



ARCHITECTURE AFTER GEOMETRY



STAN ALLEN

FROM OBJECT TO FIELD

The term 'field conditions' is at once a reassertion of architecture's contextual assignment and at the same time a proposal to comply with such obligations.¹ Field conditions moves from the one toward the many: from individuals to collectives, from objects to fields. The term itself plays on a double meaning. Architects work not only in the office or studio (in the laboratory) but in the field: on site, in contact with the fabric of architecture. 'Field survey', 'field office', 'verify in field': 'field conditions' here implies acceptance of the real in all its messiness and unpredictability. It opens architecture to material improvisation on site. Field conditions treats constraints as opportunity and moves away from a Modernist ethic – and aesthetics – of transgression. Working with and not against the site, something new is produced by registering the complexity of the given.

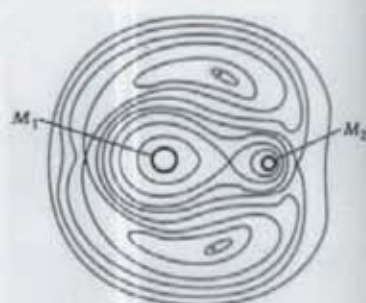
A distinct but related set of meanings begins with an intuition of a shift from *object* to *field* in recent theoretical and visual practices (figs 1 and 2). In its most complex manifestation, this concept refers to mathematical field theory, to non-linear dynamics and computer simulations of evolutionary change. It parallels a shift in recent technologies from analogue object to digital field (fig 3). It pays close attention to precedents in visual art, from the abstract painting of Piet Mondrian in the 1920s to Minimalist and Post-Minimalist sculpture of the 60s. Post-war composers, as they moved away from the strictures of Serialism, employed concepts such as the 'clouds' of sound, or in the case of Yannis Xenakis, 'statistical' music where complex acoustical events cannot be broken down into their constituent elements.² The infrastructural elements of the modern city, by their nature linked together in open-ended networks, offer another example of field conditions in the urban context. Finally, a complete examination of the implications of field conditions in architecture would necessarily reflect the complex and dynamic behaviours of architecture's users and speculate on new methodologies to model programme and space.

To generalise from these examples, we might suggest that a field condition would be any formal or spatial matrix capable of unifying diverse elements while respecting the identity of each. Field configurations are loosely bounded aggregates characterised by porosity and local interconnectivity. The internal regulations of the parts are decisive; overall shape and extent are highly fluid. Field conditions are bottom-up phenomena: defined not by overarching geometrical schemas but by intricate local connections. Form matters, but not so much the forms of things as the forms between things.

Field conditions cannot claim (nor does it intend to claim) to produce a systematic theory of architectural form or composition.



1 Mondrian



2 evolutionary change

The theoretical model proposed here anticipates its own irrelevance in the face of the realities of practice. These are working concepts, derived from experimentation in contact with the real. Field conditions intentionally mixes high theory with low practices. The assumption here is that architectural theory does not arise in a vacuum, but always in a complex dialogue with practical work.

The article is structured like a catalogue, with one thing after another. Part 1 is broadly concerned with issues of construction – the definition of the field, piece by piece – while Part 2 will treat questions of composition and the urban context.

PART 1 – FIELD CONDITIONS: ARCHITECTURE AND URBANISM

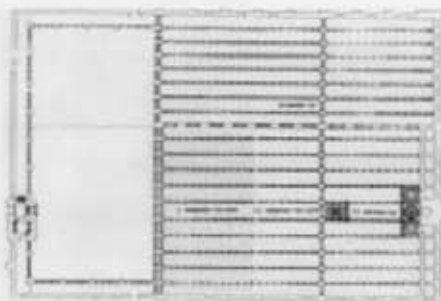
Geometric Versus Algebraic Combination

The diverse elements of classical architecture are organised into coherent wholes by means of geometric systems of proportion. Although ratios can be expressed numerically, the relationships intended are fundamentally geometric. Alberti's well-known axiom that 'Beauty is the consonance of the parts such that nothing can be added or taken away' expresses an ideal of organic geometric unity. The conventions of classical architecture dictate not only the proportions of individual elements but also the relationship between individual elements. Parts form ensembles which in turn form larger wholes. Precise rules of axially, symmetry or formal sequence govern the organisation of the whole. Classical architecture displays a wide variation on these rules, but the principle of hierarchical distribution of parts to whole is constant. Individual elements are maintained in hierarchical order by *extensive*³ geometric relationships to preserve overall unity.

