## Self-Organizing Networks

On October 19th, 1918, Europe is swept by the Spanish
Flu, which originated in the American mid-west, spreading
across the entire US in less than a week. Exported to
Europe with the arrival of the Marines during the First
World War, it claims between 2,000 and 4,000 victims
daily, twenty to fifty million over the course of two years.
Highly virulent, the influenza strain is lethal within only
hours of infection. It induces panic and chaos across
the continent, causing a near breakdown of social order.
Around 8 o'clock AM in Tokyo, March 20th, 1995, the
religious cult Aum Shinrikyo releases a deadly sarin in five
subway trains simultaneously as they are nearing the city
center, wounding 5,500 passengers and killing twelve.
On September 11th, 2001, two passenger planes crash into
the twin towers of the World Trade Center in New York,
hijacked by Islamic terrorists. A third plane hits the
Pentagon, while a fourth crash-lands in Pennsylvania;
over 3,000 people die. For several days, the superpower
is incapacitated, airline traffic ceases, borders close, and
trading comes to a standstill.

Networks are the link between these catastrophic
events, yet they are ultimately neutral—at once vessel
and target. Dependency—their greatest advantage—
is at the same time their greatest weakness.

1

Gleich, Michael.
Web of Life: Die Kunst
vernetzt zu leben.
Hoffmann und Campe,
2002. Acclaimed
scientific journalist
Michael Gleich writes
about the importance
of understanding
networks, and how to
utilize them in more
efficent ways. The book
gives examples of
networks in all façettes
of modern life, their
advantages and
disadvantages.

