

# IDENTITIES OF MATERIALS—THEMES OF IDEAS AND PERCEPTION IN ARCHITECTURAL USE OF MATERIALS

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## MATERIAL CONCEPTS ARE OF CENTRAL IMPORTANCE IN ARCHITECTURE

In the Enlightenment the classical order of architecture was questioned and the modern movement replaced the classical order with a free composition of geometry and a belief in the identities of materials.

The classical architecture has its origin in Rome and in the Roman interpretation of Greek architecture. This is described in the treaties of architecture by Vitruvius. He shared the view that was held by Plato that the world consisted of the four elements earth, water, air, and fire, and described how the materials and human beings were dependent of the elements, and thought that fire first gathered the humans and made them speak to each other.

Material expression was of importance for the architecture of Rome. Augustus said that he took over a city of bricks but left it in marble: And even the Roman use of the orders sometimes formed a relation between material and function, like the rusticated pilasters of the Porta Maggiore and its aqueduct which the arthistorian John Onians in "Bearers of Meaning"<sup>1</sup> has described as forming a picture of stone in transition like the everchanging element of water flowing above on the aqueduct.

In the medieval times material and religious ideas seemed to be interwoven sometimes. In the cathedrals light and colours almost dissolved architecture and created an immaterial experience on earth. And in the transformation of metals, alchemists tried to make gold out of lead, aiming for higher goals of both material and spiritual value.

The Renaissance reintroduced the classical architecture, placed man in the center and made architecture material. In palaces of the 15th century the facades became virtual scales of textural expression in stone and the building appeared as a solid lasting block. Materials became more and more the instrument for expression of ideas and came to be the constituted instrument of the illusions and seduction of the baroque "Gesamtkunstwerk."

## STARTING WITH SIMPLICITY

Identities of materials became a source of the architectural expression of the Enlightenment. And the study of nature was held as a major idea to reveal universal orders and laws to form a general knowledge.

In natural science major achievements were made by, among others Isaac Newton by his definition of the gravity and physical forces, then came the ordering of measure system, the great encyclopedia by Diderot, and Linné's ordering of the botanic world. The study and ordering of nature also concerned



Figure 1: Man gathering around fire, from Vitruvius "Ten Books of Architecture". Edited by Cesariano, 1521

materials. Natural laws made it possible to master materials by measuring and calculating static and forces, and architectural expression was coloured both by rationality and expressiveness related to science.

The studies of geography and history were other sciences that affected material ideas. Empirical research led to excavations of archeological remains in Herculaneum and Pompeii. It also brought thorough studies of the ancient ruins in South Italy. The results of these "explorations" did not fit the theoretical works of architecture, and therefore they put a question to the supremacy of Vitruvius and the renaissance treaties.

A new basis of architecture was needed. One of the possible alternatives was to construct and return to an origin of architecture. Not only as an interest of history and archeology but, also by pointing out the primitive wooden house, the stone architecture of the Egyptians, and textile constructions of the Turks and the Chinese, new topologies with inherent material qualities were introduced and constituted an alternative and a competitor for the classical architecture. Models of historic use of material thus can be said to be an inspiration for the 18th century architecture.



Figure 2: "Allegory of Architecture Returning to Its Natural Model." Frontispiece to M.-A. Laugier, "Essai sur l'architecture", 2nd edition, 1755

In the mid 18th century the Venetian friar Carlo Lodoli in Venezia wanted to create a new architecture.<sup>2</sup> He claimed the faults of the classical orders and Vitruvius among other things the fact that the Greek architecture of the Doric order was known to have been a wooden construction transformed into stone. Lodoli rejected therefore the orders believing that it is wrong to copy the principles of wood in stone. Instead he wanted a rational architecture based on science and the properties of the materials. Lodoli said that "Architecture must conform to the nature of materials"<sup>3</sup> and categorized materials as architecture's first integral part, and proportion, geometry and ornament as second to materials saying that "In architecture only that shall show that has a definite function, and which derives from the strictest necessity."<sup>4</sup> Lodoli wanted to connect architecture with natural science as well as with the study of history.

