Drawing and Visualisation Research

DRAWING AND THE MATERIAL CONDITIONS OF SPACE

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The visualization of architectural experience is complex and resists description in a single drawing or indeed a set of drawings. As analytical tools, architectural drawings convey information but fall short of representing architectural experience because our perception of a place can only be partially communicated through conventional drawing types. Our experience of architecture is always situated and mediated through our bodies, and so our memories, associations and the broader physical and cultural context of a setting affect how we eventually interpret space. We understand places through movement and physical engagement and so it is not surprising that the richness and subtleties of architectural experience cannot be easily articulated through traditional drawing types. These tend to reduce experience to annotation as a means of conveying information.

In contrast this paper will focus on drawing as a way of thinking, at the initial stages of the design process. It will explore issues of creativity and spontaneity in architectural design in order to engage the material imagination through drawing, for architecture is always a material thing[1]. As such, reading architectural drawings involves the material imagination, as linear relationships are interpreted in terms of physical space. This approach will contribute to our understanding of the continuity of the architectural design process between the realm of ideas and their material embodiment. Currently we tend to take an uncertain leap when crossing between theory and material articulation. Material effects, fashionable surfaces, novelty or material codification (glass=teransparency=democracy for example) all too often substitute deeper questions of content. As the Italian architect Vittorio Gregotti observed, such superficial approaches to materials can result in *"an unpleasant sense of an enlarged model, a lack of articulation of the parts at different scales: walls which seem to be made of cardboard, unfinished windows and openings: in sum a general relaxing of tension from the drawing to the building."*[2]

The tension that Gregotti refers to has to do with the relationship between architectural form and material resolution, and also the process of drawing as the creative armature for thinking through questions of materials in relationship to the whole. Architectural drawings are inextricably linked to the material imagination and yet there is no established contemporary practice that promotes the material imagination through drawing and mixed media. This paper will address this question and discuss contemporary architectural drawing outside of the conventions of current practice, dominated as it is by a single mode of production. While film, animation and digital modeling break new ground for architectural representation, this paper will argue that non-digital and hybrid drawings retain a validity. As the most spontaneous and immediate form of expression, hand drawings compliment digital production and give us access to the materiality of how we

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[1] This statement is simplistic but relevant in an age of digital drawing. It is not intended to foreclose questions of our perception of material enclosure. For a rich discussion of immaterial/material see Jonathan Hill's Immaterial Architecture, Routledge 2006

[2] Gregotti v., The Exercise of Detailing Casabella no.492 (June 1983): II Reprinted in Nesbitt op cit. pp.496-497.

think about architecture. In particular it will focus on mixed media techniques and the idea of *material-drawings*. From the earliest known drawings in the Chauvet Caves, to the practices of Antonì Tapies and George Rousse, the question of the materiality and spatiality of drawings will be framed with reference to 'the primitive' and the relationship between architectural representation and the visual arts. This study is developed in my own practice where experimental architectural collage and mixed media drawing explores the potential of 'material drawings' in the early stages of contemporary architectural design.

Today hand drawings in architecture are now all but eclipsed by their digital counterparts. These geometrical drawings are created out of pre-determined objects, forms and mathematical relationships, facts abstracted from the human situation in which they are primarily organized and from which they have meaning. The programmer will use these abstract formal relationships to simulate intelligent drawing, and architectural thinking. But while digitized modeling brings an unprecedented freedom to explore form and complexity, digital worlds remain simulated worlds. At best, like simulated music, they are pitch-perfect, but '*unreal'*.

For many architectural drawings, whose purpose it is to convey information, little is compromised, and much is gained by the accuracy and flexibility of digital drawings. Architectural visualizations and rendered models have the allure of a stage set and new, perhaps otherwise unimaginable, forms can be generated with parametric or scripted drawings[3]. At the same time we sacrifice the immediacy, spontaneity and variety of the hand drawn. What we lose in working solely with digital media is perhaps best illustrated if we consider 'simulated painting', for in painting we touch directly on the problem of materiality and the physical properties of the paint itself. Digital painting arranges colored pixels on a screen with a variety of simulated tools. *Digital is not painting,* like digital drawing it is unsituated, de-materialized.