import/export
05/30/10

**Poster. 24"× 36"**
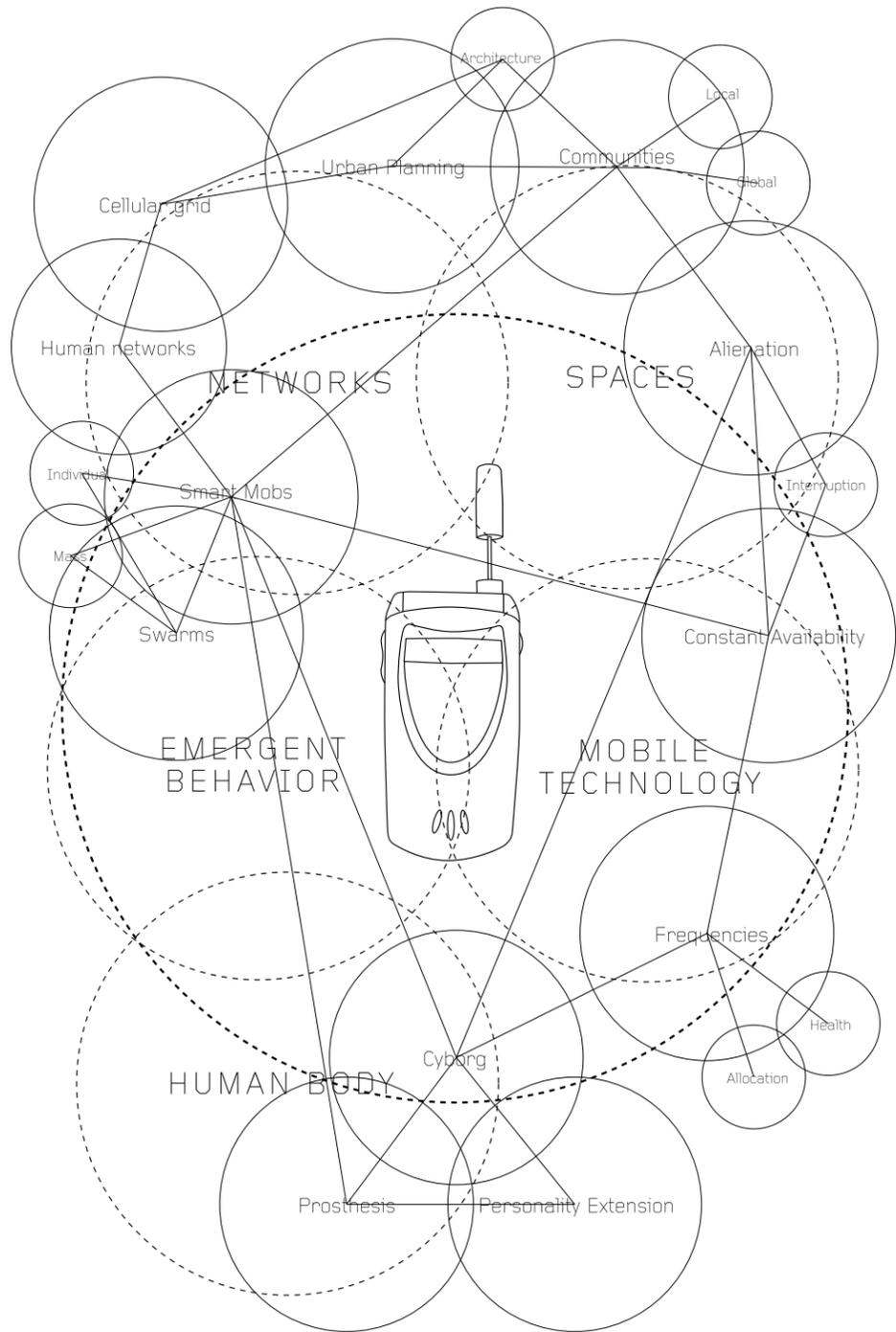
**Cellular Phones & Mobility**

**The Motorola V60 is a mid-range model in a series of mobile phones targeted towards a young and fashion-conscious consumer group. It fits comfortably and lightly in the palm of a hand, and flips open to accept calls. The phone's exterior is made from plastic and aluminum parts, with a protruding, extendable antenna. It has two backlit LCD displays: A one-line display on the flap exterior, and a five-line display on the flip side. Certain functions such as volume and voice-notes are accessible when the display-flap is closed through buttons on either side. The phone features downloadable and customizable ring tones, substitutable faceplates, text-messaging with attachable images, animations and sounds, pre-installed and downloadable games, tri-band technology and Internet access.**

**The mobile phone interface has the potential to provide incentives for design explorations—the LCD screen, alphanumeric button-field, ring tones and other auditory responses. On an economic basis, the price of owning a cell phone plays a major role, leading invariably to competition for minutes among callers. The cell phone is still perceived as a status symbol by many. Another topic is its implications for international money markets and economies. Thomas Friedman, foreign affairs columnist for The New York Times, coined the term 'electronic herd' in his book The Lexus and the Olive Tree, as a way of referring to the herd-like behavior of web-empowered global investors and traders, with their ability to move in and out of markets with great speed, as part of a chain reaction often triggered by the response of a single individual. The cell phone, with its ability to connect to the Internet, strengthens this further, by enabling real-time market activity on a 24-hour basis. Finally, cellular networks and their physical architecture of grids are an interesting area of exploration, by the ways in which they influence the urban landscape: some, including NYU research scientist Anthony Townsend, believe that mobile phones and wireless networks will change the physical environment and the architecture of our cities.**

2
Rheingold, Howard. Smart Mobs: The Next Social Revolution. Perseus Publishing, 2002. Howard Rheingold observes behavior trends associated with people empowered by mobile, Internet based and location-aware technologies. His observation is that their power lies in their ability to form spontaneous agglomerations of people he calls smart mobs, with either constructive or destructive potential.

