

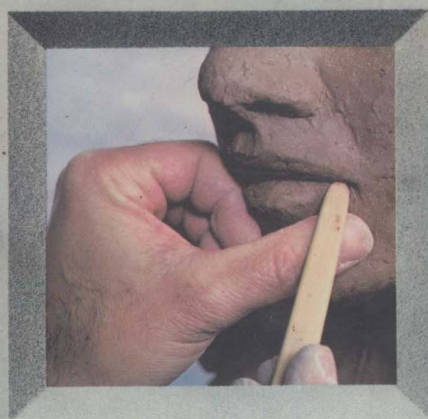
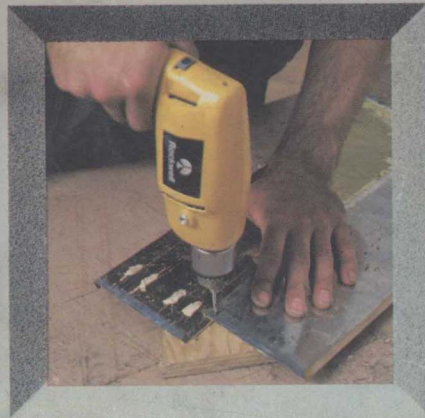
The Complete Guide to

SCULPTURE, MODELING

and

CERAMICS

Techniques and Materials



Consultant & Editor
BARRY MIDGLEY

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THE COMPLETE GUIDE TO
**SCULPTURE,
MODELING**
AND
CERAMICS
TECHNIQUES AND MATERIALS

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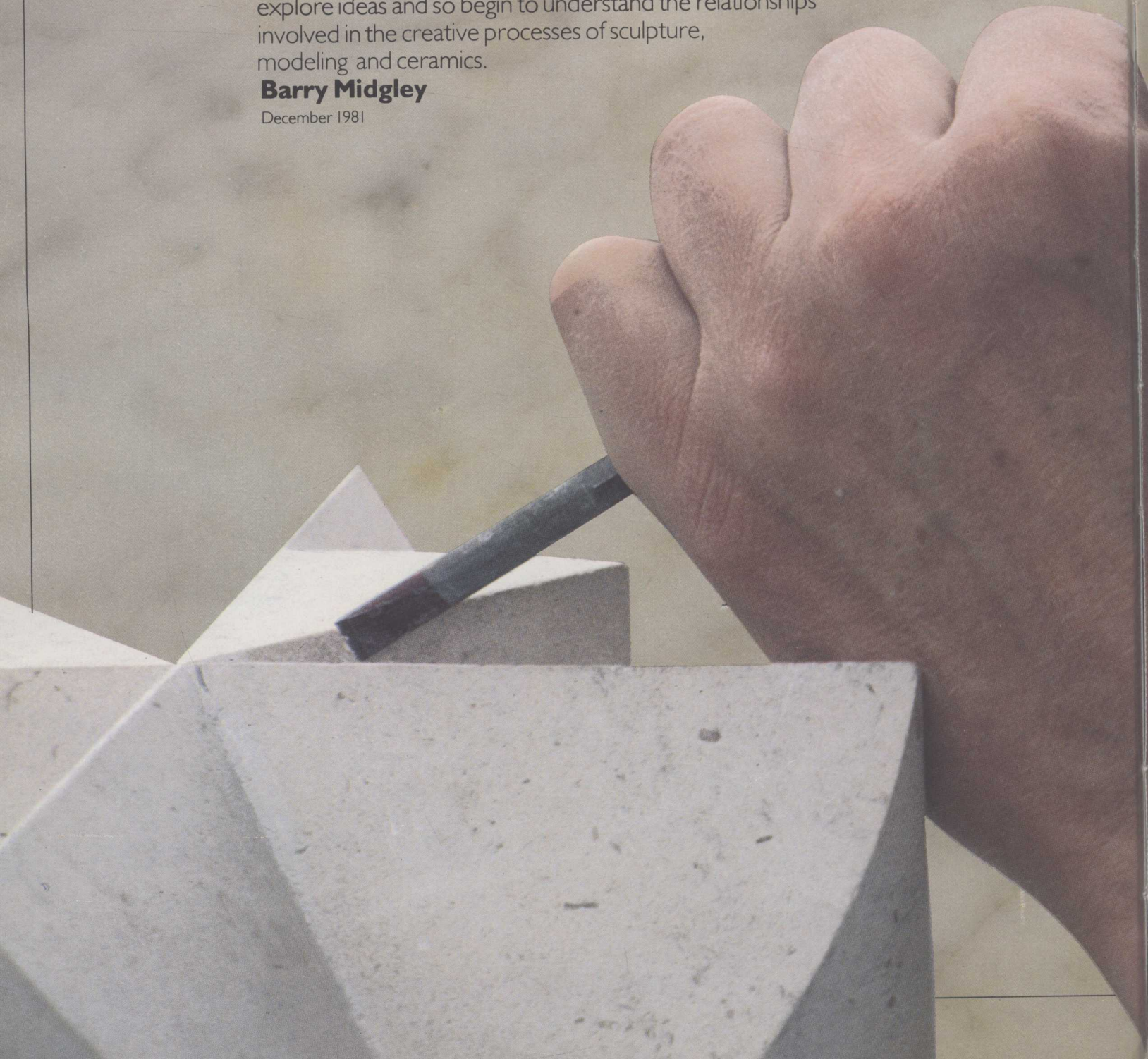
FOREWORD