If we look beyond the limitations of the digital print, drawings, like paintings, are both visual and tactile. The observer's imagination engages with the visual and material conditions of the drawing, its surface and the media used. There is an intrinsic connection between drawing and material that stretches as far as back as culture itself. Drawings existed, often in exquisite form, in the earliest forms of space. Scratched deep into the rock or held aloft towards the gods, the visual language of early drawing was a means to articulate the world. The earliest such drawings are those of the Chauvet Caves, located within a limestone cliff that sits above the Ardèche River. Recently discovered, the sequence of spectacular

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[3] Parametric features are now commonplace in software drawing packages. Dimensions and other variables are linked to the geometry of the design. Scripted algorithms establish changes to all variables as the design parameters change. This approach to design is a translation of ideas, themes or performance information into mathematically defined values.

chambers is the subject of Werner Herzog's film *Cave of Forgotten Dreams (2011).* The Chauvet drawings are around 30,000 years old[4].

Their subject matter is many kinds of animals, together with some handprints and geometric marks. The debate as to their symbolic role is unresolved but what appears to be clear is that the structuring of individual drawings is bound to their location in the cave and in the flickering light of torches the beasts would come alive[5]. There is no perspective as such, rather techniques of projection to show relationships, groupings, and movements: animals were near or far, close together or roaming alone. We know that these drawings appear to be orchestrated with the forms of the caves' limestone walls, as a series of clustered arrangements. With no sense of these drawings as independent 'aesthetic objects', their meaning was intimately bound to the rock, the underworld, time, animated beasts and analogical relationships with the world and stars to which they connected. The limestone rocks – the living rocks of the caves– were integral to the drawings. The caves forms and fissures were embedded into the very idea and detail of the drawings. One could suggest that these drawings were not on the cave walls but *of* the cave[6].

While we do not fully comprehend these material-drawings, it is nevertheless remarkable how close they bring us to such a distant world. And this is testimony to the potential of drawing as language, but also to the fundamental relationship between materials and drawing. The interdependence of drawing and material in early arts and crafts is well studied by anthropologists of material culture in terms of drawings in and onto stone, pottery, wood and metal artifacts of all kinds. For our purposes there is a particular resonance between material drawing and space in the Bronze Age drawing of the Uffington Horse dating from 1200 – 800 BC. This was drawn by digging ditches in the landscape and then fillingin the ditches with chalk. Unlike other horses from the period, the Uffington horse is dug into undulating and steeply inclined slopes, so that it is impossible to decipher

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[4] See *Chauvet Cave*, Jean-Marie Chauvet, Eliette Brunel Deschamps, Christian Hillaire ; foreword by Paul G. Bahn ; epilogue by Jean Clottes. London 1996

[5] These drawings would appear to work with a fundamental duality of light and dark. This may echo the shift from red ochre to black and grey drawings deeper into the cave. Did the ochre refer to movement through threshold into the earth or was it the color of fire? Were the inner charcoal drawings articulating a mysterious world deep in the 'live' earth, structured only by light and dark and the shadows of stone (charcoal tones, and shadows of scratched and etched lines), where beasts and man and the earth-rock conjoined?

[6] Some of the limestone surfaces are cleaned and lines are etched in, by way of catching light (what appears now as a flash-lit whiteness of a scratched surface could equally have appeared as a cast shadow). Sprayed hand prints (both negative and positive stenciling) are deliberately worked over clawed marks, an owl is composed only of scratches, marks are made with sticks charcoal or other tools, elsewhere there is shading, as charcoal and pigments are mixed with a plant-based binder and spread with a finger. Pigment is also mixed with clay to create volumes. Throughout the cave representation and spatiality of the cave seem to be interdependent on each other. We find a spatiality that looks like space but it could not have been understood as such; spatiality and cosmogony come much later, but their common structuring principle is time.

the entirety of the horse apart from the basin of the unusual land formation to the North, known as the Manger where the whole drawing appears on the crest of the distant hill[7].

