

Today's Media Art in the light of Kandinsky's theory of interactivity

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Introduction

Imagine a space, it can be a building divided into many rooms, or it can be a virtual place that people can enter through the screen. The space is full of shapes, lines and points of various sizes. Some of them have colour and some are white or black. These shapes seem to move interactively with internal tensions, line dance with the line, colours are pushing and pulling the eye. People walking through the space gradually realize that it is full of living. These shapes, lines and points invite people to generate some attention and to have a conversation. How people can communicate with these objects? Perhaps the same as they would communicate with the stranger: at the beginning carefully examining it and gradually exploring a way to understand it. People go from object to object exploring and changing them, and trying to understand their metaphors. Then people go away, they are not the same as they used to be. Communication with these moving shapes and dancing lines changed them. Why did they come?

Kandinsky was one of the first artists who observed that there is no interaction between art work and viewers. Therefore, with scientific precision he explored characteristic of point, line and plane that could engage the sight, emotion and mind of the public. Kandinsky tries to find a way to create a dialog between the viewer and the art work by using the point, the line and the plane. Arjen Mulder writes that Kandinsky figured out how the line operates in the two dimensional force field and interactive art continues its research. Moreover, Arjen Mulder elaborates that Kandinsky provided us a model for media art. Therefore the question arises:

how can today's media art be seen in the light of Kandinsky's theory of interactivity?

To answer this question it is important to describe the concept of interactivity and see how it is corresponding with Kandinsky's attempt "to find a living [and] make its pulsation perceptible". Moreover, visual perception plays an important role in understanding how interactivity can occur. To see how media art can be seen in the light of Kandinsky's theory of the point, the line and the plane it is important to describe the fundamental points of his ideas. Finally, in the book *Point and Line to Plane* Kandinsky gives examples of the point and the line in other forms of art than the painting. In this thesis, these examples will be compared with today's media art projects that explore the same forms of art.

Concept of interactivity

In the English Oxford dictionary, the word interactive is defined as two people or things influencing each other, or two way flow of information between a computer and a computer user. This definition of interactivity is too narrow to interpret all processes what happens when interactivity occurs.

Arjen Mulder writes that “interactivity is a concept, a way of working.” In other words, interactivity is an idea and its representation. Interaction requires an object that people could interact with or through. Therefore interactivity can be achieved in any medium: painting, sculpture, computer, electronics etc. Arjen Mulder describes two forms of interactivity: first, behavioral interactivity and second, often forgotten one, formational interactivity.

Behavioral interactivity

Arjen Mulder explains interactivity using the biologist’s Jacob von Uexküll example with tick. A tick sits at the end of a branch and falls or jumps off as soon as it smells butyric acid. The tick’s senses register what Uexküll calls “perceptual signs” from the outside world and converts them into “operational signs,” or specific actions. Arjen Mulder writes that life consists of discovering perceptual signs that could be converted into operational signs. He elaborates further: “To live is to interact, and interaction means discovering perceptual signs you can convert into operation signs, things you have to do, agency.”

Creating an interactive art work means making perceptual signs that allows a range of responses. Operational signs are unpredictable because they are a part of an environment of other people, not of the artist. It is because an artist cannot build a model of every viewer’s environment, he cannot see into their minds. Therefore, an interactive artwork is never completed, every interaction is different and a final state is never reached.

Formational interactivity

The second form of interactivity Arjen Mulder describes as “interactivity that produces form”. He calls this form – finding interaction “formational interactivity”. Art is about material form, and material is the combination of matter and energy that is able to organize itself. Arjen Mulder explained form – finding further with examples where artists claim that they let their work to design itself. One of these artists is Kandinsky. He saw form - finding

as the job of painting. Kandinsky saw the plane as a living being where primitive organisms (point and line) organize themselves and give birth to a new living organism. Other examples that Arjen Mulder gives are Antonio Gaudi, Frei Otto and Lars Spuybroek, for them form – finding is an architectural working method. They allow their buildings to design themselves. Form – finding in literature is the situation when authors claim that their novels seemed to write themselves. This phenomenon requires intuition, perceptive mind and patience. Arjen Mulder explains this phenomenon: “the artist’s craft involves matter and energy informing the artist as much as him or her informing and giving form to them.” Interactivity means changing each other.

Communication is interactivity

According to Arjen Mulder, communication by changing each other is a definition of interactivity and interactive art. We communicate with each other by using metaphors and we understand each other by using the same metaphors. Changing each other by communication means constantly accepting and finding new metaphors. According to Arjen Mulder, we need outsiders and strangers if we want to keep our metaphors flexible. Therefore we have art that expresses feelings, emotions and experiences that can hardly be converted into language. Art allow us to transmit presentational knowledge.

In the case of painting communication occurs through decoding the meaning in it. That meaning always spurs the viewer to do some work, generate attention, to begin investigation of the world. Ken Smith writes: “to interpret the meaning that is expressed through every visual element: shapes seeming to move interactively with internal tensions, line dancing with line, colour pushing and pulling the eye, and illusionistic clues to space in tensions with the paper <...> It is the viewer’s responsibility to focus on these tensions and interpret their role in communication.”

Painting and interactive art takes the line as a model. This is why according to Arjan Mulder, Kandinsky is so interesting today: “Kandinsky figured out how the line operated in the two-dimensional force field. Interactive art continues its research in a three-dimensional possibility space. The focus is still line, woven and spun out into a network this time.”

Interactive art craves possibilities for action by human beings and objects, human beings and media, human beings and networks. An interactive work is successful if it manages to create something that was not present before the interaction. Arjen Mulder describes it as follows:

“Interactive art’s object of investigation is the ability of materials and processes to create new virtual spaces of behaviour or open them for shared use.” When the mind is triggered by an interactive work and it becomes active, communication turns into interaction. Interactivity and visual perception

Interactivity and visual perception

Susanne K. Langer’s philosophy resulted in a new understanding of visual perception and interaction with the viewer, provoking significant changes in art. Her theory gave tools to artists to create interactivity with a viewer. Susanne Katherina Langer was an American philosopher, who wrote about mind and art. Her philosophy explores the continuous process of meaning – making in the human mind through seeing one thing in terms of another. She writes about the process of abstraction, which goes on all the time in the human mind. Susanne Langer was one of the first philosophers who explored the concept of virtual. Her publications offeres the reader a systematic, comprehensive theory of art applied to painting, sculpture, architecture, literature, music, dance and film.