The mosque at Córdoba, Spain, under construction over a span of nearly eight centuries, offers an instructive counter example.⁴ The type-form of the mosque had been clearly established: an enclosed forecourt flanked by the minaret tower, opening on to a covered space for worship (perhaps derived from market structures, or adapted from the Roman basilica). The enclosure is loosely oriented toward the *qibla*, a continuous prayer wall marked by a small niche (*mihrab*). In the first stage of the Córdoba Mosque [c785 to c800] the typological precedent was respected, resulting in a simple structure of ten parallel walls perpendicular to the *qibla*, supported on columns and pierced by arches, defining a covered space of equal dimension to the open court. The directionality of the arched walls operates in counterpoint to the framed vistas across the grain of the space. The columns are located at the intersection of these two vectors, forming an undifferentiated but highly charged field.



3 digital field



4 Córdoba Mosque



5 Venice Hospital

Complex parallax effects are generated as the viewer moves throughout the field. The entire west wall is open to the courtyard, so that once within the precinct of the mosque, there is no single entrance. The axial, processional space of the Christian church gives way to a non-directional space, a serial order of 'one thing after another'.⁵

The mosque was subsequently enlarged in four stages (fig 4). Significantly, with each addition, the fabric of the original remained substantially intact. The typological structure was reiterated on a larger scale, while the local relationships remained fixed. By comparison with Western classical architecture, it is possible to identify contrasting principles of combination: one algebraic, working with numerical units combined one after another, and the other geometric, working with figures (lines, planes, solids) organised in space to form larger wholes.⁶ In Córdoba, for example, independent elements are combined additively to form an indeterminate whole. The relations of part to part are identical in the first and last versions constructed. The local syntax is fixed, but there is no overarching geometric scaffolding. Parts are not fragments of wholes, but simply parts. Unlike the idea of closed unity enforced in Western classical architecture, the structure can be added to without substantial morphological transformation. Field configurations are inherently expandable; the possibility of incremental growth is anticipated in the mathematical relations of the parts.

It could be argued that there are numerous examples of Western classical buildings that have grown incrementally and have been transformed over time. St Peter's in Rome, for example, has an equally long history of construction and rebuilding. But there is a significant difference. At St Peter's, additions are morphological transformations, elaborating and extending a basic geometric schema. This contrasts with the mosque at Córdoba where each stage replicates and preserves the previous stage of construction by the addition of repeated parts. And at Córdoba, even in later stages when the mosque was consecrated as a Christian church, and a Gothic cathedral inserted into the continuous and undifferentiated fabric of the mosque, the existing spatial order resists recentring. As Rafael Moneo has observed: 'I do not believe that the Córdoba Mosque has been destroyed by all these modifications. Rather, I think that the fact that the mosque continues to be itself in face of all these interventions is a tribute to its own integrity.'⁷

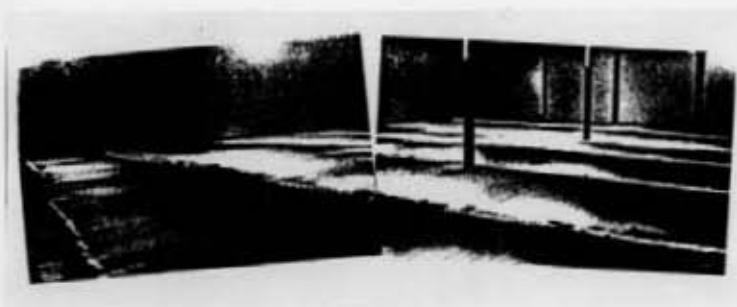
To extend briefly the argument to a more recent example, Le Corbusier's Venice Hospital (fig 5) employs a plan syntax of repeated parts, establishing multiple links at its periphery with the city fabric. The project develops horizontally, through a logic of accumulation. The basic block, the 'care unit' formed of 28

beds, is repeated throughout. Consulting rooms occupy open circulation spaces in the covered space between. The rotating placement of blocks establishes connections and pathways from ward to ward, while the displacement of the blocks opens up voids within the horizontal field of the hospital. There is no single focus, no unifying geometric schema. As at Córdoba, the overall form is an elaboration of conditions established locally.

Walking out of Cubism

Barnett Newman, it has been said, used a sequence of plane/line/plane to 'walk out of the imperatives of Cubist space and close the door behind him'.⁸ The story of post-war American painting and sculpture is in large part a story of this effort to move beyond the limits of Cubist compositional syntax. Sculptors in particular, working in the shadow of the achievements of Abstract Expressionist painting, felt that a complex language of faceted planes and figural fragments inherited from pre-war European artists was inadequate to their ambitions. It was out of this sense of the exhaustion of available compositional norms that Minimalism emerged in the mid-60s. Robert Morris' refusal of composition in favour of process, or Donald Judd's critique of composition by parts, evidenced this effort to produce a new model for working, a model that might have some of the inevitability that characterised the painting of the previous few decades.