An understanding of materials and a respect for their qualities is as relevant to sculpture today as it always has been. This book is intended to introduce the reader to techniques commonly employed by sculptors – some traditional and others firmly anchored in the twentieth century.

Craftsmanship cannot be seen as an end in itself and a poor or ill-considered idea will not be rescued by good craftsmanship. But knowledge of techniques and materials will help the reader to explore ideas and so begin to understand the relationships involved in the creative processes of sculpture, modeling and ceramics.

Barry Midgley

December 1981





PRINCIPLES OF SCULPTURE



Above The rugged stone carvings at Mount Rushmore in South Dakota can be seen from miles around. The huge sculptures took many years to complete, and were indeed finished by the son of the artist Gutzon Borglum, who began the work. One of the fascinations of sculpture is that it can encompass works on a very large and very small scale.

MAIN TECHNIQUES

Sculpture is an art form which deals directly with real space, unlike painting which creates fictive space on a single plane. Sculpture, being three-dimensional, must occupy, interact with or enclose actual space. A form may be compact and solid or armed with projections intruding into the surrounding environment. It may be hollow, linear or pierced, giving access to its own internal space. Because sculpture has to have a real existence, however temporary, in a complex and cluttered world, a sculptor must be able to match perception and imagination with practical, technical skills.

Sculpture in the round demands a coherent combination of many different design elements,

as it will be seen from several different viewpoints, and ideally each view should be equally worked out. Relief sculpture presents quite different design problems, since a complicated series of actual spatial relationships may have to be indicated within a relatively shallow depth of material. The particular challenges to a sculptor's capabilities may be overcome by learning or by instinct, but, inevitably, it is only in practice, not in theory, that the solutions are found.

The three basic methods of creating sculpture with raw materials are carving, modeling and construction. Carving and modeling are the oldest methods, and the basis of sculptural traditions, whereas construction has only been fully exploited and accepted in the twentieth century. Casting is a fourth basic technique, but this is a process of reproduction, not of original shaping.

CARVING

Carving is a subtractive process. This means that a solid mass of resistant material is shaped by cutting, chiseling and abrading the exterior to reduce the mass and create a particular form.

The outer limits of a carved sculpture are set by the shape and size of the mass of raw material. Wood and stone can be used for small- or large-scale work, and blocks of these materials can even be joined together if the form so demands. Carvings in ivory and precious stones are always small-scale.

The texture and substance of the material determine certain characteristics of the sculptural form. A soft stone may be too crumbly to be carved with any delicacy. Exhausting physical work is required to shape quite simple forms in a hard stone such as granite. Marble is relatively hard, and can be shaped into detailed forms, but could splinter during the carving process. Because of the lack of tensile strength—or the ability to withstand stress—in stone, the carving of slender, projecting forms is extremely precarious, since an ill-judged blow can fracture the whole piece. In many figurative stone carvings, arms are carved close to the body, and where a shape narrows, at the ankles for instance, there is often a supporting weight of stone, disguised as drapery, a tree trunk, or some other detail suitable to the subject. The instinctive confidence of Michelangelo (1475–1564) and Bernini (1598–1680) in handling their medium is evident from the intricacies of formal detail and their widely different approaches, which can be seen clearly in many of their works.