What does it mean; the continuous process of meaning making in the human mind through seeing one thing in terms of another? To begin with we have to realize that fixed form does not exist. The idea that there is such a thing as stable form is only the assumption. That would suggest the idea that vision is not dynamic. In this perspective vision is passive, simply registering something that is just there. But Susanne Langer reminds us that we see things we do not actually see. We all know it, but we tend to call it an illusion. That raises the question about the nature of our perception. It also suggests the idea that vision is actually dynamic itself.

“Susanne K. Langer’s example of spiralling, vegetal motifs we see in a lot of traditional decorative art states obvious: we do not see spirals we see spiralling. We see a movement that flows through the design.”¹ Forms are not moving but we also cannot ignore the fact that we see a movement when we look at them. Can we call it an illusion?

In the interview with Brian Massumi, who refers to Langer’s philosophy, this seeing of movement in a motif is explained as abstraction: “Instead of calling it an illusion – this movement that we cannot actually see but cannot not see either – why not just call it abstract?” Massumi elaborates further that reality and abstraction supplement each other. He

¹ Massumi, Brian. “The Thinking-Feeling of What Happens: A Semblance of a Conversation.” *Inflexions*. Web. 5 Oct. 2014.

explains that we see movement because of design being there and if we saw an actual design we would not be seeing what it is we are seeing – a motif.

Seeing is something that we do, it is a kind of action. We do not just register the surface of what we see, we see a potential of our bodies for example to walk around. Seeing an object is seeing through its qualities. If it is a 3D form we see volume, we see the other side without actually seeing it. Brian Massumi explains this quality of seeing as follows: “With every sight we see imperceptible qualities, we abstractly see potential, we implicitly see a life dynamic, we virtually live relation...◁ It’s an event. An object’s appearance is an event, full of all sorts of virtual movement. It’s real movement, because something has happened: the body has been capacitated. It is been relationally activated. It is alive in the world, poised for what may come. This is also “seen” – there’s a sense of aliveness that accompanies every perception. We don’t just look, we sense ourselves alive.” This is the aliveness what Susanne Langer explored. The philosopher wrote that paintings create virtual spaces: the space in a painting is not the real (flat) space of the canvas, but the virtual or imagined space the viewer sees.

Susanne K. Langer’s philosophy and Gestalt theory gave us a new understanding of visual perception. It resulted in a capability to show life dynamics with and through actual form and take viewer to virtual space.

Wassily Kandinsky and the theory *Point and line to plane*

Wassily Kandinsky, media art and code

Kandinsky refers to the future technological development in his theory *Point and Line to Plane*. As the painter tries to express his technique in numeric expression, he discovers the limited possibilities of measurement. Therefore he writes in his theory: “We today lack the possibilities of measurement which some day, sooner or later, will be found beyond the Utopian. From this moment on, it will be possible to give every composition its numerical expression, even though this may at first perhaps hold true only of its "basic plan" and its larger complexes.” Further, the painter elaborates that only when numeric expression is conceivable, the exact theory of composition can be realized. The beginning of numeric expression lacks complexity that will be possible in the future.

The future that we are in now brings these possibilities that Kandinsky was writing about, he was standing at the beginning of numeric expression. Where do we stand now? Casey Reas writes: “today, media artist think in code or use software that is based on a code. There are many types of code.” In this context it is important to elaborate on a code that represents series of instructions. This type of code is often called algorithm, procedure, or program – defines a specific processes with enough detail to allow the instructions to be followed.²

Software is a tool for our mind. The software’s resources and techniques at our disposal allow us to access and process enormous quantities of information.³ Software is a tool to extend our intellect. It gives us possibilities that Kandinsky was referring to.

In the 1940s, code was used to assist work in the fields of science and engineering. In the 1980s personal computers were introduced to the market, allowing programming to reach a wider audience. Therefore, many artists began to experiment with a given “tool”. The influence of code is not limited to the screen and projected image.⁴ It is also felt in physical space.⁵ It is used to control elements of products architecture, and installations.⁶

^{2,3,4,5,6,7} Reas, Casey, Chandler McWilliams, and Jeroen Barendse. *Form Code in Design, Art, and Architecture*. New York: Princeton Architectural, 2010.

Drawing with the computer is based on the same elements as Kandinsky referred to in his theory. Point and line can be created by using a coordinate system, giving a numeric value. In 1963, Ivan Sutherland introduced graphic user interface with his sketchpad. Sketchpad was much more than an analogue of paper and pen.⁷ The software allows a designer to create lines, draw polygons, circles, arc etc., move, duplicate, rotate them to create new compositions. The user was able to instruct the computer to interpret movements of the pen; therefore there was no need to describe elements in numeric terms every time. Computer aided design systems allowed designers to draw using mathematical lines and curves that had a big influence on productivity, speed and efficiency.

With the increasing capacities and computers being able to interpret given algorithms we reached the future that Kandinsky was writing about. Now we are able to create endless compositions and express “rhythmic life”.

The theory *Point and line to plane*

Wassily Kandinsky was one of the pioneers of abstract modern art. He explored the interrelation between colour, form, line direction and intensity of the point to create an aesthetic experience. In this way the artist engaged the sight, sound and emotions of the public. The painter believed that total abstraction offered the possibility for profound and transcendental expression. Hilla Rebay wrote: “As his last paintings prove, with intense concentration, Kandinsky increasingly refined the precision of balance in the given space of the painting, as the innermost powerful essence of its rhythmic tension. <...> . He found that a non-objective painting's rhythmic life, expressing creative invention, can be profound if done by a visionary master. It can also have a strong ordering influence on the observer.”⁸ On the contrary, copying from nature only interferes with the experiencing what painting can offer. It only provides stillness and transmits one message that does not have any influence on the viewer’s mind. Therefore, Kandinsky wrote: “Contrary to the static form-ideal of painting which prevailed in the past millennium, where the subjective object was immediately perceived as a whole and graphically recorded by the intellect, always directed objectively earthward, the moving form-ideal of today sets into motion the eye in any desired direction of the rhythmic non-objective creation.”⁹

^{8,9} Kandinsky, Wassily, and Hilla Rebay. *Point and Line to Plane*. New York: Dover Publications, 1979.