Minimalist work of the 60s and 70s sought to empty the work of art of its figurative or decorative character in order to foreground its architectural condition. The construction of meaning was displaced from the object itself to the spatial field between the viewer and the object: a fluid zone of perceptual interference, populated by moving bodies. Such artists as Carl Andre, Dan Flavin, Robert Morris or Donald Judd sought to go beyond formal or compositional variation, to engage the space of the gallery and the body of the viewer. In written statements, both Judd and Morris express their scepticism toward European (that is, Cubist) compositional norms and place their work instead in the context of recent American examples: 'European art since Cubism has been a history of permutating relationships around the general premise that relationships should remain critical. American art has developed by uncovering successive premises for making itself.'⁹ Both single out Jackson Pollock for his decisive contribution. Judd notes that 'Most sculpture is made part by part, by addition, composed . . .'. For Judd, what is required is consolidation: 'In the new work the shape, image, color and surface are single and not partial and scattered. There aren't any neutral or moderate areas or parts, any connections or transitional areas.'¹⁰ The aspirations of Minimalist work are therefore toward unitary



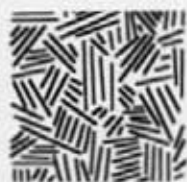
6 Barry Le Va



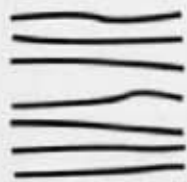
7 Renzo Piano



patchwork



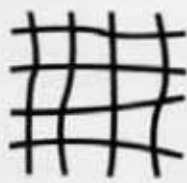
patchwork 2



striated



felt



loose grid



striated 2



axial symmetry



peripheral composition



block composition



mosaic



linked assemblies



collision

forms, direct use of industrial materials and simple combinations: a 'pre-executive' clarity of intellectual and material terms. Minimalism's decisive tectonic shift activated the viewing space and reasserted the work of art's condition as 'specific object'.

Yet if Minimalism represents a significant advance over pre-war compositional principles, it remains indebted to certain essentialising models in its reductive formal language and use of materials. Its objects are clearly delimited and solidly constructed. (Donald Judd's later architectural constructions confirm this essential tectonic conservatism.) Minimalism develops in sequences, but rarely in fields. It is for this reason that the work of artists usually designated 'Post-Minimal' is of particular interest here.¹¹ In contrast to Andre or Judd, the work of such artists as Bruce Nauman, Linda Benglis, Keith Sonnier, Alan Saret, Eva Hesse or Barry Le Va is materially diverse and improper. Words, movement, technology, fluid and perishable materials, representations of the body – all of these 'extrinsic' contents that Minimalism had repressed – return in modified form. Post-Minimalism is marked by hesitation and ontological doubt where the Minimalists are definitive; it is painterly and informal where the Minimalists are restrained; it remains committed to tangible things and visibility where the Minimalists are concerned with underlying structures and ideas. These works, from the wire constructions of Alan Saret, to the pourings of Linda Benglis, to the 'non-sites' of Robert Smithson introduce chance and contingency into the work of art. They shift even more radically the perception of the work, from discrete object to a record of the process of its making, in the field.

The artist who moves most decisively in the direction of what I am calling field conditions is Barry Le Va (fig 6). Partly trained as an architect, Le Va is acutely aware of the spatial field implicated by the sculptural work. Beginning in the mid-60s, he began making pieces, some planned in advance, others incorporating random process, that thoroughly dissolve the idea of 'sculpture' as a delimited entity, an object distinct from the field it occupies. He called these works distributions: '... whether "random" or "orderly" a "distribution" is defined as "relationships of points and configurations to each other" or concomitantly, "sequences of events".'¹² As with the other examples described above, local relationships are more important than overall form. The generation of form through 'sequences of events' is somewhat related to the generative rules for flock behaviour or algebraic combination. Le Va signals a key compositional principle emerging out of Post-Minimalism, one that is linked to previous examples: the displacement of control to a series of intricate local rules for combination, or as 'sequences of events' and not as an overall formal configuration. And in the case of Post-Minimalism, this is



8 Jeffersonian grid

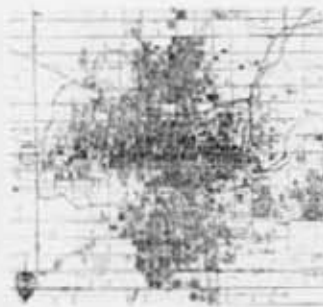
often related to material choices. When working with materials such as wire mesh (Alan Saret), poured latex (Linda Benglis) or blown flour (Le Va), the artist simply cannot exercise a precise formal control over the material. Instead, the artist establishes the conditions within which the material will be deployed, and then proceeds to direct its flows. In the case of Le Va's felt pieces, it is a matter of relating fold to fold, line to line. In later works from the 60s, the materials themselves become so ephemeral as to function as a delicate registration of process and change.

