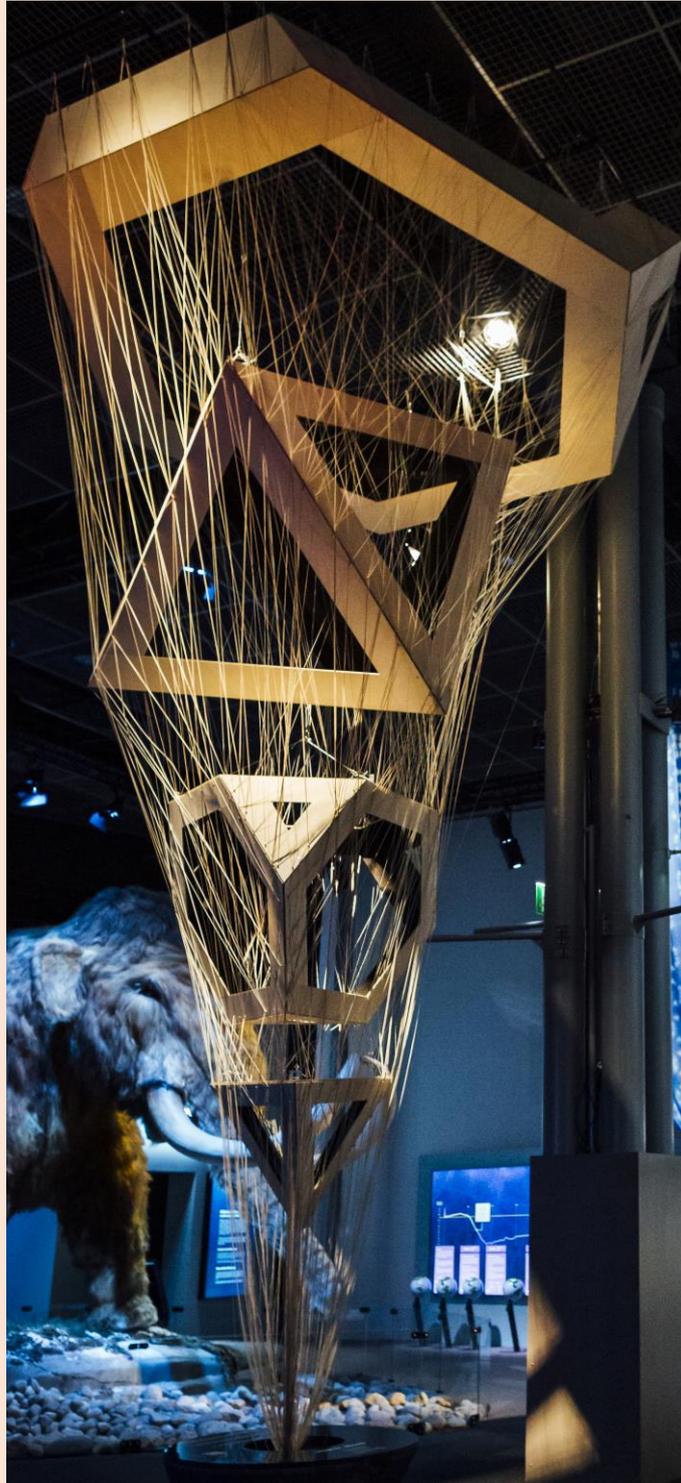


Higher Slices

-By Ketsui-



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The Fourth Dimension

The fourth dimension is a mysterious place. It is close to our three-dimensional world, just one dimension higher, yet we cannot see it or sense it in any way. To understand it, often we must use analogies, like going from the second dimension to the third, to get a glimpse of what it is like to move from the third dimension to the fourth. Despite this, there is a lot of what we do know about the fourth dimension mathematically.

One example of this is the Platonic solids. In three dimensions, there are five Platonic solids: the tetrahedron, cube, octahedron, dodecahedron, and the icosahedron. We know that in four dimensions there are six Platonic solids: the 5-Cell, 8-Cell (Tesseract), 16-Cell, 24-Cell, 120-Cell and 600-Cell. In our work we chose an indirect way to depict the 8-Cell, aka the Tesseract, with its 3D cross-sections.

The Tesseract is made of 8 three-dimensional cubes, that are folded together into one object in the fourth dimension. If the Tesseract enters the third dimension corner-first, it will first appear as an expanding tetrahedron, which then morphs into a truncated tetrahedron, and finally at the halfway point, the cross-section becomes an octahedron. After this, the process reverses, until the Tesseract

disappears completely from three-dimensional space.

