

## Air Grid: A New Colour Form

Victoria Watson

*School of Architecture & the Built Environment, University of Westminster, London*

*Email: [airstudio@blueyonder.co.uk](mailto:airstudio@blueyonder.co.uk)*

The subject of this paper is a new colour form entitled Air Grid. The aim of the paper is to identify parallels between Air Grid and other expressions of plastic art. Specifically the paper argues that the phenomenon of the Air Grid draws upon a spatial sensibility that is inherently sensual, rather like the colour forms of Donald Judd.

### Space Colour and Architecture

In his essay 'Some aspects of colour in general and of red and black in particular' Judd makes a connection between his own work with three-dimensional, constructed, artefacts and works of architecture, arguing that both share a preoccupation with *space* [1]. Furthermore, Judd claims that alongside the aspect of space there is another quality to the artefacts he produces, of equal importance to the unity of the work, this being *colour*. Judd then forges another link between his work and architecture by claiming that 'in architecture colour is a part of architecture' [1], and he brings space back into the discussion of colour and architecture by stating that 'colour and space occur together' [1]. Thus it might be argued that Judd sees the artefacts he constructs as sharing a common ground with architecture through their mutual preoccupation with the linked sensory registers of colour and space.

Throughout the essay Judd attempts to keep his discussion of space distinct from his discussion of colour, but this is a difficult division to maintain and he does not succeed. In fact, because of the way Judd thinks about colour, any attempt to separate a concept of colour out from a concept of space is doomed to failure. Judd thinks about colour as something that is produced within the real, embodied, spatial experience of those who attend to his work, but in order to conceptualise colour viewed in this way Judd would need to construct a two-part concept. It is precisely with the notion of constructing such a two-part concept that I refer to my own product, the Air Grid, and to artefacts produced by Judd through the term 'colour form'.

Although he does not use the term colour form, nevertheless this notion could appropriately be used to capture the sensibility of space and colour that comes across in Judd's reference to a specific work of architecture, this being the Seagram Building in New York, by Ludwig Mies van der Rohe [1]:

The colours of the bronze and tinted glass of the building by Mies van der Rohe in New York City form as definite a scheme as any with bright colours. The question is whether architecture should always be quiet, with natural materials, usually grey or tan, or whether it should be brightly coloured or partly coloured.

Judd's selection of a building by Mies van der Rohe to indicate the intimate connection of colour and space in architecture is of particular interest to this discussion as it was precisely through the attempt to model, not the abstract, geometrical figures of Miesian buildings, but

the ambience of their colour form that the first steps were taken toward the development of what subsequently came to be called Air Grid.

## Models of Mies

In fact the modelling of the Seagram Building was not the first but the second experiment to be conducted on the basis of attempting to capture the essence of Miesian colour form. The first was based on the Lake Shore Drive Apartments, built in Chicago between 1948 and 1951. The procedures involved were, however, the same in both cases [2].

Built in 1999, the prototype Air Grid entitled Seagram was extrapolated from a 1/500th scale plan and section of Mies' design of the Seagram Building, built in New York between 1954 and 1958. The principle of extrapolation aimed to produce information sufficient to plot a three-dimensional grid of a specific cadence and extent. It is possible to do this with Miesian architecture (to be accurate, with Mies' later work, subsequent to his experiments on the campus at IIT [3]) because Mies so organised his designs that the formal system of order coincides perfectly with the material system of expression. Between every constructional system of the Miesian building and between every member within a particular constructional system lies a harmonic relationship based upon modular proportions.