The fibrousness of wood gives it rather more tensile strength. Openwork designs and fragile, detailed forms are more commonly seen in wood carvings, such as beautiful Gothic altarpieces. A modern approach is that of the British sculptor Henry Moore (born 1898) who uses juxtapositions of space and mass in both wood and stone carvings.

MODELING

Modeling is an additive process—the form is directly built up in a soft, malleable material, such as clay or wax, over a minimal supporting structure of rigid material. Modeling provides the sculptor with a greater freedom of expression than carving. The modeling material can be molded and formed at every stage of the sculpture, giving complete control of both the inner and outer structure of the form, and if the work is unsatisfactory, part or all of the material can be pulled off and the process started again.

The size, shape and extension of forms in modeling is also more variable than in carving. Providing the supporting armature is strong and well balanced, no external supports are needed for the forms.

Hollow building in terracotta is a different type of modeling technique. There is no inner support, so the form must be more compact and self-supporting. Hollow-built terracottas are dried and fired to make the material more durable, and can be decorated with colored glazes for surface detail and shine.

Models in wax or clay are often cast in metal, to give a finished, unbreakable version of the sculpture. Casting gives perfect reproduction of the form, but obviously alters the surface texture and color of the original material.

Below The *Venus of Willendorf* probably dates from 27000 BC. Carved with crude and clumsy tools, the roughly hewn generalized forms, especially the swelling breasts and belly, nevertheless convey an impression of sensuality and fecundity. The figurine was probably used as a fertility symbol.



PRINCIPLES OF SCULPTURE

Stone quarrying

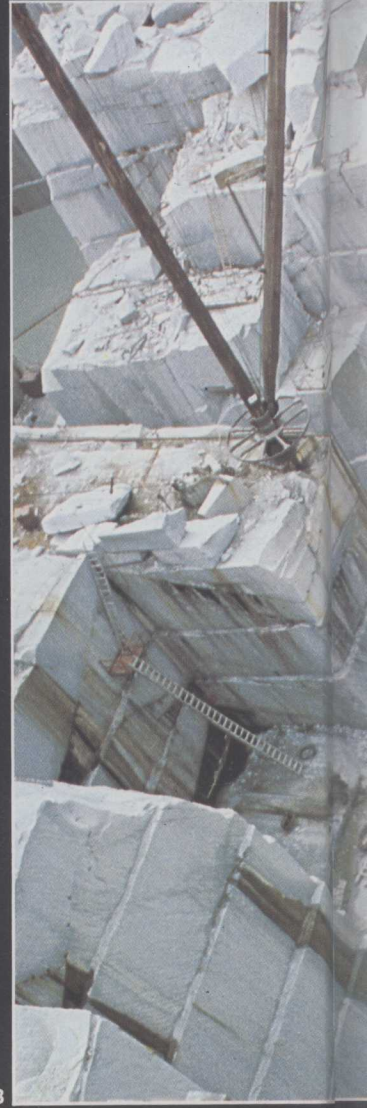
Regardless of the area of sculpture which you are working in, it is important to remember the origins of the materials you are working with. For instance, the natural fibers of wood have a bearing on the ways in which the material can be used.

Similarly, the fact that resins and glass fiber are synthetic materials affects how they are employed by the sculptor. Stone is a natural material. But, unlike wood, it has to be hewn out of the ground.

Unless the sculptor is working on a very small scale, it is likely that the stone will have come from a quarry. Marble has traditionally been one of the most popular types of stone for sculpture.

Some of the most famous marble quarries in the world are at Carrara in Italy. This is where Michelangelo obtained his stone.

