesia within electronic music and audiovisual composition. His work includes music, sound design, installation, soundscape design, multi-speakers sound, visual projections and live audiovisual performances. It is live audio visual electronic sound with moving colored light.



Simon Longo, representation of his work.

²⁷ <http://web.mit.edu/synesthesia/www/carol.html>

²⁸ grapheme → color, music → color and touch → color synaesthesia

²⁹ <http://www.marciasmilack.com/artist-statement.php>

Timothy Layden's³⁰ work investigates various aspects of human life, exploring diverse perspectives and states within the shared spectrum of experience. He also investigates the construction of reality through the senses and the emotional development of human observation, interaction and understanding, conceptualising this through abstraction and symbolism.^{xvii}



Nowadays, he makes paintings on art and synaesthesia and has developed abstract animation videos³¹ for the musical group The Beautiful taste³². He is also teaching art theory and practice and developing interdisciplinary projects and research related to synaesthesia.

3.6. WASILI KANDINSKY

Kandinsky discovered his synaesthesia at a performance of Wagner's opera Lohengrin in Moscow³³



and later on by a Schoenberg concert, on which he ended up painting *Impression III (Konzert)* two days later. He used his synaesthesia to create the world's first truly abstract paintings.

Kandinsky's paintings were based upon a set and established system of correspondences between colors and the timbres of specific musical instruments. One of most important ideas was to find the representation of music and sound.

He discovered that liberating the physical representation of the world to the color he accomplished the liberation of a materialized idea towards a more abstract idea. If the painting represents an object, the thought focuses on this object of reality, straight after associations are made and the message is formed in the observer and if the painting does not represent any specific thing, knowledge associations disconnect and the sensation functioning starts.



Kandinsky also studied "the abstract interior sound"³⁴ of forms and elements of the image (representations or abstract ones). He said: "Any object, without exception, created by nature or by a human being, is a live entity that inevitably expresses some kind of sound". Understanding abstract art is being able to communicate with the interior sensations that any image provokes, feel the image and have

³⁰ <http://www.tblayden.com/>

³¹ Track n° 1 from CD "Video"

³² www.thebeautifultaste.com

³³ He said: "I saw all my colors in spirit, before my eyes. Wild, almost crazy lines were sketched in front of me."

³⁴ Sensations that suddenly appear

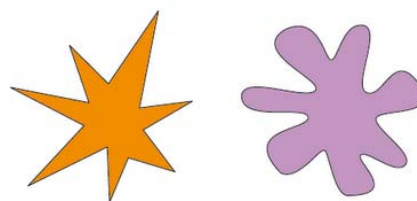
conscience of the feeling itself. He said some very important quotes such as; “Objects damage pictures” and much more.^{xviii}

3.7. TEST OF WOLFGANG KÖHLER

Have you ever crossed a word that is always the same color? Or colors that have a specific taste? Have you ever not wanted to go across a street, because it has a certain color you do not like? This is what a synesthete experiences.

More or less, a 1 % of the population has synaesthesia much more developed than the rest. Synesthetes really taste colors or see colored texts even if for the rest they are in black and white. Although in the 99 % of the population remaining the symptoms are not so exaggerated, synaesthesia exists more or less in the whole world. You do not believe it? Take a look at this test.

Wolfgang Köhler was an important researcher in the Gestalt psychology, what may have implications in the language development and it might mean that the mechanism of putting names to objects is not arbitrary. A popular experiment to demonstrate this is the “Booba/ Kiki Effect”. In this experiment, two shapes are shown to different subjects. They are asked which one is a ‘Booba’ and which one is a ‘Kiki’.



An overwhelming 98% of subjects chose the curvy figure as a ‘booba’ and the pointed figure as a ‘kiki’. There are a lot of explanations of the results to this experiment. The rounded form is usually named Booba because the lips, when saying it, form a round figure to produce the sound. On the other hand, when naming Kiki, the lips form a more angular figure. In addition, K is a forced sound, related to a sharp piece; just the opposite of B. Another explanation would be because in the Roman alphabet, the letters B, O and A have a more rounded form than K and I.

When understanding how this effect works, we can think of this type of cross-activation³⁵ similar to how synesthetes' perceptual maps are cross-activated. Some scientists believe that this effect can have determined the evolution of our language; does that mean that a more exaggerated synaesthesia can end up causing a world wide evolution?

³⁵ The cross-activation of sound and shape

4. LITERATURE AND SYNAESTHESIA

4.1. INTRODUCTION

For over a century, the term synaesthesia has also been related to literature; trying to achieve a linkage between the senses. When reading an explanation of sensations, with a lot of details, it is easier to imagine those sensations. However, not every description in literature is accurate; some reflect more the author's interpretation of synaesthesia than the phenomenon itself.

4.2. FORMS OF SYNESTHESIA IN LITERATURE

Since the increased research of synaesthesia from the 1990's more novels have appeared. There are a lot of different ways of representing synaesthesia in art. If we consider *synesthetic art*, we are talking about a cross-sensory perception evoked by the experience of an artwork, however when observing *synesthetic images*, they are images that accumulate striking metaphorical resonance. The *synesthetic metaphor* is a metaphor that exploits a similarity between experiences in different senses. It is normally used in literature. *Literary synaesthesia* is a poetic expression of a sensorial correspondence and *poetic synaesthesia* is a semantic metaphoric fusion, to create a virtual image.

If we are talking about fiction literature, according to Patricia Duffy³⁶, it generally has four categories. Below is an explanation of each with an example of a novel in that category. However, these are not the only books written on synaesthesia, there are also scientific or comic ones and they can be classified for adults or for children.^{xix}

4.2.1. SYNAESTHESIA AS ROMANTIC IDEAL

The condition can be illustrated as a romantic ideal of making one's experience of the world better. A good example is Vladimir Nabokov's novel, *The Gift*. The main character Fyodor is a gifted young poet who experiences synaesthesia. Fyodor perceives a sublime beauty in letters and sounds, which he shares with others through poetic description.^{xx}



4.2.2. SYNESTHESIA AS PATHOLOGY

Certain types of synesthetic experience can also be induced by brain injuries; this trait is pathological. For example, in the novel, *The Whole World Over* by Julia Glass, the character Saga experiences color synaesthesia, since she had an accident that caused a head



³⁶ The author of *Blue Cats and Chartreuse Kittens: How Synesthetes Color their Worlds*

trauma. Because she is not used to it, later on when she perceives colors, they are a distraction for her.^{xxi}

4.2.3. SYNAESTHESIA AS ROMANTIC PATHOLOGY

This category of synaesthesia combines the previous two: the character's synaesthesia is pathological, but unlike the previous example, it is a "good" pathology, allowing the person to perceive a better reality. In Holly Payne's novel, *The Sound of Blue*, the character, Milan, a composer, perceives music as if it had a beautiful color, but his synesthetic experience indicates an oncoming epileptic seizure.^{xxii}



4.2.4. SYNAESTHESIA AS HEALTH AND BALANCE



This phenomenon can represent balance and health in a synesthete's life, causing a loss of the person's synaesthesia, when experiencing emotional traumas or depression. When the trauma is resolved, the person regains his or her synesthetic perception, representing health and wholeness. Wendy Mass's teenage novel, *A Mango-Shaped Space* is a good example.

4.3. A MANGO-SHAPED SPACE

4.3.1. SUMMARY

A Mango-Shaped Space (2003) is a novel by Wendy Mass. It talks about thirteen year old Mia, coping with her synaesthesia, which cause s her problems in school, with her friends... The first t ime she realized she was different was in third grade, when she was called to do a math problem on the blackboard. She used colored chalk to make the numbers "right", as she saw them, and everyone laughed at her, without believing her. She was left alone, without understanding why nobody agreed. From then on, she decided not to tell anybody else about her colors.

When Mia is twelve, at her grandfather's funeral she finds a gray and white kitten with eyes just like her grandfather's. She thinks that part of his soul is living in that kitten, so she takes him home. She names him Mango, but not because of his orange eyes, rather because, for Mia, his meows and his heavy wheezing are different shades of orange and yellow; like a mango in different seasons. The wheezes are caused by a deep rip in Mango's lung, which cannot be repaired.

One day, in the supermarket, she finds a little boy; Billy, who tells her that her name is purple with orange stripes. Mia immediately nods and says it is candy apple red with a hint of light green. All of the sudden she realizes that Billy has the same thing she does. She decides to keep it a secret, but until when?

This year, in 8th grade she starts Spanish and algebra and her failing causes Mia to explain to her parents about her colors. At first they do not believe her, but when Mia explains that she relates sounds with colors and therefore names always have a specific color, they start to understand her. She also relates her colors with letters and numbers and for that reason she has so many problems in school. They go to many different doctors, until they find a neurologist; Jerry. He explains all about her colors and gives her a lot of information and a synaesthesia list, where she can speak to other people with the same condition.



When she tells her best friend, Jenna, she gets mad, because Mia had kept it a secret from her. The next day she explains it to everybody. Nobody laughs, but everybody has curiosity to know what color their name is. Only Roger Carson, who never wears the same color socks, did not ask anything.

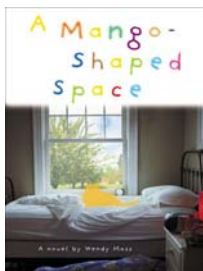
Mia assists to meetings where other synesthetes explain what happens to them, leaving school and Jenna aside. She also has her first kiss. Because she is so worried with synaesthesia and life, she forgets about Mango and his medicine and he dies. Mia is extremely depressed and her colors disappear.³⁷ They come back when Billy comes to visit her and helps her realize that she has to move on to help other synesthetes, like him. That same evening Mia finds out that her colors come from her grandmother, with who she used to dance and talk about the beautiful colors.

Slowly everything goes back to normal. When she goes back to school she finds out that Roger is color blind, she is not angry with Jenny anymore and Mango ended up mating with one of the neighbor's cats before he died. Mia hears a kitten that sounds like mustard, which, for her, is Mango's spirit.

4.3.2. WHAT MAKES THIS BOOK SPECIAL?

I chose this book because it is a simple way of explaining what synaesthesia can be like. A Mango-shaped Space only focuses on color synaesthesia, but there are a lot of different forms, as I have

³⁷ Synaesthesia as health and balance for some individuals



already explained. This book is teenage fiction, but it could be perfectly real. It explains all type of real experiences.

I thought it was a perfect way to see an everyday life of a synesthete. It is full of explanations when Mia relates names and colors and there are a lot of emotions and details. It relates being

4.4. DRAWING WORDS

As in music, literature can also create images and colors. When you read "... and that brown and white little bird flew away; back home." you probably think about a swallow spreading its wings. Synesthetes see an image for every word and a personality for every letter. It is hard to imagine, right? For this reason, this is an example of some exercises from the "Escola d'Art i Superior Disseny de Alcoi³⁸"; explaining what a synesthete can actually see, when reading a poem, for example.

This first poem is by from Júlio Cortazar: "Aplastamiento de las gotas".

"Yo no sé, mira, es terrible cómo llueve. Llueve todo el tiempo, afuera tupido y gris, aquí contra el balcón con goterones cuajados y duros, que hacen plaf y se aplastan como bofetadas uno detrás de otro qué hastío."



These are the images from the first, which is by Bartolomé Ferrando: "Sin escritura":

*"de un orificio
brotan
garabatos
de
sílabas
y
restos
fonéticos
piel
de
escritura"*



In these images you can see reflected that somehow they relate the words to feelings and to sensations. They see the images as real as any other object from their living room, for example and it is normally during seconds; the image is not long lasting. If we were asked to make a drawing about a poem, the results could be similar, but there is one big difference: they do it without thinking.

³⁸ <http://intercentres.cult.gva.es/intercentres/03011033/>

5. MUSIC AND SYNAESTHESIA

5.1. INTRODUCTION

Music (as a form of expression) is a perfect symbiotic model of unity; matter, form and content are one. Music allows the individual to experience deep and intense emotions.

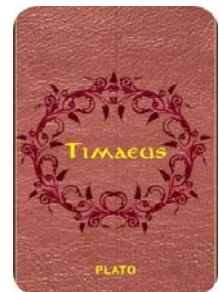


Music color synaesthesia is when a note, key or certain quality in music causes a color experience. All instruments have colors too. Their sounds make you see certain colors. Each color is specific and consistent with the particular instrument playing³⁹. Some music color synesthetes can not work while listening to color music, because they find the colors very distracting.

5.2. TIMELINE MUSIC – SYNAESTHESIA

If we take a look at ancient mathematicians and astronomers, some offered important initial cornerstones to later theories on synaesthesia. Around 550 B.C., **Pythagoreans** offered mathematical equations for the musical scales, showing that musical notes could be related to numbers. A musical scale, for example, can be divided into eight notes⁴⁰, which repeats its sequence as the musical notes proceed higher or lower.⁴¹

Almost 200 years later, **Plato** wrote *Timaeus*, where it is said that the world's soul has these same musical ratios. A cosmology emerged in which the planets' radii⁴² were set with a ratio sequence of 1:2:3:4:8:9. Afterwards, these would become the following ratio sequence: Moon = 1; Venus = 2; Earth = 3; Mars = 4; Jupiter = 14; Saturn = 25; a sequence related to the Greek diatonic musical scale's ratios. It explained that the planets were tied to music; the concept of "the music of the spheres" was initiated.