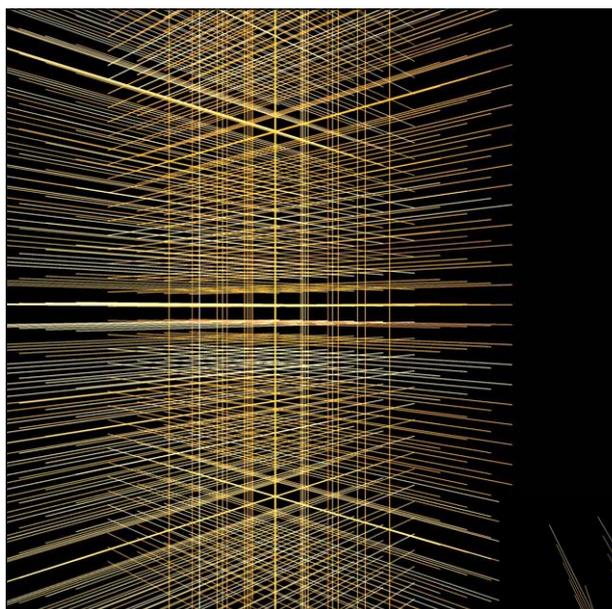
The intuitive decision to replicate the Miesian grid in *actual* space led to the selection of sewing machine thread as the material of actualisation. Machine thread being appropriately delicate, a filament of thread will score a fine line through the air when held taut at either end, the fine lines drawn by the thread are sometimes referred to as the *vectors* of the grid. Subsequent research led to the identification of two particular species of machine thread appropriate to the task of drawing vectors. Grids are drawn, primarily, in viscose embroidery thread, which is soft, smooth and lustrous; sometimes metallic polyester thread is used too, as it is more reflective than viscose, although more ductile.

The first problem involved in the manufacture of a three-dimensional grid made from machine thread is that of the support. The support has two tasks to perform, first it must serve as an apparatus for measuring and locating points in space, and second it must be able to maintain the shape of the grid. Foam-board is a composite material consisting of a polyurethane core, sandwiched between two layers of thin card. The material is light and rigid but not brittle, and it is easy to punch small, relatively clean, holes through foam-board. Because of its card surface, it is easy to mark setting-out lines on foam-board and foam-board itself is easy to cut. The three-dimensional grid is made by drawing thread through a network of holes, pierced through panels of foam-board and held taut in the grasp of a sharp incision cut into the vertical members of the foam-board armature, which gives stability to the panels of holes.

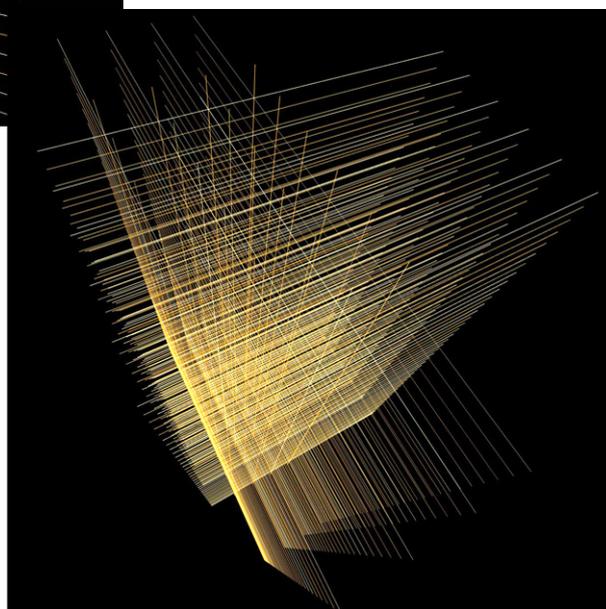
The design of the support consists of two components. Firstly a system of four, or six, panels of holes establishes an *X* and a *Y* axis, or an *X*, *Y* and a *Z* axis, called hole-panels. Secondly there is a framing system of vertical and horizontal supporting members, referred to as the support armature. Some, but not all, members of the support armature are sliced with a rhythm of fine incisions, corresponding to the rhythm of holes on the hole-panels. Because the foam-board yields, the incisions are sufficient to hold the thread taut. Prior to fabrication an electronic model of the Seagram grid, hole-panels and support armature was produced, which served two practical purposes. First it could be used to generate cutting and hole punching templates for the hole-panels and support armature, and secondly it could be used to generate a coloured ground. A dark brown was selected from the computer's default colour palette and printed onto photo quality inkjet paper, the outcome was a deep olive green. The coloured

ground, sufficient for the task at hand, was pasted to the inner face of each of the hole-panels. Marked upon the coloured ground was the pattern of points necessary to produce the network of holes through which the threads, constitutive of the vectors of the grid, would be drawn. A gold polyester metallic thread was selected for the drawing of the grid, in this respect Seagram was an unusual grid in that her vectors consisted of threads of this one colour only.

