Supremacism

Supremacism is an art movement from the 1913 by Kazimir Malevich. (Ng, n.d.)

And was interested in abstraction in their search for 'zero degree' of painting. The point on which the medium could not go without ceasing to be art. (Ng, n.d.)

It makes extensive use of geometry shapes like squares and circles. Suprematism had three main periods the black, colored and white. Black was the beginning period and used simple composition with black shaded for example "black square" Figure 1: Kazimir Malevich Black Square 1915

The second phase was Colored, it made use of color to create the idea of movement trough space and was produced by Ilya Chasnik, El Lissitzky and Alexander Rodchenko. For example Figure 2: ilya chasnik - red square and cross (c. 1928)

Figure 1: Kazimir Malevich Black Square 1915

The last era was White witch dispensed with from completely and focusing only on the idea. Figure 3: Kazimir Malevich white & white (Ng, n.d.)
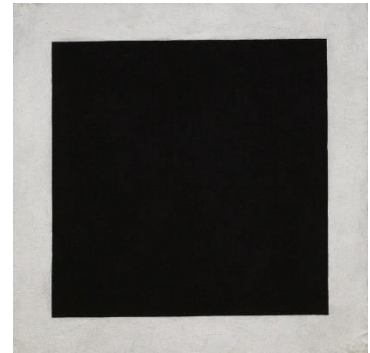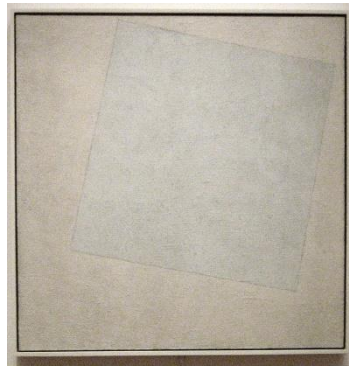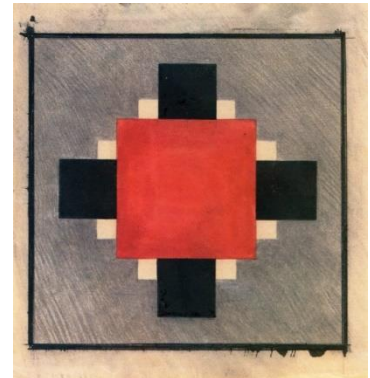

Figure 3: Kazimir Malevich white & white

Figure 2: ilya chasnik - red square and cross (c. 1928)

The general process

The tool follows a fixed process to generate painting

1. Create canvas
2. Generate construction lines
3. Use 2 to 3 lines to create the main flow
4. Transfer flow direction to construction lines
5. Calculate color pallet for white, color and black tones
6. Isolate points from the mesh
7. Place geometric shapes on the points
8. Rotate object to align with flow direction with small randomness.
9. Apply color to objet from created pallet.
10. Create painting framing
11. Merge all
12. Scale to required size.

The tool

For the creation of Supremacism art the tool starts by taking the canvas and converting it to one of several division types. One type is based on the golden ratio while another creates connecting lines between points. Then using these lines to creates additional points on all intersection.

Several of the divisions combine two of these into a new type. This gives the tool construction lines to work from and create a basic flow.
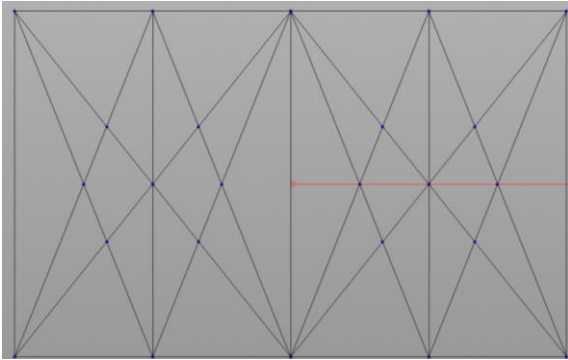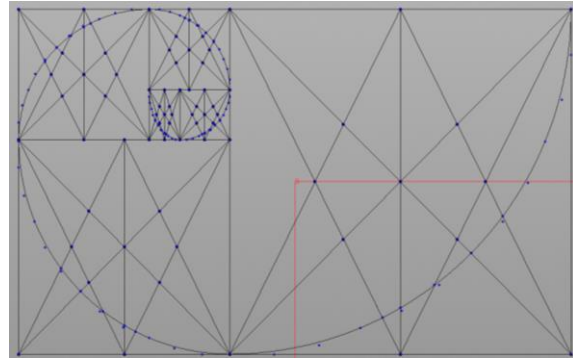