Around 350 B.C., **Aristotle** wrote that the harmony of colors were like the harmony of sounds.⁴³ Almost at the same time, **Archytas of Tarentus** introduced the «chromatic» (12-tone) scale to Greece.⁴⁴

³⁹ A piano, for example, might produce a sky-blue cloud and a tenor saxophone an image of electric purple neon lights.

⁴⁰ An "octave" scale,

⁴¹ For example, this could be the C-Major scale on the piano, consisting of just the white keys: C-D-E-F-G-A-B-C. This is also the basic "do-re-mi-fa-so-la-ti-do".

⁴² The planets' order actually varied, depending upon the author

⁴³ This set the stage for a later equating of specific light and sound frequencies, as Aristotle's works were translated and incorporated into European sciences.

With a great leap in time, around 1492, **Franchino Gaffurio** reincorporated colorized Greek modal music in Europe⁴⁵. Almost a century later, by the late 1580's, the painter **Giuseppe Arcimboldo** was formally relating «dark» with high pitches and white with low; the reverse of the more «normal» trend of low being dark and high being white.

Athanasius Kircher, around 1646, developed a system of correspondences between musical intervals and colors, based upon complex traditional symbolisms.^{xxiii} Likewise, **Marin Cureau de la Chambre**, in 1650, proposed a scheme of colored musical intervals, based on Aristotle.^{xxiv}



In 1704, Sir **Isaac Newton's** wrote treatise *Optics*, which explained the parallel between colors and music notes. It was similar to the light-sound theory of Aristotle. Newton mathematically, but quite arbitrarily, divided the visible light spectrum into seven colors and realized the mathematical relationship of these seven colors to those of the musical scale⁴⁶.^{xxv}

Alexander Scriabin's motifs found in his compositions⁴⁷ are developed off of ideas from Newton, and follow a basic mathematical musical algorithm, entitled a circle of fifths.^{xxvi}

Around 1742, the well-known mathematician and physicist **Louis Bertrand Castel**, thought there was a direct solid relationships between the seven colors and seven units of the scale, as per Newton's *Optics*. Castel created a *clavecin oculaire*, a light-keyboard; a new musical instrument which would simultaneously produce both sound and the "correct" associated color for each note. This was recalled, in 1790, when **Erasmus Darwin** wrote about the parallel between colors and musical notes.^{xxvii} **Nikolai Rimsky-Korsakov** is related to this; he is said to have had colored music notes synaesthesia.^{xxviii} In 1875, **Bainbridge Bishop** began building a color-organ in America, followed by **Alexander Wallace Rimington** in England⁴⁸, about twenty years later.



The American pianist and composer **Amy Beach**, who flourished in 1900 - 1920's, was a synesthete. She had both perfect pitch and a set of colors for musical keys. Amy could have asked her mother to play the 'purple music' Her mother encouraged her to relate melodies to blue, pink, or purple, but in a short amount

⁴⁴ This was seen as a compliment to the two main scales: the diatonic (a whole-note or full-tone scale); and the enharmonic (quarter-tones).

⁴⁵ Dorian = «crystalline» color; Phrygian = orange; Lydian = red; and Mixolydian = an «undefined mixed color».

⁴⁶ Newton himself basically only held these concordances as an analogy, and later discarded notions that there was any true connection between colors and the musical scale

⁴⁷ most noticeably in *Prometheus*, composed in 1911

⁴⁸ His concerts were very popular.

of time Amy had a wider range of colors, which she associated with certain major keys.⁴⁹

In 1911, **Filippo Tommaso Marinetti** penned his Manifesto of Futurism. He wanted to have all senses (five for him) employed in an interactive synesthetic ecstasy. In this Manifesto regarding painting there were quotes such as “it is indisputably true that silence is static and sounds, noises and smells are dynamic; sounds, noises and smells are nothing but different forms and intensities of vibration; and that any succession of sounds, noises and smells impresses on the mind an arabesque of form and color.”^{xxx}



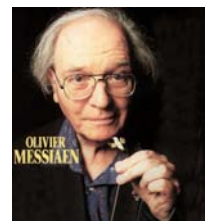
Kandinsky, working in the 1920's, had many paintings based on an established system of correspondences between colors and the timbres of specific musical instruments. However, these correspondences have no «scientific» basis; they were a combination of his personal feelings.^{xxx}

Sir **Arthur Bliss** wrote his Color Symphony in 1922, influenced by the ideas of «color music», based on British traditions. The symphony features four movements: Purple;⁵⁰ Red⁵¹; and Green.⁵²

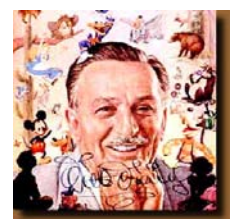


In the 1920's, **Thomas Wilfred** came to the United States and became involved with the Theosophist movement. He designed and built a «color organ» which he named *Clavilux* and the art-form was entitled «Lumia». Around 1925, the Hungarian musician and composer Alexander László composed a small set of Lichtmusik⁵³ pieces, including Eleven Preludes⁵⁴.

Olivier Messiaen, important in the 1940's, has many compositions⁵⁵. They are based on his intent of “producing pictures” via sound; writing specific notes in order to produce specific color sequences and blends. The references of light, color and visual things are constant in his work.^{xxx}



In 1940, **Walt Disney studios** presented *Fantasia*. One of the main themes of this animation film was to put pictures to pieces of orchestral music. There is a short moment where shapes and colors are represented for different



⁴⁹ C was white, F-sharp black, E yellow, G red, A green, A-flat blue, D-flat violet or purple, and E-flat pink.

⁵⁰ Track n° 1 from CD “MUSIC”

⁵¹ Track n° 2 from CD “MUSIC”

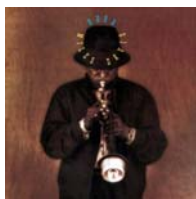
⁵² The colors represent: «Purple – Amethysts, Pageantry, Royalty – and Death; Red – Rubies, Wine, Furnaces, Magic, ...; Blue – Sapphires, Deep Water, Skies, Loyalty, Melancholy; Green – Emeralds, Hope, Youth, Joy, Spring, and Victory»

⁵³ Light music

⁵⁴ It had the following scheme: 1. ultramarine; 2. yellow; 3. violet; 4. leaf-green; 5. grey; 6. red; 7. ice-blue; 8. white; 9. sea-green; 10. cress; 11. black.

⁵⁵ Such as *Couleurs de la cité céleste*, *L'ascension*, and *Des canyons aux étoiles*,

instruments. It is similar to the actual colored-music synaesthesia. In the late 1940's, **Oskar Fischinger** developed a color-organ, named "Lumigraph".



In 1989, **Miles Davis** presented his album, *Aura* composed by Mikkelborg⁵⁶. It is a suite of 10 modern jazz pieces each set upon a color⁵⁷. The correspondences made between musical styles and colors are based upon western-European culture. One year later, the Russian composer **Sofia Gubaidulina** composed *Alleluja*; a music piece which includes an optional part for color keyboard.



One of the composer **Michael Torke's** types of synaesthesia was colored time units⁵⁸. For that reason, he composed *Color Music* in 1991.

Nowadays, synesthetic artists are quite rare to find. It is still an uncommon way of perceiving life and most synesthetes do not like to talk about it.

5.3. MUSIC MADE ENTITLED SYNAESTHESIA

Even though there are no current synesthetic art pieces, there are some bands or songs named Synaesthesia. Some are House or Techno others are rock, others jazz... a great variety in styles.

5.3.1. DIFFERENT SONGS NAMED SYNESTHESIA

Choosing a song's name is sometimes difficult. You might have to think about a reason, an experience or simply come up with a selling name. Quite some songs are named *Synaesthesia*.

On one hand, you can find the electronic music, which includes bands such as The Thrillseekers⁵⁹, Shift, Sirius-B, Broken Sunday, Richard H. Kirk or Phowa. They are artists that present their music as psychedelic; willing the evocation of emotions and memories to the listener and expecting a blending of senses. Phowa, for example, tries to recreate a synesthetic environment.

On the other hand, you can also see all different types of bands, such as guitar based rock, when speaking about Ronnie Montrose, Daelius⁶⁰ progressive rock or alternative music represented by



No One Knows. This last band is defined as a soundtrack of the subconscious; prompting your mind to wander. That is not all, though; if you are used to other styles such as jazz, Matt Lavelle is a good example or if you want to

esthesia.
D "Music": "Blue", track number 7 from his album.
ays of the week, years, etc.

⁵⁹ Track n° 4 from the CD "Music".

⁶⁰ Track n° 5 from the CD "Music".

experience an environment of metal, trash and experimental Failing Flesh can make it possible.

However, every type of music gleams with variety, intellect, and originality, taking the listener on a thoughtful, sensory musical journey. Using the concept of synaesthesia it can be defined as a merging of sight and sound.

5.3.2. THE BEATLES, THEIR MUSIC AND SYNAESTHESIA

LSD and other drugs in the middle 60's were very common in the West Coast of the United States. A lot of famous bands were experimenting with different drugs to achieve better results in their songs.

The Beatles are a very good example. Lennon in *Tomorrow Never Knows*, one of the first psychedelic songs with an inverse guitar, wound of tape and a lot of processed effects, uses only one chord to make the whole song. It was designed to be listened using more than one sense simultaneously.

Another important song to be emphasized is *Strawberry Fields Forever*, which plays with our senses again, making it impossible to avoid filling our mind of religious images and thinking that nothing is real. In the middle of the song you fall in a deep dream where you think you can touch freedom in the middle of a strawberry field.



Sgt. Pepper's Lonely Hearts Club Band is a synesthetic CD, where the ambience wraps us up. The most incredible tracks are *Lucy in the Sky with Diamonds*, whose first letter of every noun makes LSD, and *Being for the Benefit of Mr. Kite*. The first song fills you of surrealistic images and the second one is inspired by an old circus poster, where you can feel the smell of pop corn, the apples with caramel, the cotton candy and the circus. *I Am the Walrus* is another piece of art, full of twisted sentences from John's childhood.^{xxxii}



If you look once you may not see these resemblance, but with a second glance you realize that the Beatles are a lot more than music; in every note and within every melody you can actually live a blending of senses.

5.3.3. A GROUP CALLED SYNAESTHESIA

Synaesthesia is a group of musicians that have come together to create music which annotates the chaos of structure (as named one



of their songs)⁶¹. Their influences come from many different areas of knowledge and study. They indulge the artistic creation of the mind. Another song which represents very well this disorder and creativity is Masked Beauty Remix.⁶²

On the other hand, *Sinestesia*, a Spanish band, has nothing to do with the last music group mentioned. If we listen to any track, we clearly hear classic Rock, swing and funk, in other words; a blending of styles.

A little bit different, *Sinestesia Rock*, a South American band which was created in 2000, are willing to achieve different feelings and sensations in every piece of note.



As mentioned, there are a lot of songs and bands, entitled synaesthesia; it is your choice the style you prefer.

5.4. DRAWING MUSIC

When speaking about music-color synaesthesia, a person who does not have this type of perception can not understand what colors can appear in a synesthete's mind. However, if you listen to a piece of music and you look at a drawing, you may be able to imagine it. For this reason, you have an example of some exercises from the "Escola d'Art i Superior Disseny d'Alcoi".

If you take a look you will see that there are different paintings. The first two are from classical music, represented by *Illana* (a German group)



The second two are from cultural songs, belonging to the French's album *Flux de Bouche*.



⁶¹ Track nº 6 from CD "Music".

⁶² Track nº 7 from CD "Music".

6. CINEMA AND SYNAESTHESIA

6.1. INTRODUCTION

Today, the ultimate synesthetic art form is still cinema. Vision in a film can be tactile. Through the art and technology of synesthetic cinema a filmmaker can describe his own consciousness. Synesthetic cinema, more than any other medium, has demonstrated a trend towards the '*polymorphous*'. It is an intercorelation of human consciousness: thought, intuition, emotion, and sensation. At the moment, digital films are produced anywhere by anyone and are accessible on the global network, as real-time experience, as interactive space, as interconnectivity.

6.2. ABSTRACT FILMS

Harry Smith was born in 1923 in Portland, Oregon. In a time when computers still did not take part in the everyday life, Smith was thinking as if he were a multimedia bucket. He regularly consumed alcohol and drugs and he perceived and treated everything creatively, not rationally. Smith did not like rigid facts; he preferred reality to be more elastic.

He developed other lifelong interests at an early age: linguistics, filmmaking, painting and music. By the age of 15 he had already begun to write down his own methods for visualizing music using diagrams; concerning the links between music and the existent. Smith thought that things needed to be documented to discover hidden meanings.