As well as serving the practical purpose of facilitating the manufacture of the physical models, the electronic model was able to serve as a means of conducting a test. It was possible to compare perspective views made with the electronic model to the experience of looking at the model made from foam-board and thread. Although the electronic model cannot emulate the radiant light effects of the thread, it can reproduce and capture another perhaps more striking effect; this is the effect of a changing point of view. Because the vectors from which the electronic model is made are virtual, so they have no need of a support armature to hold them in place, to defy gravity. This means that in the views of the electronic model the hole-panels and support armature are strictly representational and can be taken away. In removing the hole-panels and support armature it is possible to simulate views of just the grid only. The computer can be used to capture views taken from different points and with differing angles of vision, and in doing so reveals a range of images. These range from centered, frontal views, where the fact of the grid's meagre materiality dominates the image (Figure 1), to views where the grid is tilted out of frontal alignment and forced into projections in which the vectors begin to merge into shimmering planes, and the planes in turn merge into a voluminous body (Figure 2).



**Figure 1** *The grid's meagre materiality dominates the image, view, electronic model based on Mies van der Rohe's design of the Seagram Building, New York, 1954–1958*



**Figure 2** *The planes in turn merge into a voluminous body, view, electronic model based on Mies van der Rohe's design of the Seagram Building, New York, 1954–1958*

However, and this distinction should not be taken lightly, the stillness of the computer-generated views, or indeed of photographs of the physical models, is not available to the real, embodied experience, which is constantly animated through the interplay of environmental factors. Most noticeably the grid is highly sensitive to changes in ambient light and to the constant movement of the eye.

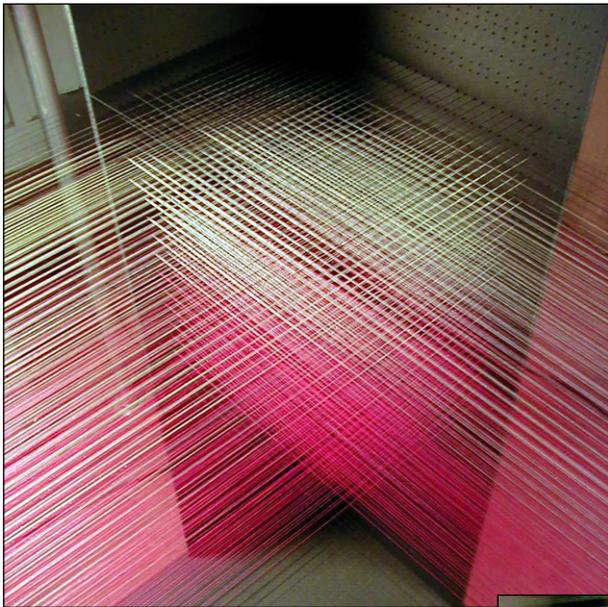
Table 1 summarises the two Miesian buildings investigated in this way. This experience provoked the thought that the essence of the artefacts being produced did not reside in the Miesian precedents upon which they were based. So a third investigation was initiated, based on Mies' design of the Office Building, Westmount Square, Montreal, 1965–68. Extrapolation from a 1/200th scale plan and section produced information sufficient to plot a three-dimensional grid of specific cadence and extent. However, instead of attempting to select colours for the hole-panels and for the vectors based on the colour ambience of the actual building an alternative and perhaps somewhat surprising source was selected as the basis of the colour selection. There is a moment in the life of the popular icon Marilyn Monroe in which, attired in a red dress, she is said to have had herself suspended from a helicopter and lowered into an amassed and no doubt amazed crowd waiting in the streets below. It is this image on which the colour selection of the Westmount grid was based. Perhaps the choice is not so entirely arbitrary as it first seems. There is a correspondence between the literal hovering and suspension, supposedly performed by the idol herself, and the quality of unassisted levitation that is reported to pervade so much of our experience of Miesian architecture [4]. Marilyn, as the Westmount grid came to be called, had matt black hole-panels, in fact her support armature was coloured matt black too and her vectors were drawn from red, scarlet, honey blonde, white, peach-orange and pink viscose, and red metallic thread.