Self-Organizing Networks

import/export
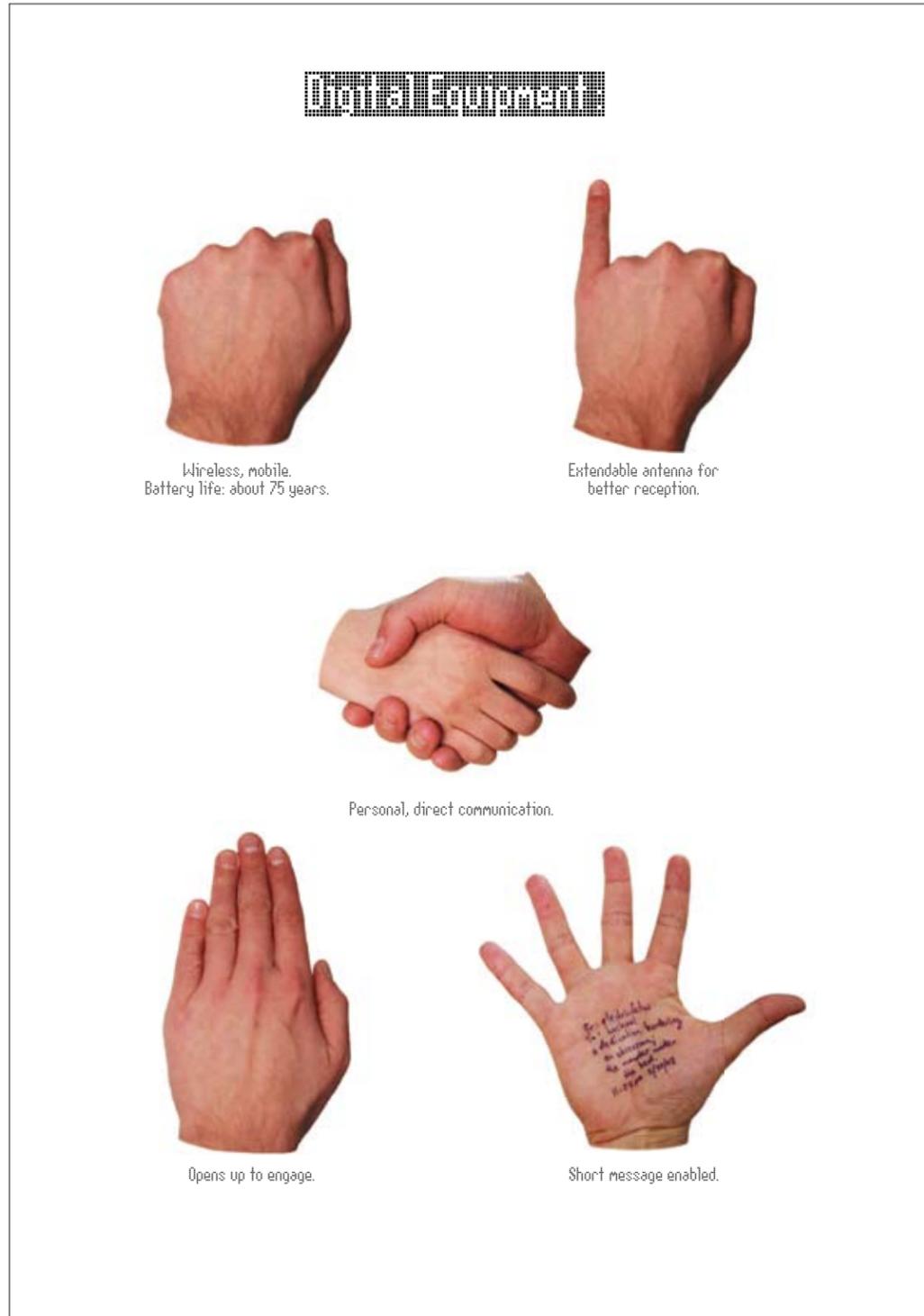
The peer-to-peer networks of cell phones can be compared to the behavior patterns associated with swarms, herds and flocks. Howard Rheingold, author of Smart Mobs,[2] describes a contemporary, network society, which, through use of cellular and peer-to-peer technology, has the ability to organize itself into large, self-regulating groups—with either beneficial or destructive motives. Groups of networked individuals—each with