After dropping collage because of marijuana, he moved to California, where he began to make abstract films and became involved in experimental films. Five years later, he moved to New York in the 1950s, which was becoming the best place for film activity.

Smith's earliest films⁶³ are his most geometrically abstract films. *No. 1* (1946) was hand-drawn; avoiding any need for a camera. They were extensions of his paintings. Circles occasionally dance around the screen with hand-scrawled imprecision and it contains a lot of sensorial effects. This mode of abstract cinema is related to the 1920s avant-garde filmmaking. In Germany, Hans Richter⁶⁴

⁶³ They are from number 1 to 7; number 6 is lost. From the second phase, number 8 and 9 is also lost.

⁶⁴ He was a painter, graphic artist, avant-gardist, film-experimenter and producer.

produced films from scroll paintings, animating geometrical shapes in a rhythmic manner. Smith's *No. 1* shares some similarities with Richter's *Rhythmus 21*⁶⁵, but it is distinguished by its color.

One explanation of his films is the notion of synaesthesia; attractive to many artists in the late 19th and early 20th Century. It is a "non-rational" experience, representing liberation from laws of the physical world. Taking hallucinogen drugs made him experience synesthetic sensations, remarking seeing "little colored balls" when listening to people talk and "all kinds of colored flashes". At this point, he decided to add music to his films. Smith's interest in cross-sensory perception was already evident in his attempts to transcribe music and was carried through to his early filmmaking.

No. 1 appears to be very freeform in its structure, on the other hand *No. 2*, uses many more geometrical forms and *No 3* is the reference of a structural mode of arrangement.^{xxxiii} *No. 4* (1949) works with a black background and white shapes. Smith plays with the tension between precise shapes and rhythms, and less regulated patterns and movements. It begins with a filmed sequence showing his painting, *Manteca*; the name of a Dizzie Gillespie's⁶⁶ song, and Smith's painting of the same name was another of his attempts to subjectively transcribe music. The painting is an attempt to transform his sensations into a codified form; to place the dialectic between his films, paintings and musical inspiration at centre stage. There is an important influence of Oskar Fischinger⁶⁷.^{xxxiv} Smith's films are more synesthetic than his paintings. They produce shapes through time, bombarding the senses in order to perceive the film better.



No. 5 (1950) is more directly related to the great animator's work and this is made explicit in its subtitle, *Homage to Oskar Fischinger*. It is an extension of *No. 4*, but with the addition of concentric circles as well as dancing circles. *No. 7* (1950) is also based on Fischinger. There are more concentric moving circles as well as the motif of shapes composed, which create a sense of hypnotic absorption. Smith makes use of grille patterns at times.^{xxxv}

The films numbered 1-3⁶⁸ seem to be related by their hand-painted techniques, whilst 4⁶⁹, 5 and 7⁷⁰ also feel of a piece through their use of optical printing. The third phase in Smith's filmmaking, concerns "semi-realistic animated collages.

⁶⁵ Track n° 2 from the CD "Video".

⁶⁶ An American jazz trumpeter, bandleader, singer, and composer.

⁶⁷ He is an abstract animator, filmmaker, and painter (<http://www.oskarfischinger.org/>).

⁶⁸ Track n° 3 from the CD "Video"; No 1, No 2 and part of No 3 abstract films.

⁶⁹ Track n° 4 from the CD "Video"; the rest of No 3 and all No 4.

⁷⁰ Track n° 5 from the CD "Video"; No 5 and No 7.

No. 10⁷¹ (ca. 1957) is the first surviving film from this “phase”. It is a shift in his filmmaking, but there is also a notable continuity from No. 7. He uses “specific” symbols, yet more “elementary”. Geometric forms are still present in this film, as well in No 11, which is very similar.

No. 12⁷² (1957) is regarded as Smith’s masterwork. He uses collage techniques, like in the others, but it is a much longer and more ambitious work than anything he had made before. The film is in black and white. One simple sentence can not contain its complexity, but it is clear that the importance of the mind is paramount. The importance of the mind and its unconscious processes were clearly important to Smith. He composed his own soundtrack for this film; creating sometimes curious and confusing contrasts.^{xxxvi}

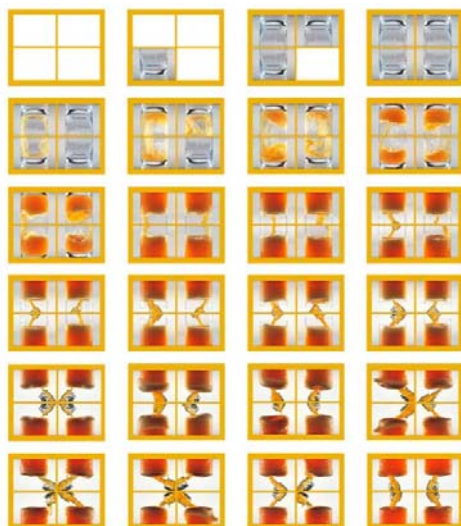
The nature of unconscious connections, in which logical relations are often altered, relates this film and the work of the surrealists; especially on his methods as akin to automatic writing⁷³.

Smith’s last phase of filmmaking seems to have two main developments; first, reworking *Wizard of Oz* and second, extending the incorporation of specific material; the use of photographed film.⁷⁴

He tended to see his work in social terms; in personal-political terms. He mixed things up in order to derange the senses. For Smith, as for the surrealists, the distinctions between art and life became meaningless. We should think of Smith’s work as an attempt to overcome oppositional boundaries, which would have been connected to rationality. Within his films he continually made connections between anything and everything.

6.3. MICHAEL JOAQUIN GREY:

Michael Joaquin Grey⁷⁵ (born 1961 in Los Angeles, California) is an American artist, inventor, and



toy designer based in New York City. For the past twenty years, he has been creating work that extends and plays with the boundaries of art, science and media. His investigations are basically about the development and the origins of life, language and form. Culture is an example of

th Magic. (7 videos)

ial thought; tapping into the unconscious.

ilm, using a number of colored glass plates in front of the lens at different

distances in order to create strange effects.

⁷⁵ http://www.citroid.com/citroid_orange/4flavor.html is Grey’s page. Here you can find his videos.

an object in his work, as the prepositional states of change between matter, energy, behavior, and meaning are.

In the mid 1990's Grey invented the first Zoob; an award-winning toy modeling system. They are known as "biological Lego". They have 64-fold symmetric joints as opposed to the 4-fold symmetry of Lego blocks, and are available in post-Mondrian colors. Zoobs are of interest to anyone interested in how sculpture and biology might be related to the toy market.

6.4. MOVIES RELATED TO SYNAESTHESIA

6.4.1 INTRODUCTION

If you take a look at the movie production in the world and you try to find a film on synesthetic experiences, you realize that the list is not very long. When searching "synesthetic movies" on Google, you find almost nothing; even if since the 1990's synaesthesia is far more often to find than before. Cinema is the best way of explaining this neurological condition, but it is rather rare. I have focused on "Ratatouille", on "The Perfume" and, curiously the only movie entitled this way, on "Synesthesia".

6.4.2. RATATOUILLE

6.4.2.1. SUMMARY

Ratatouille is an unthinkable combination of a rat and a 5-star gourmet restaurant come together for the ultimate fish-out-of-water tale. It is an animation comedy of Walt Disney Pictures and Pixar Animation Studios.

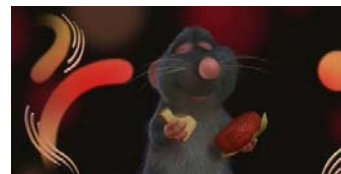
Remy, the main rat, dreams of becoming a great chef despite his family's wishes and the obvious problem of being a rat in a world where they are hated. When fate places Remy in the city of Paris, he finds himself ideally situated beneath his hero's restaurant; Auguste Gusteau's restaurant. Despite the apparent dangers of being an unwanted visitor in the kitchen at one of Paris' most



exclusive restaurants, Remy finds a partner; Linguini, the garbage boy, who inadvertently discovers Remy's amazing talents. Linguini had spoiled the soup and Remy had fixed it, but everyone in the kitchen thought, of course, that Linguini had made a wonderful soup. For that reason, they make a deal; somehow Remy would teach how to cook to Linguini. Remy remains underneath Linguini's hat and by pulling the boy's hair, they cook together.

At one point, Remy finds again his family and he is stuck in the decision of following his dreams or returning forever to his previous existence as a rat. After problems and enemies, he learns the true meaning of friendship and family and understands that no matter what, his place is in the kitchen.

The film has a happy ending; Remy ends up creating his own restaurant with Linguini and other secondary characters from the movie as cooks, waitress, etc, accomplishing his dream, guided by his synaesthesia.



6.4.2.2. WHAT MAKES THIS MOVIE SPECIAL?

When thinking about synesthetic movies I remembered this film. They had told me that, sometimes, when Remy ate, “strange” colors appeared on the screen. Those “strange” colors were really Remy’s synaesthesia, because he has color synaesthesia when eating. He is always guided by his scent and his colors and that is why he becomes such a good cook. It is related to reality; most people with synaesthesia do creative things better. During the films there are a few moments where you can see this “gift” that Remy has. ^{xxxvii}



It is interesting to analyze that a phenomenon like this, not so common, is incorporated in a child’s film. Maybe because it is still not taken as a serious disorder or maybe because children have a more imaginative mind and can understand it better.

6.4.3. THE PERFUME

6.4.3.1. SUMMARY

The Perfume is set in the 18th century France. It is centered on the life of an unfortunate boy, Jean Baptiste, born in the slums of a Paris fish market. Left to die amongst rotting fish guts, he inhales every insignificant smell around him and it is as if that makes him alive. Already in the beginning, he kills his mother, because of his crying. He is rescued by some men and is placed in an orphanage.

Jean Baptiste is an odd child and a socially unaccepted. He is blessed with outstanding olfactory senses. He possesses the ability to receive every smell around him. The twists and turns of his life are one continuous tragic story. Every time he leaves from one place, or is sold to another, his



“master” dies; maybe a coincidence or maybe faith.

His ambition is to learn how to keep the smell of anything; especially the essence of a women. His first time in the city, he is captivated by the smell

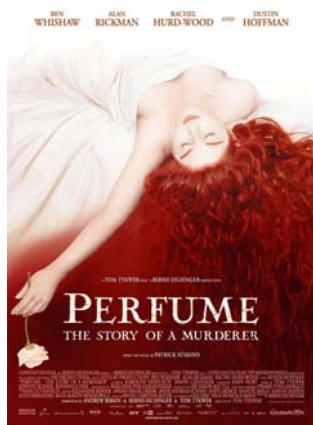
of a red-hair girl. He follows her and accidentally kills her. Before leaving he smells her, but realizes that, at one point, the smell is gone. Since that moment, he is obsessed by the art of perfume. Once taught, Jean Baptiste desires to make the ultimate perfume. During his apprenticeship, he discovers he has no personal smell and is initially devastated.



His olfactory perfection is made out of the essences of 13 beautiful women; killed in order to recollect their smell and it has the ability to provoke unexpected reactions on the receptor and on him. When putting some on, he learns that in life it does not matter to have a developed sense, if you are not able to love, or be loved, to feel sad or to feel anything at all. That is why he drops the whole perfume on himself, because he has no purpose in life, and is eaten, for love.

6.4.3.2. WHAT MAKES THIS MOVIE SPECIAL?

Different from the previous movie, I have chosen the perfume not because it has synesthetic elements (because it does not), rather for a developed sense that characterizes the movie^{xxxviii}. As I have said, Jean Baptiste has a developed sense of smell and he can smell things that are unthinkable; such as glass, or worms from a rotten apple.



It is fascinating to analyze how a person with a developed sense may not pay so much attention to another one. For example, in this movie, Jean does not begin talking until he is five, because does not need it; he prefers to smell things. Even when he does start talking, it is frustrating for him, because there are not so many words as smells for him.

When analyzing every detail, you realize the importance of the olfactory sense. Every time Jean smells, his nostrils move and when he feels a different smell he chases as if he were hypnotized. The power of a sense is infinite, but it does not make a human being complete. It is only with our five senses that we can describe the world how it is, or even better if we have a blending of senses.

6.5. "SYNAESTHESIA" – THE FILM.

6.5.1. SUMMARY

The movie opens with the investigation into the murder of Mari's rich foster father and the strange symbol that has been made in the carpet with red wine. Mari's previous foster parents had all mysteriously died. The story cuts to Shinsuke Hayama a synesthete and his friend Takashi Nohara,

who make a very good living from Internet voyeurs by putting cameras all over the city and people's homes.

They investigate a girl's camera that may be playing a video tape. They go to her apartment and surprisingly, they do not find her, rather a blood stain symbol on the bed sheets, which Shinsuke recognizes as the work of 'Picasso'. Suddenly with the images of another camera they see a motionless girl on the ground under a nearby river bridge. They take this girl, Mari, to their flat and Shinsuke and Takashi start investigating Picasso. At the same time, the police are also investigating a possible link between the symbol and synaesthesia.