In France another clerical Abbé Laugier had seen the origin of architecture in the primitive hut. This had also been described by Vitruvius, but was brought forth by Laugier as a natural model for architecture just like Voltaire stressed the relations of nature and man.<sup>5</sup> Laugier derived all architecture

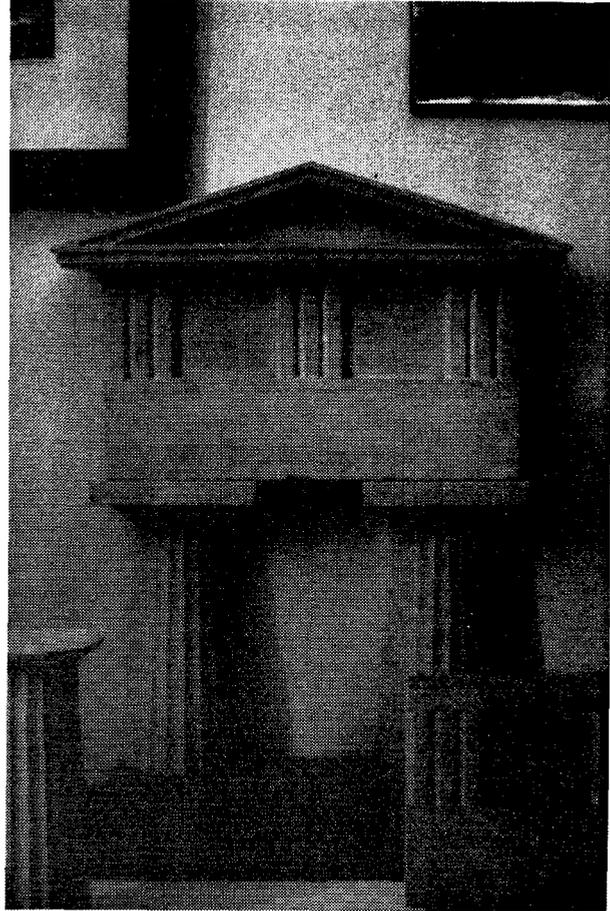


Figure 3: Portico models at the Marine Museum in Karlskrona, by Carl August Ehrensvärd, 1785.

from the natural wooden architecture of the hut.

He was not as rigoristic as Lodoli however, and saw no problem in transforming the expression of wooden architecture into stone, but still he claimed the importance of relating the architecture to the origin hut.

In the scenarios of garden architecture huts were constructed as pavilions in different materials and constructions. If Rousseau's "Emilé" and Defoe's "Robinson Crusoe" were immaterial objects of literature these huts became physical objects as models and illusions of nature related to man and architecture.

To learn from nature and create a culture was a pedagogical question. The Swedish officer Carl August Ehrensvärd (E.) travelled in Italy and acquired a taste for the beauty of the arts which he, starting with simplicity wanted to transfer to the North. He said that the most beautiful object second to man, was the tree and that the properties of wood were the circle, the square and the straight line and the only guidelines of architecture.<sup>6</sup> The properties of stone were according to E. only to imitate wood and endure time, and metal had no properties and could be treated however you liked. Architecture of the earth was to create holes in the ground, but only architecture of the tree was to E. beautiful and healthy for man.

Like Laugier he saw the wooden architecture as a source of architecture and in the Doric order he found a classic expression of wood architecture. And he made a set of models which can be seen in the Marine Museum of Karlskrona which

form a simple motif of Doric proportions in an extremely "heavy" proportion. Like a set of models of a mechanical "alphabet" formed by another Swede, the engineer Christoffer Polhem, E. with models seems to have formed a similar pedagogical tool of architecture models. Other examples by E. are the manor house Skärva and the inventory chamber of the Arsenal at Karlskrona.

The architecture of the revolutionary architects, for example Ledoux and Boullée, stressed the importance of geometry, the volume, and the surface of the building, abolished ornaments and asserted the constitution of the material.

In "Von Ledoux bis Le Corbusier" E. Kaufmann writes,

*Da die Eigengesetzlichkeit des Stofflichen anerkannt wird, hören die Umdeutungen der toten Materiale in organische Gebilde auf, endet die barocke Allbeseelung. Für die nachrevolutionäre Baukunst ist der Stein wieder Stein. Seine natürliche Beschaffenheit soll voll zur Geltung kommen...<sup>7</sup>*

It was necessary to control geometry to execute architecture of stone. A valuable stoneblock had to be drawn and cut precisely. Furthermore, the weight of the stone was both a problem to handle with force and an inherent property that fixed the construction and made it solid. With the help of gravity, stones locked the structure and gave expression to delicate and forceful architecture.

