Explorations of New Visual Systems

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Perspective systems are designed to construct pictures that, when viewed, produce in the trained viewer the experience of depicted objects that match perceivable objects. Our capacities to see are constrained by the perspective system that we use, that is, by our way of depicting what we see. The work of mathematicians showed that geometries could be based on axioms other than Euclidean. This altered the notion of geometry by revealing its abstract postulational character and removing it from any connection with the structure of empirical intuition. Spaces were constructed on the basis of non-Euclidean axioms revealing behaviors closer to our sensations rather than our perception.

This sketch investigates how computers and new media may extend the designer's perception and imagination. I shall attempt to present a series of experimental mathematical functions that demonstrate some of these models or mappings for a variety of values for the parameters. The functions address geometric mappings as well as numerical models of projection and their interest lies in the dynamic nature of the continuous computer processing (real-time movement).

A series of experiments will be presented. Some experiments investigate the implementation of art or design theories. For example, how would it look like to move inside a cubist world? Other experiments explore the effect of non-Euclidean theories in the exploration of visual systems. For example, how would an inverted perspective representation behave in a hyperbolic world? Most of the experiments can be combined together in rather unusual ways, such as, for example, a cubist world, with supremacist shapes, seen through a pointillist filter in real-time animation.

The computer system that was developed by the author for this paper is called "zhapes" and is a Java-based 3D-visualization system. It resides at the address http://www.cda.ucla.edu/caad/java/x/formProj2/formB.html where it can be downloaded for explorations.

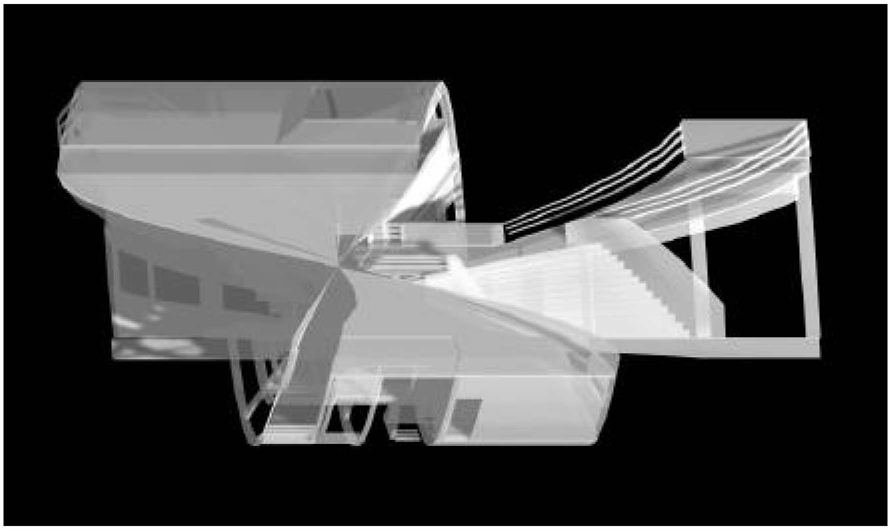

Figure 1. Trigonometric Perspective: $x_p = x \cdot \sin(y) + y \cdot \cos(t)$,
$y_p = y \cdot \sin(x) - z \cdot \cos(t)$