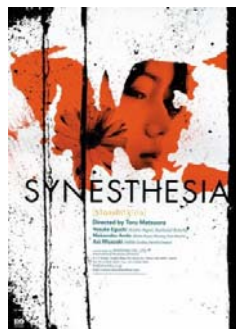


Shinsuke later uncovers a game that is rumored to be connected with Picasso, who with the computer game brainwashes the players and convinces them to commit suicide. Takashi completes the game and Shinsuke speaks with Picasso. Picasso insists to release Mari, but they do not. Picasso sends Koichi, a friend of Shinsuke and an allied of Picasso to kill Takashi and Shinsuke in order to bring back Mari. When they think that something is going to happen, Takashi leaves with Mari to protect her while Shinsuke continues tracking down Picasso, fearing that Mari is Picasso's next victim. The movie culminates with the police investigation revealing the whole story. Mari is Picasso, covered up by her brother, who abandoned her in the orphanage.

Her brother commits suicide, leaving Mari and Shinsuke face to face; two lonely souls who possess the same puzzle of mind. For that reason, Mari looked for Shinsuke, to find somebody who also had synaesthesia in the world; to find somebody who saw the same world.

6.5.2. WHAT MAKES THIS MOVIE SPECIAL?

It is a strange movie, with some blurry ideas, but it is interesting because already at the beginning a doctor gives an explanation of what this neurological condition is and they show Köhler's test and explain some characteristics of this phenomenon, such as their loneliness in this world. It is curious how they define things. For example, a spoon is a



dandelion, number "2" is yellow, small raindrops are the word "hello", etc.



On the other hand, it is a movie which is basically based on the murder, using a different way to resolve it, which is synaesthesia. It does not give you a clear definition, but it introduces the concept. What is very special is the importance they give to being together with somebody who

understands you; which is not always possible in a synesthete.

7. CONCLUSION



When interpreting the world that envelopes us, there are a lot of factors that influence us. What is your favorite color? Which number do you always choose? Have you ever thought about the reason of these answers? Everything is only a question of perception.

Synaesthesia is a genetic neurological condition, with an unknown beginning. It may have appeared as a consequence of the changing environment; as a characteristic for a better adaptation. It is a better way of perception, a more precise form of learning and knowing everything surrounding you. Who knows if in a century we will talk about normality, rather than of a phenomenon.

In a social way, synaesthesia tends to be negative. Synesthetes are not understood and may be treated as special or as crazy people. Socially they are, in the most of the cases, left aside because of humans' prejudices. What is different is always unaccepted, despised and is normally given the name of *strange*. Sometimes we do not even take a moment to realize about the meaning of this difference. In this case, for example, it only means an atypical way of seeing the world with a distinct personality or a special taste.



It does not affect physically the person; they are just normal. But, what can we name normal? We live in a society where everything is related to fashion and popularity. In some way, we often forget the meaning of life. The world whispers so many secrets and we tend to hear nothing. Synesthetes, on the other hand, are those who feel the world, who have seen, heard or tasted images that none of us "normal" people have. Should they be admired for their capability? Could it not be that what is different is better? Monotony has filled our minds and we normally do not see anything beyond the limits that we have been told. Synesthetes have more open windows to look through. They are the ones with an unlimited perception; the contrary of our five simple senses. Can we call it a blessing? Everything seems to define synaesthesia as a gift.

Maybe I have learned a lot from the cognitive and scientific point of view and I have extended my vocabulary in English, but the best from this project is that I have learned to perceive the world in a different way; to appreciate every smell, the tact of everything and every sound. People passing by are not simple walking shadows; every person has unique details which sometimes are hidden for fear of being unaccepted. When this individual character is erased, what we really do is hide the diversity that constitutes the world. Everybody has a different point of view. Kant was right; the

world is not in a specific way, rather as our experience makes it. Only understanding this heterogeneity you can understand everyone else, because without diversity the unit does not exist.

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9. ANNEXES

9.1. Surveys

All surveys are in Catalan, because it is the language spoken and written where I live.

ⁱThis is the first survey I gave out, in order to find out about synaesthesia generally and specifically.

LA SINESTÈSIA

1.- SEXE: Masculí Femení

2.- EDAT:

3.- a)SAPS EL QUÈ ÉS LA SINESTÈSIA?

Sí No

b) SI HAS AFIRMAT, ON N'HAS SENTIT A PARLAR?

- A l'escola
- En les notícies
- A casa
- En una revista
- Altres:

c) SI HAS AFIRMAT, ESCRIU UNA BREU DESCRIPCIÓ SI US PLAU:

4.- LA SINESTÈSIA ÉS UNA SENSACIÓ SUBJECTIVA PER LA QUAL LA PERCEPCIÓ SENSORIAL PRÒPIA D'UN SENTIT S'ACOMPANYA DE LA PERCEPCIÓ AMB UN SENTIT DIFERENT.

A PARTIR D'AQUESTA DEFINICIÓ, INDEPENDENTMENT DEL NOM, LI SONA AQUEST TIPUS DE PERCEPCIÓ?

Sí No

5.- SI HAGUÉS D'ANOMENAR D'ALGUNA MANERA AQUESTES DUES FORMES I TINGUÉS AQUESTS DOS NOMS: BOOBA I KIKI, QUIN SERIA QUIN?



1.-

2.-

6.-MIRI EL TEMPS. ARA BUSQUI QUINA FORMA EN CONCRET FAN LES "H". APUNTI EL TEMPS QUE HA TARDAT EN ADONAR-SE'N. SI SE N'HA ADONAT PER ALGUN MOTIU EN CONCRET, APUNTI'L TAMBÉ SI US PLAU.

LLETRA EVOCA:

- Color
- Gènere
- Localització espacial
- Olor
- Personalitat
- Sabor
- Textura

SONS (SOROLL) EVOCA:

- Color
- Forma
- Localització espacial
- Olor
- Sabor
- Textura

OLOR EVOCA:

- Color
- Forma
- Gènere
- Localització espacial
- Sabor
- Textura

NÚMERO EVOCA

- Color
- Gènere
- Localització espacial
- Olor
- Personalitat
- Sabor
- Textura

UNITATS DE TEMPS (DIES, MESOS, ANYS) EVOCA:

- Color
- Forma
- Gènere
- Localització espacial
- Olor
- Sabor
- Textura

SABOR EVOCA:

- Color
- Forma
- Gènere
- Localització espacial
- Olor
- Textura

PARAULA (COMPLETA) EVOCA:

- Color
- Gènere
- Olor
- Personalitat
- Sabor
- Textura

PERSONALITAT EVOCA:

- Color
- Forma
- Gènere
- Localització espacial
- Olor
- Sabor
- Textura

SONS (MÚSICA) EVOCA:

- Color
- Forma
- Localització espacial
- Olor
- Sabor
- Textura

SONS (PARLA) EVOCA:

- Color
- Forma
- Localització espacial
- Olor
- Sabor
- Textura

DOLOR EVOCA:

- Color
- Forma
- Gènere
- Localització espacial
- Olor
- Sabor
- Textura

TEMPERATURA EVOCA:

- Color
- Forma
- Gènere
- Localització espacial
- Olor
- Sabor
- Textura

9.- RESPON LES SEGÜENTS PREGUNTES, CANVIANT DE COLOR O DE FORMAT EL NÚMERO QUE SIGUI, DEPENDENT DEL GRAU DE LA REACCIÓ A CADA ACCIÓ:

Veus algun color quan escolta una cançó?	0	1	2	3	4	5
Confon l'esquerra i la dreta?	0	1	2	3	4	5
Quan algú li parla, nota algun sabor?	0	1	2	3	4	5
Veus paraules de color?	0	1	2	3	4	5
Veus colors quan parla algú al seu costat?	0	1	2	3	4	5
Nota alguna textura quan li parla algú?	0	1	2	3	4	5
Té algun sabor el seu color preferit?	0	1	2	3	4	5
Associa un color al seu dolor?	0	1	2	3	4	5
*Veus colors en cada lletra de l'alfabet?	0	1	2	3	4	5
Els mesos de l'any són d'algun color en concret?	0	1	2	3	4	5
Veus colors en els dies de la setmana?	0	1	2	3	4	5
Si veus una esquerda al terra, li fa mal?	0	1	2	3	4	5
Quan escolta un so, automàticament veus un color?	0	1	2	3	4	5
Quan menja algun aliment veus un color?	0	1	2	3	4	5
Veus música, en comptes de sentir-la?	0	1	2	3	4	5
Els objectes inanimats tenen gènere?	0	1	2	3	4	5
Els objectes inanimats tenen personalitat?	0	1	2	3	4	5
A vegades, se sent acorralat per massa colors?	0	1	2	3	4	5
Si mira un paper en blanc i hi ha sons, veus colors?	0	1	2	3	4	5
Quan escolta música, ho associa a estacions?	0	1	2	3	4	5
Sent algun so, <u>sempre</u> que veus un moviment?	0	1	2	3	4	5
Quan veus formes, les pots tastar?	0	1	2	3	4	5
Associa el menjar a textures?	0	1	2	3	4	5

*(Si és en algun grau del 1-5, agrairia que contestessis a les preguntes de les següents pàgines si us plau, si és que no, ja ha acabat, GRÀCIES!)

L'ALFABET

De quin color és A?	De quin color és H?
De quin color és B?	De quin color és I?
De quin color és C?	De quin color és J?
De quin color és D?	De quin color és K?
De quin color és E?	De quin color és L?
De quin color és F?	De quin color és M?
De quin color és G?	De quin color és N?
De quin color és O?	De quin color és U?
De quin color és P?	De quin color és V?
De quin color és Q?	De quin color és W?
De quin color és R?	De quin color és X?
De quin color és S?	De quin color és Y?
De quin color és T?	De quin color és Z?

ELS NÚMEROS

De quin color és 1?	De quin color és 6?
De quin color és 2?	De quin color és 7?
De quin color és 3?	De quin color és 8?
De quin color és 4?	De quin color és 9?
De quin color és 5?	De quin color és 0?

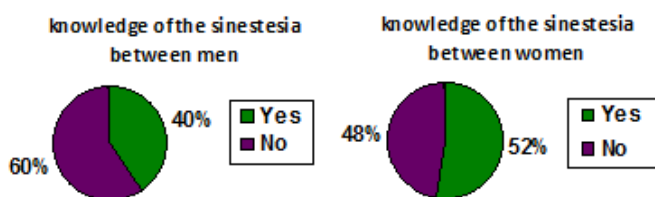
MOLTES GRÀCIES PER LA SEVA AJUDA!

In order to find out the knowledge of the concept “synaesthesia” in our society and how it affects us, I decided to give out this survey. It was summer and everybody had finished school; I thought that if I would go looking for people, they would rather go to the swimming pool and the streets would probably look more like deserts. For that reason, I decided to e-mail my surveys so that people could do it without having to leave home and in a spare moment. I gave out about 300 and after three months only 65 were answered.

Since I had more surveys from women than from men, I decided to count how many men answered, in order to gather the same amount from the women. I ended up gathering twenty-five from each. The women’s ages are from fifteen to forty-eight years old, but are basically in between sixteen and eighteen years old. On the other hand, the men’s ages are from sixteen to forty-six, but basically men from eighteen to twenty-five years old answered.

Why not do it all together, you may think; as I have said before, synaesthesia is more common in women than in men, or at least that is what I have read. For this reason, I have chosen to do it separately; in order to find out if being a male or a female is really an influence.

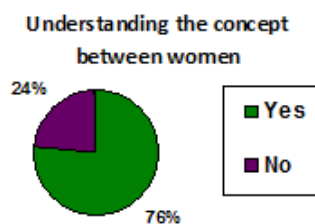
When talking about the knowledge in general in society, we can see that more women than men have heard about synaesthesia. About a 12% more women have worked with the concept before. Most of the women got



to know it at school or in magazines. However, men have mostly read it on internet or from friends.

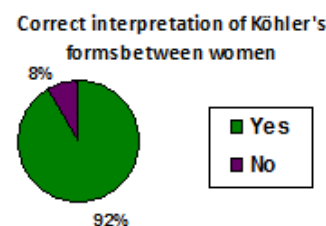
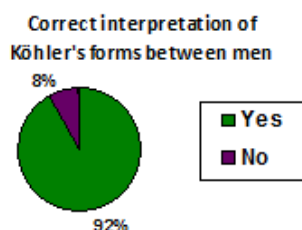


After asking if anybody had an idea of the definition of synaesthesia I gave the definition myself. I asked if the concept was clearer now and, for the second time in a row, more women understood what it

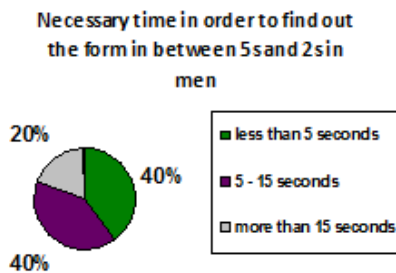


meant than men. However, in general, when reading the definition, it is mainly understood.