Kandinsky was the first who proclaimed his principles of painting in a book Point and Line to Plane. With scientific precision painter describes characteristics (that he calls sound) of a point, line and their interaction within a plane. He explained how to evoke rhythmic life and engage viewer's mind with the composition of primary forms, line and point.

Kandinsky's art and ideas inspired many generations of artists: his students, later such painters as Jackson Pollock, Philip Guston, Mark Rothko and many other twentieth century artists. Kandinsky's ideas are relevant today as well, thought from the painting they shifted to media art. For example the artists/ engineers Golan Levin and Scott Snibbe refer to Kandinsky's theories in his investigation in interface to "engage the unconscious mind directly". In work of many other artists Kandinsky's ideas are still visible and perhaps functioning even better than in a painting.

Concept of the point

The point preserves its fundamental geometrical properties – invisibility and position¹⁰, therefore it can be defined as an incorporeal thing. To Kandinsky, a geometric point considered in terms of substance is equal to zero. But what form point embodies in a painting /graphic art?



Fig. 1. An example how other form defines the size of the point. Wassily Kandinsky. 1923

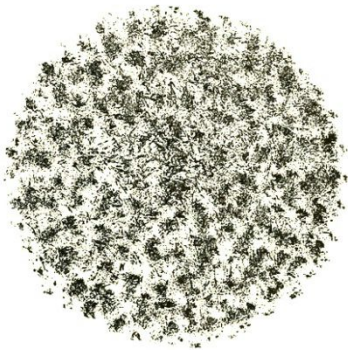
First of all, the point in painting/graphic art is a result of a collision with the tool and material plane. Kandinsky defines a point as the smallest, indivisible or the briefest elementary form, the proto – element of painting and especially of the “graphic.” The term smallest in his theory is relative. The painter raises the question where is the boundary between point and plane. The point can grow and occupy all area; the point appears as a plane. The size of a point can be defined by other forms next to it.

Secondly, Kandinsky talks about the external form of the graphic point. He writes that abstractly or imaginatively, the point is thought of as ideally small, ideally round. In reality, it is an ideally small circle. Nevertheless, just as in the case of its size, its limits are equally relative. In its material form, the point can assume an unlimited number of shapes: it can become jagged, it can move in the direction of other geometric forms, and finally develop into entirely free shapes.

¹⁰ “Geometry Restored.” *Beaugrande*. Web. 18 Oct. 2014.



Thirdly, Kandinsky emphasizes the importance of the texture of an element. The texture affects the manner it is visually combined with other elements and with its graphic context. Kandinsky writes that texture possibilities should be given even in the limited field of the point. Despite that the point is the smallest element it can display different sound depending on how it was created.



Time in the point

The element of time in the point is almost completely eliminated due to lack of mobility on and of the surface. The element of time in special cases of composition makes the point inevitable. Kandinsky writes that its use here corresponds to the sharp blow on a kettledrum or a triangle in music, or to the short tap of the woodpecker in nature.

Tension in the point

The graphic point has an inner tension. Kandinsky writes that the tension within the point constitutes the element. Each individual graphic or pictorial form is an element. Materializing that element forces tensions which are alive within it.

Furthermore, Kandinsky elaborates on the energy that graphic element has inside. He claims that if these tensions were to disappear or to expire, the work, which is alive at that very instant, would die. On the other hand, every accidental grouping of several forms could be called a work of art. The content of a work of art finds its expression in the composition: that is, in the sum of the tensions inwardly organized for the work.

To conclude, the energy that is in the point also develops to the outside. This energy hurls itself upon the point which is digging its way into the surface, tears it out and pushes it about the surface in one direction or another. The concentric tension of the point is thereby immediately destroyed and, as a result, it perishes and a new being arises out of it which leads a new, independent life in accordance with its own laws. This is the Line.

Point in media art

Dance

Kandinsky writes that point appears in other art expressions. Writing about point he gives example of a dance performance. First of all, he writes about classical ballet: “The rapid running on the toes leaves behind on the floor a trace of points. The ballet dancer leaps to a point above, clearly aiming at it with his head and, in landing, again contacts a point on the



Fig. 5. “A leap of the dancer Palucca”. Kandinsky. 1923

floor.” Secondly, he compares classical ballet with modern dance. He examines “modern” leap by giving a schematic drawing of a dancer’s leap. Kandinsky writes: “the “modern” leap frequently forms a five-pointed plane with its five extremities — head, two feet and two hands, whereby the ten fingers form ten smaller points. Furthermore, the brief states of rigid immobility can be looked upon as points. Thus we have active and passive point formations which bear a relationship to the musical form of the point.”

Today’s media artist attempts to visualise dance performance using what Kandinsky called the smallest form – the point. United Visual Artists in collaboration with contemporary UK dance group Mimbres create an eight minute live abstract performance out of points. UVA uses 3D cameras to capture the physicality of movement of the dancers on stage. This information is translated in real time to abstract white forms made out of points on a large – scale backdrop. The combination of movement of the dancers and information that is translated through the point creates a monumental performance. Where viewer can see point’s tensions organizing it into abstract form or recognisable shape and interacting with the dancers.



Music

Kandinsky writes that “points can be produced in music with all sorts of instruments — especially the percussion instruments. The piano, however, enables the creation of finished compositions exclusively by means of the combination and the sequence of tonal points.” Therefore, the painter gives examples of a translation of music pieces into points.



The same point of view of visualising sound with the point is seen in the project called *Messa di Voce*. Though this project does not deal with sound made by instrument it reflect the idea of point as an agent of sound. Golan Levin's software augments the speech, shouts and songs with real time interactive visualizations.