**Table 1** Summary of Miesian buildings modelled (scale 1/500)

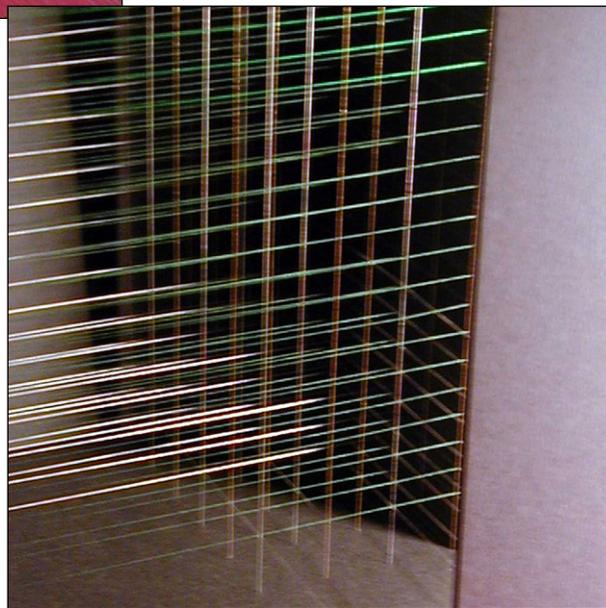
Air Grid	Building	Hole-panels	Vector colour	Vector material
Lakeshore	860–880 Lake Shore Drive Apartments, Chicago, 1948–51	Black	Powder blue, periwinkle, lavender gray	Viscose
Seagram	Seagram Building, New York, 1954–58	Deep olive green	Gold	Metallic

The artefact thus produced was in itself a delightful colour form. Unfortunately insufficient consideration had been given to the design of the support armature and this grid did not last long; sadly only one photograph remains (Figure 3). The story of its derivation remains entertaining but puzzling. Perhaps it was because the Lakeshore and Seagram buildings had been visited in person, prior to the process of modeling whilst the Westmount Square edifice was known only through black and white photographs and reproductions of drawings. Perhaps it was because the original was unknown in its existence as a colour form that there was a lack of intensity in the process of imagining the model, a lack of intensity that required a supplementary image to generate sufficient energy for the process of imagination.

A fourth investigation ensued involving a return to the Seagram Building but this time with an enforced and consciously erroneous projection of a colour form in shades of green. Green is an unusual colour for a building. Based upon an extrapolation at 1/200th scale, with matt black hole-panels and support armature and vectors drawn in threads of British racing green, myrtle and forest green viscose, and gold and silver metallic, this grid came to be known by a name with somewhat mineral connotations, *She was called Christophene* (Figure 4).



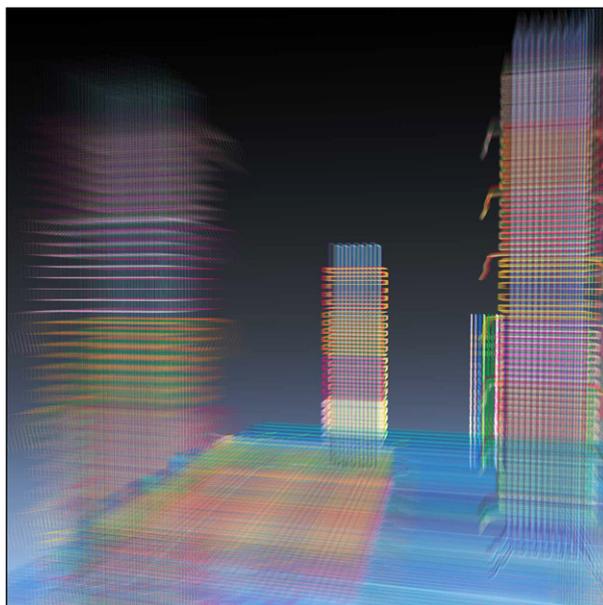
**Figure 3** Sadly only one photograph remains, photograph, model in foam-board and machine thread based on Mies van der Rohe's design of the Office Building, Westmount Square, Montreal, 1965–1968