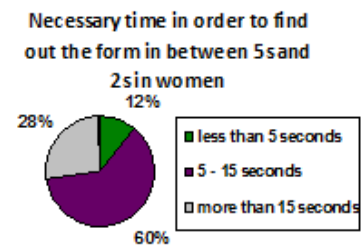
What is curious is that when asking the association of the figures to a name, both women and men have answered in the same percent. This is a question that is not based on the female or on the male, but on the person in general. It is what helps us know, that more or less, synaesthesia is around us, but some have it in a very high level and others just have details, like in the results of Köhler’s test.



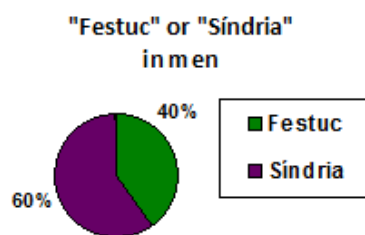
In this question, the results are quite different. In this case, men are more accurate and quicker than women; finding with a higher speed what the two's and the five's mean. It is based on a representation where two's and five's are mixed up. Numbers two make a triangle, but it is a little hard to see at a simple glance. Women



here have been a lot slower than man, only a 12% have been faster than five seconds. However, almost half of the men have seen it before five seconds.



After formulating all these questions I only had one more test left to do. It is based on two words, which are very different. On one hand "Festuc" is a strong word, with letters such as F T and C and on the other hand "Sindria" is a smoother word, with letters such as vocals, N and S. I questioned which word the person doing the survey would

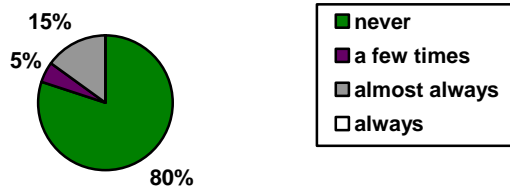


prefer and in most of the cases, in general, the result was "Sindria". However, more women have chosen "Sindria" than men and in a curious way for different reasons. Women have chosen it because of its taste, but mainly because of its sound and the men are the other way around; they have chosen it for its sound, but mainly for its taste.

In this survey, we can see the difference between women and men. Women are guided more by instinct and sensations; however men are guided more by ability and mind games. In conclusion, with these results I have been able to confirm that more women than men tend to have synaesthesia.

Quan escolta un nom, ho associa a menjars o gustos, per exemple, el nom "Marc" té gust a mongetes acabades de collir o qualsevol altre gust?

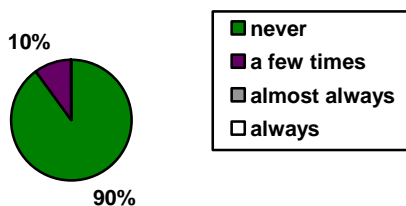
mai pocs cops sovint sempre



Experimenta altres tipus de barreja de sentits?

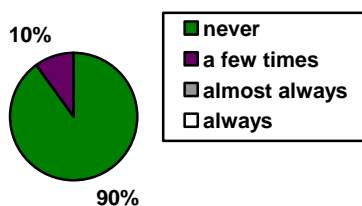
mai pocs cops sovint sempre

*Quins són?



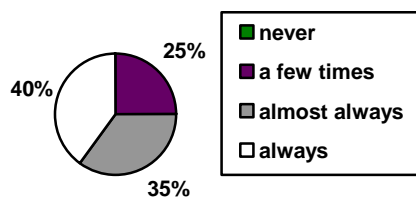
Té problemes diferenciant la esquerra i la dreta?

mai pocs cops sovint sempre



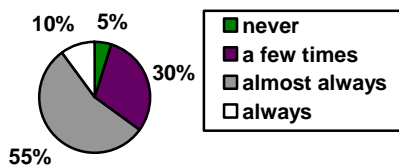
Pot recordar la localització dels objectes amb rapidesa i exactitud?

mai pocs cops sovint sempre



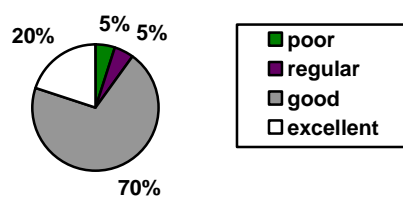
Pot llegir mapes amb facilitat?

mai pocs cops sovint sempre



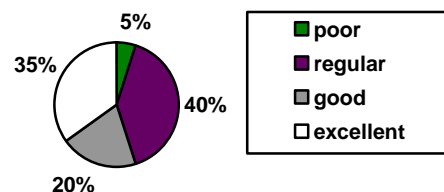
Com considera la seva memòria?

pobra regular bona excel·lent



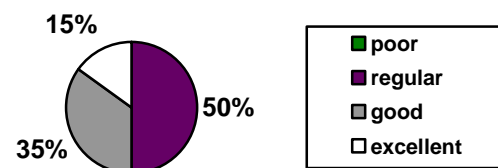
Com considera la seva habilitat per aprendre llengües?

pobra regular bona excel·lent



Com considera la seva habilitat matemàtica?

pobra regular bona excel·lent



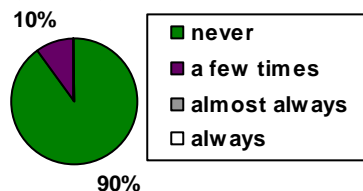
This second one is from ages thirteen to fourteen, without distinction of male or female.

SEXE Masculí Femení

EDAT: 13 - 14

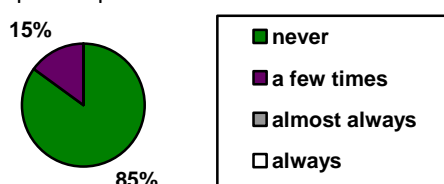
Experimenta paraules o lletres amb un color específic, per exemple, la lletra "A" és vermella, groga... encara que estigui escrita en color negre?

mai pocs cops sovint sempre

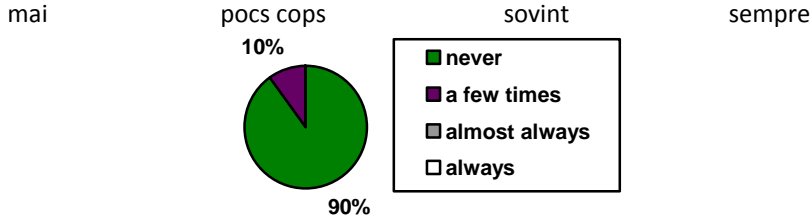


Veus colors quan escolta sons o música?

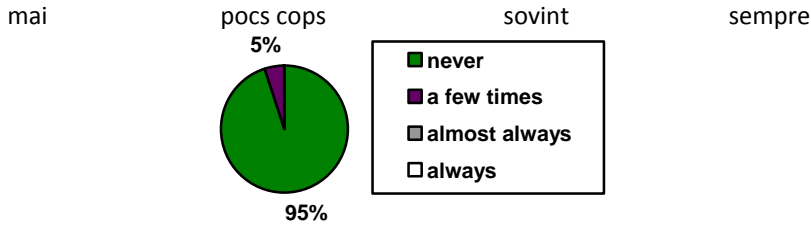
mai pocs cops sovint sempre



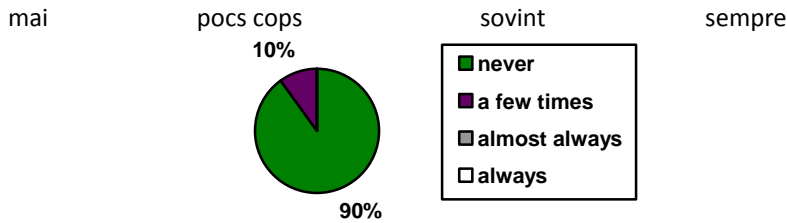
Nota sabors quan veu una forma, per exemple, un triangle té gust a xocolata, un quadrat té gust a pera...?



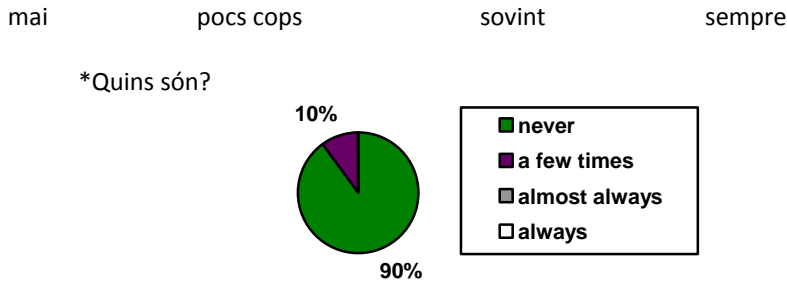
Veus una figura dibuixada quan nota una textura, per exemple, si toca alguna cosa rugosa, és un triangle, una superfície llisa és un cercle... ?



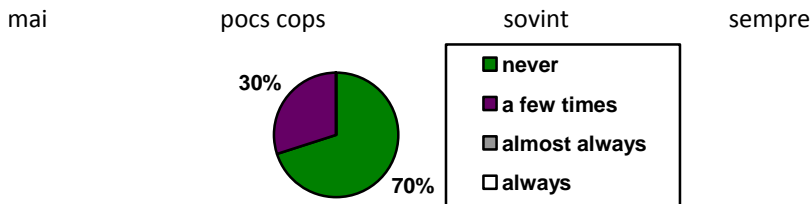
Quan escolta un nom, ho associa a menjars o gustos, per exemple, el nom "Marc" té gust a mongetes acabades de collir o qualsevol altre gust?



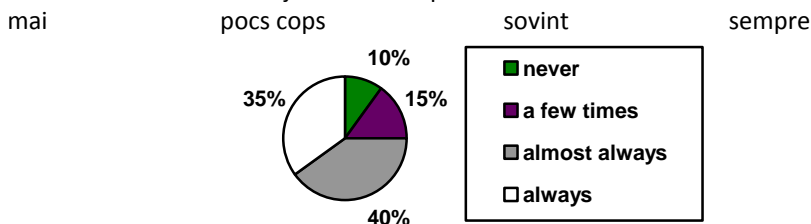
Experimenta altres tipus de barreja de sentits?



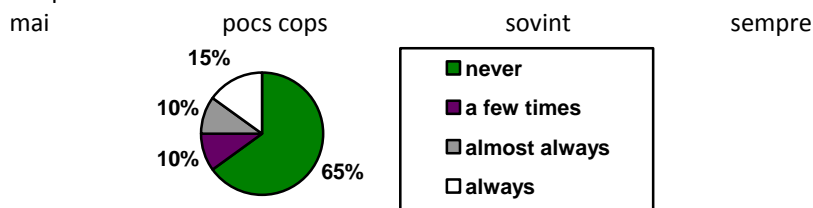
Té problemes diferenciant la esquerra i la dreta?



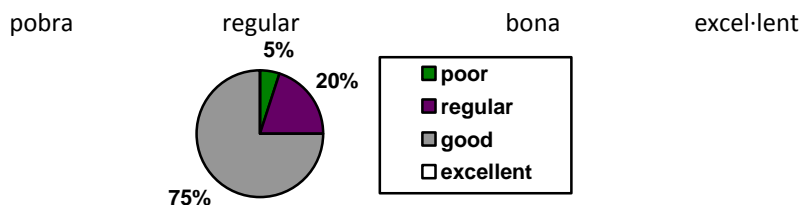
Pot recordar la localització dels objectes amb rapidesa i exactitud?



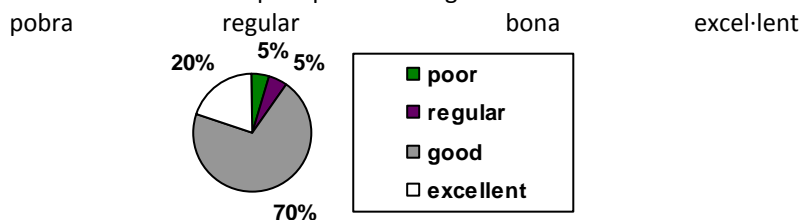
Pot llegir mapes amb facilitat?



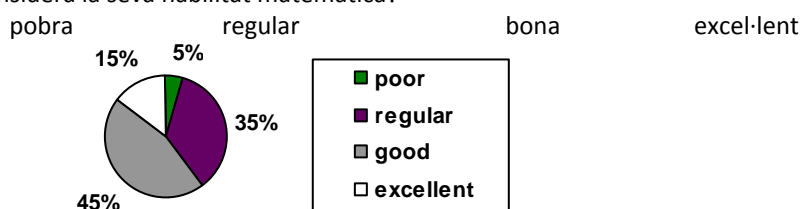
Com considera la seva memòria?



Com considera la seva habilitat per aprendre llengües?



Com considera la seva habilitat matemàtica?