Here stone workings at the top of Monte Altissimo (1) can be seen. The exact methods of quarrying may vary according to the type of stone. At Carrara a network of wires which are used to cut the stone can be guided into position by pulleys. The stones are cut into large blocks (2). The huge size of the blocks can be judged by the tiny figures of men standing on top of them, using drills to split them into smaller pieces. Another way of splitting blocks of stone is using wire in conjunction with carborundum stone which acts as an abrasive (4). In this instance, granite is being cut. Water is used to lessen both the heat caused by the friction and the amount of dust created. Holes have to be made in the stone so they can be lifted and transported (5). Here the nip holes are being made, before lifting, while other stones are being lifted in the background. Most quarries have their own large stockpiles. The blocks of stone are heaped on top of one another. For this, heavy gantries and lifting gear are essential (6). The blocks of stone (9) are stacked in the stockyard to await sale. Like most stockpiles, the marble stockyard at Carrara (8) contains pieces of stone of many sizes. When selecting a piece of stone to work on, make sure you assess its possible structural weaknesses as well as whether the shape and texture suits the effect you wish to achieve. Drills are used to split the stones (7) even when they are very





7



8

large. Wedges and pressure may also be used. Stone has poor tensile strength and so will split reasonably easily if pressure is exerted through it, by means of wedges, for example. Stones come from many different parts of the world. This spectacular picture (3) shows the Rock of Ages quarry in New York state, in the United States. The stones are piled to a great height. Granite is one of the hardest stones to work on and requires special tools. Sculpture with stone is one of the oldest sculptural media. Some of the earliest relics of artistic achievement include small stone carvings which may have been used as religious fertility symbols. Although the techniques of stone sculpture may have changed little over the centuries, the subjects and treatment by the sculptor have constantly changed to ensure that stone sculpture is one of the most popular and enduring areas of sculpture.



9



Above Gianlorenzo Bernini was one of the greatest Italian sculptors. This statue of St Longinus is made from terracotta which was later covered with gesso and gilded. This was a smaller version of Bernini's marble statue of St Longinus which stands in St Peter's in Rome. Bernini worked in many different sculptural media.

CONSTRUCTION

Construction refers to the process of building a whole sculpture from various component parts, which may be all of the same material or of different substances. This is largely a twentieth century development, brought about by the sudden increase in materials and techniques which have become available through scientific and industrial research. Constructions may incorporate traditional sculptural materials, such as wood, stone and metal, but these are used to develop quite new ideas, which may, perhaps, be combined with modern materials such as plastics and glass fiber.

Modern techniques of lifting, joining and supporting heavy materials have removed some of the traditional restrictions on sculpted forms, and opened the way to very different descriptions of the relationships between space and mass. Transparent plastics give access to the internal space of a sculpture, even if it is enclosed. Industrial welding techniques are used in metal sculptures which thrust out huge, heavy projections, unsupported in space.

Preformed shapes and whole found objects can be joined together and combined with raw materials to function in a new context. Motor mechanisms and electrical circuits are incorporated in works that move through space or cast out light. The scope offered by new materials and techniques has also prompted artists to re-examine the possibilities of natural materials, even reshaping them in their own environment to form giant earthworks.

CASTING

Casting processes are for reproducing a sculpture in a different, usually more durable material from that of the original. With some methods, the original work perishes during the casting process and, again depending on the technique, it may be possible to produce several copies of the original, or only one. A mold or impression is built up around the original form, and used as the pattern into which the new material is set.

The traditional technique of casting is the lost wax method for casting bronze. Small models may be cast solid, but larger ones are usually hollow. Metal has considerable tensile strength, so that fragile and extensive forms can be cast which would be impossible to work in stone, or liable to fracture in either stone or hardened clay. Since bronze is poured into a mold in liquid form, it settles into every detail and sets in a completely faithful copy in which all the intricacies of form in the original are preserved. Complex compositions can be cast in several sections and later constructed into the whole. The qualities of bronze have always been highly regarded for their own sake—the rich, reflective surface, its natural color and the heavy patination which it forms are all elements which can be held in mind when the original model is made.

Plaster is a cheap and readily available material for casting, but is somewhat crude for finished work. Glass fiber resin is a relatively new material which can be used to cast both modeled and constructed forms. Special pigmentation enables the sculptor to cast directly in bright color, or even produce a surface imitative of bronze. A great advantage of the material is that, when cast hollow, the sculpture is quite lightweight.

DEVELOPMENTS

Many of the tools, materials and forms of sculpture have changed little through centuries of activity. The earliest evidence of a deliberate carving process is the tiny *Venus of Willendorf*, dating from about 27000 BC. The simple curving shape of the figure indicates the problems of fashioning a form with primitive stone tools. Early artefacts were usually made from small lumps and fragments of material which could be easily carried and worked.