Stones were used to express geometry and gravitation, and big volumes could be plastered to express geometry and volume. And thus they became a material of universal appearance. Like for example the former townhall of Copenhagen by C.F. Hansen built in 1820. Sometimes visions were greater than the possibilities of materials. In projects of enormous dimensions, like for instance Etienne Boulé's cenotaph for Newton, a giant sphere, without any ornaments, was projected so big that no material for its construction was known at that time.

#### A GREAT FREEDOM

The Modern movement brought a freedom of room conception and formed an idea of universal materials. Just like Lodoli, Adolf Loos claimed the supremacy of material identity saying,

*Ein jedes Material hat seine eigene Formsprache und kein Material kann die Formen eines anderen Materials für sich in Anspruch nehmen. Denn die Formen haben sich aus der Verwendbarkeit und Herstellungsweise eines jeden Materials gebildet, sie sind mit dem Material und durch das Material geworden. Kein Material gestattet einen Eingriff in seinen Formenkreis.<sup>8</sup>*

This opinion was understandable when it concerned wellknown and traditional materials, but how were architects to deal with new use of materials and new materials?

Of course the antique natural concrete of pozzolana was known from Roman constructions, and industrial produced concrete was discovered in the 18th century and developed in the 19th century but was still in the beginning of this century a new material with a great range of unexplored constructive possibilities and material expressions. Concrete was believed to be a wonder material that would allow to build with the same universal material everywhere and would solve major problems

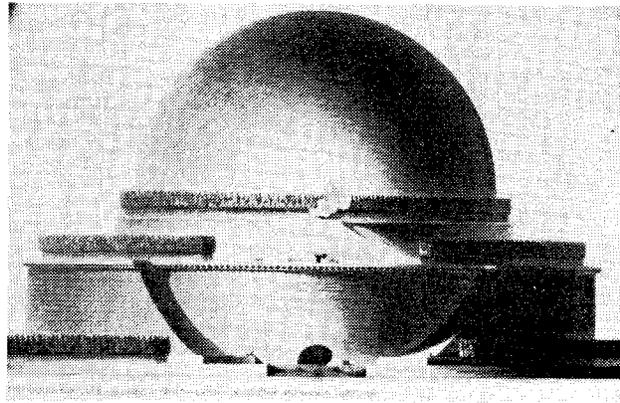


Figure 4: Cenotaph to Newton, Etienne-Louis Boullée c. 1785



Figure 5: Reflections in the glass of the facade of Casa del Fascio, Como

of architecture. But the expressive qualities of the material were still not very known and architects became explorers of the new material.

A manifesto of a young group of Italian rationalists called "Gruppo 7," formed a renewed architecture based on a new aesthetic of concrete.

*According to age-old tradition, stone and brick have their own aesthetic, born from constructive possibilities by now instinctive to us... Now with reinforced concrete, this scale of values loses its sense and its entire raison d'être. From its new possibilities... it is understandable that the new aesthetic of reinforced concrete completely*