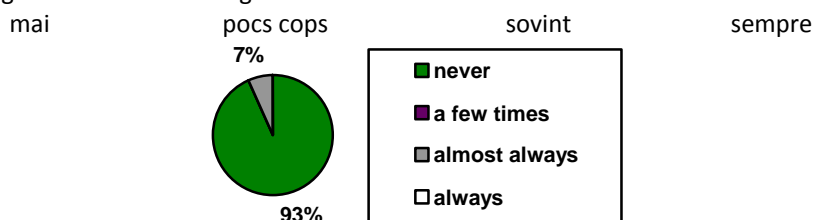


This third one is from ages thirty to fifty. I have done males and females together.

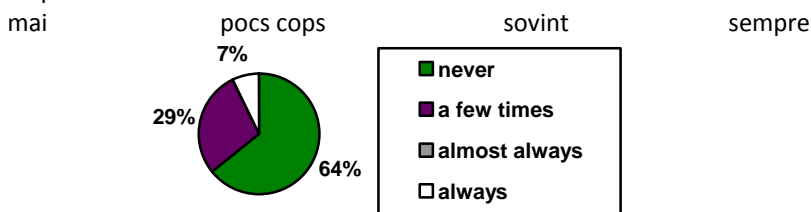
SEXE Masculí Femení

EDAT: 30 - 50

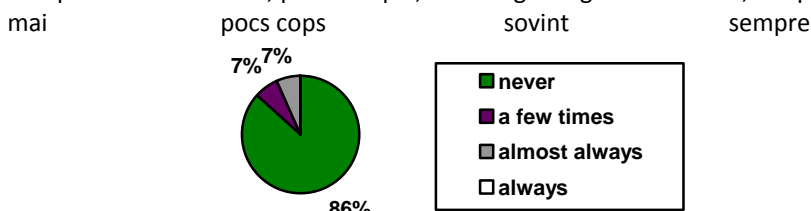
Experimenta paraules o lletres amb un color específic, per exemple, la lletra "A" és vermella, groga... encara que estigui escrita en color negre?



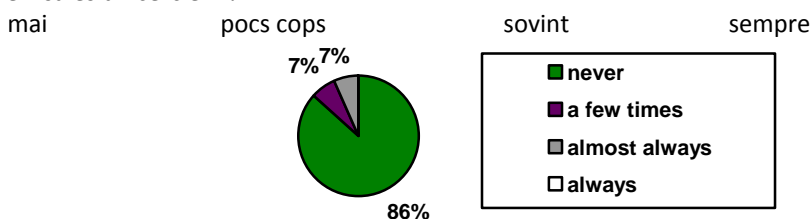
Veu colors quan escolta sons o música?



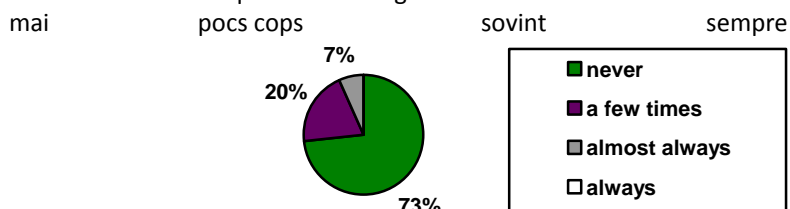
Nota sabors quan veu una forma, per exemple, un triangle té gust a xocolata, un quadrat té gust a pera...?



Veu una figura dibuixada quan nota una textura, per exemple, si toca alguna cosa rugosa, és un triangle, una superfície llisa és un cercle... ?



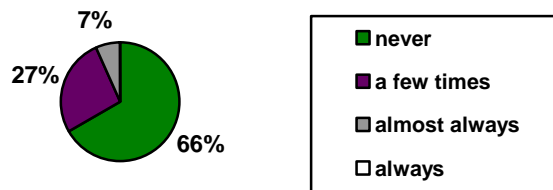
Quan escolta un nom, ho associa a menjars o gustos, per exemple, el nom "Marc" té gust a mongetes acabades de collir o qualsevol altre gust?



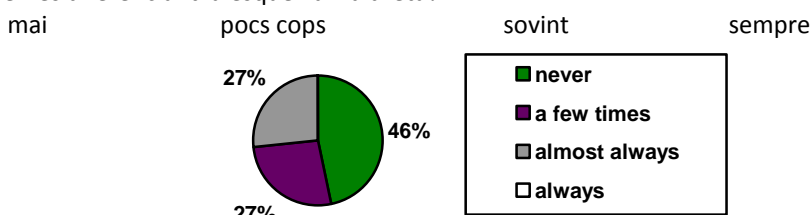
Experimenta altres tipus de barreja de sentits?



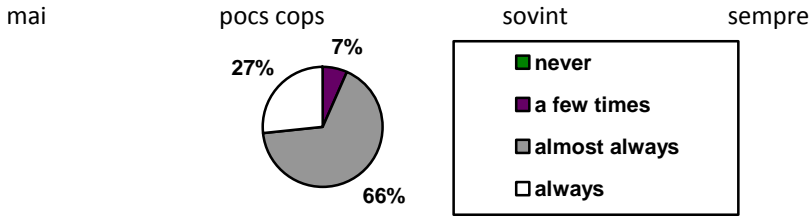
*Quins són?



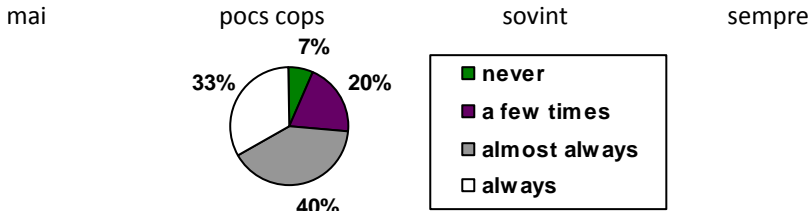
Té problemes diferenciant la esquerra i la dreta?



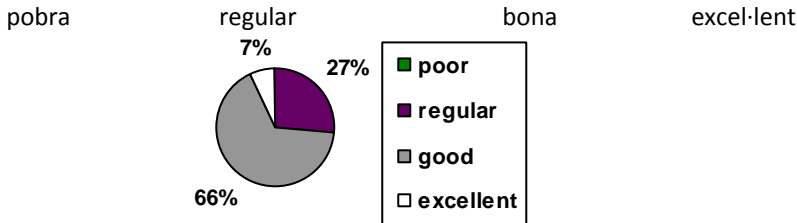
Pot recordar la localització dels objectes amb rapidesa i exactitud?



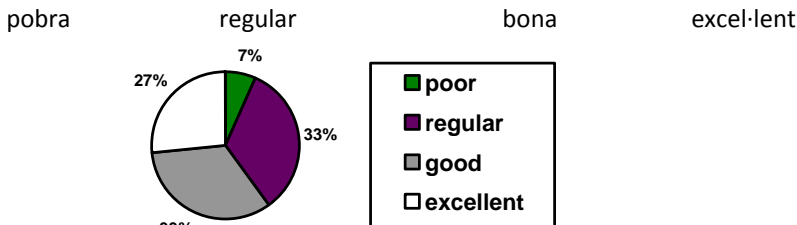
Pot llegir mapes amb facilitat?



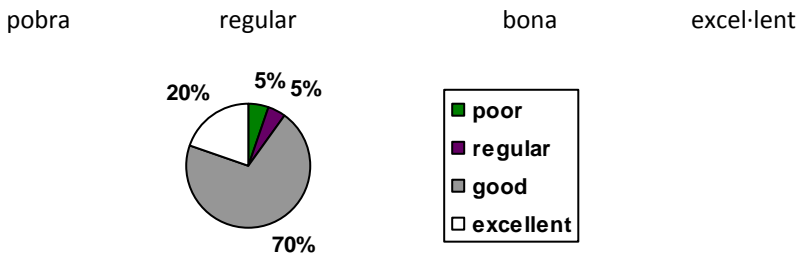
Com considera la seva memòria?



Com considera la seva habilitat per aprendre llengües?



Com considera la seva habilitat matemàtica?



When analyzing the information, you can see in the three different surveys, that in most of the cases, the answers do not demonstrate a majority of synesthetes; it is just the opposite. It does not depend on the age, because synaesthesia is an inherited character, but with the pass of time, one realizes that his or her perception is not the same as the other people surrounding her or her. For this reason, there may be more variety in the last survey's answers, but not because it is a condition that with the years it is possible to develop.

ⁱⁱⁱ In this survey I have centered my questions to a person specific person who has synaesthesia. She is a female of forty-eight years old, who does not have a defined synaesthesia and is mostly of association, not directly. She has different types of synaesthesia. She only contradicts the theory that in language and in math synesthetes do not do well. The survey is in Catalan, as the previous ones.

Saps el què és la sinestèsia?

Sí, he fet filologia i per tant aquest tema ja l'he tocat bastant. Sé que és una figura literària, no ho coneixia tant a fons com està descrit, però sí sabia més o menys que era la combinació o l'enllaç de diferents sentits. De fet hi ha molts exemples en la literatura, on a part de fer poesia i jugar amb els sons de les paraules, juguen amb la forma, per exemple.

Tens alguna forma de percepció relacionada amb la sinestèsia?

Sí, quan parla la gent veig colors, quan escolto cançons també en veig. En el cas de la música, aquests colors son més aviat suaus, perquè la música em relaxa. Veure aquests colors, per a mi, és una cosa automàtica, no hi penso, però els veig igual. Per exemple, una cançó fúnebre en un enterrament em fa veure-ho tot negre, però si de sobte parla el capellà ho començo a veure to blanc o bé rosat.

Et sents acorralada per colors?

No, això no em passa. Per molt que vegi colors quan em parlen, no em sento mai acorralada per ells.

Quan llegeixes un llibre antic, on tot està imprès en blanc i negre ho veus amb colors?

No, això no em passa mai; jo també ho veig en blanc i negre si és així com està escrit.

Tenen colors per a tu els sons?

Sí, com ja he dit abans, quan escolto una cançó veig un color per cada fragment o melodia que està sonant.

Confons la dreta i l'esquerra?

Sí, des de sempre m'ha passat i encara em passa. No puc evitar-ho i em faig uns bons embolics!

Tens bona memòria?

La veritat és que sí, és més, tinc una memòria espectacular. Fins i tot m'han fet tests i he respòs sempre molt positivament. La localització de les coses, però, no les recordo molt bé; m'he de guiar pels colors de cada cosa, recordant on era cada color, fins i tot penso en la forma.

Com creus que és la teva habilitat matemàtica? I la lingüística?

Les dues són molt bones. Sempre és el que se m'ha donat millor. A més a més que he estudiat llengües. Fins i tot ara quan el meu fill em pregunta per les matemàtiques recordo com s'ha de fer els problemes.

Quan toques una superfície rígida, notes algun sabor o et recorda a algun sabor?

Sí, quan toco una superfície rígida em ve un gust molt amarg i emfatitzo el molt i totalment àcid. A més a més em fa mal tot.

Quan veus una esquerda al terra te fa mal?

Em fa molt mal; és un dolor molt agut. Em fa mal tota l'esquena, és a dir, tota la part de la columna vertebral, com si em partissin per la meitat a mi. Recordo en un museu, per exemple, a Londres, la Take Modern, que hi ha una esquerda en tot el terra, com a obra d'art, doncs per mi va ésser més aviat una obra de dolor.

Recordes alguna experiència relacionada amb la sinestèsia?

Sí, em passa sovint que depèn del color que sigui el terra o bé una porta, no puc passar per allà. Si no m'agrada el color o bé em sento incòmoda amb aquell color, no puc passar per allà, ja que em fa por. Des de sempre m'ha passat això. Normalment depèn molt en si estic concentrada en alguna cosa o no. Quan no penso en res més em passa això dels colors, però si estic per una altra cosa, no ho noto tant. A més a més, també depèn del meu estat d'ànim, que em fa veure uns colors o uns altres. Si la veig d'un color bonic com ara rosa o bé blau, m'agrada molt passar-hi.

Una altra experiència que recordo és que em costa molt orientar-me. En els mapes no sé on és un sud, més aviat recordo colors. Àfrica, per exemple, és una taca negra, Oceania és de color verd i Japó és una taca groga. Quan tanco els ulls i m'imagino el mapa, veig això; taques de colors. Gràcies a això em recordo del mapa del món.