individual behavior patterns—lead to the emergence of collective behavior, following the principle of more is different. I am interested in the ways in which decentralized, collective systems might influence graphic design.
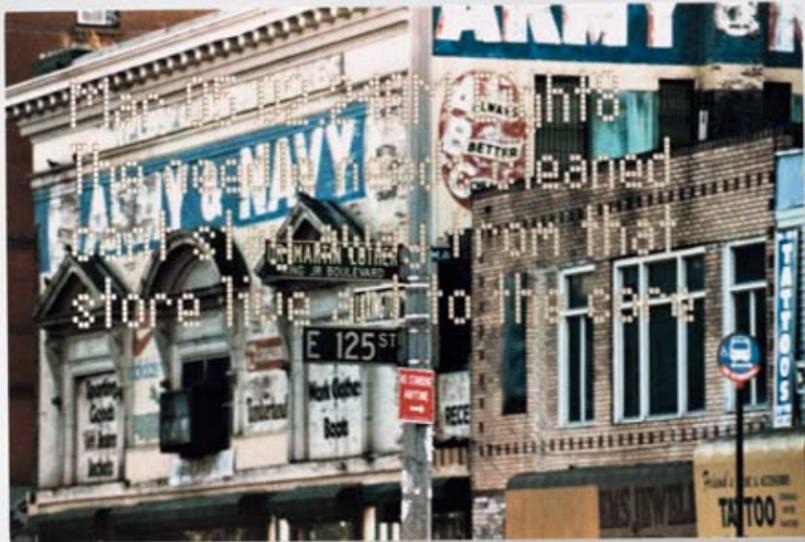
A version of this text was presented on February 11th, 2003 to faculty and students at Yale University, as a proposal for a series of projects, some of which are shown on the following pages.
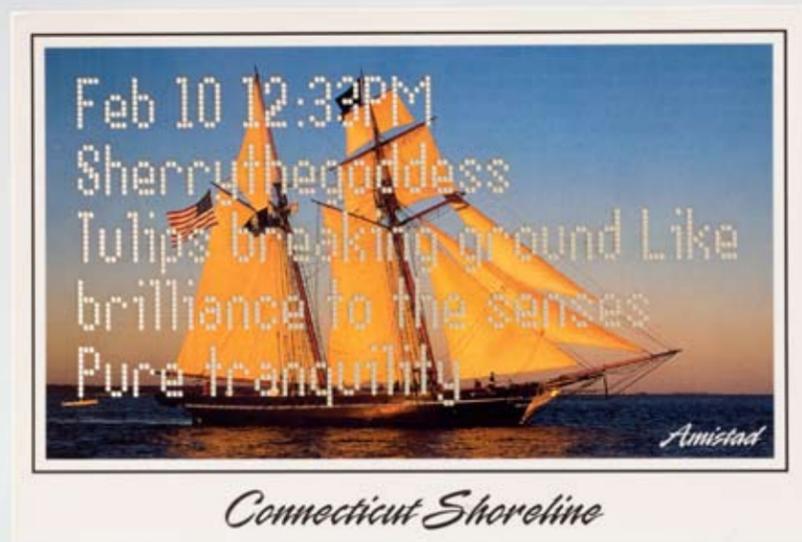
Digital Equipment