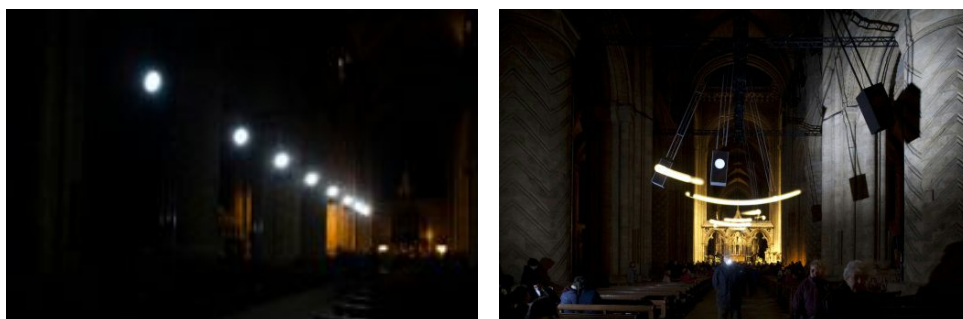
The project touches on the theme of abstract communication. Bespoke software transforms every vocal nuance into correspondingly highly expressive graphics. *Messa di Voce* lies at an intersection of human and technological performance extremes, melding the unpredictable spontaneity and extended vocal techniques of human improvisers with the latest in computer vision and speech analysis technologies. Utterly wordless, yet profoundly verbal, *Messa di Voce* is designed to provoke questions about the meaning and effects of speech sounds, speech acts, and the immersive environment of language.¹¹

Every abstract sound that is produced by the performer is recorded and displayed on a backdrop. At the beginning points have a gravity that keeps them on top of a backdrop. In time the inner tensions of points become visible and they start independently behave on a backdrop by releasing recorded sound.



Fig. 8. "*Messa di Voce (Performance)*". Golan Levin and Zachary Lieberman, 2003

Another good example of music visualisation is *Chorus* project by United Visual Artists. This project deals not only with music but with the given space as well. With *Chorus* UVA



created a kinetic installation that produces a hypnotic performance. Eight tall black pendulums swing back and forth, simultaneously emitting light and sound.¹² United Visual In

¹¹ "*Messa Di Voce.*" *Flong*. Web. 8 Oct. 2014.

this project is visible another property of point that Kandinsky refers to – the point’s ability to give birth to the line.

Kandinsky’s ideas that dance and sound can be represented with point are visible in today’s media art. Here point is represented in real time visualizing sound and dance performance. On one hand, some characteristics of the point are visible instantly, on the other the texture of the point that was describe earlier is not applicable anymore. Point’s characteristics depend on the process of its creation, and media artists use different tools to create the point.

¹² “Chorus.” *United Visual Artists*. Web. 2 Nov. 2014.

Concept of the line

Geometrical line is an invisible thing. Kandinsky sees the line as a derivative element from moving point. Line can be considered as the track of the moving point that signifies the visual transition from static to the dynamic. The characteristic visual property of the line becomes an ability to evoke motion. The line is the antithesis to the static point, as motion is antithesis to position. Our eyes follow the line as they stop at a point. Kandinsky categorises lines into straight, angular, curved.

Straight line

Kandinsky describes generative cause of a line as action of one external force to a point. This line has a length of infinity. Therefore its tension represents the most concise form of the potential for endless movement. Typical straight lines can be horizontal vertical or diagonal. Kandinsky sees the horizontal line as a flat supportive base while the vertical line is a complete contrast, it has height. Diagonal line derives from both of them. According to Kandinsky, lines can be characterized by the centre into centric and acentric. Different arrangements of lines can be used in painting, architecture etc. where object needs to be organized in relation to particular centre. Different arrangements of lines lead to visual effect of pictorial depth.

Angular line

Kandinsky recognises angular lines as a more complex movement of a point influenced by two external forces. Moreover, an angular line is considered as one line. When the moving point changes its straight course this action gives a notion of external force. Kandinsky describes how a given context interacts with the straight line and changes its form. An angular line is created by alternate action of two forces. A curved line is created by simultaneous action of two forces.

Curved line

Kandinsky wrote that curved line is generated from simultaneous action of two forces on the point where the one force acts steadily and continually and exceed the other. This type of line tends to close itself. The simple curved line and the simple straight line have different characters. The straight line expresses the infinity, an endless movement. On the contrary,

curved line has an elastic character. Therefore, these two types of lines constitute the primary contrasting pair of lines. An angular line has a straight segments and a curved line lacks this quality.

Complex lines

Kandinsky attempts to express the constructive power the parallel principle and the principle of contrast. The visual outcome is more complex and gives a notion of different rhythms. In complex combinations individual characteristics of lines become more obvious. Line has another characteristic; it tends to close itself and form in more solid structure the shape.

Texture in the line

Kandinsky treats the edges of the line as two independent lines that are not necessarily continuously parallel or straight. Therefore the outer lines can be considered as having a shape. They can be smooth, jagged, rounded line etc. All of these characteristics can be used in the three types of lines – straight, angular and curved – and each of the two sides can have a special treatment.

The weight of a line is also significant to Kandinsky's theory. He names it emphasis. This linear accentuation can be gradual or spontaneous, increased or decreased in strength. The use of emphasis enables the line to attain the shape necessary at the moment.

Time in the line

The element of time in the line is much greater than in the case of the point. The length of the line is a concept of time. On the other hand, the time required to follow the straight line is different from that required for a curved one, even though the length is the same. The more animated the curved line becomes; the longer is the span of time it represents. The possibilities of using line as a time element are various.

Tension in the line

Kandinsky writes that the point is rest and the line is inwardly animated tension created by movement. The two elements developed their language which cannot be explained with words. The exclusion of "trimmings," which hush and obscure the inner sound of this message, lends the greatest brevity and precision to pictorial expressions. The pure form carries more tension and is able to dispose the living content.

The line is the clearest and simplest case of creative process. Creative process in this case is when the action of the force on the given material brings life into the material (e.g. stroke of the pencil on a paper), which expresses itself in the tensions. The tensions permit the nature of the element to be expressed. An element is the objective result of the action of the force on the material.