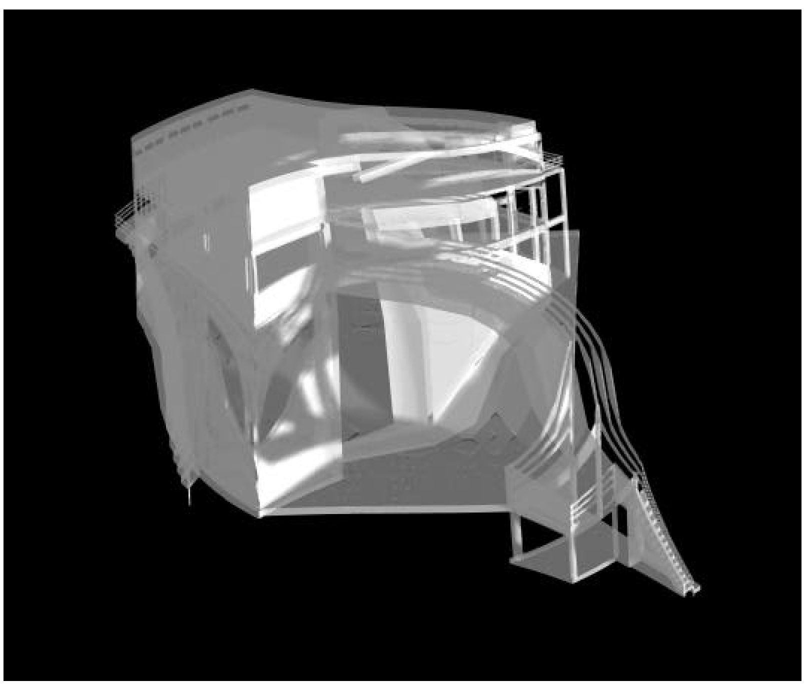

Figure 2. Exponential Projection: $x_p = \sqrt[n]{x}$, $y_p = \sqrt[n]{y}$

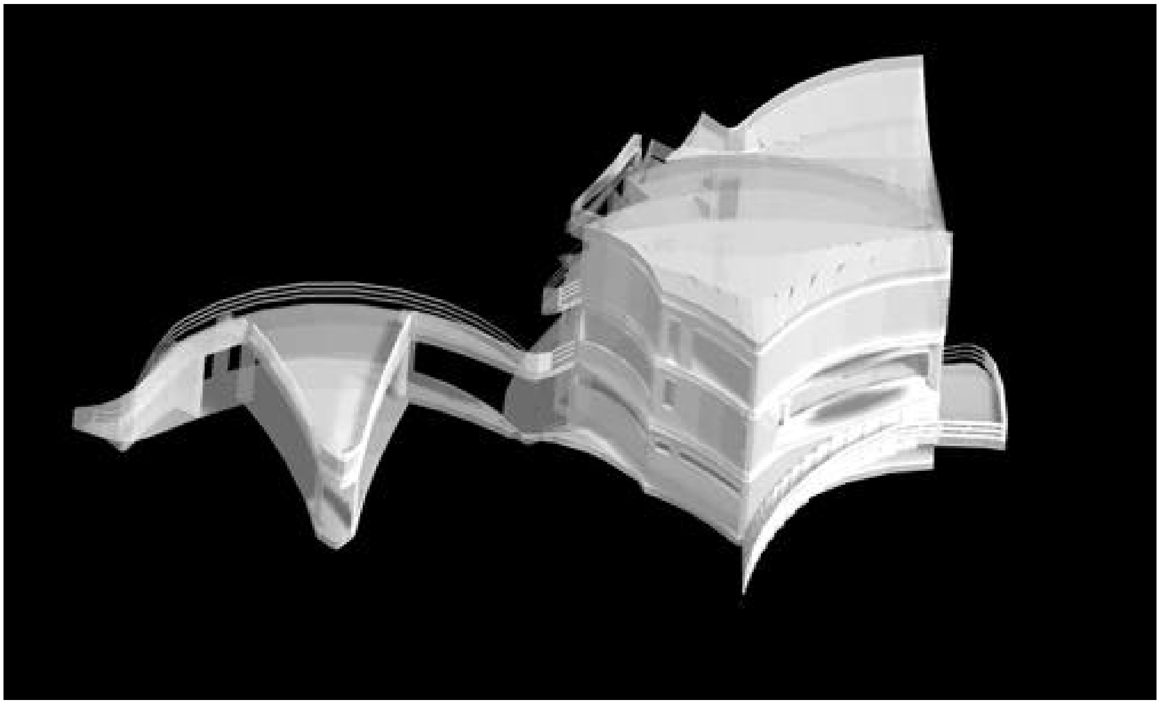

Figure 3. An exponential mapping on a hyperbolic projection

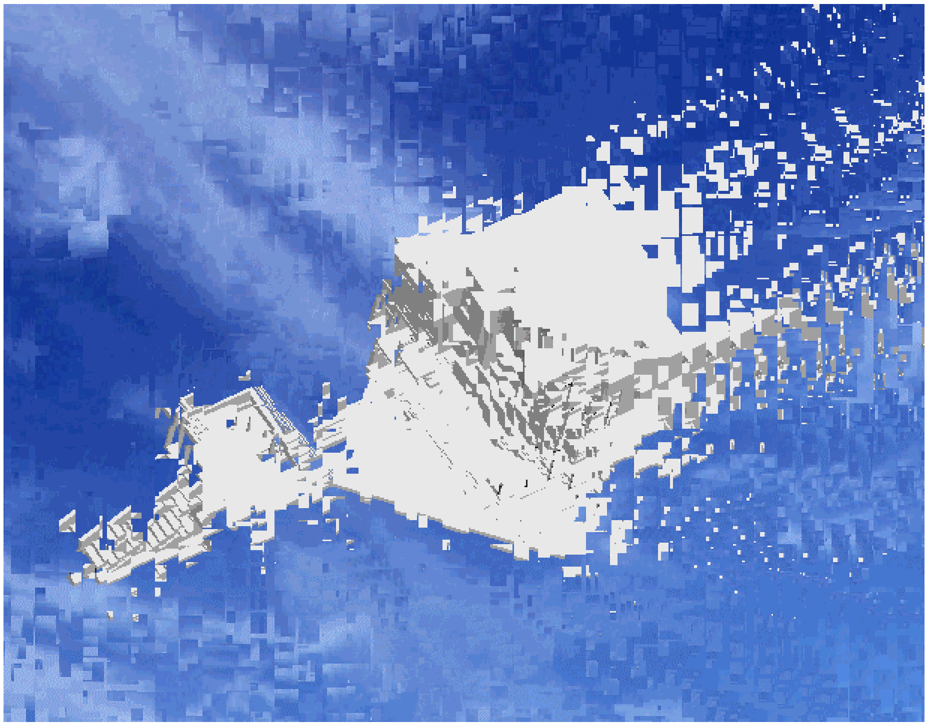

Figure 4. A random size small square-based filter (Seurat-like)