The topographic complexity of the hilltop raises questions as to how was the drawing first set out. It must have been conceived as an integral part of the landscape. In the same way that the Chauvet cave drawings were built out of the topography of the cave, so the Uffington Horse was clearly understood with respect to the Manger. This is not to do perspective thinking, nor projective geometry, but rather is about the drawing reaching-out to and 'participating in' the landscape.

It is also clear that the meaning of the horse-form was connected to the technique of its making, to both the earth and to the chalk. Whatever the space of the Manger, or the horse-image meant to these ancient people it is clear that the material-drawing, as both light and earth, articulates a duality of horizon. Hovering between earth and the stars, this drama was only to be seen from the natural amphitheatre of the Manger.

Further interpretation would be speculative, but these primitive marks and drawings remain compelling and retain a communicative power in part by virtue of the way in which they are embedded in the space and materiality of the landscapes to which they belong. The drawings are like gatherings of knowledge and beliefs of a people but at the same time they unfurl, opening windows into the natural world beyond. And underpinning their communicative power is the way in which material is integrated with act of drawing as the most primitive and spontaneous form of representation.

In contrast, today's digital drawing tends to promote architectural form akin to de-materialized shape-production. There's a sense remoteness to the practice of digital drawing, like drawing through someone else's eyes, mediated by the constraints of software and input devices. This is best understood if we recall that architectural drawing is properly understood as rooted in the European tradition of *disegno*, in its full sense, as a process that belongs to human experience and its embodiment in drawing. Reaching back to Aristotle's association of art and science with experience, *disegno* came into the Western tradition as a form of knowledge that *"arises from the human soul to make one thing out of many."*[8] In Italian art of the renaissance disegno, meaning both drawing and design, was understood to derive from the creative intellect and, of the artist's God-given genius, and it was this origin that elevated the arts from craft. *Disegno* was a synthetic underpinned all arts: *"disegno, father of all our arts...."* writes Vasari in the second half of

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[7] The horse may have edged up the hill over time, so the view of it from the Manger may have been clearer originally. See Miles, D., Palmer, S., Lock, G., Gosden. C. and Cromarty, A.M. 2003. Uffington White Horse Hill and its Landscape: investigations at White Horse Hill, Uffington, 1989-95 and Tower Hill, Ashbury, 1993-4, Oxfordshire. Oxford: Oxford Archaeology. Thames Valley Landscapes Monograph 18

[8] See Summers, D., The Judgment of Sense, Renaissance Naturalism and the rise of Aesthetics, Cambridge 1987 p. 210.

the sixteenth century, *"….deriving from the intellect and creating a universal judgment from many things."*[9]

This tradition of drawings, as artefacts that gathered and spoke of human experience, displays a deep understanding of material qualities, transparency and light. The role of surface depth to early painting and material-drawing techniques is illustrated in gilded surfaces (for which the preparation of a bole underlay was so important) and more explicitly in tempera painting, which established the ground for oil painting in later centuries. In preparing the ground for tempera, layers of gesso and zinc white pigment (a translucent pigment), mixed with rabbit skin glue, were applied and each finely sanded to create a translucent depth that became the light-source of the painting itself. The drawing was transferred onto this mirror-like surface, and with each subsequent layer the drawing is built up in coloured glazes (in egg yoke), where tiny ground crystals of colour are caught in a thin space, suspended between the layers gesso and the final surface of the work. The image is eventually caught up in a drama of light and in the metaphysics of material and immaterial.

The reciprocity between the content of such work and the materiality and techniques used to articulate it is clearly all but lost in contemporary architectural drawing. This limitation may be particularly significant at the early stages of a design, where themes emerge as spatial and material strategies, as part of an open-ended process of visual research. Today's drawings, sketch models and other artefacts explore thought and the rich field of possible influences that come to bear on this process is not easily 'conceptualized' geometrically. It rather requires a complex knowledge of the issue that may call on history and memories, the environment and climate, physical and social constraints and opportunities. To pull all of this together holistically requires a creative process that is fluid, spontaneous and at times also anticipatory. For drawings-as-visual-research have the ability to suddenly reveal new ideas. At a certain point of the visual process of drawing there is a leap: *something just happens to be right.* Such instinctive knowledge, what we might call *visual intelligence*, is a fundamental part of the human content of drawing and individual creativity.