Wireless, mobile.
Battery life: about 75 years.

Extendable antenna for better reception.

Personal, direct communication.

Opens up to engage.

Short message enabled.

**Poster. 24"× 36"**

Self-Organizing Networks

import/export

Lasercut postcard. Front, 4" × 6"



Lasercut postcard. Front, 4" × 6"
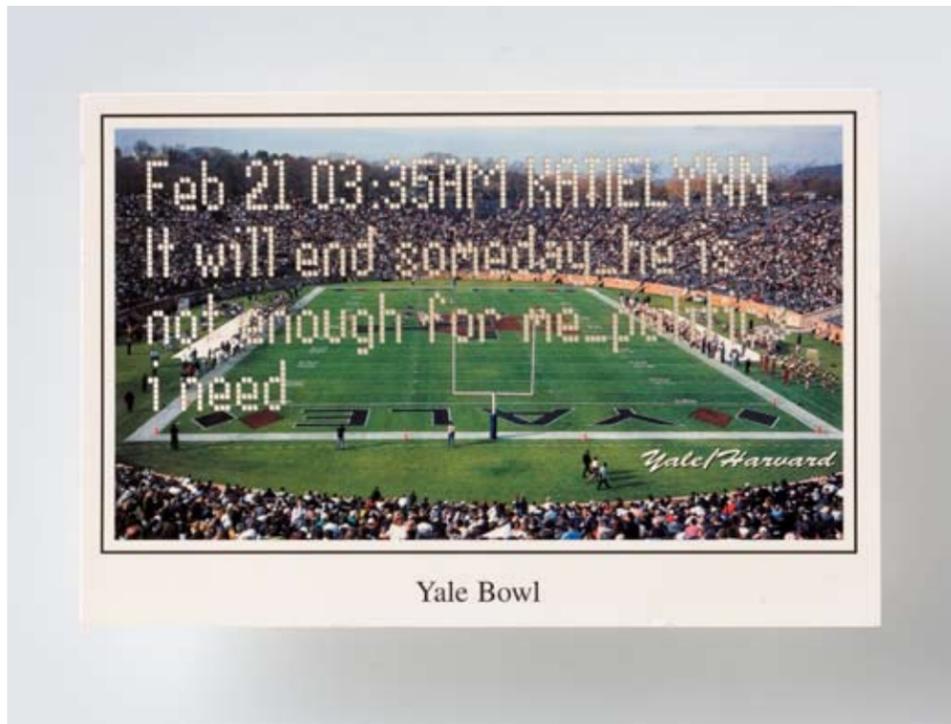


Lasercut postcard. Front, 4" × 6"



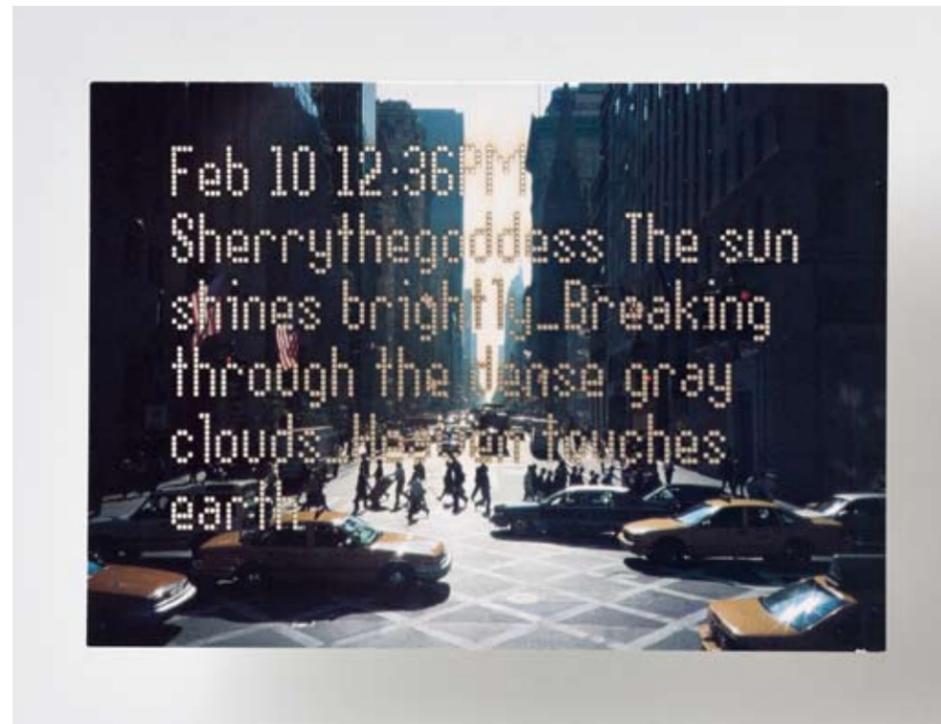Lasercut postcard. Front, 4" × 6"

**Hybrid Messages**

**A series of postcards is lasercut with haikus, written by the participants of an online forum, in which members send and receive SMS messages using the keypad of their cellular phones.**