**Figure 4** She was called *Chrystophene*, photograph, model in foam-board and machine thread based on Mies van der Rohe's design of the Seagram Building, 1954–1958

The final grid to be made bearing conscious resemblance to Miesian architecture was called The Gateway Grid. Mies' later work exclusively and recurrently expressed two formal types: the Tower and the Pavilion. Sometimes Mies' design will consist of a single building, a Tower or a Pavilion standing alone, but often his designs will express both types. For example, the design for Westmount Square consists of three Towers and one Pavilion, the Tower and Pavilion elements still stand alone but there is a harmonic relationship between them and a single grid can be seen to order their spatial relationships. The Gateway Grid, although based on no actual Miesian design, proposed an assemblage of five Towers and one Pavilion (Figure 5).

Mies' preoccupation with the free plan, dating from the 1920s, is continued and expressed in his later work. This expression is nowhere to be seen in the composition of the individual Towers and Pavilions of a composite design, which are rigorously ordered to read as rectilinear, prismatic volumes, but in the unifying, urban, or landscape composition by which they are aggregated. For all that the Miesian work is fused into the single modular unity of the organising grid, this module is too small to override the dominant compositional strategy of blocks placed freely in space. In Mies' urban compositions buildings seem to glide past one



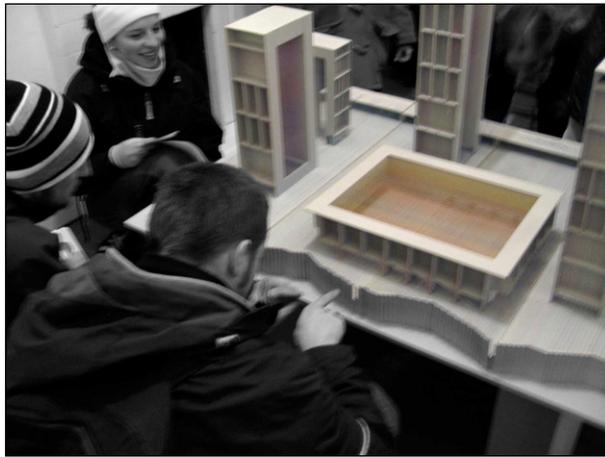
**Figure 5** An assemblage of five towers and one pavilion, view, electronic model, *The Gateway Grid*, based on a general idea of Miesian design principles

another, as if subject to a gentle homogeneous force, thus establishing a loosely flowing space, much more like water or air than the firm lines and angles of classically constructed space. The Gateway Grid expresses a similar, harmonious space in which the ‘Towers’ and ‘Pavilions’ of the aggregate float above an ambiguous ground plane; their placement relates them, one to the other, through elision rather than symmetrical, axial or repetitive aggregation.

The Gateway Grid was drawn into a support armature and system of hole-panels that had been spray painted grey. The range of threads selected for the drawing of the vectors was intended to represent the full spectrum of visible light. Thus the colours range through purple, red, orange, yellow, green, cyan and blue. The decision to select the electromagnetic spectrum of colours was made in the full knowledge of the association of this form with notions of disembodied colour, but it is not necessary to the discussion we are attempting in this paper to explain the theme of disembodiment as manifest in the Gateway Grid.

The Gateway Grid was exhibited in Hoxton, London in November 2006 [5]. It was clear from the public response that the colour form had a presence that could be strongly felt, and many of the visitors to the exhibition were intrigued by it. However, the Miesian reference did not go unnoticed either, although many visitors understood the reference only in terms of the abstract notion of modern architecture in general, the precise allusion to Miesian architecture escaping them. Bifurcation between the sensuality of the grid and the connotations of modernism in architecture confused the audience, although it was a confusion that many of them seemed quite content with. Perhaps the idea that what was on display represented a future (or some kind of alternative) architecture, meant they did not need to concern themselves with the question of why they were drawn to these particular colour forms (Figure 6).