Field Constructions

The common element in these two examples – one from within the culture of architecture, and one from outside – is a shift in emphasis: from abstract formal description towards a close attention to the operations of making. Questions of meaning are secondary. In the case of the Córdoba Mosque, the architects gave only rudimentary consideration to the exterior form (dictated by and large by the constraints of site), but paid close attention to the measure and interval of the individual elements. Similarly, a contemporary architect such as Renzo Piano works from the individual joint outwards (fig 7). For Piano, the joint is not an occasion to articulate the intersection of two materials (as is the case, for example, with Carlo Scarpa), but is instead a locus of an intensive design energy that proceeds outwards to condition the form of the whole.

What is proposed here is not simply a return to the mystification of construction and the phenomenology of materials. Rather, it is an attempt to go beyond the conventional opposition of construction and form-making. By looking for a precise and repeatable link between the operations of construction and the overall form produced by the aggregation of those parts, it becomes possible to begin to bridge the gap between building and form-making.

In *Studies in Tectonic Culture*, Kenneth Frampton has pointed to the split between 'the representational scene and the ontological construct', expressing a clear preference for the latter.¹³ What is proposed here follows Frampton in its refusal of representation. The field is a material condition, not a discursive practice. But I also want to suggest that a return to the ontology of construction – solidly grounded in conventional tectonics – is not the only alternative to a scenographic or semiotic architecture. By remaining attentive to the detailed conditions that determine the connection of one part to another, by understanding construction as a 'sequence of events', it becomes possible to imagine an architecture that can respond fluidly and sensitively to local difference while maintaining overall stability.



9 the American city

PART 2 – DISTRIBUTIONS AND COMBINATIONS: TOWARDS A LOGISTICS OF CONTEXT

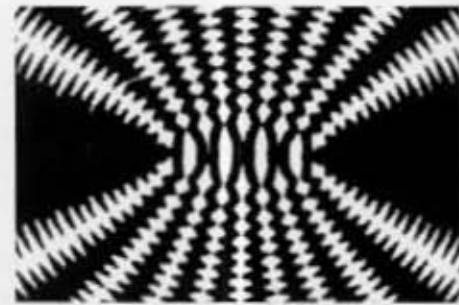
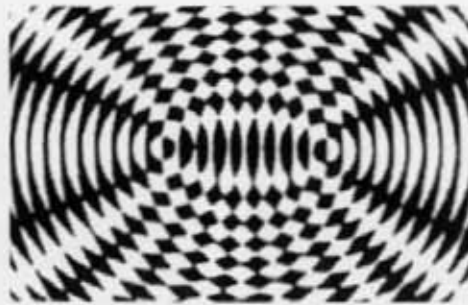
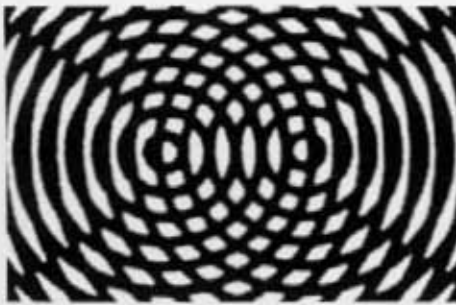
Distributions

'Field conditions' is opposed to conventional Modernist modes of composition as much as it is to classical rules of composition. My thesis here is that in Modernist composition by fragments – montage strategies that work to make connections between separate elements brought together at the site of composition – the classical assumption that composition is concerned with the arrangement of, and connections among, those parts persists. As Robert Morris has put it, 'European art since Cubism has been a history of permutating relationships around the general premise that *relationships should remain critical*.'¹⁴ While painting and sculpture have gone beyond Cubism, architecture, I would argue, is by and large still operating with compositional principles borrowed from Cubism. The organisational principles proposed here suggest the new definitions of 'parts', and alternative ways of conceiving the question of relationships among those parts. What is required is a rethinking of some of the most familiar elements of architectural composition. Field conditions is not a claim for novelty, but rather an argument for the recuperation of an existing territory.