Kandinsky elaborated on tensions of different lines as well. The straight line has two distinct primitive tensions which play an unimportant role in case of the curved line. Tension in straight lines is minimal as straight lines are silent lines. Silence represents stillness. In a curved line tension resides in the ark and produces sound.

Line in media art

Music

As with the point Kandinsky emphasizes that line can be used in other forms of art not only in a painting. He writes that a more or less precise translation of line's characteristics can be found in other means of arts.

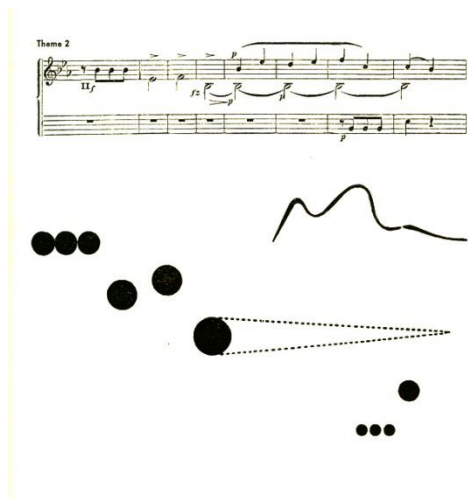
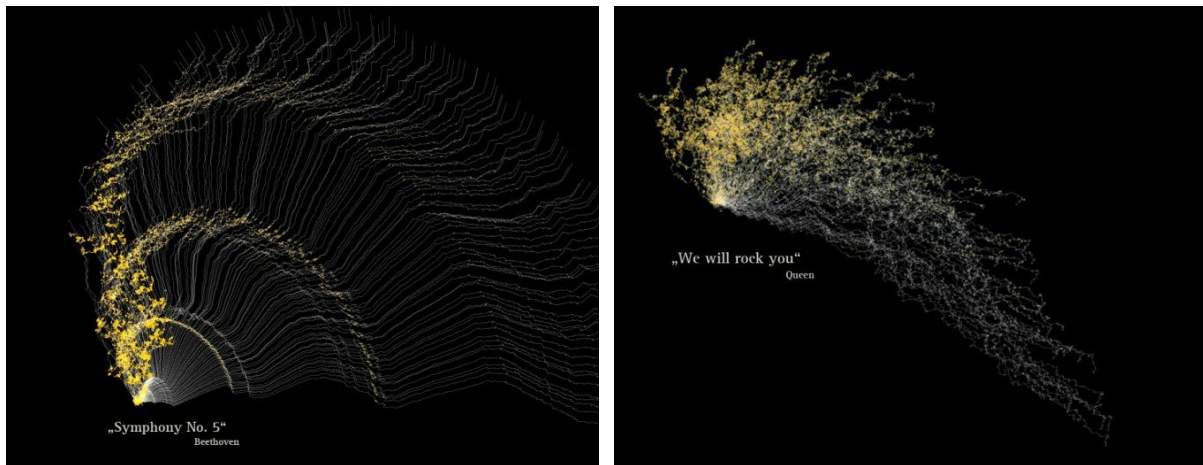


Fig. 10. "Theme 2 translated into points". Wassily Kandinsky. 1923

Kandinsky writes that most music instruments are of a linear character. He gives an example of organ and piano. Organ according to Kandinsky is "line" instrument and piano a "point" instrument. As shown in the example above Kandinsky attempts to translate music in line and point. He further elaborates that in music the line supplies the greatest means of expression. Kandinsky writes that line manifest itself here in time and space just as it does in painting. Moreover he comments on graphical music representation that is common to use. Kandinsky

talks about musical notation and he writes that it is nothing other than various combinations of point and line. He elaborates further that only one way to arrive at graphic expression is analytic separation into fundamental elements.

This separation is visible in “Narrative 2.0” created by Matthias Dittrich. Code allows people to experience music in a visual way. Therefore the frequencies of a music piece are analysed frame by frame. The frequencies are laid out fan like, symbolizing the growth of music building up to the main theme. The increase the emphasize of significant patterns of the music a highlight was added. The goal of the visualization was not to create a deconstructive code. The established system should rather enable the music to become a visual artist by itself, creating an aesthetic response to its music.¹³



The same point of view of visualising music is seen in Martin Wattenberg’s work. Artist writes software called “The shape of song” that tries to visualise music. The custom software in this work draws musical patterns in the form of translucent arches, allowing viewers to see literally the shape of any composition available on the Web. The resulting images reflect the full range of musical forms, from the deep structure of Bach to the crystalline beauty of Philip Glass.¹⁴



¹³ “Narratives 2.0.” Matthias Dittrich | *interaction Design Portfolio*. Web. 9 Oct. 2014.

¹⁴ Maeda, John. *Creative Code*. New York, NY: Thames & Hudson, 2004.