Small bone and stone sculptures, as well as clay figurines and pots, survive from the Paleolithic periods, but wood sculptures appear to have perished. Much evidence exists to prove that the impulse to create decorative and expressive form in natural materials was a very early feature of human development.

The significant early development in the history of sculpture was the discovery of metal working techniques. This at once provided a new material for sculpture, and far more efficient tools for cutting and carving. Abrasion techniques, equivalent to sandpapering wood, were well established, but these were laborious and imprecise. Metal tools were a much quicker and more accurate means of shaping, making possible delicate detail and intricate decoration.

The basic principles of carving, working in clay and bronze casting in use today were known in ancient Greek and Roman civilizations, and neither the tools nor the techniques have greatly changed. Their particular use has been subject to fashion and personal preference, and this has had considerable bearing on the developing styles of sculpture through the ages. In carving, for instance, each different tool gives a characteristic mark. The relatively deep holes formed by a punch, used in much decorative detail on Egyptian sculpture, set a very different style from that of the criss-cross texture and curving surfaces formed by claw chisel work. Although many of Michelangelo's sculptures are highly finished and polished, his mastery of chisel work is often clearly visible.

The marks on a clay model are an extremely personal expression of individual skill, since they are often formed with the fingers in a very direct engagement with the material. Although much clay sculpture was smoothed and neatened in the pursuit of 'perfect' form, the work of the modern French sculptor Auguste Rodin (1840–1917), with its massive forms and craggy, organic texture, clearly illustrates the vitality of the medium.

The task of a sculptor is to cooperate with the material to achieve his or her ideas, rather than

impose a predetermined form upon it. For instance, it is senseless to try to imitate the plasticity of clay in rigid stone. The finest sculptors have always controlled their medium while paying due respect to its own inherent qualities. This can be seen in a traditional view of carving which holds that the sculpture lies already imprisoned within the block, and the sculptor works to recognize and reveal the true form.

The human figure was the primary subject for sculpture until the twentieth century. Ancient and medieval sculpture was created mainly for religious or celebratory purposes, to portray gods and goddesses, figures from myth and legend, and ordinary mortals in pursuit of a higher plane of living. Animals also appear frequently, with particular significance in pre-Christian, Eastern and tribal cultures. In relief sculpture, where quite different rules of space and form apply, some elements of architecture and landscape are shown in a rather condensed view.

Below This glazed figure of a mounted drummer is an example of Tang dynasty ware. This time—from AD 618 to 906—was one of great excellence in ceramic wares. The modeling on this figure is very detailed. The color of the fired clay can be seen in places where the glaze has chipped off.