Inevitably in the scale-less space of the screen the programmer will always, to some extent, have already decided how the world should be conceptualized. On the other hand, working with non-screen, hand drawings, as an integral part of the design process, may give us a better process to articulate the materiality of our imaginations. By analogy, the variety of

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[9] Perché il disegno, padre delle tre arte nostre architettura, scultura e pittora, procedendo dall'intelletto cava do molte cose un giudizio universale simile a una forma overo idea di tutte le cose della natura, la quale è singolarissima nelle sue misure…."Scritti d'arte del Cinquecento VIII Disegno Ed. Paola Barocchi, 1971, p. 1912 (my translation). The theme of disegno develops through the sixteenth century through Cellini, Allori and Lomazzo, among others and culminates in Federico Zuccari's L'Idea de'pittori, scultori e architetti (1607) where he describes the idea of disegno interno (a God-given idea/illumination) and disegno esterno (the manifestation of that divine inspiration/knowledge). Hence the more 'artful' the drawing, the closer it came to representing its divine origin.

physical grounds, drawing media, instruments and techniques bring a sense of materials into play, and into the practice of architectural design. In contrast, the software tools and filters that reproduce charcoal, pencil or brushes are visually effective, but remain non-material. This disengagement of visual form and materiality, that is often a product of the digital drawing process, finds its built form in wall paper-like patterned skins of many contemporary buildings.

Paradoxically there is nothing terribly 'modern' about this approach to form. The aesthetic strategy has its roots in the nineteenth century where the materiality of a drawn or painted surface played an increasingly important role to promote an emotional connection with the work. The mood of the artists and architects of the time was overwhelmingly one of self-reflection, to the extent that the external world was relevant in so far as it affected an interior world of sensations. A pictorial flattening and correspondences between sensations, colors and arabesque lines were to express an essential and mysterious rhythm underscoring human existence[10]. In a parallel with our own culture of disembodied drawing or the disconnected building skin, one could speak of an *aesthetic of fragment,* with a preoccupation on detail and an obsession with an isolated aspect of detail. In the late nineteenth century this would manifest itself in architectural drawings that focused on the creation of highly singular compositions of arabesque lines and material combinations as personality-driven decorative patterns[11]. Today's patterned surfaces have all the character of the decorative systems of the nineteenth century, but without the same basis in craft. Though the more anonymous plot has now replaced the intimacy and variety of drawing techniques of the period there is a rich history of textural surfaces and representational techniques during the first decades of the twentieth century. The flattened, decorative surfaces of the fin-de-siècle were eventually challenged by the density and material depths of synthetic cubism. Paper collages, frottage and bricolage were part of a lineage of work in the visual arts that explored the tactility of surface, and the interdependence of color, form and material.

Modernist architectural drawings on the other hand were more keyed to developing technologies, more complex information, large scale projects and infrastructure. Le Corbusier famously divided his time between painting and his architectural studio, but in contrast drawings from this period tend to be characterized by a sense of the de-materialized surfaces of the glass walls and open plans that were to dominate the modern age. While there are some notable exceptions, such as the drawings of Carlo Sacrpa or Sigurd Lewerentz, we need only compare Mies van de Rohe's drawing of a tower on

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[10] See Silverman, D., Art Nouveau in Fin-De-Siècle France, 1989

[11] Victor Horta was the principal architect in Brussels at the time. His drawings for the carpets of the Anna Boch House and other sketches reveal an obsession with highly individual line pattern. While the decoration has the superficial read as 'natural' the drawings illustrate the drive to make the compositions highly artificial.

Friedrichstrasse (1919) to a sketch for Seagram Plaza (1969) to trace disengagement between drawings and material that is typical of the period. It is no coincidence that around this time we the first attempts to simulate drawing using a computing device, with Ivan Sutherland's Sketchpad (1963)[12].