Fig. 12. “The shape of song” Martin Wattenberg. 2001

Dance

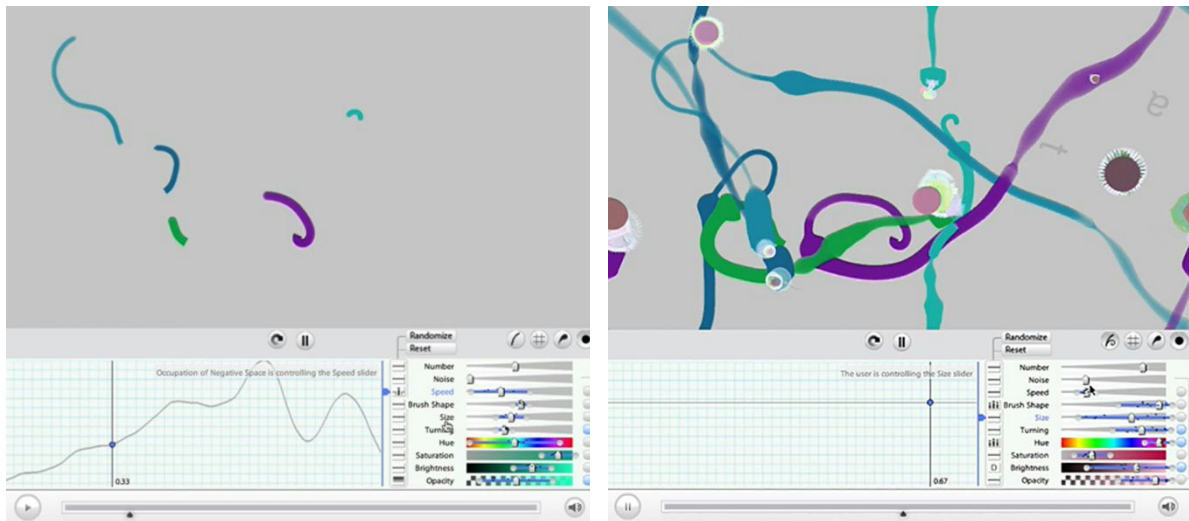
Kandinsky writes that in the dance, the whole body and every finger draws line with very clear expression. He elaborates that the “modern” dancer moves about the stage on exact lines. The entire body of the dancer is at very moment an uninterrupted composition of lines. Kandinsky writes that all people at every stage of their “evolution” work with line in the dance.

Motion Bank is a project that aims to share motion capture data from choreographies online. They believe that data visualizations can show invisible aspects of the dance. During this project Amin Weber created digital adaptation to a dance performance “No Time to Fly”.¹⁵ By using motion tracking technology artist translates dancers’ movements into animated data. This project illustrates Kandinsky’s vision that “the dancer is at very moment an uninterrupted composition of lines.”



¹⁵ “Using the Sky.” *Motion Bank*. Web. 5 Oct. 2014.

Another project that visualizes dance data is synchronous objects. This database deals with series of objects that work in harmony to explore choreographic structure, reveal their patterns and reimagine what else they might look like. One of these exploratory works was made by Matt Lewis. He used data from dancing performances as an inspiration to create drawing tool. Drawing tool used data from the dance to drive the motion of the “paint brushes” that creates interesting animations and ultimate drawings. ¹⁶



Another visualization that was created during synchronous object project is “Alignment Annotations” that elucidates the dancers’ structures. This information graphic represents all of the movement materials cueing between dancers, and sync-ups that occur over the full length of the dance. It allows to examine discrete patterns of occurrence, repetition, and stillness that may be hard to perceive and retain purely by watching the dance. It was created

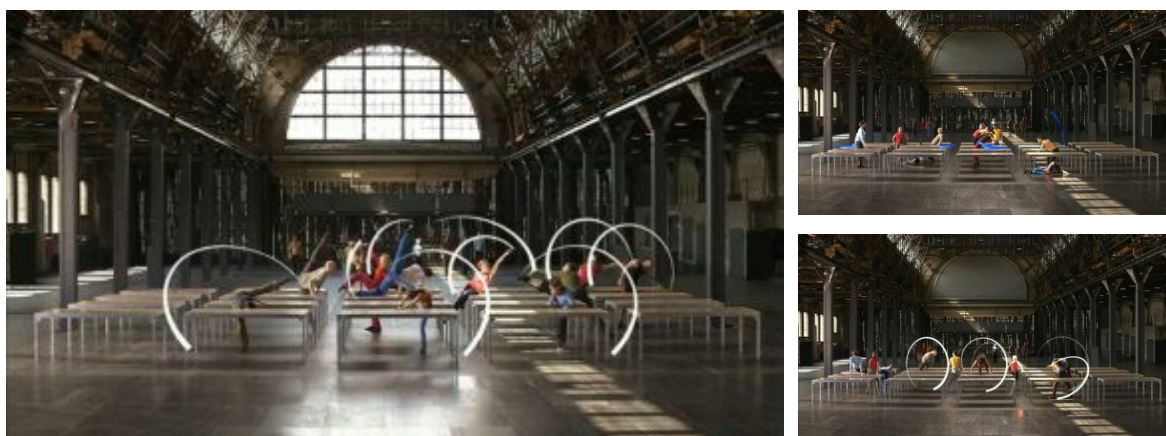


Fig. 14. “Alignments Annotations” Synchronous objects

here aesthetic choices were

¹⁶ “Generative Drawing tool”. *Synchronous Objects*. Web. 5 Oct. 2014.

imposed on the data through code which generated visuals.¹⁷

Nature

Kandinsky writes that the use of line in nature is an exceedingly frequent one. He observes that it is especially important for the artist to see how nature uses the basic elements in her independent realm. What characteristics do these basic elements possess and in which manner do they combine to form structures. Examination of structures in nature can help to understand composition and formation but not to superficially imitate it.

Kandinsky observes that the line appears in nature in countless phenomena: in the minerals, plants and animal world. He shows the schematic construction of the crystal, that is purely linear formation.

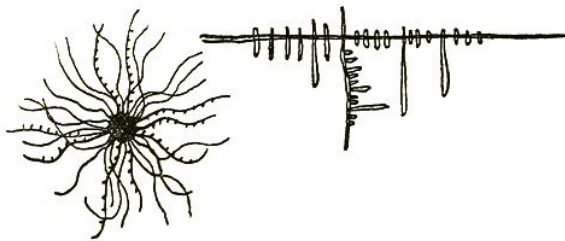


Fig. 15. “Trichites – hair-like crystal” and “Crystal skeleton”. Wassily Kandinsky. 1923

A plant in its entire development from seed to root as far as the beginning of the bud passes over from point to line. As it progresses it forms more complicated complexes of lines, independent structures. Point and line creates centric constructions of evergreen trees. The organic linear pattern of the branches always emanates from the same basic principle but exhibits the most varied arrangements. Kandinsky writes that both geometric constructions and more free line constructions can be found in the nature and in abstract painting.



Fig. 16. “Diagram of leaf positions”. Wassily Kandinsky. 1923

¹⁷ “Alignment Annotations.” *Synchronous Objects*. Web. 5 Oct. 2014.