Figure 4: Example construction lines

Figure 5: Example construction lines 2

Connecting points

The connecting of points is accomplished using vex code that uses a double for loop to connect the starting point to all others higher point. The first loop isolates a new starting point each iteration while the second loop uses this point and loop trough all higher remaining points to create the connection.

```
int createEdge(int start, goal){
    int prim = addprim(geoself(), "polyline");
    addvertex(geoself(), prim, start);
    addvertex(geoself(), prim, goal);
}

vector pPos = point(geoself(), "P", @ptnum);

for( int i = @ptnum +1; i < @numpt; i++)
{
    vector iPos = point(geoself(), "P", i);
        createEdge(@ptnum, i);
}
```

Main flow

Supremacism uses only a few direction to generate flow to replicate this I calculate the normal angle of each point. Then on a side branch I take the points with the normal and on 2 to 3 points a line is created in the direction of the created normal all other points are removed leaving only the lines.

These lines help create the main flow of the painting. The Normals of the lines are align to the direction of the line and then using a "attributeTransfer" transferred to the construction lines. This gives all the points I the mesh a new normal direction based on the flow lines.

At this time the number of neighbors of each point is also calculated, this is later used to influence the size of elements.
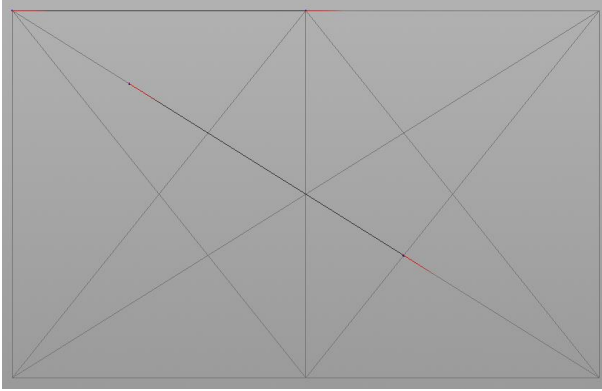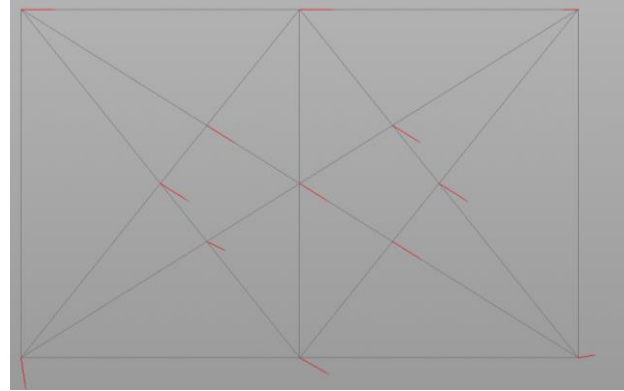
Figure 6: Flow lines

Figure 7: Copied normals to construction mesh

Element creation

Then points are sorted or randomized and X number of points are removed, leaving a small amount of points to place objects on. On these points either big or small shapes are placed and rotated to match the normal direction. The size of the object is influenced by the number of neighbors a point had. More neighbors results in a bigger shape. To the rotation an additional small offset is given creating a more dynamic result instead of every object heaving the same direction.

After creating the object a color is selected from one of three option pools. The first pool contains several white shades, the second color shades and the last one contains black shades this allows the tool to pick from a large set of colors matching those of the art style.

Color pool creation

For each of the color pools I use a python algorithm that picks random colors from a color circle based on a set of parameter. The basic process works as following.

