Gernot Riether
Georgia Institute of Technology

Digital media, with the capacity to master complexity, has permitted an unprecedented ability to reinterpret natural processes. An infinite number of realities can emerge from their interpretations that can be developed into physical structures or spatial models that can further be appropriated to inform the design of architecture. In this paper the potential of these digital interpretations to inform architectural design processes will be discussed. Demonstrating how digital media can operate as an interface that couples information with cognitive processes I will show how digital media can be constructed in order to intensify our perception of our natural environment. Examples from projects that were developed with students during the spring semester of 2008 at Georgia Institute of Technology will be used to support the argument.
1 Constructing new Realities

We live in a digital world. This digital world is according to Vilem Flusser a sand of data, a desert. Understanding the world as a desert has an enormous potential since the data or grain of the desert can be reorganized into new realities. The confrontation with this new digital realities is interesting in relation to perception.

Each of us has a different frame work of perception that is, according to Jean Piaget a reality that each of us develops through an interaction within an environment. Or according to Ernst von Glaserfeld a reality that each of us constructs by organizing and ordering experiences. This reality or cognitive construct can only be expanded by destabilizing it, which happens when we encounter a reality, which exists in a contrary relationship with our own cognitive framework which creates a state of instability, a dissonance or disequilibrium. In that moment of instability we are faced with the task of balancing the harmony between the pre-existing construct, and the new contradictory one. When we successfully manage this disequilibriation our cognitive framework will be reconfigured and expanded. To upset the framework through conflict is therefore necessary to allow for growth and knowledge to occur.

Using this concept of instability in order to expand our reality there are two challenges or problems that we have to overcome: The first problem relates to our interface to our environment. The complexity of our environment is highly reduced by the limited capacity of our sensor’s receptors, which as we know from Immanuel Kant constitutes a break. The second problem relates to the way our brain functions as a self-referential network. As described by Humberto Maturana, the brain is an autonomous system that maps through an environment back onto itself. That means that we are constantly trying to match other exterior realities with our own, aiming for consensus.

Responding to both of these challenges Vilem Flusser’s image of the world as a desert opens up interesting opportunities. First, digital tools can be used to construct new interfaces and second new realities that emerge from using these interfaces might conflict with our own reality interrupting the self-referential process of our brain. It is therefore important to use digital media to construct new interfaces that continuously generate new realities by reorganizing and reprocessing digital information. These interfaces are systems that in order to stir and process data, have their own rules and boundaries. Depending on the rules we define we can produce an endless number of new realities.

2 Digital Traces

In a seminar that I taught last spring semester at GaTech students were asked to develop 3d systems that were informed by digital traces of natural patterns. Since natural patterns are always a consequence of processes of growth, decay or movement the information was extremely rich of variation.

In order to reinterpret complex information digitally an interface that had the capacity to interpret and process information had to be designed. In order to achieve valuable results the interpretation as well the processing of information had to be guided by precise rules and methods.

Students were first asked to take photographs of natural patterns such as patterns form tree branches, bone structures or water movement. These digital interpretations or organizations were then in a second part called “Informed Materials” used as base information to generate thee dimensional constructs in a post digital process.

If students wanted to produce a digital trace of a curve that they found within a photograph for example, they found themselves confronted with a series of questions such as: Which geometrical principles do we use to draw the curve in a drawing software? Are we drawing the curve along a series of points or are we using a spline that is defined by control points? How many points do we use to define the curve and how much deviation from the original do we accept? It seemed to be a very simple task but all these questions had to be answered in order to generate another organization or reality that is based on specific rules and operates within specific boundaries.

Since only the graphic information of the photographs, an abstract information was
used, we were less interested in strategies to translate a meaning from one language to another language instead we were looking for strategies to transposition information. The goal in this project was not to use digital media to represent the reality of these natural patterns. Instead the intention was to allow new realities to emerge from specific reading or misreading strategies of information.

For the tracing of the photographs curve tools in Maya were used. It was highly emphasized that students had a very precise definition of tools used and a very precise definition of the method used for the tracing the natural patterns. (Figure 1 and 2)

Tools were defined by setting boundaries or limits. Methods were defined by establishing a set of rules. To interpret a three-dimensional trace from the two dimensional information additional rules were introduced. In a second part of this assignment the three dimensional traces were used as a scaffolding that was interpreted again. This time three different geometries were tested: Nurbs, Polygons and Subdivisions (Figure 3). In relation to a specific geometry tools were selected, boundaries and rules defined. After the method of tracing was established the tools used were customized and combined and networked into scripts. To generate further realities the scaffoldings were exchanged between students, which allowed executing the same script on different scaffoldings or using different scripts on the same scaffolding. It became clear very soon that the possibilities of generating new realities from the same information are endless.

3 Informed Materials

Developing a physical structure from digital traces a new form of digital media had to be introduced. Similar to the first part of the project the challenge is to construct new realities by interpreting the information of the digital model not a representation of the virtual model. Digital fabrication tools such as laser cutting were used as a medium that to interpret the information from the digital model in different ways.

A line for example can be scored or cut. The speed of the laser cutter can be adjusted which can generate different effects depending on the material that is cut. It became important to understand the possibilities of the media to be able to fully explore the potential a medium has to interpret information in different ways. Besides developing the fabrication tool into a media there were several other questions that need to be answered such as the choice of material and scale.

Constructing a media from different possibilities of digital fabrication tools as well as the different properties of different materials it was possible to generate different realities each of them informed by the digital model. These models were not representations of
digital models; they were realities that emerged from a misreading or misinterpretations of abstract information.

In this second part of the project students were asked to test different methods of digital fabrication as media: Laser cutting, 3D printing and milling. In addition they were asked to experiment with different materials such as chipboard, wood or different plastics.

If we for example laser cut a pattern from chipboard we assign new properties to the chipboard. (Figure 3) The chipboard is informed by another information that will change the material properties. This new material performance together with a set of rules can inform three dimensional structures. (Figure 4, 5 and 6) The variables of the media that define how the laser cutter cuts, what material is used and what scale is determined can be changed and manipulated in multiple ways. The chance of new realities to emerge from the interpretation of a medium that can constantly be reconstructed is large. Being confronted with continuously new ways of looking at the same information helped us to intensify the perception of any information.

4 Conclusion

Using digital tools to construct digital media the challenge was to maximize the chance of generating new surprising realities from pre-existing data. Digital tools were used to construct scripts that were used as a media in order to construct a new reality by reorganizing and interpreting information. Second digital fabrication tools were utilized into interfaces to perform another set of interpretations. This use or misuse of digital tools required a shift in thinking from media being stirred to media doing the stirring.

Since the media was constructed based on feedback, the rules and boundaries that defined the digital media had to be developed in a constant feedback loop. In that spirit an endless amount of different media and new realities can be generated, a process that will have the potential to destabilize, reconfigure and complicate our perception through digital technologies. The continuing constructing of digital media will therefore allow us to interact and communicate with our environment in continuously new ways.

5 References

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