The American City: Open Field

The rectilinear grid is one of architecture's oldest and most persistent organising devices. From the outset, the grid supports a double valence: at once a simple and pragmatic means to partition territory or standardise elements and at the same time an emblem of universal geometries, with potential metaphysical or cosmological overtones. Hence the Jeffersonian grid, projected unconditionally over the open territories of the western United States (fig 8) is at once a symbol of democratic equality and an expedient means to manage vast quantities of territory; an attempt to impose measure on the immeasurable. But as Colin Rowe has remarked in a different context, in America, the pragmatic tends to win out over the universal. Paraphrasing Rowe, we note that in this context, the grid is 'convincing as fact rather than as idea'.¹⁵

The earliest examples of gridded planning in the New World were Jesuit colonies, defensive enclaves organised hierarchically around the cathedral square in imitation of Spanish models. In sharp contrast to these self-enclosed units, and equally distant from the figural concepts of eighteenth-century town planning in Europe, the American cities of the Midwest and the West are local intrications and perturbations to the extended Jeffersonian grid (fig 9). The town is an elaboration of the order applied to the farmland surrounding it. The grid is given as a convenient



10 moiré patterns

starting point, not as an overarching ideal. Over time, the accumulation of small variations establishes a counter principle to the universal geometry of the grid. In these American cities, pragmatics unpacks the ideality of the grid, in the same way as the unthinkable extent of the grid itself nullifies its status as an ideal object.

These cities are prototypical field conditions. Local variations of topography or history are smoothly accommodated within the overall order; borders are loosely defined and porous. They are connected with one another in larger networks. Organisation and structure display almost infinite variety within patterns that are publicly legible and institutionally manageable. Variation and repetition – individual and collective – are held in delicate balance.

Thick Surfaces: Moirés, Mats

All grids are fields, but not all fields are grids. One of the potentials of the field is to redefine the relation between figure and field. Legal and social theorist Roberto Mangabeira Unger has identified the traditional attributes of religious expression in the architecture of iconoclastic societies (that is to say, where explicit figuration is prohibited): 'The basic architectural devices of this expression were and are: blankness, vastness and pointing – pointing to a world outside this world ...'¹⁶ The conjunction, within this short catalogue, of concepts which might recall Modernist values of abstraction ('blankness') and even suggest a universal, undifferentiated grid ('vastness') with the more figural concept of 'pointing' implies something more complex than a simple opposition between the figurative and the abstract, between field and figure.

However, if we think of the figure not as a demarcated object but as an effect emerging from the field itself – as moments of intensity, as peaks or valleys within a continuous field – then it might be possible to imagine these two concepts as allied. While recognising a certain dependence on radical Modernist compositional models (Mondrian, for example), it seems important to differentiate this proposition from conventional Modernist compositional strategies. What is intended here is close attention to the production of difference at the local scale, even while maintaining a relative indifference to the form of the whole. Authentic and productive social differences, it is suggested, thrive at the local level, and not in the form of large-scale semiotic messages. Hence the study of these field combinations would be a study of models that work in the zone between figure and abstraction, models that refigure the conventional opposition between figure and abstraction, or systems of organisation capable of producing vortexes, peaks and protuberances out of

individual elements that are themselves regular or repetitive.

A moiré is a figural effect produced by the superposition of two regular fields (fig 10). Unexpected effects, exhibiting complex and apparently irregular behaviours result from the combination of elements that are in and of themselves repetitive and regular. But moiré effects are not random. They shift abruptly in scale, and repeat according to complex mathematical rules. Moiré effects are often used to measure hidden stresses in continuous fields, or to map complex figural forms. In either case there is an uncanny coexistence of a regular field and emergent figure.

In the architectural or urban context, the example of moiré effects begs the question of the surface. The field is a horizontal phenomenon – even a graphic one – and all of the examples described so far function in the plan dimension. Instead of refusing this characteristic, I would suggest examining it more closely. Although certain post-modern cities (Tokyo for example) might be characterised as fully three-dimensional fields, the prototypical cities of the late twentieth century are characterised by horizontal extension. What these field combinations seems to promise in this context is a thickening and intensification of experience at specified moments within the extended field of the city. The monuments of the past, including the skyscraper – a Modernist monument to efficient production – stood out from the fabric of the city as a privileged vertical moment. The new institutions of the city will perhaps occur at moments of intensity, linked to the wider network of the urban field, and marked not by demarcating lines but by thickened surfaces.

Digital Fields

Analogue technologies of reproduction work through imprints, traces or transfers. The image may shift in scale or value (as in a negative), but its iconic form is maintained throughout. Internal hierarchies are preserved. A significant shift occurs when an image is converted to digital information. A notational schema intervenes. 'Digital electronic technology atomizes and abstractly schematizes the analogic quality of the photographic and cinematic into discrete *pixels* and *bits* of information that are transmitted *serially*, each bit discontinuous, discontinuous, and absolute – each bit "being in itself" even as it is part of a system.'¹⁷ A field of immaterial ciphers is substituted for the material traces of the object. Hierarchies are distributed; 'value' is evened out. These ciphers differ one from the other only as place-holders in a code. At the beginning of this century, Viktor Shklosky anticipated the radical levelling effect of the notational sign: 'Playful or tragic, universal or particular works of art, the oppositions of one world to another or of a cat to a stone are all equal among themselves.'¹⁸



11 order and chaos: flocks



12 order and chaos: crowds

This evening out of value has implications for the traditional concept of figure/field. In the digital image 'background' information must be as densely coded as the foreground image. Blank space is not empty space; there is empty space throughout the field. If classical composition sought to maintain clear relations of *figure on ground*, which modern composition perturbed by the introduction of a complicated play of *figure against figure*, with digital technologies we now have to come to terms with the implications of a *field-to-field* relation. A shift of scale is involved and a necessary revision of compositional parameters implied.

