

Material Decay

Some artists do not care about the durability of their works. They choose to use materials that will not last and happily accept that their works will never acquire a patina of age and accreted meaning. The Russian constructivist sculptor Naum Gabo, however, wanted to make works of permanent value, and had every reason to believe that the new materials he used in his interwar constructions would last for a very long time.

Born Naum Neemia Pevsner in Russia in 1890, he adopted the surname Gabo in 1915 to distinguish himself from his brother, Antoine Pevsner, also a sculptor. Before this, he had studied medicine and then the natural sciences at Munich University, while also attending art history lectures by the famous art critic Heinrich Wölfflin. In 1912 he transferred to an engineering school in Munich, and coincidentally discovered abstract art and met Wassily Kandinsky. Deciding to become an artist, he spent time in Paris and then Norway, where, in 1915, he made his first constructed sculptures.

He returned to Russia in 1917, at the time of the Revolution, and became a leading figure among avant-garde artists, teaching at Vkhutemas (Higher Art and Technical Studios) alongside such artists as Tatlin and Kandinsky. In 1920 he set out his new thinking in the *Realistic Manifesto*, which he posted on hoardings around Moscow. The text condemned cubism and futurism as having failed to deliver a convincingly new approach to art, suitable for post-revolutionary life and culture. Art could not be built on empty abstractions but on ‘life and its laws’, which, for him, meant principles of space and time. ‘The plumb line in our hand, eyes as precise as a ruler, in a spirit as taut as a compass, we construct our works as the universe constructs its own, as the engineer constructs his bridge, as the mathematician his formulae of the orbits.’ In short, he wanted to bring the ‘constructive thinking of the engineer into art’.

It was thus natural that he believed that artists should make use of the new industrial materials that the modern age provided. Made from metal, glass and increasingly plastic, his ‘constructions in space’ echoed the forms and surface qualities of scientific models and contemporary machinery. In the mid-1920s new plastics became widely available, and Gabo, then living in Berlin, seized upon celluloid acetate for its transparency, translucency and malleability.

From his earliest days as an artist Gabo explored ideas for sculptures through small models, often made first in paper or card. He would then make progressively bigger models before creating the final full-scale works. Sometimes a model might be reworked, and become the source for more than one sculpture. This seems to be the

case for a tiny plastic model, now in Tate's Archive. It apparently served as a prototype for *Construction in Space: Soaring* 1930, a work now owned by Leeds Museums and Galleries, before the artist altered it as he developed what was to become *Construction in Space: Two Cones*.

At the heart of the conception of both works is the shape of two cones. In *Soaring* the cones sit either side of a vertical shape made of stereometric triangular shapes and black struts soar upwards and behind the piece like wings. In the interwar years Gabo was interested in aeroplane designs, and this piece suggests his fascination with flight, both mechanical and animal. Six years later, Gabo reworked the idea in *Construction in Space: Two Cones*, twisting the black wing forms forwards and around to suggest a more organic and apparently grounded structure. Whether his shapes were rectilinear or curved, however, Gabo believed that they related to deeper aspects of nature and of man's spirit. 'Shapes act, shapes influence our psyche, shapes are events and Beings', he wrote. 'Our perception of shapes is tied up with our perception of existence itself.'

Gabo made the second work while living in London. A Jewish left-wing intellectual, he left Berlin in 1932 just before the Nazis came to power, and travelled to Paris. The loss of his home and despair at the political situation in Europe weighed heavily on him: convinced that his art was becoming increasingly irrelevant to a society descending into chaos and political reaction, he tried to commit suicide on at least one occasion. Art, however, remained a source of consolation. When he moved to Britain in March 1936, buoyed by the thought of the small but growing community of abstract and constructivist artists in London, he brought with him the tiny model from which he created the larger work. (Made from cellulose nitrate rather than cellulose acetate, the model's transparent plastic has yellowed but otherwise remains in good condition).