Although it had emerged out of my working within established structures of representation (my ambition to model Miesian architecture), what is engaging and new about the Air Grid is that it seems to transcend representation and to confront the viewer with an actual presence, in the same biopsychological environment of their own inhabitation. This in itself should be sufficient for the ambitions of the work and in future all allusions to the spatial divisions of Miesian buildings will be omitted from the Air Grid project, serving now as little more than



**Figure 6** *Why were they drawn*, photograph, exhibition, opening night, The Mobile Studio with V A Watson, *Brief city 2051*, Hoxton Gallery, The Macbeth, 70 Hoxton Street, London N1 6LP, 22–29 November 2006

a distraction and luring the viewer of the work away from what is essential and back into the world of representation.

The unlikely fact of discovering the Air Grid in a project seemingly rooted in representation owes its due as much to the intuitive determination to model, not the numerical divisions, but the sensual colour forms of Miesian buildings as it does to the perfect coincidence of formal order and material expression in Miesian architecture.

## Environmental Optics

In this discussion I am referring to the artefacts produced by Donald Judd, to the buildings of Mies van der Rohe and to the Air Grid by the term ‘colour form’. As initially indicated this was because the term seems more appropriate to discussions of colour in the plastic arts, especially architecture, due to the impossibility of imaging colour and space as separate phenomena. In fact, besides space and colour there is a third factor incorporated in the term colour form and this is material. However, following a suggestion of Donald Judd in an interview of 1989, in the concept of the colour form, material and colour are conceived as being consolidated [1]:

I don’t like plain plywood or plain concrete or plain metal to be considered without colour. So to me they are coloured. But I also know that at least it’s not bright colour, it’s not red and blue. So it’s a pretty big span. But it’s best to consider everything as colour. On the outside the pieces are grey; that’s pretty easy, grey.’

Judd’s suggestion that everything be considered as colour is supported by the theories of environmental optics, as developed by the psychologist James Jerome Gibson. In his book *The senses considered as perceptual systems* [6], Gibson states that the meaning of the term ‘color’ is one of the worst muddles in the history of science [6], he does not discuss the controversy but gives his own definition of colour as [6]:

...the pigmentation of substances in the environment. This includes both the selective pigments that yield hues and the unselective pigments that yield black, grey and white. In this sense of the term, the color of something helps to specify the material substance of it – that is, what the object is composed of.

According to Gibson the ability to distinguish the black-white character of a surface is a colour phenomenon as much as is the ability to discriminate the different proportions of the spectrum of light reflected from it, in other words the chromatic qualities of a surface.

Our understanding of colour becomes confused when we try to reconcile the physical theory of light, in which light is deemed to consist in electromagnetic radiation of varying wavelengths and that different wavelengths are deemed to correspond to different colours, with our belief that information about an external object is conveyed by light. According to Gibson the paradox can be avoided by considering different aspects of light; thus he makes the distinction between 'radiant light', which is light performing primarily as a source of energy, and 'ambient light', which is light performing primarily as a source of information. Obviously there is no hard and fast distinction between the two aspects, light as energy can still involve information transfer and light as information still involves energy transfer.

The reason that ambient light in the environment carries information about the environment is because it is reflected light, not light directly travelling from a pure energy source but light that has been reflected or refracted, for example off the surfaces of objects in the environment and through more substances such as water and air. Living beings have evolved to exploit the fact that ambient light is dense with information, developing visual systems of which the human visual system is one example. The visual system is but one of a number of systems that permit the human being to perceive an external world and it is arguable that vision is the best utilised of the sensory systems involved in human perception.

Gibson argues that it is no use trying to understand the mechanics of information conveyance in terms of representation [6]:

...information about something means only specificity to something. Hence, when we say that information is conveyed by light, or by sound, odor or mechanical energy, we do not mean that the source is literally conveyed by a copy or a replica. The sound of a bell is not the bell and odor of cheese is not cheese. Similarly the perspective projection of the faces of an object (by the reverberating flux of reflected light in a medium) is not the object itself.