It might be noted that the universal Turing machine – the conceptual basis of the modern digital computer – performs complicated relational functions by means of serially repeated operations of *addition*. Paradoxically, it is only when the individual operations are simplified as far as possible that the incredible speed of the modern computer is achieved.

Flocks, Schools, Swarms, Crowds

In the late 1980s, artificial life theorist Craig Reynolds created a computer program to simulate the flocking behaviour of birds. As described by M Mitchel Waldrop in *Complexity: The Emerging Science at the Edge of Order and Chaos*, Reynolds placed a large number of autonomous, birdlike agents, which he called 'boids', into an on-screen environment. The boids were programmed to follow three simple rules of behaviour: first, to maintain a minimum distance from other objects in the environment (other boids, as well as obstacles); second, to match velocities with other boids in the neighbourhood; third, to move toward the perceived centre of mass of boids in its neighbourhood. As Waldrop notes: 'What is striking about these rules is that none of them said "Form a flock" ... the rules were entirely local, referring only to what an individual boid could do and see in its own vicinity. If a flock was going to form at all, it would have to do from the bottom up, as an emergent phenomenon. And yet flocks did form, every time.'¹⁹

The flock is clearly a field phenomenon, defined by precise and simple local conditions, and relatively indifferent to overall form and extent (fig 11).²⁰ Because the rules are defined locally, obstructions are not catastrophic to the whole. Variations and obstacles in the environment are accommodated by fluid adjustment. A small flock and a large flock display fundamentally the same structure. Over many iterations, patterns emerge. Without repeating exactly, flock behaviour tends toward roughly similar configurations, not as a fixed type, but as the cumulative result of localised behaviour patterns.

Crowds present a different dynamic, motivated by more complex desires, interacting in less predictable patterns (fig 12).

Elias Canetti in *Crowds and Power* has proposed a broader taxonomy: open and closed crowds; rhythmic and stagnating crowds; the slow crowd and the quick crowd. He examines the varieties of the crowd, from the religious throng formed by pilgrims to the mass of participants in spectacle, even extending his thoughts to the flowing of rivers, the piling up of crops and the density of the forest. According to Canetti, the crowd has four primary attributes: the crowd always wants to grow; within a crowd there is equality; the crowd loves density; the crowd needs a direction.²¹ The relation to Reynolds' rules outlined above is oblique, but visible. Canetti, however, is not interested in prediction or verification. His sources are literary, historical and personal. Moreover, he is always aware that the crowd can be liberating as well as confining, angry and destructive as well as joyous.

Composer Yannis Xenakis conceived his early work *Metastasis* as the acoustical equivalent to the phenomenon of the crowd. Specifically, he was looking for a compositional technique adequate to powerful personal memories:

Athens – an anti-Nazi demonstration – hundreds of thousands of people chanting a slogan which reproduces itself like a gigantic rhythm. Then combat with the enemy. The rhythm bursts into an enormous chaos of sharp sounds; the whistling of bullets; the crackling of machine-guns. The sounds begin to disperse. Slowly silence falls back on the town, taken uniquely from an aural point of view and detached from any other aspect these sounds events made out of a large number of individual sounds are not separately perceivable, but reunite them again and a new sound is formed which may be perceived in its entirety. It is the same case with the song of the cicadas or the sound of the hail or rain, the crashing of waves on the cliffs, the hiss of waves on the shingle.²²

In attempting to reproduce these 'global acoustical events', Xenakis drew upon his own considerable graphic imagination, and his training in descriptive geometry to invert conventional procedures of composition. That is to say, he began with a graphic notation describing the desired effect of 'fields' or 'clouds' of sound, and only later reduced these graphics to conventional musical notation. Working as he was with material that was beyond the order of magnitude of the available compositional techniques, he had to invent new procedures in order to choreograph the 'characteristic distribution of vast numbers of events'.²³

Crowds and swarms operate at the edge of control. Aside from the suggestive formal possibilities, I wish to suggest with these two examples that architecture could profitably shift its attention from its traditional top-down forms of control and begin to



cluster



open cluster

investigate the possibilities of a more fluid, bottom-up approach. Field conditions offers a tentative opening in architecture to address the dynamics of use, behaviour of crowds and the complex geometries of masses in motion.

