1999

GREG LYNN

Animate Form

Lynn (b 1964, Vermilion, Ohio), provides what is probably the most lucid and well-articulated exposition of the organisational modus, facilitated and generated by computers and computer software. Both primer and manifesto, it sets out the terms of reference and philosophical-cultural argument for the approach. A number of the ideas central to the modus such as flows, forces, fields and vectors are evident in the University of Cincinnati School of Design, Architecture, Art and Planning which he designed while working for Eisenman Architects. Now with his own practice, Greg Lynn FORM, Lynn also teaches at Columbia University.

... Animate design is defined by the co-presence of motion and force at the moment of formal conception. Force is an initial condition, the cause of both motion and the particular inflections of a form. For example, in what is called "*inverse kinematic*" animation, the motion and shape of a form is defined by multiple interacting vectors that unfold in time perpetually and openly. With these techniques, entities are given vectoral properties before they are released into a space differentiated by gradients of force. Instead of a neutral abstract space for design, the context for design becomes an active abstract space that directs form within a current of forces that can be stored as information in the shape of the form. Rather than as a frame through which time and space pass, architecture can be modeled as a participant immersed in dynamical flows. In addition to the special-effects and animation industries, many other disciplines such as aeronautical design, naval design, and automobile design employ this animate approach to modeling form in a space that is a medium of movement and force. [p 11]

... Static models underwrite the retrograde understanding of gravity as a simple, unchanging, vertical force. Architecture remains as the last refuge for members of the flat-earth society. The relationships of structure to force and gravity are by definition multiple and interrelated, yet architects tend to reduce these issues to what is still held as a central truth: that buildings stand up vertically. In fact, there are multiple interacting structural pressures exerted on buildings from many directions, including lateral wind loads, uplift, shear, and earthquakes, to name a few of the non-vertical conditions. Any one of these **live** loads could easily exceed the

relative weight of the building and its vertical **dead** loads ...

These concerns are not merely technical as architecture presently expresses also the cultural diagrams of stasis. Despite the popular conception among architects that gravity is a fact, the contemporary debates about theories of gravity could inform present discussions of architecture in the same spirit that they have done in the past ... [p 14]

... The shift from a discrete model of gravity as a force that could be eliminated from matter, to a concept of gravity as integral and continuous with masses in space, involves a redefinition of space from being neutral and timeless to being temporally dynamic. Once design is posed within a Leibnizian monadological space, architecture may embrace a sensibility of micro and macro contextual specificity as a logic that can not be idealized in an abstract space of fixed coordinates. In such an abstract active space, the statics of fixed points in neutral space is replaced by the stability of vectors that balance one another in a phase space. [p 15]

... The tools that architects use to draw, such as adjustable triangles and compasses, are based on simple algebra. The prevalence of topological surfaces in even the simplest CAD software, along with the ability to tap the time-and-force modeling attributes of animation software, presents perhaps the first opportunity for architects to draw and sketch using calculus. The challenge for contemporary architectural theory and design is to try to understand the appearance of these tools in a more sophisticated way than as simply a new set of shapes. Issues of force, motion and time, which have perennially eluded architectural description due to their "*vague essence*," can now be experimented with by supplanting the traditional tools of exactitude and stasis with tools of gradients, flexible envelopes, temporal flows and forces. [p 17]

... The most obvious aesthetic consequence is the shift from volumes defined by Cartesian coordinates to topological surfaces defined by U and V vector coordinates. Another obvious aesthetic byproduct of these spatial models is the predominance of deformation and transformation techniques available in a time-based system of flexible surfaces. These are not merely shapes but the expression of the mathematics of the topological medium. [p 18]

There are three fundamental properties of organization in a computer that are very different from the characteristics of inert mediums such as paper and pencil: **topology**, **time**, and **parameters** ... [p 20]

... Another model that has been developed in conjunction with evolutionary theories is the idea of the fitness landscape. With the replacement of fixed types by temporally organized phylogenetic trees, came the model of the developmental

landscape to describe the space within which organisms evolve ... [p 28]

A landscape is a system where a point change is distributed smoothly across a surface so that its influence cannot be localized at any discrete point. Splines are the constituent element of topological landscapes. Spline surfaces [can be] explained as vector sequences whose regions of inflection produce singularities on a continuous surface ... [p 29]

... A landscape is a ground that has been inflected by the historical flows of energy and movement across its surface. These historical forces manifest a geological form of development that is inflected and shaped by the flows that have moved across it. These slow transformational processes result in forms which are oriented with motion, both the virtual motion of their history and the actual motion they initiate through their slopes and valleys. This animation of slow form with the historical processes of gradual geological becoming is a paradigm of motion and time that renders substance virtually animated and actually stable. Rhythmic motion is manifest in stable-oriented form rather than in literally moving objects ... [p 35]

The use of parameters and statistics for the design of form requires a more abstract, and often less representational origin for design. The shape of statistics, or parameters, may yield a culturally symbolic form, yet at the beginning, their role is more inchoate ... [p 39]

... Signifiers are not rejected but delayed toward the moment that they are "*found at the intersection of different systems and are cut across by the statement acting in the role of primitive function.*" Linguistic constructions are merely postponed, not abolished, and a regime of abstract, schematic statements are seen to preempt and sponsor them ... [p 40]

... In order to bring these technologies into a discipline that is defined as the site of translation from the virtual into the concrete, it is necessary that we first interrogate their abstract structure. Without a detailed understanding of their performance as diagrams and organizational techniques it is impossible to begin a discussion of their translation into architectural form. The availability and rapid colonization of architectural design by computer-aided techniques presents the discipline with yet another opportunity to both retool and rethink itself as it did with the advent of stereometric projection and perspective. If there is a single concept that must be engaged due to the proliferation of topological shapes and computer-aided tools, it is that in their structure as abstract machines, these technologies are animate. [pp 40–1]