9.2. SECONDARY INFORMATION

^{iv} Spatial sequence (number form)	= 77/1014	= 7.6%
Graphemes -> colors	= 707/1090	= 64.9%
Time units -> colors	= 252/1090	= 23.1%
Musical sounds -> colors	= 207/1090	= 19.0%
General sounds -> colors	= 163/1090	= 15.0%
Musical notes -> colors	= 90/1090	= 8.3%
Phonemes -> colors	= 86/1090	= 7.9%
Flavors -> colors	= 69/1090	= 6.3%
Personalities -> colors ("auras")	= 69/1090	= 6.3%
Smells -> colors	= 68/1090	= 6.2%
Pain -> colors	= 57/1090	= 5.2%
Touch -> colors	= 41/1090	= 3.8%
Emotions -> colors	= 28/1090	= 2.6%
Temperatures -> colors	= 23/1090	= 2.1%
Orgasm -> colors	= 23/1090	= 2.1%
Emotion -> smell	= 2/1090	= 0.2%
Grapheme personification*	= 45/1090	= 4.1%
Object personification*	= 17/1090	= 1.6%
Emotion -> flavor	= 2/1090	= 0.2%
Emotion -> pain	= 2/1090	= 0.2%
Emotion -> smell	= 2/1090	= 0.2%
Emotion -> temperature	= 1/1090	= 0.1%
Emotion -> touch	= 1/1090	= 0.1%
Flavors -> sounds	= 2/1090	= 0.2%
Flavors -> temperatures	= 1/1090	= 0.1%
Flavors -> touch	= 6/1090	= 0.6%
Grapheme -> flavor	= 1/1090	= 0.1%
Kinetics -> sounds	= 4/1090	= 0.4%
Lexeme -> flavor	= 27/1090	= 2.5%
Lexeme -> touch	= 1/1090	= 0.1%

Musical notes -> flavors	= 3/1090	= 0.3%
Pain -> flavor	= 1/1090	= 0.1%
Pain -> sound	= 1/1090	= 0.1%
Personalities -> smells	= 5/1090	= 0.5%
Personalities -> touch	= 2/1090	= 0.2%
Phoneme -> touch	= 1/1090	= 0.1%
Smells -> flavor	= 2/1090	= 0.2%
Smells -> sounds	= 5/1090	= 0.5%
Smells -> temperatures	= 1/1090	= 0.1%
Smells -> touch	= 5/1090	= 0.5%
Sound -> flavors	= 59/1090	= 5.4%
Sounds -> kinetics	= 5/1090	= 0.5%
Sounds -> smells	= 15/1090	= 1.4%
Sound -> temperatures	= 6/1090	= 0.6%
Sound -> touch	= 43/1090	= 3.9%
Temperature -> flavors	= 1/1090	= 0.1%
Temperatures -> sounds	= 1/1090	= 0.1%
Touch -> emotions	= 2/1100	= 0.2%
Touch -> flavors	= 11/1090	= 1.0%
Touch -> smell	= 3/1090	= 0.3%
Touch -> sounds	= 6/1090	= 0.6%
Touch -> temperatures	= 1/1090	= 0.1%
Vision -> kinetics	= 1/1090	= 0.1%
Vision -> smells	= 14/1090	= 1.3%
Vision -> sounds	= 25/1090	= 2.3%
Vision -> flavors	= 29/1090	= 2.7%
Vision -> Temperatures	= 2/1090	= 0.2%
Vision -> touch	= 18/1090	= 1.7%

^v Words associated to positive emotions can provoke the appearance of colors such as pink, orange or green, on the contrary those which are associated to negative emotions probably evoke other colors like black, brown or gray.

^{vi} In humans, with time, it has evolved in a considerable form. The hippocampus is the area where the sensory character information converges. It proceeds from the different senses and its multisensory evaluation is made. According to Cytowic, this process happens in everybody, but only synesthetes are conscious of it.

^{vii} This activation can be due to two main causes; on one hand, the fact that the synesthetes have excessive connections and, because of that, the adjacent areas communicate better than in “normal” people. On the other hand, the existing connections in everybody – that are not active in “normal” perception, or practically inactive -, are active in synesthetes. This second option would explain the fact that LSD or any hallucinogenic type of drugs could induce synaesthesia. This sensation is not created by a new connection in their brain, they just use connections we all have, but in a different way.

^{viii} Studying the emotional reactions associated to the perception of stimuli of coherent^{viii} color with the evoked ones by synesthetes or incongruously^{viii}, the results were quite clear. Synesthetes are clearly influenced by the color in which the words were written when evaluating, on the other hand, non-synesthetes

were not. In other words, if the word was colored in a coherent form, the results were positive and if it was colored in an incongruous form they were negative.

^{ix} When those who are not synesthetes evaluate a word as positive or negative, what we really do is evaluate the meaning of the word and with this information we decline our answer as positive or as negative. Nevertheless, synesthetes make a different type of evaluation. They do the same as we do with the semantic evaluation and at the same time they make a synesthetic evaluation based on the difference between the real color and that one that they perceive. If both colors are the same, the result is positive and if both colors are different, the answer is negative. If this occurs, the answer will be a lot faster and their electro dermal answer will be minor. If an answer is positive and another negative, the opposite will happen.

^x In some neuroimages studies some participants are given a task. This is done while they are inside a device that detects the blood levels in different areas of the brain and, with powerful algorithms. It indicates the cerebral areas that are more active. With this experiment, you can know which areas are involved in the achievement of the task that has to be considered.

In these types of studies, Scientifics have realized activations in areas related to the color process when synesthetes were carrying out a task in which only black digits appeared. However, this activation was not seen in normal participants.

^{xi} **Art history timeline —a selection of early modernism**

— **Expressionism** began early 1900

— **Futurism** 1909-1924

— **Dada** 1916-1922

— **Surrealism** 1924-1930

— **De Stijl** 1917-1931

— **Abstract Expressionism** 1940-1950

^{xii} . About *'The Scream'*, Munch wrote: *"I was walking along a path with two friends – the sun was setting – suddenly the sky turned blood red – I paused, feeling exhausted, and leaned on the fence – there was blood and tongues of fire above the blue-black fjord and the city – my friends walked on, and I stood there trembling with anxiety – and I sensed an infinite scream passing through nature."*

^{xiii} Russolo presented his musical theories in a manifesto entitled *'L'arte dei rumori'* (The Art of Noises) in 1913 ([12](#)). The noise-generating instruments (hand-activated large scale boxes with megaphones attached) allowed the inclusion of *'noise'* into musical composition. Russolo's first *'art-of-noises'* concert for 18 *'Intonarumori'*, caused a huge scandal in Milan (1914).

^{xiv} This multiple-self-portret represents five images of the artist, a mise-en-scène of a brainstorming session with himself. We see a manifestation of introspection, a reflective moment of pause in a circular tango of

thoughts. Marcel Duchamp said: *"The individual, man as a man, man as a brain, if you like, interests me more than what he makes, because I've noticed that most artists only repeat themselves"*.

^{xv} Picabia made his claim for the power of art not only by suggesting an analogy between painting and music but also by emphasizing that the rules of painting, no less than those of music, had to be learned: *"If we grasp without difficulty the meaning and the logic of a musical work it is because this work is based on the laws of harmony and composition of which we have either the acquired knowledge or the inherited knowledge... The laws of this new convention have as yet been hardly formulated but they will become gradually more defined, just as musical laws have become more defined, and they will very rapidly become as understandable as were the objective representations of nature"*.

^{xvi} Smilack explains that the painting is not a copy of what she hears; rather, when she listens to music, for example, she perceives more colorful textures than she normally does and she is able to depict them in the painting. She also expresses the movement of the music, as its energy influences the pictorial composition.

"I taught myself to take pictures by shooting whenever I experience a synesthetic reaction to what I see: if I experience a sensation of texture, motion or taste, I take the picture. If the reflection elicits the sound of cello, I shoot the picture. I photograph reflections on moving water. It works like this: I watch the surface of the sea until I experience one of my synesthetic responses. When I do, I trust it to be a reliable signal that tells me it is the right time to take the picture, so I click the shutter. Within the creative process, I think of my synesthetic responses as vital messengers that arrive faster than thought to deliver one urgent message which I always heed: beauty is lurking."

"The painting represents the opening of the concerto for four violins. I listen to the music while I paint. First, the music gives me an optimistic, happy feeling and I perceive red, yellow, and orange colors in a great variety with little contrast. It looks like a field of these colors. I perceive the color field as a musical chord. You can compare it with the colors of a blanket or cover made of autumn leaves."

She explains how she perceives the painting:

"The lively movements in the music become a stream of glowing shades of orange. The black structure provides cadence and reveals its significance and character. It is an indispensable foundation for the moving colors. The painting evokes my feelings again when I listen to the music again. I hear the melodies in my mind when I look at it."

^{xvii} He studied Fine Arts at the University of The Americas in Mexico and has produced mixed media art work. He wrote his doctoral thesis on the influence of music and synaesthesia on contemporary painting, presenting at the same time exhibitions of mixed media visual art.

^{xviii} These are some quotes of Kandinsky:

"The more frightening the world becomes ... the more art becomes abstract."

"Color is the key. The eye is the hammer. The soul is the piano with its many chords. The artist is the hand that, by touching this or that key, sets the soul vibrating automatically."

"There is only one road to follow, that of analysis of the basic elements in order to arrive ultimately at an adequate graphic expression."

"Of all the arts, abstract painting is the most difficult. It demands that you know how to draw well, that you have a heightened sensitivity for composition and for colors, and that you be a true poet. This last is essential."

"All methods are sacred if they are internally necessary. All methods are sins if they are not justified by internal necessity."

"Each period of a civilization creates an art that is specific in it and which we will never see reborn. To try and revive the principles of art of past centuries can lead only to the production of stillborn works."

"The true work of art is born from the 'artist': a mysterious, enigmatic, and mystical creation. It detaches itself from him, it acquires an autonomous life, becomes a personality, an independent subject, animated with a spiritual breath, the living subject of a real existence of being."

"The artist is not a 'Sunday child' for whom everything immediately succeeds. He does not have the right to live without duty. The task that is assigned to him is painful, it is a heavy cross for him to bear."

"When [blue] sinks almost to black, it echoes a grief that is hardly human. When it rises towards white ... its appeal to men grows weaker and more distant." -- Kandinsky in his *Concerning the Spiritual in Art* from 1911.

^{xix} **Synaesthesia in Adult Fiction**

Below is a short list of books in which one there is a synesthetic experience; it is copied from wikipedia and not elaborated, because I could not change it.

- [Aylett, Steve](#) (2005). *Lint*. New York: Thunder's Mouth Press.
- [Baudelaire, Charles](#). "Correspondances" in *Les Fleurs du Mal*.
- [Berry, M.](#) (2005). *Blind Crescent*. Toronto: Penguin.
- [Bester, Alfred](#) (1956). *The Stars My Destination*. New York: Vintage
- [Chevalier, T.](#) (1999). *Girl with a Pearl Earring*. Dutton Adult.
- [Ford, Jeffrey](#) (2005). *Nebula Awards Showcase 2005*. New York: Penguin.

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- Forster, E. M. (1911). "The Celestial Omnibus" in *The Celestial Omnibus and Other Stories*. United Kingdom: Sidgwick & Jackson.
 - Halvorson, Eileen (2009). *The Color of Light*. Aonian Press.
 - Herbert, Frank. The *Dune* saga. Synesthesia is experienced by the Atreides family, notably Paul and Leto II.
 - Huysmans, J.-K. (1884; English translation by Robert Baldick, 1959). *À rebours [Against Nature]*. London: Penguin Books.
 - Kernan, B. M. (2002). *The Synesthete*. Lincoln, NE: Writer's Showcase.
 - Moore, J. (2004). *The Memory Artists*. Toronto: Penguin.
 - Morall, C. (2004). *Astonishing Splashes of Colour*. Harper Collins.
 - Nabokov, Vladimir (1991/1938). *The Gift*. New York: Vintage.
 - Neal, J. M. (2007). *Specific Gravity*. Dunn Avenue Press.
 - Neal, J. M. (2008). *Ontario Lacus*. Dunn Avenue Press.
 - Payne, Holly (2005). *The Sound of Blue*. New York: Penguin Group.
 - Parker, T. J. (2006). *The Fallen*. New York: William Morrow.
 - Rimbaud, Arthur. "Les Voyelles".
 - Salzman, Mark *Lying Awake*.
 - Shelley, Mary. (1818). "Frankenstein." London: Lackington, Hughes, Harding, Mavor & Jones.
 - Smith, Dominic (2007). *The Beautiful Miscellaneous: A Novel*. New York: Atria.
 - Vaz, K. (1994). *Saudade*. New York: St. Martin's Press.
 - Vian, Boris (2003). *Foam of the Daze*. Tam-Tam Books. (Former translation: *Mood Indigo*.)
 - Yardley, Jane (2003). *Painting Ruby Tuesday*. London: Doubleday.

Synaesthesia in Teenage/children's Fiction

- Mass, W. (2003). *A Mango-Shaped Space*. London: Little Brown and Co.
- Morgan, N. (2003). *Mondays are Red*. New York: Delacorte.

Synaesthesia in Graphic Novels & Comic Books

- Di Filippo, P., and Ordway, J. (2006). *Top 10: Beyond the Farthest Precinct*. La Jolla, CA: America's Best Comics.
- Moore, A., Ha, G., and Cannon, Z. (2000). *Top 10: Book 1*. La Jolla, CA: America's Best Comics.
- Moore, A., Ha, G. and Cannon, Z. (2002). *Top 10: Book 2*. La Jolla, CA: America's Best Comics.

Non-fiction general audience books

- Ackerman, D. (1994). chapter on "Synesthesia" in *A Natural History of the Senses*. New York: Vintage.
- Baron-Cohen, S. and Harrison, J. (1997). *Synaesthesia: Classic and Contemporary Readings*. Oxford: Blackwell Publishers. ISBN 0-631-19764-8.