A Logistics of Context

One of modern architecture's most evident failings has been its inability to address adequately the complexities of urban context. Recent debates have alternated between an effort to cover over the difference between old and new (the contextualism of Leon Krier or the so-called 'New Urbanists'), and a forceful rejection of context (deconstruction, and related stylistic manifestations). The potential of a well-developed theory of field conditions is to find a way out of this polarised debate, acknowledging the distinct capabilities of new construction, and at the same time recognising a valid desire for diversity and coherence in the city.

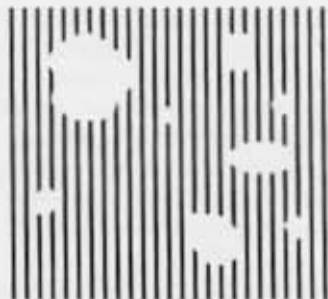
How to engage all the complexity and indeterminacy of the city through the methodologies of a discipline so committed to control, separation and unitary thinking? This is the dilemma of the architect working in the city today. Architecture and planning, historically aligned with technical rationality and committed to the production of legible functional relationships, have had tremendous difficulty thinking their roles apart from the exercise of control. This is all the more true today when the real power of architecture has been eroded everywhere by a swollen bureaucratic apparatus. Architecture and planning, in a desperate attempt to survive, have simply opposed their idea of order to chaos: planning versus uncontrolled growth. But this is a kind of zero-sum thinking, in which architecture can only be diminished in the measure to which it relinquishes control over the uncontrollable. We thrive in cities precisely because they are places of the unexpected, products of a complex order emerging over time.

Logistics of context suggests the need to recognise the limits of architecture's ability to order the city, and at the same time, to learn from the complex self-regulating orders already present in the city. Attention is shifted to systems of service and supply, a logic of flow and vectors. This implies close attention to existing conditions, carefully defined rules for intensive linkages at the local scale, and a relatively indifferent attitude toward the overall configuration. Logistics of context is a loosely defined working framework. It suggests a network of relations capable of accommodating difference, yet robust enough to incorporate change without destroying its internal coherence. Permeable boundaries, flexible internal relationships, multiple pathways and fluid hierarchies are the formal properties of such systems.

Above all it is necessary to recognise the complex interplay of indeterminacy and order at work in the city. 'This place, on its



field vectors



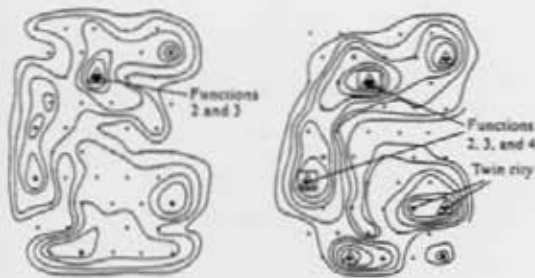
striated 3



field vectors



twigs



13 urban growth

surface, seems to be a collage. In reality, its depth is ubiquitous. A piling up of heterogeneous places,' writes Michel de Certeau. These 'heterologies' are not arbitrary and uncontrolled, but rather 'managed by subtle and compensatory equilibria that silently guarantee complementarities'.²⁴ Even a very simple model of urban growth, ignoring large-scale accidents of history or geography, but incorporating fine-grained difference in the form of multiple variables and non-linear feedback, demonstrates how the interplay between laws and chance produces complex, but roughly predictable configurations of a non-hierarchical nature

(fig 13).²⁵ Field conditions and logistics of context reassert the potential of the whole, not bounded and complete (hierarchically ordered and closed), but capable of permutation: open to time and only provisionally stable. They recognise that the whole of the city is not given all at once. Consisting of multiplicities and collectivities, its parts and pieces are remnants of lost orders or fragments of never-realised totalities. Architecture needs to learn to manage this complexity, which, paradoxically, it can only do by giving up some measure of control. Logistics of context proposes a provisional and experimental approach to this task.