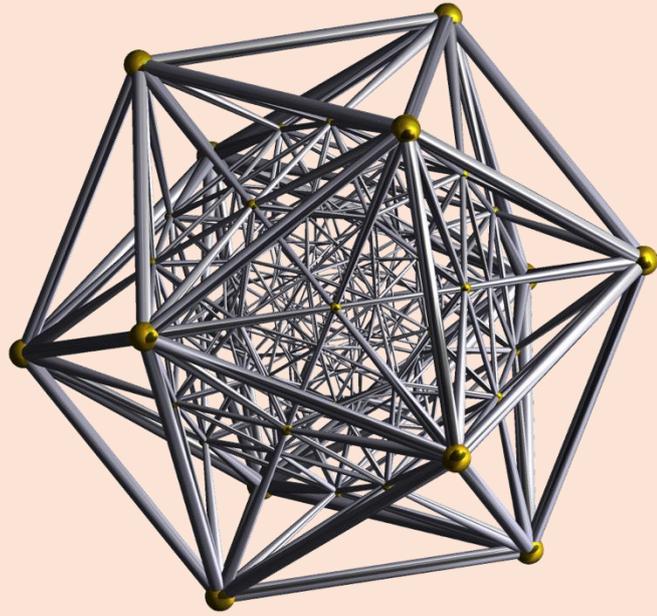
This process can be also understood via analogy by imagining if you could push a 3D cube corner first through a 2D surface, like a table, and visualizing what the 2D cross-section would be. At first the cross-section would be an expanding triangle, and at the half-way point it would be a regular hexagon. After this, the process reverses, until the cube has completely passed through the table.

Concept & Inspirations

Our initial inspirations included other modern hanging art installations, cubist and abstract art by Picasso and Kandinsky, mathematical concepts like the 600-Cell, cellular automata and the Golden Ratio, and natural phenomena like the analemma.

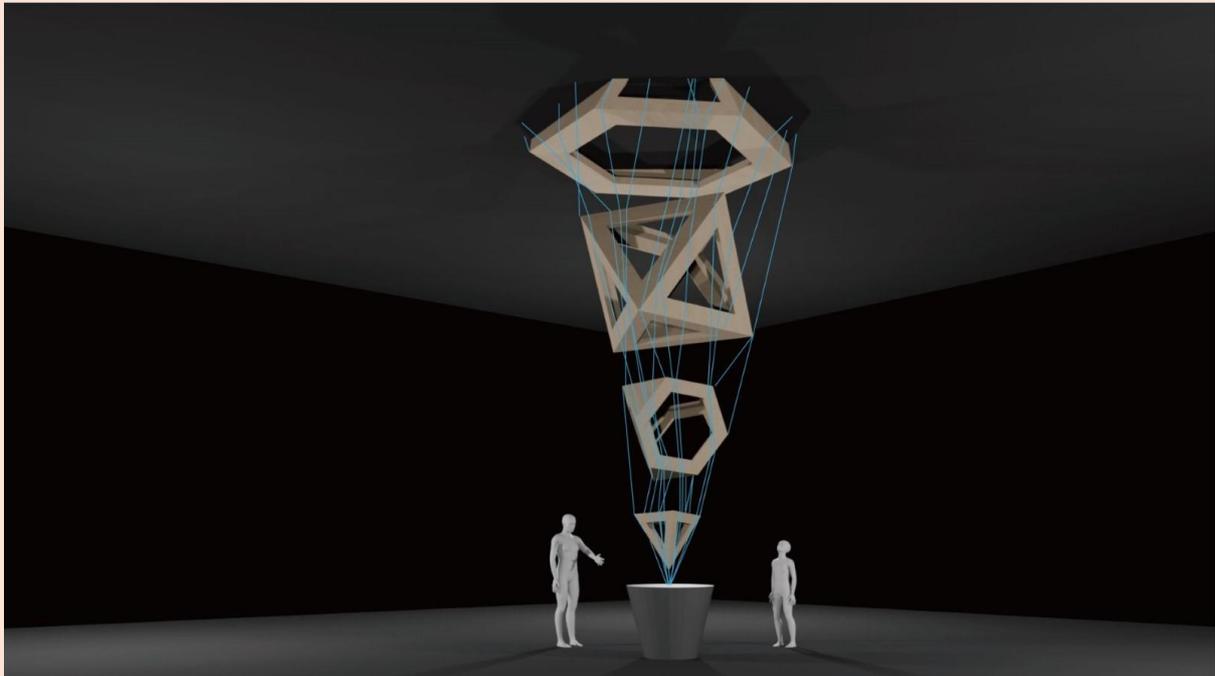
We felt it would be very exciting to try to create something that is related to the fourth dimension.





We didn't want to use a projection to depict a 4D object, so we thought about presenting a 3D unfolding of a regular 4D polychoron (a four-dimensional analogue of a 3D polyhedron) or showing 3D cross-sections of a 4D object. Ultimately, we decided on creating 3D cross-sections of a 4D Platonic solid, which we chose to be the Tesseract, because the cross-sections are not too spherical and create an interesting contrast between each other.