For our purposed the *Matter Paintings* of Antoni Tapies and the *Art Informel* movement of the 1950's represent a significant counterpoint. Here we see irrational creative practice based material qualities that became the primary source of expression. In the context of post-war Spain, "*logically enough*" writes Borja-Villel *"artists, writers and philosophers gradually began turning their attention away from everything that involved fantasy, moving increasingly closer to existential or phenomenological reality"*[13] Matter-paintings take their impulse from the dual actions of the artist and of the material as it dries, cracks or bleeds[14]. The process of making them is only in part compositional because the action of the artist and the action of the material may not coincide. In this sense the properties of the material are informing the qualities and composition of the final work. His method opens up the painting and drawing processes to chance, and as such contradicts the digital, where everything must be mathematically defined.

On the painting's surface Tapies may add drawn lines that establish a dialogue with the depths of the matter-surface. This emphasizes a sense of a 'floating space' that is reminiscent of some of Paul Klee's drawings. It is a spatial relationship, between the formed lines and the partially formed matter, that captures the imagination, and promotes a creative involvement in work[15]. The late nineteenth aesthetics of intimacy, are supplanted by a fascination with the *Primitive*: *"I …felt like following some of my early intuitions 'towards magic' with their confusion between reality and unreality, objects with beings, and wanted to give my paintings an air of primitivism."*[16]

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[12] The first CAD software with a graphical interface was Sketchpad, developed in 1963 by Ivan Sutherland. See http://www.youtube.com/watch?v=mOZqRJzE8xg

[13] Writing on the Wall Manuel J. Borja-Villel in Tàpies Comuncacio sobre el mur, Barcelona 1992, ibid p.297

[14] He first applies a layer of varnish to the canvas, and before this varnish dries he sieves marble dust, sand or other materials as well as paints all over it. He then adds paint with a brush to different areas, creating a figure, an object or a field of colour. Once the top layers are applied, the material begins to crack, showing its structural components. Sometimes the artist intensifies this impression by peeling off some sections. The fissures and cracks as well as the different colors and textures do not necessarily follow the lines of any figure or object, whose inflexions relate as much to the material as to the represented object. The distinction between the 'formed' figure and the 'formless' space surrounding it is thus blurred". Ibid p.299

[15] Klee may be drawing on the late nineteenth century work of Gustav Moreau and others in the spatial disengagement between line and floating space. The quality of Klee's work draws on the attention to the drawing support (white linen, hand made papers, wrapping paper, cottons) and the ground for his oils and watercolors (built up with plaster, chalk and encaustic). See Writing on the Wall Manuel J. Borja-Villel in Tàpies Comuncacio Sobre el mur, Barcelona 1992, P.295

[16] Ibid. p.297

A similar connection between drawings and the rawness of the material conditions of space is the focus of work by the French photographer, Georges Rousse, who draws paints, cuts-through and builds-into existing space in an attempt to uncover new or underlying 'orders' to the location. Clearly deriving some impetus from the work of Gordon Matta-Clark, Rousse started to work with drawings, paintings and photography in abandoned buildings during the 1970's. But while Matta-Clark largely carried out real-scale 'photographic operations' in the buildings, the purpose of all Rousse's work is to take a photograph and the acts of drawing in space and drawing on material surfaces on location are finally brought together as a photograph.

His early work involved overlaying of figurative paintings on existing fabric and then evolved, shifting in terms of techniques but always focussing on architectural order in terms of light, material and structure. The role of drawing in his investigation is described by Rousse himself with reference to an early work at Metz: *"I decided to envisage these compositions as two-dimensional planes, as drawings in space. I decided that three-dimensionality did not exist here and I wanted to obtain the effect of drawing superimposed on three-dimensional space. Photography allows this overprinting, just as it allows reproduction."*[17]

Other more complex drawings are integrated in work that emerged in mid 1980's (Bercy 1984, Geneve 1985, Arles 1986). The act of drawing or mark marking at various scales and with various tools, either literally onto the material surface, in the dark room, or as a projection allows Rousse to open new spatial readings to the given space. The layering of tones and boundary lines lends a deliberate ambiguity to the image, opening readings that not only speak of memory of the exiting location but of fictive spaces caught somewhere between an imaginary world and the concrete reality of the given.

