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HYBRID ART / SCIENCE METHODOLOGY: EMPLOYING RATIONAL PARTICLE SYSTEMS TO GENERATE VISUAL EVENTS

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Abstract: *Questions of when art becomes science, or science becomes art, are gaining increasing prominence alongside ubiquitous technology, yet mainstream culture continues to ask for a statement of position, 'Are you an artist or a scientist?' To the extent that disciplines are defined by their methodologies and discourses, this poses two interrelated problems for the presentation and discussion of true hybrid works: that of accessibility of language (for both artists and scientists), and that of valid presentation of process. It is my thesis that hybrid methodologies should be presented as such, rather than forcing them into the notation and language of one discipline or the other. To facilitate an informed discussion, in part I, I simultaneously present the visual and abstract methodologies used to create the rational particle systems illustrated: from the inception of the idea, (using visual symmetries to represent rational numbers) to their application by artists and scientists alike. In part II, I pose open questions arising from hybrid methodologies, in particular that of the role of mathematics and symmetry in future hybrid art/science curriculum.*

1 RATIONAL PARTICLE SYSTEMS

Rational particle systems are made from three, two or one dimensional grids of rational points programmed to flow in three dimensional space. These points are coloured according to their lowest common denominator in an initial reference position. In the first image below, a three dimensional grid of rational points is flowing within a unit cube. Each orthogonal direction is assigned a different frequency. Observable alignments of particles of related denominators (for example multiples of six) form as a result of the quotient map R/Z^3. In other words, particles disappearing out one side of the cube immediately re-enter from the opposite face where they overlap with previous layers of the particle system.

In the second image, a two dimensional grid of rational points are programmed to flow in a spiralling torus or doughnut shape. The longitudinal and meridian flows are assigned different frequencies. This time the quotient map R/Z^2 is staggered off the surface of the torus into a volume. This allows for the formation of extended spatial alignments as flowtime increases. Locally, these alignments spiral as they coalesce and dissipate. Globally, this object resembles a swirling galaxy. In the third image, numerous one dimensional grids of rational points are programmed to flow in and around the surface of a sphere. The flow is two dimensional (with two different orthogonal frequencies), however the objects are initially one dimensional. The result is an ever-changing visually complex particle system in which alignments possessing great symmetry continually coalesce in and out of existence. Two examples of instantaneous symmetrical alignments are shown in the fourth image. As humans we recognise these alignments as visual events in an otherwise chaotic flow.

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In terms of methodology, the decision to stagger the alignments in the longitudinal and meridian directions (Image 2) was driven by mathematical enquiry, whereas the recognition of the extended alignments as the dominant visual form and its subsequent application (Image 3) were driven by artistic enquiry: the decision to explore this form as a dynamic motif in its own right. While one can represent it symbolically as a union of time dependent particle systems of related denominators flowing *autour de* a known mathematical structure (and I will do so), the constructed notation seems to belie the meaning of the hybrid symmetry-based object. How then do we notate/teach?

References

Penny, Simon (2004) After Interdisciplinarity, *paper presentation ISEA2004; August 18th Tallin* (http://www.isea2004.net/mainframe.php?id=TAL_TMP_CNF)