At first the idea was to create three-dimensional objects as a wireframe, possibly out of metal tubes or bamboo, and connect them with strings or hooks. Ultimately, we settled on using plywood to create 3D objects, but mostly following their outlines, and having a polygonal hole in each of the faces of the objects.



Materials & Construction

Materials: Birch plywood, threads, tea dye, glue, black wood dye, nails, screws



The plywood was cut lengthways using a table saw and then at a 60-degree angle. If the angle was incorrect, the glue would not bond properly, so it was essential to cut it to the exact dimensions shown in the drawing.



The inner surface was filed and prepared for painting.

To create each triangle or octagon, three or six pieces of material were glued together along their edges. In this case, great care was taken to ensure minimal misalignment, as this would affect the paintwork and appearance. To prevent any damage to areas other than the glued surfaces, masking tape was used to protect them.

Additionally, as advised by the teacher during the process, we attached support material to the glued areas to create a stronger surface.

We used spruce rough material for the joints, planning and cutting it to the required thickness before using a table saw to create rectangular strips.



To ensure 70.5- and 109.5-degree angles, we cut angled pieces using a table saw and router.

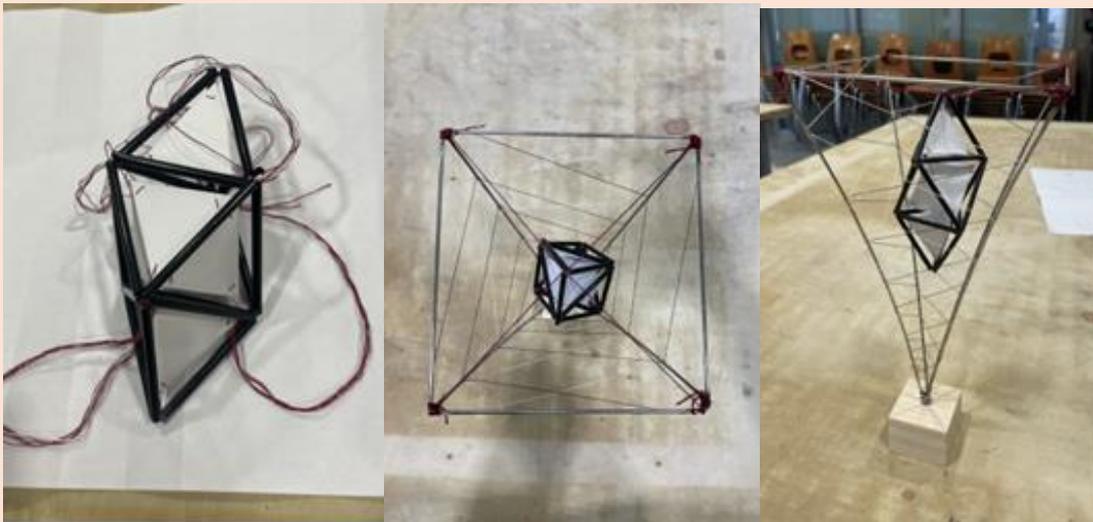


Once the glue had dried, we painted the inside of the panel black. We also painted visible joints on the inside.

Thread Dyeing & Application

The goal of the threads was to create a 3D space in which the objects could live. The threads would serve as a barrier between our own reality and the reality in which the objects exist.

We went through different ideas of what the material of the threads would be. First, our initial idea was to create a metal frame which would encase the piece and serve as a base for the threads to attach to. As a result, our first 1:20 scale looked like this:



After deliberating on the purpose of the metal frame, we decided to get rid of it and focus only on the threads. For the next two models, we liked the idea of creating a “rosary” effect, where the threads would wrap around each individual object, each contributing to the whole.



So far, we'd been modeling and testing with sewing and embroidery threads, but the scale of the actual piece would require threads much thicker so that they show up proportionately. Our first idea was yarn from wool or cotton that would reflect colors found in nature such as water, forests, and rocks. Another idea was to use natural, undyed thread that would be dyed with tea so that the color compliments and highlights the natural color of the grain of wood panels they encase.

We tested methods to produce a gradient, of darkest shades of tea to light, undyed thread. We

decided to use black tea as the final dye and undyed 12-count cotton thread.



To assist us in the dyeing process, we reached out to the workshop master Eeva at the textile printing workshop and who kindly demonstrated how to create skeins and let us use the equipment there. Once the skeins were ready, we prepared a little under 100 tea bags to boil, meanwhile we lightly soaked the threads in a mix of water and white vinegar, then transferred to the tea mixture and let the threads soak at various intervals for a total of 1-2 hours.



It was an interesting experience dyeing such large amounts of thread and then measuring them to the height of the piece (6m + extra, for a total of ~9m per string length).





The final :)

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