**This series addresses the concept of place and its changing meaning from cellular communication. For the writer, the location of conception is as important as the location in which it is read. Here, the two are juxtaposed, forming a hybrid space in the void created by typography.**

Self-Organizing Networks

import/export

Lasercut postcard. Front, 4" × 6"



Lasercut postcard. Front, 4" × 6"
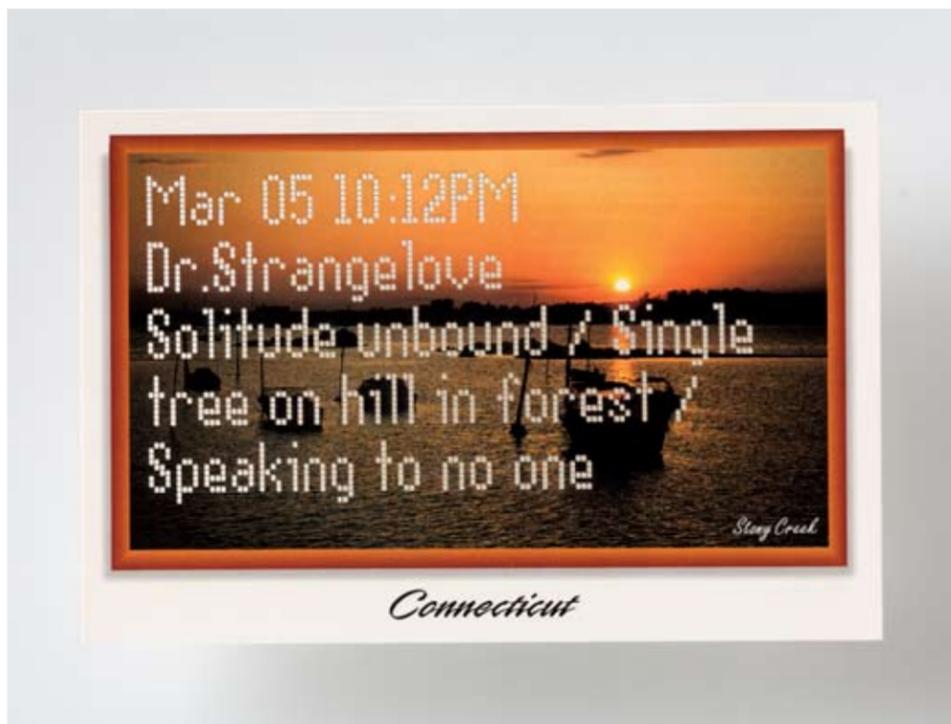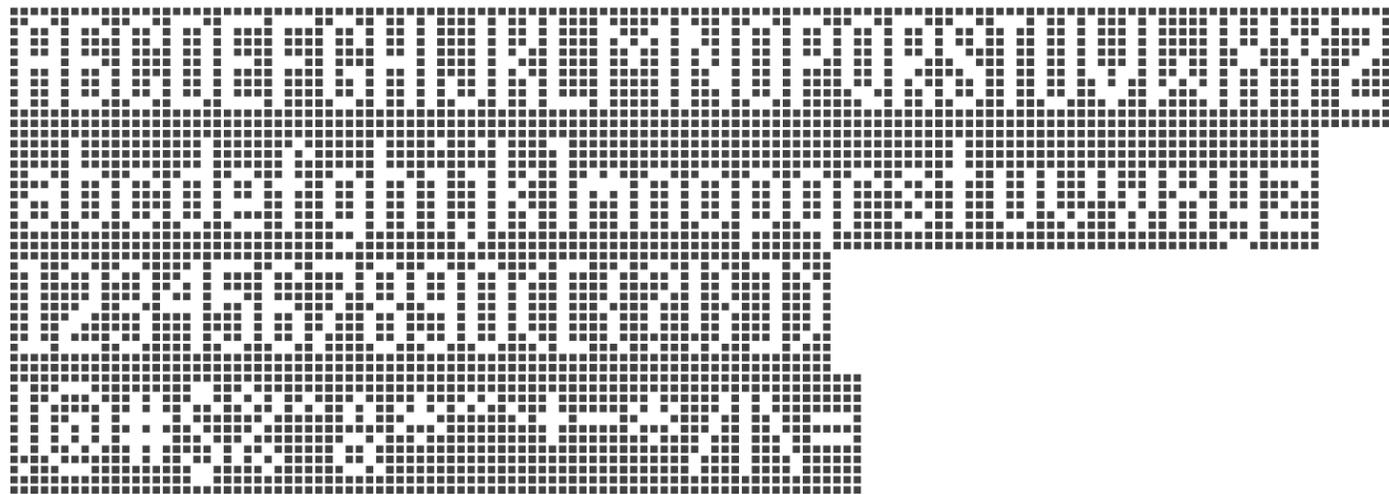