Notice that Gibson stresses the fact that the information to which he refers is *information about* a specific thing, and this information is able to be about a specific thing because it is related to a property of the thing of which it is the information.

Thought of in this way, the human perception of colour is nothing more than a means of revealing information about a specific environment, this being the human environment. Other creatures have evolved to live in different environments, which may well include colours as a means of revealing information, but these will be colours seen from an altogether different point of view to the way they are revealed in human perception.

The colours that are revealed in human perception do not represent any feature of the terrestrial environment in which all creatures act out their lives. However, they are related to that environment by virtue of physical laws, including the constitution of the organism. This means that the human experience of colour is not representational, or pictorial, but profoundly corporeal. That is why the human experience of colour, no doubt all animal experiences of colour, is so sensual, charged with a powerful biopsychological force.

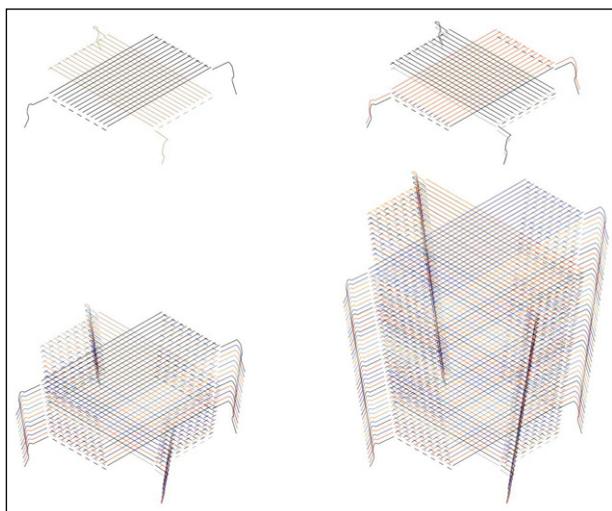
However, as far as humans are concerned, being as they are immersed in a tendency toward self-consciousness, there is another register to their interest in colour. Colours are certainly of interest to the human being insofar as they act and feel, but colour is also of interest to them because they imagine and have ideas. The suggestion of this paper is that it is precisely because

they imagine and have ideas that the colour forms on discussion are of interest to so many people. But what is the nature of this interest, its cause?

To answer this question it may be useful to turn to the the Air Grid, as it has been developed since the original experiments based on Miesian architecture.

## Air Grid

As has already been suggested, the invention of the Air Grid is best considered as a colour form, i.e. an artefact manifesting inseparable modalities of space, colour and material. As the description of work with Miesian buildings indicates, Air Grid consists of a lightweight, three-dimensional rectilinear lattice structure made from lustrous, brightly coloured machine thread, drawn into a foam-board support and held taut in the grip of fine incisions, sliced into designated members of a supporting armature.



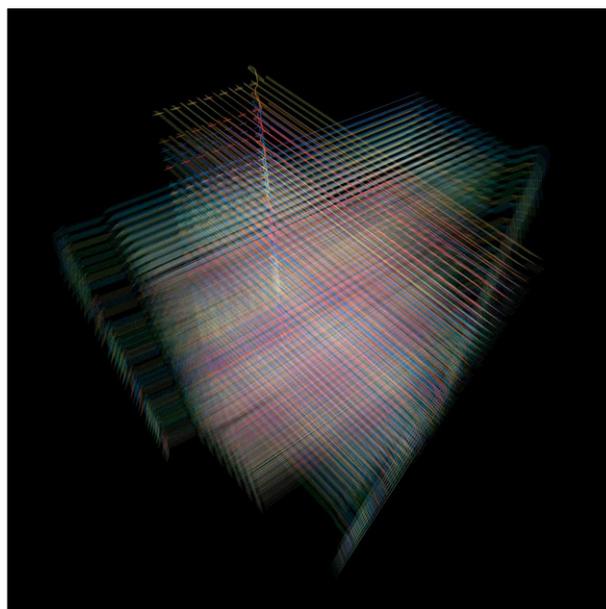
**Figure 7** It is by replication of the single grid field that the unified Air Grid is brought into formation, staged in four isometric projections, electronic model

The principles of order according to which the rectilinear lattice structure is drawn consists in the vertical alignment of an array of equivalent grid fields, an equal distance apart, in the air/space predetermined by the design of the foam-board support armature. It is by replication and addition of the single grid field that the unified Air Grid is brought into formation (Figure 7).