- Select a random reference angle.
- Select a random angle in the total of the range (the three range angles added together)
- If the angle is smaller than the first range, keep it
- Otherwise, if the angle is bigger than the first range, but smaller than the sum of the first Two ranges, offset it by the first offset angle
- Otherwise, offset it by the second offset angle
- Add this angle to the reference angle
- The color with this angle as hue is a color generated with the triad harmony
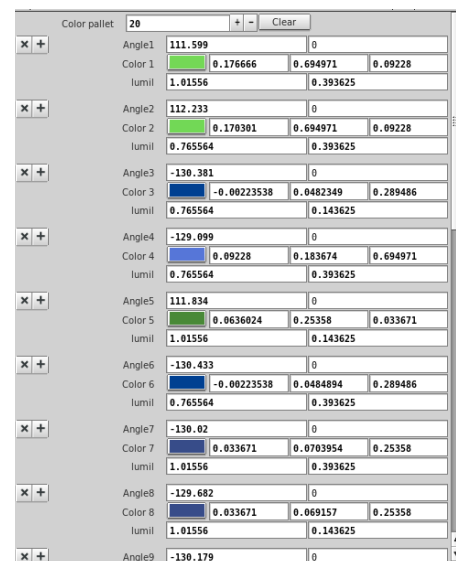
(Tulleken, 2012)

Figure 8: Example result color pool

The settings for the color pool is set so it picks colors from 3 positions along the circle with equal spacing. Additional the tools also allows the user to control the min and max saturation and lamination of the color. Figure 9: Triad color pattern

Canvas border

Using the starting canvas the framing of the painting is created. The canvas is divided into 9 pieces and scaled up to be slightly bigger than the original canvas. The center poly is removed and the inner border are aligned to the canvas. As extra addition on or two points can be selected and given a small random rotation. The framing is also used to clip off parts that fall off the painting.
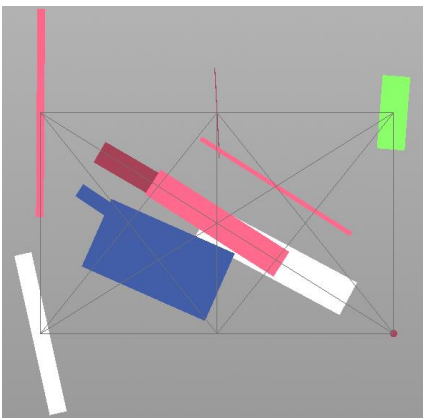

Figure 9: Triad color pattern

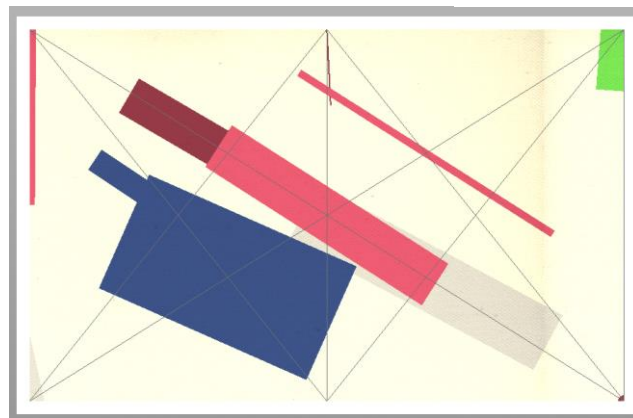*Figure 10: Un cliped elements*

Figure 11: Final result

Adding materials

At the end the main canvas and all the elements are uv mapped in such a way their position in the painting is the same as the position on the us map. This way a cloth pattern can be applied to the canvas and also be visible on the painted elements without any seams. Using this potentially brush strokes could be suggested with on the thing parts the cloth shining through. This would depend on the created and used.
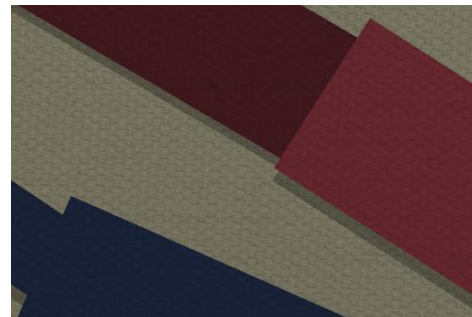