Today it is possible to see Kandinsky's insights about geometric constructions taken from nature in a simulation. Achievements of science let us simulate the natural world with high precision. But goal in design, art and architecture of using simulation software is different; it is a tool to explore something beyond.¹⁸

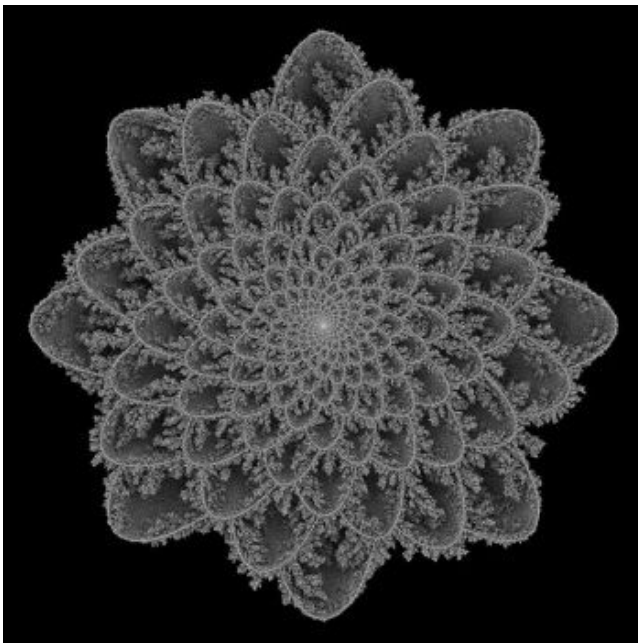


Fig. 17. "Aggregation". Andy Lomas

Exploration of relationship between organic natural forms and their relationship to mathematical rules are visible in Andy Lomas works "Aggregation." The sculptural shapes are created by a process of accretion over time. Shapes are gradually grown by simulating the paths of millions of particles randomly flowing in a field of forces. Over time they build on top of an initial simple seed surface to produce structures of immense complexity.¹⁹

¹⁸ Reas, Casey, Chandler McWilliams, and Jeroen Barendse. *Form Code in Design, Art, and Architecture*. New York: Princeton Architectural, 2010.

¹⁹ "Aggregation." *Andy Lomas*. Web. 15 Oct. 2014.



Fig. 18 “Strandbeest” Theo Jansen. Since 1990

Another example showing linear constructions in nature, but this time in artificial animal is Theo Jansen’s work. For over a decade, he has worked to create a population of artificial animals that are able to survive unassisted on the beach of the Netherlands. The skeleton of these creatures are completely constructed of plastic tubing, are powered by wind, and they can secure themselves to ground in a storm. Theo Jansen uses a genetic algorithm to optimize the lengths of the bones.

Concept of the plane

The mathematical concept of the plane is as Aristotle describes “a line by its motion produces a surface”. This concept is close to Kandinsky’s decryption of the plane. The plane is planar shape or a form with closed boundaries. The material plane of the graphic surface becomes the finite graphic context that has closed linear boundaries and is approached as a shape of the composition.

The most stable and at the same time the most unstable plane is the circle. Kandinsky explains that curved line carries within it a seed of the plane. If the two forces, with conditions unchanged, roll the point ever further, the developing curve will arrive again at its starting point.

There is another possibility to form a plane. If the straight lines are move about the common meeting point, finally they flow into one another. In this way a new form appears – a plane in the shape of a circle.

There are many ways to create a plane. Their characteristics depend on the type of line they were created from. Kandinsky gives one example of primary contrasting pair of planes. Curved line needs two forces to create a plane in a contrast straight line needs three forces in plane creation.

When the basic elements are manipulated on the plane, the graphic context can be seen as a basic plane. Kandinsky observes that pairs of linear segments usually bound this context. The basic plane is a material plane that receives the content of the work of art.

According to Kandinsky the plane is a living being. He explains that when the basic plane receives the right elements in a right order this primitive living organism is transformed into a new living organism. It becomes no longer primitive but reveals all the characteristics of a fully developed organism. Further Kandinsky explains how the viewer should look at a basic plane. The right side of the basic plane should be the one which is opposite viewers left side and vice versa – as in the case of every other living thing.

Texture

Kandinsky defines two possibilities of a texture concerning the plane. Material plane is created in a pure material way and is dependent upon the nature of this creation. Therefore

textural possibilities can be as such: smooth, rough, prickly, glossy, dull and plastic. On the material plane the elements lying firmly (materially) on a solid, hard, to the eye, tangible plane.

In a contrast to material plane Kandinsky describes dematerialized plane. There the elements are floating without material weight in an indefinable space. The purpose of this dematerialization in combination with the element according Kandinsky is the road from external to the inner.

Plane in media art

Kandinsky writes that in the future it will be possible to give to every composition its numerical expression. Kandinsky talks about composition where elements are organized in order and placed on a basic plane. Software Aaron embodies that vision. It is the most famous piece of creative software written by Harold Cohen. Aaron's drawings have been displayed at numerous museums including Tate Britain in London and the San Francisco Museum of Modern Art. Aaron is fully automated and produces images without human interaction. Rules that are encoded in Aaron let software create consistent style and evaluate its drawings.



A different approach to the plane is found in Scott Sona Snibbe and Golan Levins research in “Interactive Dynamic Abstraction”. During this research several experiments in using pure human movement as the interface to dynamic abstract systems were presented. The goal was to create phenomenological interface that engage the unconscious mind directly. As Scott

Snibbe described “these applications are visual instruments that allow immediate understanding of dynamic system, but point towards infinite challenges in their mastery as any good artistic medium.”²⁰



Fig. 20. “ Motion Phone” Scott. S. Snibbe. 1989 - 1996

“Motion Phone” was created during 1989 and 1996. This software allows working “communicating” in a network of two, three or even four person at once in the same dynamic canvas. The Motion Phone provides an infinitely zoomable plane. Multiple “conversations” or compositions can take place at any position or scale within this virtual world. “Motion Phone” allows communication with colour, shape and movement. Motion phone touches another aspect of Kandinsky’s theory of the plane. According to Kandinsky the plane can be infinite. On one hand it is difficult to perceive infinitive by looking at the painting on the other hand it is easy to explore it in *Motion Phone*.