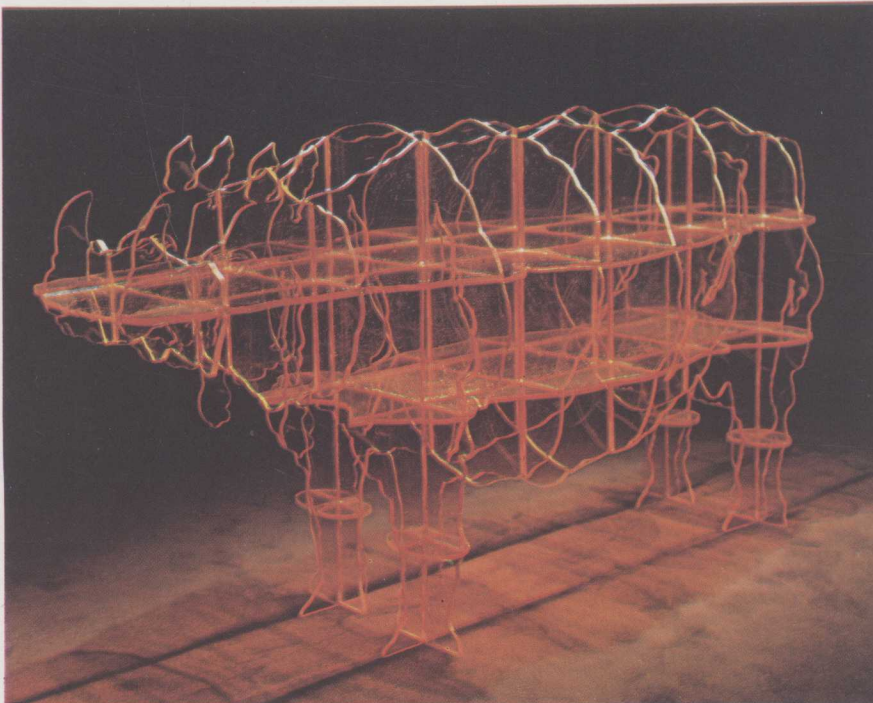


The twentieth century has seen many changes which have revitalized sculptural activity. Industrialization has produced man-made materials and mechanized tools which sculptors have eagerly grasped and put to their own uses. Communications are so efficient that virtually an international conversation has occurred between artists, resulting in an unprecedented and rapid evolution of ideas.

From tentative beginnings, pure abstraction came to be the dominant mode of artistic and sculptural form in a space of only 50 years, after centuries of figurative tradition. Picasso (1881–1973) was a remarkable innovator in both painting and sculpture. His analysis of form in his Cubist paintings introduced a new concept of volume, mass and space in visual terms. Reducing a form to a series of basic planes and angles, and combining several viewpoints simultaneously, he examined the interior and exterior structure of solid mass, without regard to its 'realistic' surface appearance. Picasso also first introduced the use of found objects and humble materials as appropriate components of sculpture.

The French artist Marcel Duchamp (1887–1968) went further, exhibiting everyday, functional objects, unaltered, as works of art. The lofty plane of sculptural tradition was questioned in the context of commercialism, industrial design and the immense social, political and philosophical upheavals occasioned by the First World War. The Dada and Surrealist movements investigated futility and fantasy, illustrating their visions as artistic form. Futurism and Constructivism at-

Below One of the most exciting breakthroughs in sculpture this century has been the advent of plastics as a sculptural medium. This work by the Italian artist Gino Marotta is entitled *Rhinoceros*. It is made from acrylic sheet. Acrylics are often used in conjunction with light because of their translucent qualities.



tempted to define an art appropriate to the age of machines and urban development. Abstract art after the Second World War declined to grapple with social or political messages and concentrated on the full expression of the physical qualities of artists' materials, and pure visual sensation.

The images of Pop Art in the 1950s and 1960s entered into direct combat with the images and products of a consumer society, placing the forms in a fine art context. Minimal sculpture returned to pure form, allowing the characteristic qualities of the materials full reign, and artists even took to the land, working natural materials in their proper environment, and importing contrasting man-made elements.

Lightweight man-made materials, such as plastics and glass fiber resin, have reintroduced color as an important feature of sculpture, as have paints developed for industrial and commercial use, which can be applied to metal and plastic. Heavy metal sculptures by the American David Smith (1906–1965) and the Briton Anthony Caro (born 1924) gain vibrancy from their bright color which matches the impact of the innovative forms. The whole basis of Smith's technique was learned directly in the workshop of an auto factory. The celebration, by Pop and Surrealist sculptors, of the vigor and vulgarity of modern life would be far less effective if they did not use materials invented by the consumer society.

Mechanized tools and lifting gear have banished restrictions on sculpture originally imposed by the weight and substance of the materials. A new attitude to scale, both real and symbolic, has emerged. The human figure has been ousted from its dominant place in the subject matter of sculpture by the rapid adoption of abstract styles and concepts. Sculpture has achieved architectural scale in constructions and inflatable forms, and rivaled the immensity of landscape by treating it as both studio and gallery. For instance, the *Wrapped Coastline* in Little Bay, Australia, project of the sculptor Christo (born 1935), could only be a twentieth century feat, a redefinition of the natural form of the oldest sculptural material, stone, by literally packaging a coastline in plastic sheeting. On a smaller scale, sculptures have been produced which, in different forms, examine the space within which they exist. The *Corner Reliefs* by the Russian sculptor Vladimir Tatlin (1885–1953) are simple wooden constructions fitting into a 90° angle in a studio or gallery, from which curving metal rods reach out and touch the walls to create the sculptural area. *Palace at 4am* by the Swiss artist Alberto Giacometti (1901–1966), made in glass, string and wooden rods, defines the whole space of a building on a small scale by means of an open linear framework.