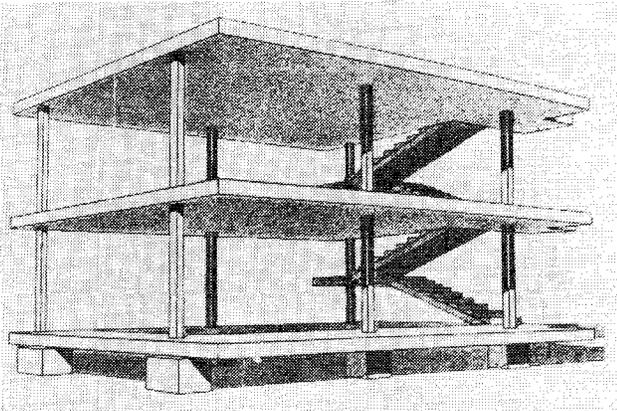


Figure 6: Do-mi-no, building system, Le Corbusier 1914

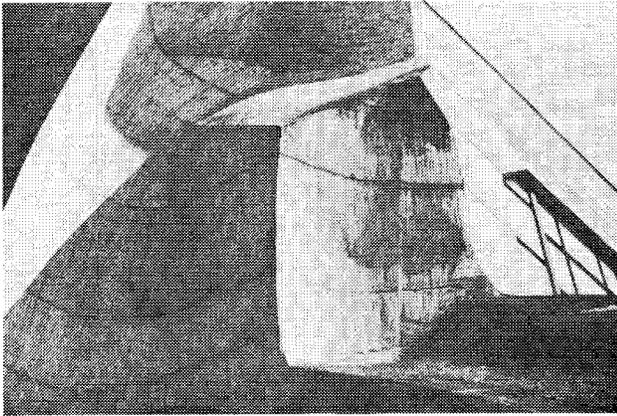


Figure 7: Detail of concrete construction, Goetheanum II, Rudolf Steiner, Dornach, 1925. (Picture from Sharp, Dennis, "Modern Architecture and Expressionism", London, 1966, p. 166)



Figure 8: House with plastic construction, Staffan Berglund, Torö, in the archipelago of Stockholm, 1970. (Picture from, "Handboken Bygg, Material...", Stockholm, 1984, p. 306.)

escapes most people accustomed to the traditional aesthetic, and worse is denied by them. More broad-minded people admit at most that the new material can be used in its constructive purity only for buildings of industrial nature and that a special aesthetic can be derived from them, not extensible to other forms of architecture. Others at most admit a compromise between constructive rationalism and some other elements renewed from past art. And these are the best cases. But almost everyone in Italy denies that reinforced

concrete can attain monumental value. Now there is nothing more mistaken. If there is any material susceptible of achieving classical monumentality, it is precisely reinforced concrete, and it derives this quality from rationalism.<sup>9</sup>

Glass was another material of new use. Its transparency made it a symbol of openness and honesty. In a competition entry for the headquarter of the League of Nations in Geneva in 1926-27, Hannes Meyer said that he used glass in the building because he wanted, "No back corridors for backstair diplomacy but open glazed rooms for public negotiation of honest men."<sup>10</sup> A similar view with a different political meaning was the background for Terragni's Casa del Fascio in Como sharing,

*the Mussolinian concept that Fascism is a glass house into which everyone can peer, giving rise to the architectural interpretation that is the complement of this idea: no encumbrance, no barriers, no obstacle between the political hierarchy and the people.*<sup>11</sup>

Concrete steel and glass were more or less isotropic materials. This means that they were homogeneous and the same in every direction. This made them possible to calculate and control in a standardized and industrial process which made them preferable as materials of the early modern movement. In 1918 Le Corbusier formed the building system Domino as a hut for the modern architecture.

With the help of industry and transportation, materials could be obtained everywhere and universal building materials, abused ornaments, and gave architecture distinct form that emphasized geometry. These were characteristics that early modern architecture shares with the architecture of the late 18th century.

Still the vocabulary of materials could be perceived both as linear and cubic as the architecture of Adolf Loos and Le Corbusier or as sculptural and organic as in the buildings by Rudolf Steiner and Erich Mendelsohn.

In the late twenties the aesthetics of the machine of the modern movement were criticized and instead values of representation were of great discussion, as for instance during the competition of the headquarters for the National League in Geneva.

At this time material attitude seemed to renew architecture. By using traditional materials in combination with concrete, steel, and glass, a contrast and a scale of different texture and cultivated materials enriched architecture and combined tradition and modernity not only as geometrical proportion but also as physical perception.

Examples: House for Tristan Tzara by Adolf Loos, Paris 1926, Villa Mme Mandrot by Le Corbusier, in Le Pradet 1930-31, Une Maison de weekend Paris 1935, Maison aux Mathes 1935, Exposition d'art "primitif" 1935, Tempe a Pailla by Eileen Gray 1932-34, Atelier d'artiste by Lingeri, Lago di Como 1935-39, Villa Leoni by Lingeri, Campo-Ospedaletto sul Lario 1938-42, Casa Malaparte by Adalberto Libera and Curzio Malaparte, Capri 1940, and Falling Water by Frank Lloyd Wright 1936.

#### A NEW REALITY

As a result of new technologies, new realities conceive both physical and virtual concepts of materials. The concept of free room of modern movement was dependent on materials,

now it's possible to create even a free material concept. Material identities can be programmed and constructed both theoretically and physically to create a freedom of material conception. The freedom of material concept will also call for responsibility in the handling of reality and illusion. New medias have to be commonly available to develop an experience of sensitive criticism to handle and use the contrast between the material and the immaterial, reality and illusion.

