Name:	Gary R. Greenfield
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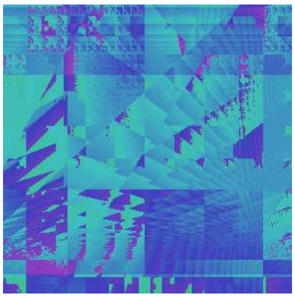
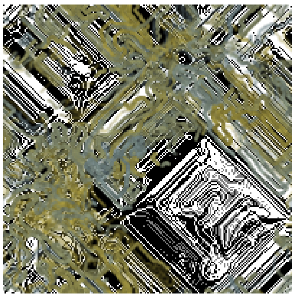
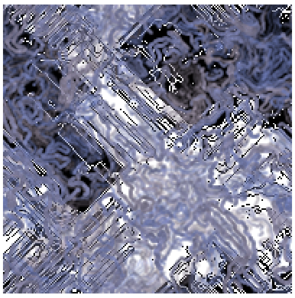
Title of summary:	Mathematics in Art-Making Systems
Target audience:	Interdisciplinary, HS or above
Time frame:	1-2 years
Relevant field(s):	Algebra, Mathematical Modelling

Abstract Art: Algebra and Visualization

We assume students are familiar with graphing functions and conic sections in two dimensions, and graphing surfaces such as quadric surfaces and simple parametric surfaces in three dimensions. There is a historical thread within the algorithmic art movement that is related to this topic — *visualizing* mathematical expressions. Perhaps the most widely known example is that of “evolving expressions” popularized by Karl Sims which combines visualizations of so-called primitives in complex and sophisticated ways to produce abstract art. An example, “Emergent Blue’, is shown below at left. The thrust of this presentation is to consider an initiative to make it possible for students to design their own sets of primitives and develop similarly inspired art-making systems.







Swarm Art: Modelling Agent Interaction and Communication

Increased emphasis being placed upon biological models, artificial life, evolutionary computation, complexity, and robotics has led to advances in simple procedural models that far surpass such familiar standbys as Turtle Logo, Conway’s Game of Life, and Turmites. Agent-agent communication models using more complex, dynamic environments are now the norm. These advances have led to the emergence of procedural models for artistic use that can be categorized loosely using the umbrella term “swarm art” (see untitled examples above right). The goal of this presentation is to consider the development of software that allows students to investigate the use of various mathematical models for agent-agent communication such as interacting particles, mobile automata, or simulated robotics for similar artistic endeavors.

Most current software dedicated to these types of projects is “research level code”. A critical issue that needs to be addressed is whether or not it should be repackaged as stand-alone, user-friendly products or as something more general purpose such as Mathematica packages.