Figure 12: Material mapped

Removed addition

At an earlier stage the suggested gravity point of the painting was calculated using the flow lines. This was done by extending the lines to a length they would intersect. Then the number of connection of each point would be calculated and the point with the most connections would the implied gravity point. This was then used for the creation of lines and curves in the painting and giving them more direction. This was partly accomplished by sorting the construction lines based on their distance of the gravity point. Then X number of lines would be isolated and used for the artistic lines. This gave more

direction and control over randomly generated lines.
But as Supremacism does not make use of curves lines this addition was dropped.
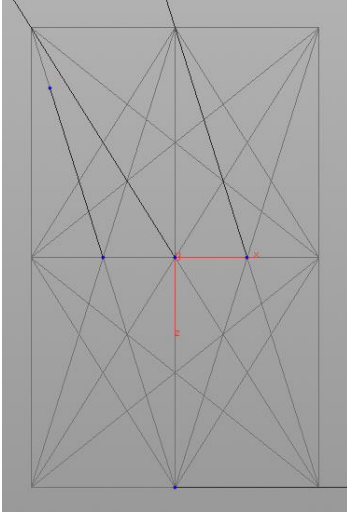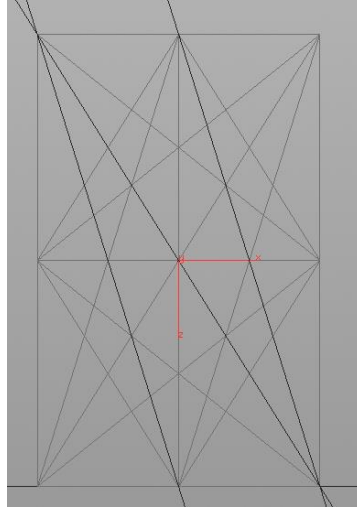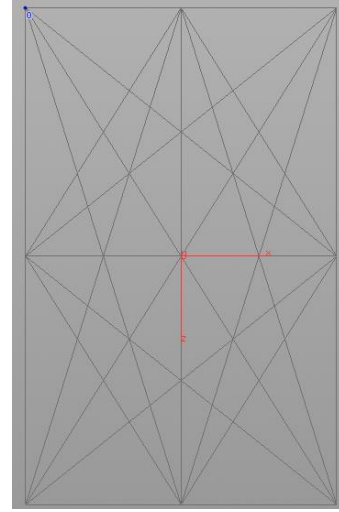

Figure 13: FLow lines

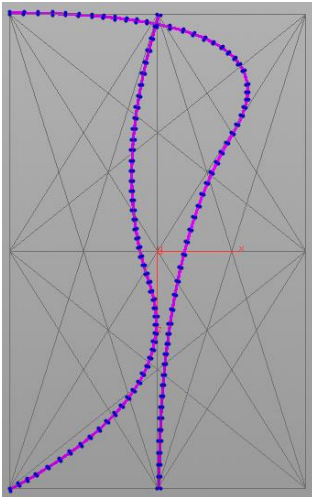*Figure 14: Extended lines*

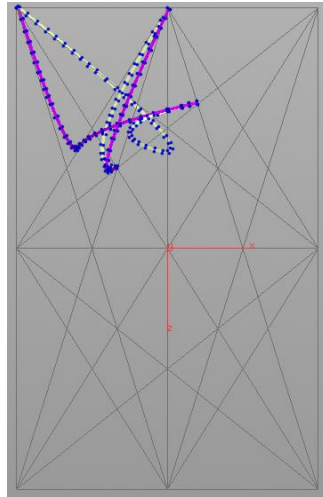*Figure 15: Gravity point*

Figure 16: Lines with gravity influence

Figure 17Lines with out gravity influence

Bibliography

Ng, T. (n.d.). *the art story*. Retrieved from http://www.theartstory.org/movement-suprematism.htm

Tulleken, H. (2012, 11 06). *devmag.org*. Retrieved from http://devmag.org.za/2012/07/29/how-to-choose-colours-procedurally-algorithms/