Technology makes it possible to dematerialize our actions and reduce our use of material resources. Material does not have to exist, for ages stock brokers have been handling values of immaterial appearance, and the text on the computerscreen does not need any paper and the Internet makes communication immaterial, and in architecture computer models and cyberspace will make it possible for us to sense and take part of different realities.

How will we move from one reality to another? What will be the relation between the immaterial and material world? Perhaps future will bring a new universal material as a mediator that can materialize what we see on the screen.

In "Deutsche Bauzeitung 1, 1996," an issue dedicated to materials, the editor claims that the plastic fingertouch of the keyboard and the mouse will create a desire to experience the material world. Will future bring "holiday trips to reality" and experimental parks where we can amuse ourselves in the physical world.

Relation between material and immaterial realities and new technologies is present in e.g. the works of the Swiss architects Herzog and de Meuron and some of Jean Nouvel's works which create a new range of contrasting material qualities. This shows that we can not one-sidedly take part only in historic or new technology. Instead we have to learn from age old as well as from modern techniques and materials. Material use has constantly to be evaluated, renewed and techniques have to be maintained to enrich modern architectural tradition and meet new technology.

Many restoration projects are great opportunities for a sensibility, to sense expressive qualities of old and new materials, and the work of restoration mostly calls for an architecture which adopts to the particular situation of each project. In the same way artisans for ages have adopted to the particular piece of material with which they were working, the woodcutter to the growth of the tree and the mason to the strains of the block of stone, perceiving the material. With the restoration of modern buildings new questions of material, techniques, and authenticity are brought up.

Examples of restoration: The restoration of the old planetarium in Terme di Diocleziano in Rome, by Giovanni Bulian, Castel Vecchio in Verona by Carlo Scarpa, House in Eichholteren in Switzerland by Donald Judd, The pavilion in Barcelona by Mies van der Rohe, Theater in Belfort by Jean Nouvel.

Material identities are more than a discussion of technology. Imaterially materials are bearers of meaning, identity, and even form a basic language. This is stated by the German philosopher Thomas Raff in his dissertation, "Die Sprache der Materialien" from 1994.

Briefly said, new technology is defined in meanings, themes, and forms, and even a relative new material as plastic could be a rich story-teller. The French philosopher Roland Barthes in 1957 cursed plastics in saying:

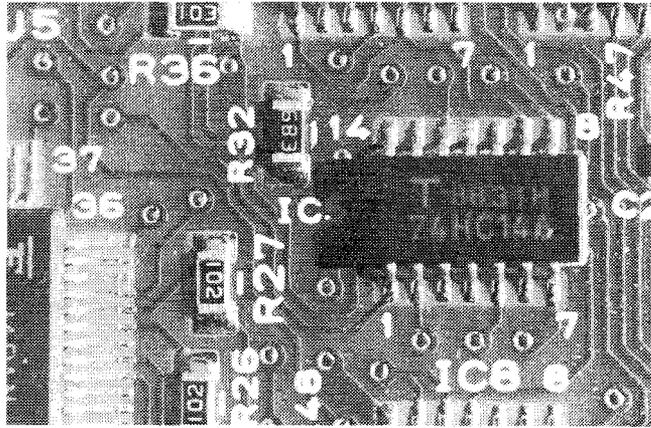


Figure 9: Computerchips

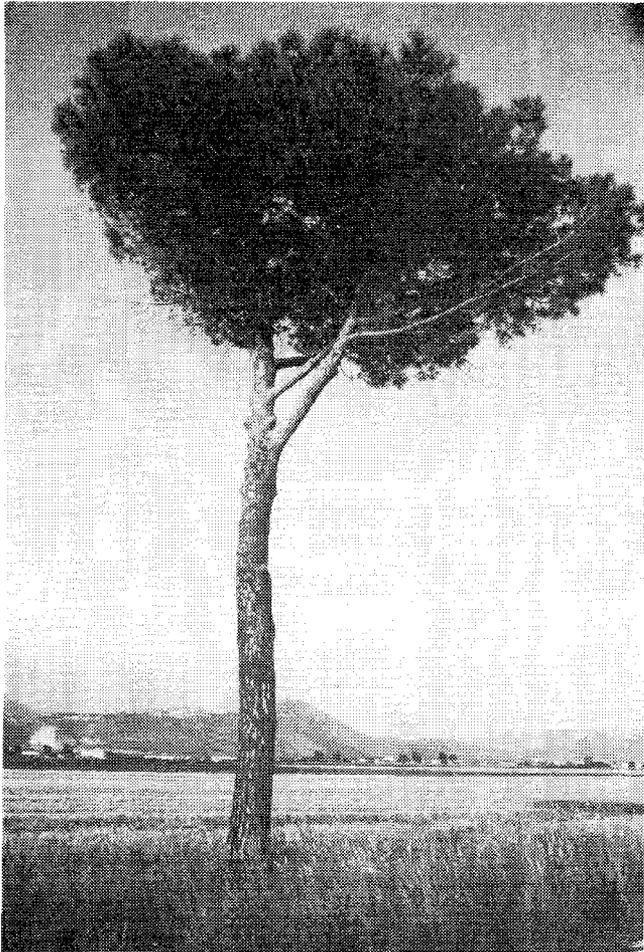


Figure 10. A tree by Via Appia

*"Despite names that would suit a Greek shepherd (polystyrene, phenoplast, polyvinyl, polyethylene)...this is a graceless material, lost between exuberance of rubber and the flat hardness of metal."*<sup>12</sup>

Set up against this, the meaning of plastic for the Italian designer Alessandro Mendini from 1990 creates a colourful material contrast stating:

*Clean air, real food, undeveloped landscapes pain us moderns, the "sentimental robots". We do not like them, nor do we know how to*

use them. The boundaries between real and false have vanished, everything has become make-believe; people and things are like mirror-images or souvenir of themselves. In this context, plastic becomes the perfect, multiform material to resolve our need for ambiguity and simulation. Plastic—the word itself tells it—is so without identity as to have, on the contrary, an infinite number of identities. It allows us to say that “today, any image is possible.”<sup>13</sup>

In a sophisticated way we have learned to control and refine material identities, but the way nature provides materials neither correspond to the laboratory situation nor to the computerized reality. More than this identities of material also inherit semiologic meanings of poetry and expression. A material entity for architecture could be a hut as well as an atom<sup>14</sup>, and the properties of the tree as well as the information of a microchip could form identities of architectural materials.

#### NOTES

1. Onians, John, *Bearers of Meaning*, New Jersey, 1988, p.50
2. Two of Lodoli's adherents Francesco Algarotti and Andrea Memmo have written about Lodoli's ideas of architecture. Alberto Sartoris has commented on Lodoli in a chapter of *Encyclopédie de l'architecture nouvelle*, Milan, 1957, called “Le rationalisme lodolien.” Other writings on Lodoli have been published in works by E. Kaufmann and J. Rykwert.
3. Translated from Algarotti, “Saggio,” p.65 in Emil Kaufmann, *Architecture in the Age of Reason*, New York 1955. p.97
4. Kaufmann, (from Algarotti “Saggio” p. 61.) p.96
5. Laugier, Marc-Antoine, *Essai sur l'Architecture*, (2nd ed., Paris, 1775)
6. Ehrensward, Carl August, *De fria konstens filosofi*, Stockholm, 1782, p.47-50
7. Kaufmann, Emil, *Von Ledoux bis Le Corbusier*, Wien, 1933, p.45
8. Kulka, Heinrich, *Adolf Loos*, Wien, 1979, p.22
9. Rassegna Italiana, December, 1926, quoted from a translation by Ellen R. Shapiro in “Oppositions,” Spring 1978:12
10. Frampton, Kenneth, *Modern Architecture*, London 1980, p.134
11. Quoted from Thomas Schumacher, *Surface and Symbol*, New York, 1991
12. Quoted from catalogue of the exhibition “Mutant Materials in Contemporary Design,” New York, 1995, p.12
13. “Mondo Materialis,” New York, 1990, p.153
14. da Landa, Manuel, “Matter of Philosophy,” in “Communications from the United Nations Environment Programme's Working Group on Sustainable Product Development, the Magazine,” “Way Beyond,” 1, Amsterdam, 1996