PREPARATIONS DRAWINGS

Drawing is the common medium of all visual artists, and a common purpose is shared when drawing is used as a means of noting visual impressions quickly in a sketchbook or on a rough sheet. In many ways, however, the drawings of a sculptor may differ from those of a painter or graphic artist. Sculptors are not bound to two-dimensional space and need not spend time developing complex systems of perspective, immense vistas of landscape or crowded figurative scenes. Studies for a sculpture are quite likely to be self-contained images within the picture plane, and may be anything from a minutely careful examination of form from life, to a broadly sketched impression of the basic idea for a particular work. Color plays a less important role, since the immediate problem is to define three-dimensional structure, as in an architect's drawing. Many sculptures use the natural color of the material, and, if not, ideas about surface finish may arise directly from the execution of the form.

Many beautiful line and hatched ink drawings exist which demonstrate the preoccupations and working methods of major artists such as Michelangelo, Leonardo da Vinci (1452–1519) and the German wood carver Veit Stoss (c1450–1533). Small, broken studies of anatomical detail, the outline for an equestrian statue or an intricate design of a whole altarpiece show how drawing records the progress from original research to a vision of the completed form.

The lovely wash drawings of Rodin indicate the massive, vital forms of his models by means of delicate overlapping tones. The modern sculptors David Smith and Alexander Calder (1898–1976) made bold abstract drawings with brush and paint, which are not necessarily a plan for a particular work, but provide the essence of their approaches to sculptural form. Christo and American Claes Oldenburg (born 1920) both combine collage with drawn images to describe huge outdoor projects, whether in town or landscape. Some of Christo's collages are like shallow reliefs, and Oldenburg sometimes adds photographs to suggest the three-dimensional reality.

Constructed forms, such as kinetic sculpture with motor power, or a transparent plastic sculpture with internal lighting, cannot be thrown together. Accurate drawings are needed which plan out both the aesthetic form and technical detail. In figurative work, disciplined objective studies of human form are made, to observe and understand the structure before the sculptural medium is approached.

In any artist's work, no theory or formula can provide an adequate substitute for careful and continual observation, and drawing is the quickest way to record this experience. In sculpture, however, the usefulness of drawing is limited as the final form of the work will depend upon the different experience of the physical qualities of the material, which cannot be accounted for entirely in advance.

This being said, it is also true that drawing media—like pencil, charcoal, pastel, ink or gouache—have characteristic material qualities of their own which may themselves suggest visual properties for the work. The importance of drawing for sculpture is often overlooked in the emphasis on three-dimensional form, but the sculptor's range can extend to cover the materials of both painting and sculpture, giving a very broad area of visual expression to be explored.