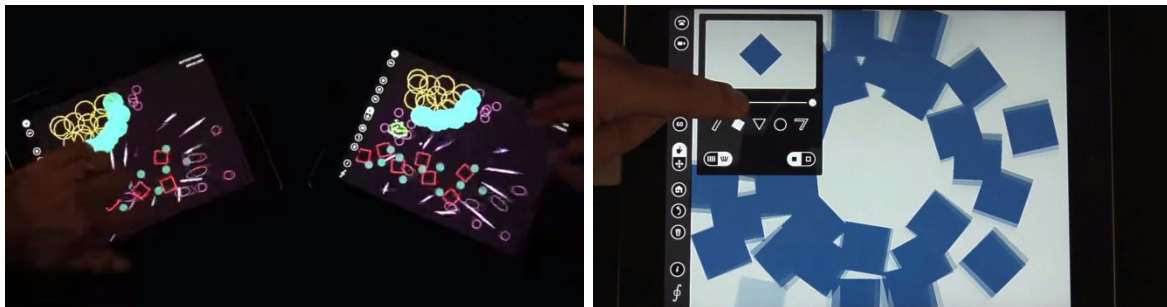


Fig. 21. “MotionPhone iPad app” Scott. S. Snibbe. 2012

²⁰ Snibbe, Scott Sona, and Golan Levin. “Interactive Dynamic Abstraction.” *Flong*. Golan Levin. Web. 20 Sept. 2014.

Conclusion

With scientific precision Kandinsky described characteristics of point, line and plane in his book *Point and Line to Plane*. The goal of Kandinsky's theory was "to find the living [and] to make its pulsation perceptible". Kandinsky tries to engage the sight, emotion and mind of the public by using point, and line. That means creating a dialog between the viewer and the art work by using "perceptual signs".

"Perceptual signs" evokes actions: to interpret meaning, to generate attention, to begin investigation of the world, and yourself. One of the definitions of interactivity explains this process as discovering "perceptual signs" and converting them into actions.

Visual perception plays an important role in finding and understanding "perceptual signs". Susanne K. Langer explains that vision is dynamic and therefore we see movement that follows through design. We see movement when we look at forms that are not moving. Moreover, according to Susanne K. Langer we enter a virtual/imagined space when we look at the artwork. The nature of visual perception allows us to discover perceptual signs and to see and to feel the potential of action.

Kandinsky created a visual language that encodes our abstract world. This visual language allows making the liveliness of the line and point perceptible. He gave us a tool to create a new "living organism" out of primitive organisms (the point and the line). Arjen Mulder writes that Kandinsky figured out how the line operates in the two dimensional force field and interactive art continues its research.

How can media art be seen in the light of Kandinsky's theory of interactivity?

In the book *Point and Line to Plane* Kandinsky gives examples of the point and the line in other forms of art than the painting. These examples are compared with today's media art projects that explore the same forms of art.

Firstly, according to Kandinsky the point and the line can be used to translate music into graphical expression. Today's media art explores these possibilities further. Some characteristics of point and line described by Kandinsky are instantly visible in examples given. Project *Messa di Voce* translates sound into composition of points. In these project inner tensions of points makes them independently behave and release recorded sound. This characteristic of the point refers to Kandinsky's idea of a smallest living organism – the point.

Project *Chorus* created by United Visual Artist reveals another property of the point – the point’s ability to give birth to the line. *Narrative 2.0* created by Matthias Dittrich allows people to experience music in a visual way. Artist translate music piece into lines. In this project lines give notion of time and space. Each projects described earlier grasps a part of characteristic that point and line have.

Secondly, Kandinsky writes that in the dance, the whole body and every finger draws lines. Moreover, the brief state of immobility of a dancer can be locked upon as point. These ideas of translating dance into graphic expression are visible in media art projects. Project *Echo* created by United Visual Artists translates dance performance into abstract forms. These forms are created out of points. As this performance is figurative, the point serves perfect to express every composition created by dancers. Project *No Time to Fly* is a good example of a translation of dancer’s movements into animated lines. Armin Weber created digital adaptation to a dance performance. He used motion tracking technology and then translates data into animated lines. This and two other examples discussed in a chapter *Line in media art* depict Kandinsky’s idea that dancers draw lines with body and every finger.

Thirdly, Kandinsky sees the line in nature. He shows schematic construction of his observations and elaborates that it is important to an artist to see how lines combine and form structures. These observations are visible in media art were artist simulate nature’s structures. Simulation allows creating something new by using laws of nature. Theo Jansen is developing animals that are able to survive unassisted. He uses genetic algorithm to optimize the lengths of bones (linear structures). Andy Lomas explores relationship between natural organic forms and their relationship to mathematical rules. In the project *Aggregations* artist explores shapes that are gradually grown by simulating paths (construction lines).

Fourthly, Kandinsky finishes his theory with describing the plane. The most important is that Kandinsky describes the plane as a living being. He explains that when the basic plane receives the right elements (the point, the line and its derivative) in a right order, this primitive living organism is transformed into a new living organism. Media art explores this “living” as well. *Motion Phone* creates an ability to communicate with each other with animated abstract forms. It shows how Kandinsky’s visual language can be applied in visual conversation. Users of this application can express his/her ideas by using form, rhythm and composition.

Finally, there is a part in Kandinsky's theory that could hardly be applicable in media art. Kandinsky writes that method how the point, the line and the plane are created gives specific characteristics to them. For example, the point can be created with pencil by soft touch or hard expressive collision with the plane. That would give different characteristic to the point. Media art uses other methods to create the point. Earlier described, media art examples create the point, the line and the plane with algorithm. The material plane is also different from the one that is described by Kandinsky. Media art uses screens or space instead of material plane known to Kandinsky.

Kandinsky and media artists explore how the point, the line and the plane operate and what messages they transmit. In the given examples media art uses most of characteristic of the point, the line and the plane. Media art adds something more to what Kandinsky calls "the living". In some described cases media art creates controls that allow users see how interactivity works.

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