

TRANSARCHITECTURES EXCERPTS

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Transarchitectures in brief

The notion of transarchitectures aims to dissolve certain false dichotomies and to declare that whatever side of those old and no longer pertinent divisions an architect may fall on, the issue of transformative change under the pressure of technology and the overall information culture is one that must be grappled with, even if it leads to unfamiliar ground. In my writings, I have tried to cluster together the various facets of the new tectonic horizon by coining the term "transarchitectures". This term articulates the transformative effect of information, communication, and computation on architecture, both as physical construct and as information construct, an effect so strong as to require the reevaluation of architectural and urban theory, practice, pedagogy and research. Transarchitectures charts the changes in:

conception

prototyping

fabrication

inhabitation

interaction

communication

telepresence

immersion (casting the physical into the virtual)

eversion (casting the virtual unto the physical)

these are changes that are brought about by our construction of a world in which the distinction between actual and virtual is rapidly fading, and in which our very understanding of space is undergoing drastic reconsideration.

Generative Principles

My ongoing investigations are aimed at arriving at architectonic propositions that are inherently liquid, algorithmic, transmissible, and derived from the geometries of higher space. By "liquid" I mean involving the total but rigorous variability I introduced in my essay "Liquid Architectures in Cyberspace", and the idea that form can be driven by both data and presence. both when we are immersed in information and when information is everted onto the physical world.

By "algorithmic" I mean both created by the algorithms and subject to a self-imposed principle of minimal manual intervention - if the results are not acceptable, it is the algorithm, not the resultant form, that is corrected. Generally these algorithms use artificial life and dynamical system techniques to generate or manipulate fields of data within which I discover latent forms.

By "transmissible", I mean that since both the algorithm and the parameters of an architectonic proposition are explicitly available, the architecture is suitable for transmission to either physical fabricators or to virtual environments in cyberspace. Since what is to be transmitted is the algorithm and the parameters, or in the most efficient form,

the mathematical description of the architecture, what is to be transmitted is maximally compressed.

By "derived from higher space", I mean three things: first, employing four or more spatial dimensions, second, involving the manipulation of the curvature of the underlying matrix of space rather than the manipulation of objects, and, third, involving time as an intrinsic parameter within generative algorithms, as a dimension added to the spatial dimensions, forming a spacetime continuum.

For this project, a cuboid defined by six parametric surfaces was generated, each with its own (u,v) coordinate system. The parametric equations controlling these six surfaces were arranged in such a way as to allow variations in each surface to propagate to all the adjacent surfaces. This, in effect, created a topological cube, a shape whose structure was inherently cubic even though its surfaces could be made to vary dramatically by the manipulation of the equations that controlled each one. The parameterization also allowed the smoothness of each surface to be arbitrarily defined -- making the surfaces smoother simply meant altering a smoothness parameter. This was important in that the skeletal elements were derived from the same processes as the skin: the skin was computed at high smoothness, the skeletal structures at low.

The parametric cuboid was used to create both the structural elements and the enclosing skin of the architectonic proposition. The functions defining the parametric cuboid were manipulated to create two basic forms, one for the skin and one for the skeleton. Each of these generations involved the idea of iterative nested perturbations, an idea I adopt and adapt from computer sound synthesis, where complex timbres are constructed by adding overtone frequencies to base ones, via the inverse of a Fourier analysis or what might be called Fourier synthesis.

The skeleton was then extruded into a fourth spatial dimension. This involved adding a fourth coordinate to three dimensional points, adding entirely new four dimensional points, and deriving a new four-dimensional topological structure from the given three-dimensional one. Points became lines, lines became polygons, polygons became cubes, and cubes became hypercubes or tesseractes. Once this was done, the resulting four dimensional object was rotated about a plane in four-dimensional space by the appropriate matrix transformations. The effect of this transformation, once it was projected back into the third dimension by dropping a dimension and re-adjusting the topology, was that the skeleton became a space-frame. Because the extrusion into the third dimension was neither constant nor linear, however, the cells of the space frame are all different, providing a rich variety of dimensions and relations.

The skin on the other hand, was not extruded into the fourth dimension but rather was subjected to mappings that effected a curvature of the spatial matrix within which it existed. Normally, discussions of non-Euclidean geometry speak of positively and negatively curved space, but other variations are also possible. Specifically, it is possible to envision rippled spaces, spaces of varying curvature and of non-homogeneous measure. The operations on the skin used the idea of iterative, nested, timbral perturbations to create such a rippled space of varying curvature and non-homogeneous measure.

In certain studies two skins were derived from slightly displaced sets of parameters, effecting a spatial polyphony that explored an aesthetic of varying nearnesses. This doubling of the skin happened at each of the stages described above, providing a means by which to create numerous closely related but non-parallel geometries, each of which could then be cast into a specific architectural role, or from the interrelationship of which specific architectonic features could be derived