Although the principles of order that determine the formation of Air Grid are conceptually simple, in its material manifestation what is simple (the figure of the rectilinear lattice) is very

hard to discern. Sometimes the Air Grid material will appear to condense a cloud of radiant plasma, at other times to vibrate, as if an invisible force were acting on the threads, switching them from on to off (Figure 8).

Air Grid quite literally constitutes a volume of coloured hatching in the air, acting as a three-dimensional grating of sufficiently fine grain that the human visual system, as it scans back and forth trying to make sense of what it sees, cannot fix an image. The effect is like that of a badly tuned television or radio, of unfocused information. Vision cannot grasp what



**Figure 8** As if invisible forces were acting on the threads, staged and compacted animation, electronic model

passes across its sensory field; but unlike the effect of a badly tuned instrument, which can be most disturbing to the viewing subject, the experience of watching Air Grid is both delightful and strange. This strangeness is perhaps due to a number of ideas that murmur beneath the threshold of perception and that the experience of Air Grid causes to heighten, or intensify. For the purpose of this discussion, which focuses on colour, only one of these involved ideas will be considered, which is the confused perception of colour as an indication, or perhaps intimation is a better expression, of an inherent colour sensuality possessed by all human eyes.

The threads of Air Grid are in fact coloured by dyes or pigments, each individual thread producing one specific colour quality, regardless of where a person stands in relation to it (subject, of course, to the diversity of effects produced in all phenomena of vision as they are conditioned by differing intensities and directions of illumination). However, Air Grid is able to simulate the dynamic qualities of structural colours. This is because the lattice of the Air Grid consists of a multitude of differently coloured threads and as the eyes probe the lattice, seeking as all eyes do to fix an image, so these differences of colour will move in and out of our field of attention, seeming to switch from colour to colour. It is often hard to be precise about exactly which colour is produced at any particular moment, or in any particular location in the body of the Air Grid. Rather, the overall effect is of a shift that shimmers across the chromatic scale. Furthermore, the lines of thread cast shadows upon one another and upon the inner surfaces of the hole-panels and support armature, which also tend to shift and shimmer with the movement of the eye and of the colour. They thereby participate in the overall effect of a sonorous modular vibration, as if the threads were vibrating in the air but in doing so emitting harmonics, not of sound, but of colour.

In the experience of Air Grid one's primary perception is of colour harmonies, rather than the physical embodiment of particular colours. Thus the feelings generated in the proximity of an Air Grid are not so much those of an immediate colour sensibility, as experienced, for example, in so many abstract expressionist canvases, such as those by Barnett Newman or Jackson Pollock. Rather, what is evoked is the more remote, but none-the-less pleasurable, sensation of colour sensuality. The colour forms under discussion evoke an internalised, ascetic idea of colour, which is not to suggest the idea of colour they express is abstract and static, far from it. This idea is charged with a quality of sensuality, a quality which depends on the psychic undertones of sensory experience rather than on sensory experience itself.

The fascination of the colour forms discussed in this paper is to do with the way these forms affect an awareness of colour sensuality. They intensify a vague awareness that lies somewhere below the threshold of self-consciousness: this is the realisation that the basis of sensuality rests with the sentient perceptions of the sensations of matter. The process of perception, in which sensations are experienced and reproduced, is essentially one of biopsychological resolution. Perception is not a matter of representation but of refinement and determination. The perceiving subject is not in space but must resolve a space for itself, as it were, step by step, moment by moment, out of the mass of environmental information in which it is immersed. This is an ideational process of which our self-conscious selves are but dimly aware. The colour forms discussed in this paper are able to enhance this dim awareness, to amplify it to the point that the process itself becomes the focus of attention. This can be an intensely satisfying experience, strange but at the same time pleasurable.

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