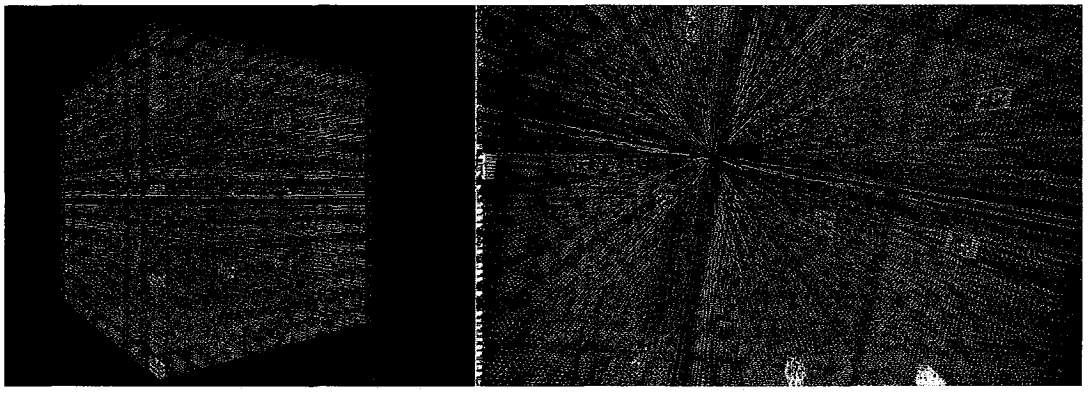

Image 1

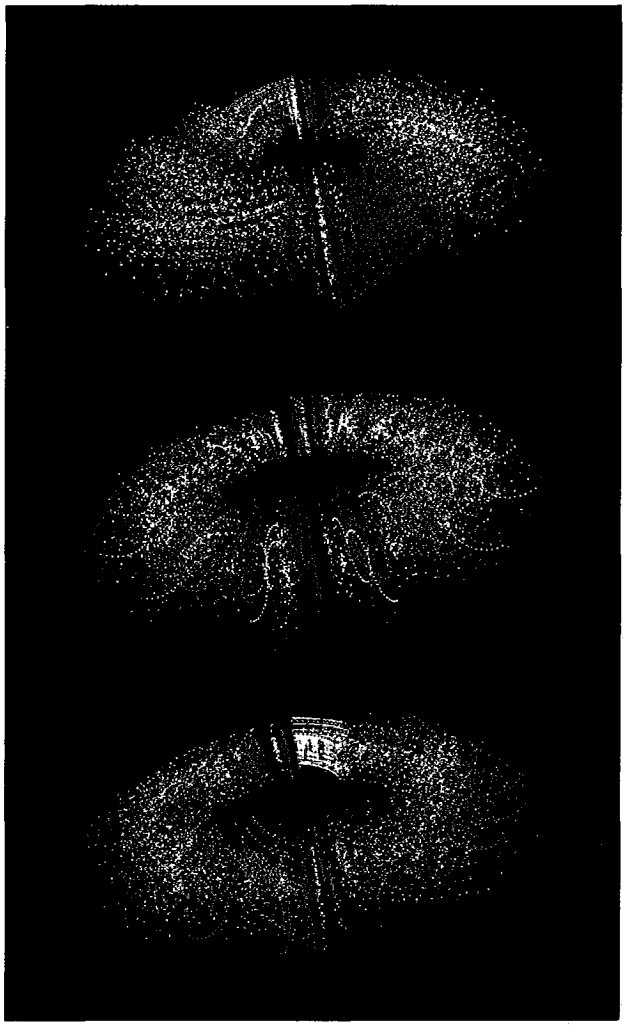

Image 2

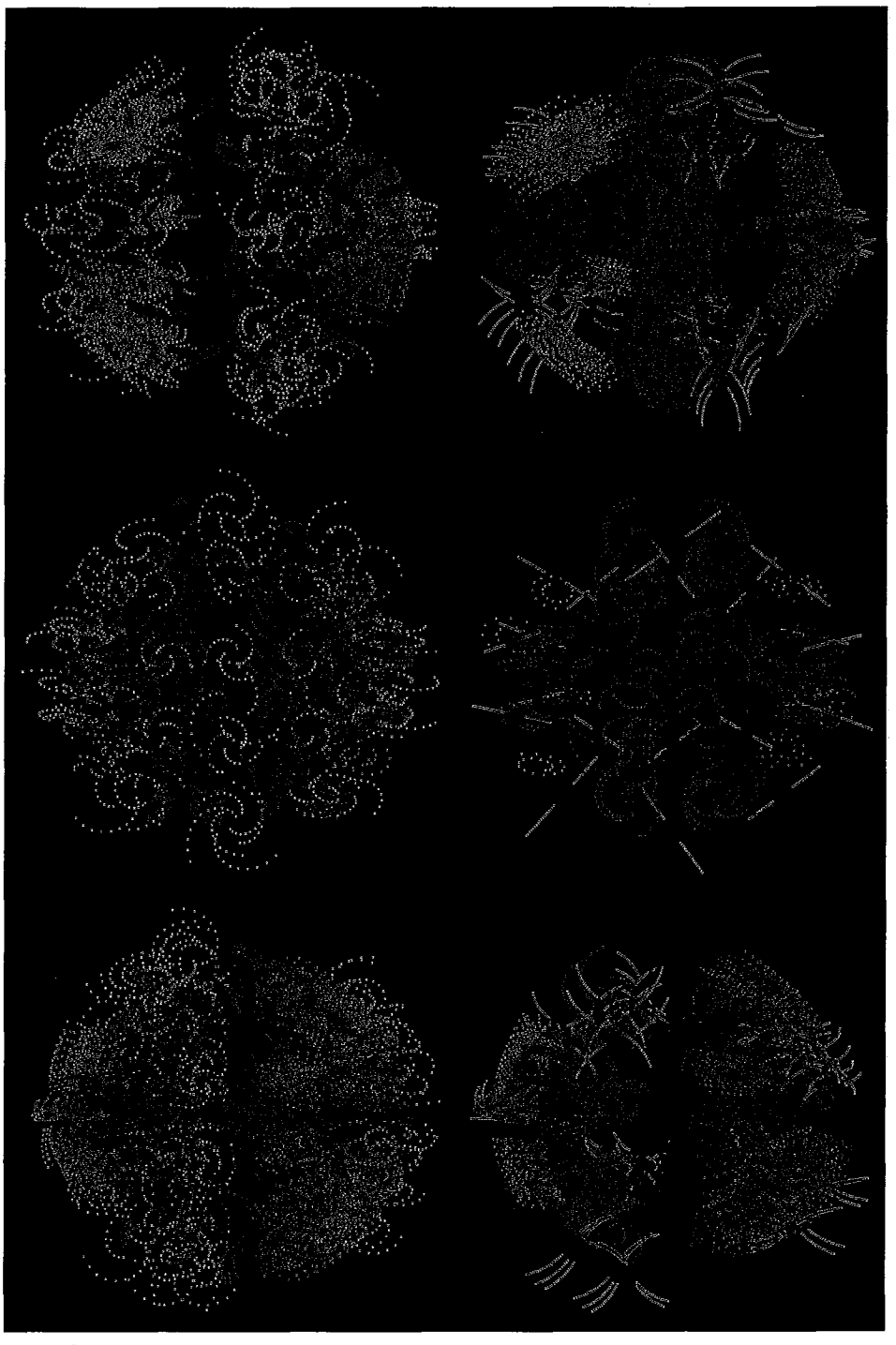

Image 3