

GDesign

A freeware, open source educational design software with LSystems and Artificial Life

Umberto Roncoroni
 Universidad SMDP, Lima, Peru. 2007
<http://www.digitalpoiesis.org>

Generative art, from the art system' view point, is an obscure and exoteric concept. If we think of users with little computer skills, such as many art teachers, artists or designers without training in computer science, it seems to me that is needed an application that could provide to these professionals the benefits of direct coding with the facilities of traditional software. Besides, generative art still needs some more experimentation to figure out which real creative capabilities could be developed from the huge mass of theoretical research. Inside this framework, GDesign is:

- 1 An interactive generative art and design application, that will help educators, students and artists without programming skills to design, edit and experiment their own generative tools, scripts and grammars
- 2 A tool to build complex parametric objects, with full 3D movements and rotations, that can be exported to other 2D/3D formats.
- 3 A lab to investigate LSystems, ALife and hybrids of these techniques quickly, visually and interactively

The aesthetic computing philosophy

GDesign is a sort of software art experiment, where the multiple aesthetic layers of software—such as code, interface, algorithms—are explored inside the application, in its the documentation or in its web page.

In the first place, GDesign visualizes in real time the output of complex grammars and rules, but the main point is that GDesign was implemented in a very interactive and evolutive style, both the result of direct design experiences and as a solution to specific tasks from artistic practice and teaching.

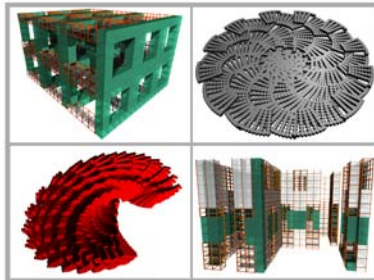
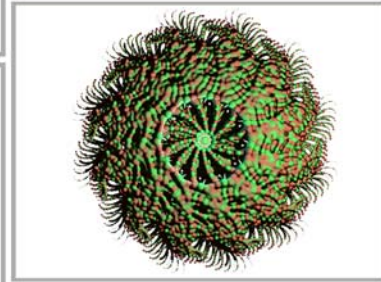
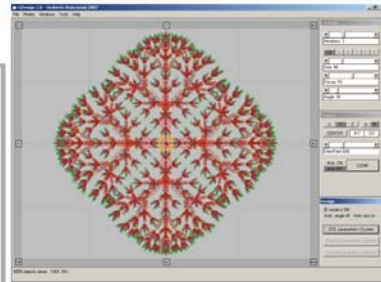
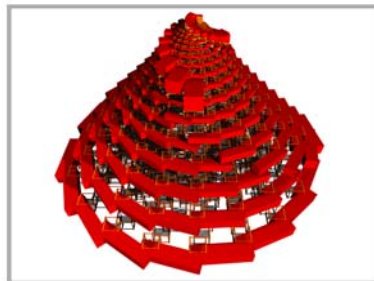
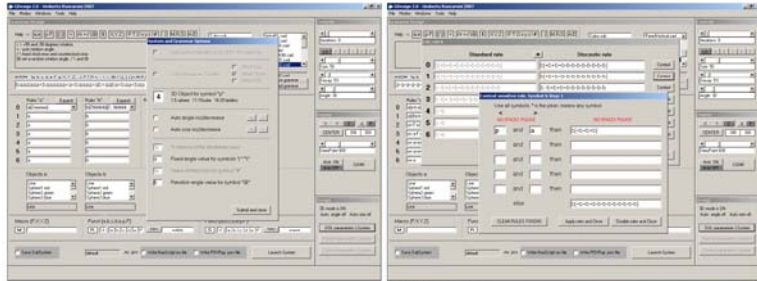
Research

The development of GDesign requested different kind of research: from interface design, to generative grammars and computer science. Actually, the first version of GDesign has been written for my master thesis in Computer Science at the Catholic University of Lima (2005-2007).

The main field of research was the exploration of the creative capabilities of LSystems (standard, stochastic, context sensitive, timed and parametric). I tried to develop a more complex and rich language, keeping in mind the peculiar needs of artists, students, teachers and designers.

So far, I have experimented with:

- 1 Dynamic rules, that change with time
- 2 Multiple languages (such as stochastic and context sensitive rules in one single grammar, or during different stages of a single symbol)
- 3 Interactive rules, modified by external events or by database queries
- 4 Functions and macros: editable sets of user defined rules and actions embedded into terminal symbols
- 5 Automatic effects, that simulate growing processes or other organic behaviors
- 6 Subsystems, or nested LSystems. These are full grammars embedded into a single symbol, with real time control of its parameters and rules.
- 7 Intelligent objects, that are elements or symbols with adaptive properties
- 8 Language development and improvement:
 - random symbols, for unpredictable movements and rotations
 - triggers and inhibitors, that alter behaviors, energy or life of symbols
 - special symbols like pivots, for specific construction tasks, reset values, etc.
 - multi stacks: push/pop of position, size, angle etc. together or alone



L-Systems are traditionally used to simulate the growth of trees and plants. With GDesign it's easy to design a grammar and modify parameters interactively to experiment forms, branches and the effects of external events.



The aesthetic importance of rules is that let the designer simulate or model cultural contexts, social traditions, local technologies and artistic/artisanal procedures. The pictures to the left are the result of a study of generative grammars that analyze the morphology of the ancient peruvian city of Taqo Colorado, near Lima. The real time feedback between the design of rules and the forms that are generated allows for a greater flexibility and a better understanding of metaphors, models and processes.



Bitmaps can be used to control objects' position, size, color and behavior. This makes easy the task of designing context sensitive rule. Different types of data can actually be mapped into images RGBA values. For instance, it is possible to create terrain models and use these data to position a single element or a complete collection of complex objects. But it is also possible to use L-Systems as 3D image processing filters, an unusual application of generative grammars that I have just begun to explore.