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- Cytowic, R. (2003). *The Man Who Tasted Shapes*. New York: Tarcher/Putman. [ISBN 0-262-53255-7](#).
 - Dann, K. (1998). *Bright Colors Falsely Seen*. Cambridge: Harvard University Press. [ISBN 0-300-06619-8](#).
 - Duffy, P. L. (2001). *Blue Cats and Chartreuse Kittens: How Synesthetes Color their Worlds*. New York: Henry Holt & Company. [ISBN 0-7167-4088-5](#).
 - Harrison, J. (2001). *Synaesthesia: the strangest thing*, Oxford: Oxford University Press. [ISBN 0-19-263245-0](#).
 - Luria, A.R. (1968). *The Mind of a Mnemonist*. New York: Basic Books.
 - Lvovich, N. (1997). Chapter 2, "Confessions of a Synesthete" in *The Multilingual Self*. Mahwah, New Jersey: Lawrence Erlbaum Associates.
 - Ramachandran, V.S. (2004). *A Brief Tour of Human Consciousness: From Impostor Poodles to Purple Numbers*. Pi Press. [ISBN 0-131-48686-1](#)
 - Sacks, O. (1995). "The Case of the Colorblind Painter" in *An Anthropologist on Mars*. New York: Vintage.

^{xx} "If I had some paints handy, I would mix burnt sienna and sepia for you as to match the color of a 'ch' sound... and you would appreciate my radiant 's' if I could pour into your cupped hands some of those luminous sapphires that I touched as a child."

^{xxi} "The word would fill her mind for a few minutes with a single color: not an unpleasant sensation but still an intrusion... Patriarch: Brown, she thought, a temple of a word, a shiny red brown, like the surface of a chestnut."

^{xxii} "Without color, he heard nothing. He filled notebooks with the sound of yellow and red. Purple. Green... Like Liszt and Stravinsky, Kandinsky and Rimbaud, Milan shared the multisensory perception of synesthetes, and unfortunately the seizures that about 4 per cent of them endured... Milan's epilepsy resulted from his multisensory experiences."

^{xxiii}

octave	green
seventh	blue-violet
major sixth	fire red
minor sixth	red-violet
augmented fifth	dark brown
fifth	gold
diminished fifth	blue
fourth	brown-yellow
major third	bright red
minor third	gold
major whole tone	black
major whole tone	black
minor second	white
minor whole tone	grey

^{xxiv}

double-octave	black
twelfth	purple
eleventh	blue
octave	green

fifth	red
fourth	yellow
base	white

xxv

red	= tonic
orange	= minor third
yellow	= fourth
green	= fifth
blue	= major sixth
indigo	= seventh
violet	= eighth (octave)

xxvi

C#	Purple
F#	Bright Blue/Violet
B	Blue
E	Sky Blue
A	Green
D	Yellow
G	Orange
C	Red
F	Deep Red
Bb	Rose/Steel
Eb	Flesh
Ab	Violet
Db	Purple (same as C#)
Gb	Bright Blue/Violet (same as F#)

xxvii

B	= (dark) violet
Bb	= agate
A	= violet
Ab	= crimson
G	= red
F#	= orange
F	= golden yellow
E	= yellow
Eb	= olive green
D	= green
C#	= pale green
C	= blue

xxviii

B major	gloomy, dark blue with steel shine
Bb major	darkish
A major	clear, pink
Ab major	grayish-violet
G major	brownish-gold, light
F# major	green, clear (color of greenery)
F major	green, clear (color of greenery)
E major	blue, sapphire, bright
Eb major	dark, gloomy, grey-bluish
D major	daylight, yellowish, royal
Db major	darkish, warm
C major	white

^{xxix} These are the measurements of the intensity and perception of arabesques for the futurists. It is a copied list, because it is exactly what futurists thought.

«The painting of sounds, noises and smells rejects:

1. All muted colors, even those obtained directly and without using tricks like patinas and glazes.
2. The banality of those velvets, silks and flesh tints which are too human, too refined, too soft, and flowers which are too pale and drooping.
3. Greys, browns and all muddy colors.
4. The use of pure horizontal and vertical lines, and all other dead lines.
5. The right angle, which we consider passionless.
6. The cube, the pyramid and all other static shapes.
7. The unities of time and place.

«The painting of sounds, noises and smells calls for:

1. Reds, rrrrrreds, the rrrrrreddest rrrrrreds that shouuuuuut.
2. Greens, that can never be greener, greeeeeeeeeeens that screeeeeeam, yellows, as violent as can be: polenta yellows, saffron yellows, brass yellows.
3. All the colors of speed, of joy, of carousings and fantastic carnivals, of fireworks, cafe-chantants and music-halls; all colors seen in movement, colors experienced in time and not in space.
4. The dynamic arabesque, which is the sole reality created by the artist in the depths of his feeling.
5. The clash of all the acute angles, which we have already called the angles of will.
6. Oblique lines which fall on the observer like so many bolts from the blue, along with lines of depth.
7. The sphere, the ellipse that spins, the upside-down cone, the spiral and all the dynamic forms which the infinite powers of an artist's genius are able to uncover.
8. Perspective obtained not as the objectivity of distances but as a subjective interpenetration of hard and soft, sharp and dull forms.
9. As a universal subject and as the sole reason for a painting's existence: the significance of its dynamic construction (polyphonic architectural whole). Architecture is usually thought of as something static; this is wrong. What we have in mind is architecture, similar to the dynamic musical architecture achieved by the Futurist musician Pratella. Architecture is found in the movement of colors, of smoke from a chimney, and in metallic structures, when they are experienced in a violent, chaotic state of mind.
10. The inverted cone (the natural shape of an explosion), the slanting cylinder and cone.
11. The collision of two cones at their apexes (the natural shape of a water spout) with flexible or curving lines (a clown jumping, dancers).
12. The zig-zag and the wavy line.
13. Ellipsoidal curves considered as straight lines in movement.
14. Lines and volumes seen as plastic transcendentalism, that is, according to their characteristic degree of curvature or obliqueness, determined by the painter's state of mind.

15. Echoes of lines and volumes in movement.

16. Plastic complementary (for both forms and colors), based on the law of equivalent contrasts and on the opposite poles of the spectrum. This complementary derives from an imbalance of forms (which are hence forced to move); from the consequent elimination of the complements of volumes. We must reject these because like a pair of crutches they allow only a single movement, forward and backward, and not the total movement that we call spherical expansion in space.

17. The continuity and simultaneity of the plastic transcendence of the animal mineral, vegetable and mechanical kingdoms.

Abstract plastic wholes, corresponding not to our sight but to the sensations which derive from sounds, noises, smells and all the unknown forces that surround us»

xxx

Colors	Musical timbres
Yellow	Trumpet; Sound of the fanfare
Azure	Flute
Blue	Deep sounds from the organ
Dark blue	Cello
Very dark blue	Bass
Green	Middle tones of the violin
White	Temporary pause
Black	Conclusive pause
Gray	Lack of sound
Bright red	Fanfare; Tuba/Horn
Crimson red	Drum-roll; Tuba/Horn
Cool red	Medium and deep tones of the cello
Bright cool red	Other tones of the violin
Orange	Middle bells of the church; Strong contralto voice; Viola
Violet	English horn; Bagpipe
Deep purple	Deep tones of the woodwinds; Bassoon

^{xxx}i Messiaen left some explanations of his art work, mostly in *Vingt Regards sur l'Enfant Jésus*; he refers to blue-violet in V, orange, red and a little bit of blue in XIII, pink and mauve in XVII, etc. The colors are seen related to the evolution of the music.

^{xxx}ii "Yellow matter custard, green slop pie; all mixed together with a dead dog's eye. Slap it on a butty, ten foot thick; then wash it all down with a cup of cold sick".

^{xxx}iii These explanations refer to Harry Smith's abstract movies. They describe the movie with clear details.

Since *No. 1* appears to be very freeform in its structure, the next two move towards a more calculated mode of abstraction: in *No. 2* (ca. 1946-48), circles swoop across the frame and swarm within it. The film uses many more geometrical forms than the first, and structures them into occasional motifs, thus creating a more insistent rhythmic pulse. Yet the rhythms are never tightly structured into entirely predictable patterns: some movements are more random, thus retaining a sense of freeform abstraction. The structural mode of

arrangement seems to be directly referenced in the predominant grid motif of *No. 3* (ca. 1947–49). Simple grids at the beginning intermingle with other shapes, such as diamonds. As the film progresses, grids intermittently grow more complex and dominate the screen, occasionally expanding to reveal vibrant colored cells.

^{xxxiv} It begins with two small circles dancing in tandem across the screen, as well as decreasing and increasing in size to give an impression of depth. These are joined, via superimposition, by two simple grilles, and then by a larger grille which swishes from left to right and vice versa at such a speed to produce a blurred effect. Gradually the forms become more complex: larger, more elaborate grilles as well as clusters of less geometrically precise dots. The simple, regulated forms become more indistinct and murky through alchemical transformation.

^{xxxv} The film also bombards the viewer with a number of alternating color transitions used in conjunction with shapes that emerge from deep screen space. In addition to using moving circles and circular patterns, the pace of movements and color alternations intensify at various moments, as though attempting to overwhelm the viewer's sensorial apparatus.

^{xxxvi} Smith had built a projector with color filters to tint the images, whilst he also planned for the entire film to be projected through a series of masking slides, which would transform the shape of the film. These slides were modeled on important images within the film, such as the recurrent watermelon or egg symbols. Apparently this only occurred for a single preview screening at Steinway Hall in New York. Smith also wanted to design seats in the shape of important motifs from the film (such as the watermelon) and to electrically manipulate the movement of the seats in accordance with the shapes and colors on screen. Such an ambitious plan, which would have greatly extended Smith's sensorial assaults, unfortunately never materialized.

The themes of mentality and divination run through *Heaven and Earth Magic*, which features a loose story in which a woman chases a dog who has stolen her watermelon. After going to a dentist she then begins to experience a number of hallucinations under anesthetic (directly referencing Smith's interest in the work of Canadian neurologist Dr Wildner Penfield, whose brain surgery on epileptics supposedly produced visions).

^{xxxvii}

These are the minutes of the movie where Remy's synaesthesia is seen. The first number is the number of the track from the CD "VIDEOS".

8. 2:11 min - 3:00 min: He explains he has a highly developed gift of taste and Shell.
9. 4:36 min - 5:00 min: Each flavor for him is a color and a combination of flavors is something new.
10. 5.44 min - 6:14 min: Cheese goes great with rose-Mary, a mushroom...
11. 6.40 min - 7:00 min: He associates circles with the taste of the mushroom.
12. 23.42 min - 24.00 min: He fixes the soup because of the smell and because he knows what ingredient goes good with another ingredient.
13. 1:36:00 min - 1:36:40 min: The taster reminds his infancy because of the taste of the food (thing which is normal in almost everybody)

These are the moments where Grenouille's Developer sense it demonstrated. The first number is the number of the track from the CD "VIDEOS".

14. 3: 47 min - 3:51 min: A fleeting realm of scent.
15. 5:26 min - 5:26 min: When he is born, he smells everything around him and somehow, that is what gives him life. He is born to smell.
16. 7:33 min - 7:48 min: A boy from the orphanage spreads his finger out to touch him and Jean Baptiste grabs his finger, being only a baby.
17. 8:58 min – 11:38 min: He is already five years old, but he still does not talk. He smells everything: apples, sticks, leaves... He can even smell an apple which is about to hit him. When he finally does talk, he can not find the words to describe his smell.
18. 13:30 min - 15:01 min: It is his first time in the city and he smells absolutely everything.
19. 17:18 min: He smells a woman, which he follows. First, when he is so close to her that she notices the presence, he smells her palm and she runs away, but he finds her again and without willing he kills her. When he sees the body on the floor he starts smelling her, until one point, when he realizes that that woman has lost her smell. He is deceived and leaves thinking about a way to save that smell.
20. 32:10 min - 42:52 min: He knocks on a perfumer's door with the excuse that he brings him skins from where he works. He smells everything in the perfumer's house. He asks the perfumer if he wants a sample of his opponent perfume and the perfumer surprised, believes he can not do it. When he recreates the same perfume, the perfumer can not believe it. Jean Baptiste asks him if he wants a *real* perfume, and makes a very good one. The perfumer kicks him out and without knowing what to say, he puts the perfume on; he feels as he is in the middle of a beautiful garden with a woman giving him a kiss.
21. 1:50:20 min - 2:05:00 min: He is supposed to be killed for all his murders, but when he puts on some perfume, everybody is pleased to see him and everybody kneels down to his feet. When he throws the handkerchief full of perfume, everybody wants to grab it. When they already have it, they start an orgy. At this point, Jean Baptiste understands that it does not matter to have a beautiful perfume, if you can not have love, or be loved.
22. 2:07:28 min - 2:08:21: He goes back to where he was born, to disappear. He could have whatever he wants in the world, except of love, and if he can not have this, he does not believe he should live.