From an exchange of letters between Rousse and the art historian Jocelyne Lupien, one comment (Dec 1999) by Lupien emphasises the role of drawing for Rousse in exploring a spatial imagination: *"your words remind me of Poussin's letter to Chantelou in which he used the word "idea" in the sense of "drawing". Poussin told Chantelou that he was preparing work of which he would soon be sending him an "idea", that is to say, a drawing, a sketch. What this example shows, of course, is the conceptual nature of drawing, the "idea" in your case being related to the drawing (still to come, but already existing in your imagination) that you will subsequently make in the architectural space."*[18] In Rousse the

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[17] Georges Rousse 1981-2000, Bartschi-Salomon Editions Catalogue for exhibition at Centro Galego de Arte Contemporanea (12 Sept-19 Nov 2000) Letters between Rousse and Jocelyne Lupien p. 39

[18] Georges Rousse 1981-2000, Bartschi-Salomon Editions Catalogue for exhibition at Centro Galego de Arte Contemporanea (12 Sept-19 Nov 2000) Letters between Rousse and Jocelyne Lupien p. 39

'conceptual' is enriched by its intrinsic reciprocity with material reality of a given topography.

The photographs represent a tension between the imaginary, as Lucien describes, and the primary material order of the given space, discovered through drawing and its extension into a range of painting and photographic techniques. The work explores drawing at a range of scales that grow out of response to a physical engagement with the place. The lines or hatchings become material edges, boundaries or implicit structure within real space, delineators of a new, fictive topography that are juxtaposed like a collage: Rousse's work exposes what he refers to as a 'theatricalisation of space', a process of 'laying-bare' something fresh about a place. Rousse's work is a process of discovery, as opposed to an illustration of a concept, a character that John Berger describes as the lynch-pin of what it means to draw: *"Nearly every artist can draw when he has made a discovery. But to draw in order to discover - that is the godlike process, that is to find effect and cause"*[19]

This approach to drawing and its connection to the material conditions of space form a background to my own experimental architectural drawing that sets out to synthesis the material and formal imagination at the start of the design process. It explores the integrity of the process of architectural design from strategy to detail. Like the *Art Informel* of Tapies and others my material-drawings allow the materiality of surface, its qualities and the process of working with it to inform and at times drive the work.

The material-drawings illustrated here are part of a group called *Imaginary Cities*. The site was based around East London and focused on the idea of 'lost space', both literally and metaphorically. The cultural diversity of the area gives a social rich depth to the urban fragmentation that characterizes its physical fabric. It also presents challenges to define urbanshared space for diverse cultures. The drawings began with a photographic survey of this *polyethnic architecture*.

Intrigued by the floating spaces of Tapies' drawings and paintings, the ground of the drawings was carefully constructed on board, covered with linen and sized with rabbit skin glue. Gesso da Bologna and Zinc white pigment was laid down in thin layers, brushed in perpendicular directions, and sanded at each stage. The depth of whiteness and surface luminosity is otherwise difficult to achieve.

Earth pigments were ground into rabbit skin glue and which acts a rather crude glaze medium. The same glue was a flexible adhesive for a wide range of materials and collage, ranging from resin and bitumen to canvas and jute. The drawings are part made by these glued surfaces, edges and textures, part by specific printed collage and part by lines otherwise drawn or painted.

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[19] Berger on Drawing Berger, J. London 2005, p.102

The drawing process is akin to thinking-through-materials, and in this way is not another form-making procedure. Rather, the drawing is structured as a layered sequence and formally less definite: it is intended as a way of thinking about a given set of conditions, contextual, historical, social and physical that integrates formal thinking with the material imagination. Each drawing was laid flat and of a size that made it impossible to work on fully from any one side. This meant that during the visual-material exploration there was never one primary orientation for the drawing. The drawing was deliberately made from all sides of the board in order to focus not on the final drawing as aesthetic object or perspective likeness to a fictive space, rather to use the drawing and its textural surface as a vehicle to think with. The drawings are intended as initial studies and focus on the spontaneous level of creativity as a preparatory stage of design, as Dalibor Vesely has described, the work is *"defined by the intention to return to the stage of design where the first attempt to visualise the content of design is taking place. The process of visualisation can be described as materialisation, or more precisely as the first encounter with the material conditions of the later, more abstract stages of design"*[20].