Notes

- 1 I first introduced the term 'field conditions', and a version of the conceptual structure outlined here, in the context of a studio taught at Columbia University in spring 1995. As the articles collected here demonstrate, I am not alone in my interest in the techniques and phenomena associated with the field. Jeff Kipnis and Sanford Kwinter should be mentioned. Here is Kwinter, for example, writing in 1986: 'This notion of "the field" expresses the complete immanence of forces and events while supplanting the old concept of space identified with the Cartesian substratum and ether theory... The field describes a space of propagation, of effects: it contains no matter or material points, rather functions, vectors and speeds. It describes local relations of difference within fields of celerity, transmission or of careering points, in a word, what Minkowski called the world' ('La Città Nuova: Modernity and Continuity', *Zone* 1/2 (1986), pp88-89).
- 2 Xenakis, who has already an intimate connection to architecture, uses language and concepts very close to those utilised here, as described by Nouritza Matossian in her biography of Xenakis: 'A concept from physics served as a useful cognitive scheme for characterising the experience; the notion of the field, a region of space subject to electric, magnetic or gravitational forces. Just as the magnetic forces create patterns in a field of iron filings, so fields of sound might be created by varying the qualities and directions of the forces, ie dynamics, frequency, duration.' Nouritza Matossian, *Xenakis*, Kahn and Averill (London), p59.
- 3 'One of the essential characteristics of the realm of multiplicity is that each element ceaselessly varies and alters its distance in relation to the others... These variable distances are not extensive quantities divisible by each other; rather each is indivisible, or "relatively indivisible", in other words, they are not divisible above or below a certain threshold, they cannot increase or diminish without changing their nature [my emphasis]'. Gilles Deleuze and Felix Guattari, *A Thousand Plateaus*, University of Minnesota Press (Minneapolis, MN), 1988, pp30-31.
- 4 The following discussion is adapted from Rafael Moneo: 'La vida de los edificios', *Arquitectura* 256 (Sept-Oct 1985), pp27-36.
- 5 This well-known phrase is taken from Donald Judd's discussion of the paintings of Frank Stella. The order is not rationalistic and underlying but is simply order, like that of continuity, one thing after another. ('Specific Objects', *Arts Yearbook*, 1968, republished in Donald Judd, *Complete Writings, 1959-1975*, Nova Scotia College of Art and Design (Halifax, NS), p184.
- 6 The term 'algebra' derives from the Arabic *al-jabr* ('the reunion of broken parts'), and is defined as 'the branch of mathematics that uses the positive and negative numbers, letters, and other systematized symbols to express and analyse the relationship between concepts of quantity in terms of formulas, equations etc; generalized arithmetic'. 'Geometry' on the other hand is a word of Greek origin and is defined as the branch of mathematics that deals with points, lines and solids and examines their properties, measurements and mutual relations in

- space. Word origins and definitions taken from Webster's New World Dictionary, World Publishing (Cleveland, OH), 1966.
- 7 Moneo, 'La vida de los edificios', p35.
- 8 Cited by Rosalind Kraus in 'Richard Serra: Sculpture Redrawn', *Artforum*, May 1972.
- 9 Robert Morris, 'Anti Form', *Artforum*, April 1968, p34.
- 10 Judd, *Complete Writings*, p183.
- 11 In fact much of the work developed at nearly the same time. Posat here implies a certain degree of dependence and opposition rather than chronological sequence. Note, for example, the absence of women in the ranks of the Minimalists: Post-Minimalism would be unthinkable without the contributions of Benglis or Hesse. A certain fluidity in these categories is a required; Robert Morris, for example, is often grouped with the Post-Minimalists. See Robert Pincus-Witten, 'Introduction to Post-Minimalism' (1977) in *Postminimalism to Maximalism: American Art, 1966-1986*, University of Michigan Research Press (Ann Arbor, MI), 1987.
- 12 Jane Livingston, 'Barry Le Va: Distributional Sculpture', *Artforum*, November 1968.
- 13 MIT Press (Cambridge, MA), 1995.
- 14 Morris, 'Anti Form', p34.
- 15 Colin Rowe, 'Chicago Frame', in *The Mathematics of the Ideal Villa and Other Essays*, MIT Press (Cambridge, MA), 1976, p99.
- 16 Roberto Mangabeira Unger, 'The Better Futures of Architecture', *Anyone*, 1991, p36. It is, of course, Jeff Kipnis who first called attention to the suggestiveness of Unger's formulation; see 'Towards a New Architecture', *AD Profile* 102: *Folding in Architecture*, pp41-49.
- 17 Vivian Sobchak, 'The Scene of the Screen: Towards a Phenomenology of Cinematic and Electronic Presence', *Post-Script* 10 (1990), p56.
- 18 Cited by Manfredo Tafuri in 'The Dialectics of the Avant-Garde: Piranesi and Eisenstein', *Oppositions* 11 (Winter 1977), p79.
- 19 M Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos*, Simon and Schuster (New York), 1992, pp240-41.
- 20 Linda Roy has studied swarm behaviour and its architectural implications in greater depth. See her upcoming article in *ANY*.
- 21 Elias Canetti, *Crowds and Power*, Farrar, Straus and Giroux (New York), 1984, p29.
- 22 Matossian, Xenakis, cited from an interview, p58.
- 23 Ibid, pp58-59.
- 24 Michel de Certeau, 'Indeterminate', in *The Practice of Everyday Life*, University of California Press (Berkeley, CA), 1984, p201.
- 25 This discussion of the Christaller model is taken from Ilya Prigogine and Isabelle Stengers, *Order out of Chaos: Man's New Dialogue with Nature*, Bantam Books (New York), 1984, p197ff.