Combining flamboyant curves and geometric shapes, *Construction in Space: Two Cones* was first displayed in an exhibition of Gabo's constructions at the London Gallery in January 1938. One of the more important pieces in the show, it was reproduced on the cover of the invitation. The exhibition as a whole was favourably reviewed, though critics struggled a little with the aesthetic justification of these abstract sculptures. The *Sunday Times* critic, for example, wrote that Gabo's pieces 'show by their complexity and precision how mathematics and aesthetics can be fused, as in a Bach Invention, into a synthetic whole'. *Construction in Space: Two Cones* was bought by the major American collector A.E. Gallatin for the Museum of Living Art in New York, and then given to the Philadelphia Museum of Art in 1952. As was then apparent, the piece was an important work marking a transition from the machine-related constructions of the 1920s and later sculptures made with continuous and rhythmically curving planes. For these, Gabo essentially took the form of the two cones and developed it into a series of variations of spiral shapes and, famously, what he termed 'spheric themes', sometimes incised with lines to help articulate the idea of movement through space. He was to make many examples of the spheric theme motif, which he had developed from the idea of two interlinked and twisted circles and, before that, two cones.

In 1960 conservators at the Philadelphia Museum of Art noticed condensation droplets on *Construction in Space: Two Cones*, the first signs that the sculpture had begun to deteriorate. Cracks developed in some parts of the construction and the plastic base and central element were fractured. Repairs were made but the piece continued to deteriorate. In 1968 the museum carefully sent the work to Gabo, who was then living in Middlebury, Connecticut, for an assessment. He felt that repair was impossible and, refusing then to accept that there might be a problem with the material itself, blamed the deterioration on the fact that the museum had kept the piece in an airtight vitrine. He offered to make a replica using the same material but refused the museum's request to use Plexiglas, a more stable plastic.

Gabo returned the sculpture to the museum but only after he had created templates of the various elements of the piece. He then used these templates to make a replica, employing the same materials; he had old stock of sheets of cellulose acetate and presumably wanted to prove there was nothing inherently wrong with it. In 1977 he presented the replica to the Tate Gallery in London.

All plastic degrades eventually but different kinds of plastic degrade at different rates depending on their composition and environmental factors. Developed in 1904, cellulose acetate is made by treating wood or cotton fibres with acetic acid. Pure cellulose acetate is easily broken but when plasticised with a liquid solvent becomes flexible. However, the solvent evaporates slowly, resulting in brittleness, shrinkage and a loss of surface transparency. Cellulose derivatives also tend to oxidise when exposed to light. The acidic by-products of this oxidation react with water in the air, breaking the chemical bonds holding the cellulose acetate together and releasing acetic acid (the source of the tell-tale vinegar smell found when cellulose acetate begins to deteriorate). This acid may increase the rate of the deterioration but is not the cause of the material's buckling and warping. When the acetate sheets are made, the material is extruded, dried and pressed. This locks in stresses related to the differential drying of different parts of the sheet. Once much of the plasticising solvent has gone, the forces locked into the acetate reassert themselves: sheets warp and shrink. When the degradation has been triggered, it cannot be stopped.

Signs of deterioration in Tate's sculpture were first noticed in 1980: the work gave off a strong vinegar smell and shortly thereafter sweat-like beads of moisture were seen on its surfaces. By 1982 much of the adhesive holding the pieces of plastic together had failed under the stress of the pieces warping. Five years later, the base was distorted and two corners were broken off. The black base of the sculpture was split and distorted. Sections had begun to separate into their component layers.

Research suggested that the deterioration of Tate's version of *Construction in Space: Two Cones* was caused by the 'inherent vice', or flaw, in the materials, with the environmental history of the work providing an additional catalyst. Significantly, however, not all of Gabo's cellulose acetate works were in poor condition or are today. The chemical structure of the acetate used in different sculptures seems to have varied,

while the different environmental conditions experienced by the works appears also to have played a role in determining the variable longevity of the pieces.

Knowing that the deterioration of this particular piece was going to proceed apace, a holographic representation of the work was commissioned in 1987. The aim was to capture something of the three-dimensional quality of the sculpture, seen from different angles, to try to retain something of the experience of viewing the piece in the round for future generations. Today the original work and its replica are just masses of broken shards, far removed from the pristine constructions intended by the artist, and they cannot be exhibited as works of art. The hologram – made as an experiment in visualising a soon-to-be-lost object – is kept in Tate’s sculpture conservation studio, a spectral reminder of an artwork that is no longer available to be viewed in all its spatial complexity.

Text—

Jennifer Mundy