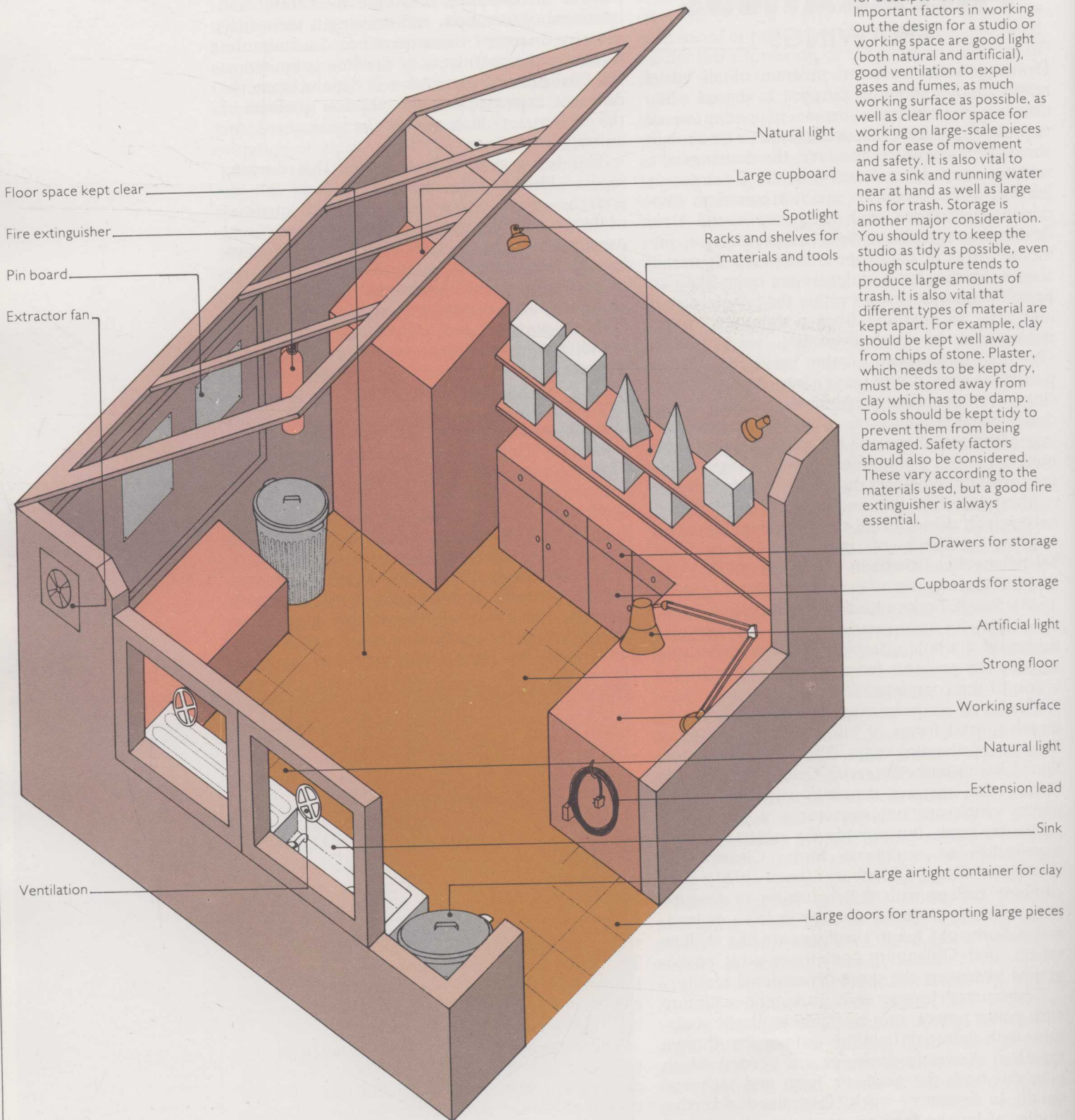
MAQUETTES

Drawing alone may be inadequate as a preparation for sculpture, since the crucial question is what the work will look like in a solid form, in real space and from all viewpoints. A useful way of checking the balance and volume of a sculpture is to make a small-scale model in which all the ideas for the larger work can be tried and tested. This is known as a maquette. It is a traditional aspect of carving and modeling work and, with drawing, has historically served the purpose of demonstrating the sculpture not only to the artist, but also to the patron who may have commissioned the work. In modern techniques of construction, the practice is not always suitable, since the forms are often arrived at through work in progress, suggested by the shape, texture and scale of each component piece. The ideas may be developed in small-scale sculptures which are important works in their own right.

Clay, wax or plaster can be used to make a maquette for a carved or modeled sculpture. A maquette can be scaled up mechanically to match a stone block by a technique known as pointing. This involves taking careful measurements of the forms and transferring the proportions to the stone via a metal structure with adjustable arms. This does not always produce a good result, since the large work may be a dull copy of the model, exhibiting no real relationship between the carver and the material.

The emphasis on direct engagement with materials, which has been a feature of twentieth century art, somewhat outmoded this academic tradition. Nevertheless, it may provide the means of understanding a form more completely than is possible in drawing, without the danger of wasting expensive materials.

PRINCIPLES OF SCULPTURE



The studio This diagram (left) shows a possible layout for a sculptor's studio. Important factors in working out the design for a studio or working space are good light (both natural and artificial), good ventilation to expel gases and fumes, as much working surface as possible, as well as clear floor space for working on large-scale pieces and for ease of movement and safety. It is also vital to have a sink and running water near at hand as well as large bins for trash. Storage is another major consideration. You should try to keep the studio as tidy as possible, even though sculpture tends to produce large amounts of trash. It is also vital that different types of material are kept apart. For example, clay should be kept well away from chips of stone. Plaster, which needs to be kept dry, must be stored away from clay which has to be damp. Tools should be kept tidy to prevent them from being damaged. Safety factors should also be considered. These vary according to the materials used, but a good fire extinguisher is always essential.