The material surfaces change during their making as charcoal lines and articulate ideas and then disappear irrecoverably, so that in some of the final pieces drawn lines and materials converge, leaving cloth, string or paper edges as the only visible lines. Later in the process some of the site-specific drawings are combined with earlier contextual studies as digital collages. Digital manipulation is minimal to retain reference to the original textures. The spatiality of the drawing is first a play between floating charcoal line and material depth overlaid by a cluster of non-perspectival spaces that can be read into the lines and tonal fields. The panels represent a synthesis of a field of associations and knowledge relating to the initial design stages of the hypothetical brief, in a way that promotes material depth and concreteness of image over formal resolution and geometric precision.

In this sense, rather like primitive drawings, these material- drawings are not to be primarily read as aesthetic objects, rather as documents of a process of discovery that are bound to the material imagination. This potential of drawing and painting to act as a vehicle for creative discovery was discussed by Sartre in his remarkable text *Imaginaire*, first published in 1940. He draws attention to the metaphoricity of drawings and paintings, as visual-material analogues that promote new 'realities' in the imagination of the observer: *"what manifests itself through it, [a painting] is an unreal collection of new things, of objects I have never seen or ever will see…..objects which do not exist in the painting, nor anywhere in the world, but which manifest themselves by means of the canvas"*[21] A

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[20] Dalibor Vesely, Forward to catalogue Material Imagination Artemis, Edizioni, Rome, p.10 Exhibition of drawings by author held at British School at Rome, 2005

[21] The Psychology of Imagination, Jean-Paul Satre, NY 1966, p. 49

painting (or drawing) is gathers a field of tensional relationships: the painting points to a world beyond itself as the viewer dreams into its material surfaces. Reciprocally, the viewer inhabits the work their own world, any creative interpretation of a drawing is necessarily personal: *"When I look at a drawing I posit in that very glance a world of human intentions of which that drawing is a product"*.[22]

This two-way engagement with the drawing described here by Sartre, accurately portrays the process of making the material-drawings, as a process of discovery, as much as it does the reflection on the final work. At the heart of the process is the relationship between the material surface and the physicality the body. Thinking-through-making material-drawings keeps the question concerning the material conditions of space integral to the design process. Material-drawings and paintings help us understand the interdependence of light, material and colour in the three-dimensional setting, as observed here by Sartre: "There is in fact no such thing as pure colour" he states, in a discussion over the perception of a colour in painting. *"For colour is always perceived as material-colour "If Matisse chose a rug rather than a sheet of dry and glossy paper it is because the voluptuous mixture of the colour, the density and tactile quality of the wool. Consequently the red can be truly enjoyed only in grasping it as the red of the rug, and therefore unreal."*[23]

Here we can reflect again on the limits of digital simulation. Matisse's manipulation of the material qualities of paint, how it is mixed and applied, was fundamental to portray rug-red, so central to the sense of the overall room. Of course there is no wool in the paint: the 'unreal' wool rests as an image in our imaginations. Metaphorically speaking the *paint is wooly* and its material surface tells us about the material conditions of the actual space not through illustration, but by poetic reference that allows each of us to do more than just observe and note the information, but to participate in its rug-redness. A digital reproduction of the rug would reduce it to a mere illustration of a painted rug.

In a similar way the power of material drawings, as opposed to their simulations, is their potential of synthesis and to involve the observer in the material conditions of space. These are not illustrated, but are open and completed in the 'unreal' objects that lie somewhere between the viewer's imagination and the drawing itself. It is in such configurations, Sartre would attest, that we find beauty.

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[22] ibid p.277

[23] Mearleau Ponty echoes Sartre's Imaginaire (originally published 1940) "The real colour persists beneath appearances as the background persists beneath the figure, that is, not as a seen or thought-of quality, but through a non-sensory presence" Phenomenology of Perception p.305, Transl. Smith, C., London 1962 He goes on to explain, as part of the phenomenon of constancy: "A colour is never merely a colour, but a colour of a certain object, and the blue of a carpet would never be the same blue were it not the a wooly blue" p. 313