Lasercut postcard. Front, 4" × 6"



Lasercut postcard. Back, 4" × 6"

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890([{?!}])
!@#$%^&*`´~+−÷/|\=

Mobs of
networked
individuals
convergent
collective
behavior
location
sensitivity
site-specific
information

Self-Organizing Networks

import/export

**V60 Raster 1 Positive (above) & Negative (below), full character sets, 48pt / 48pt**

**V60 Raster Positive & Negative, 48pt / 48pt**
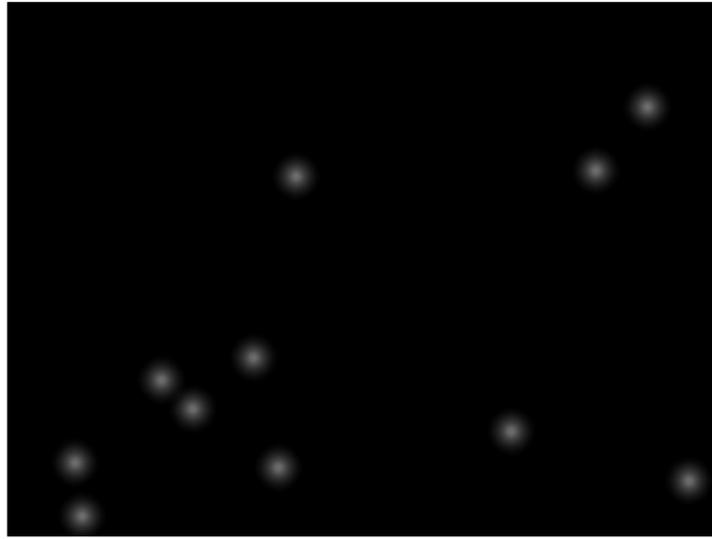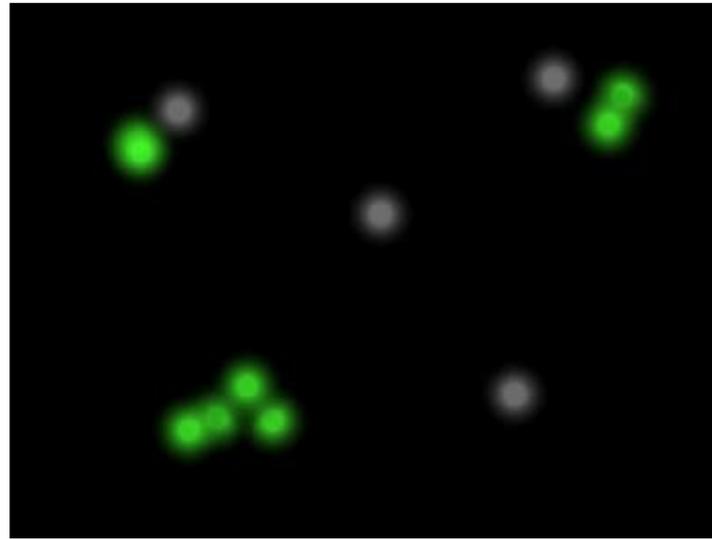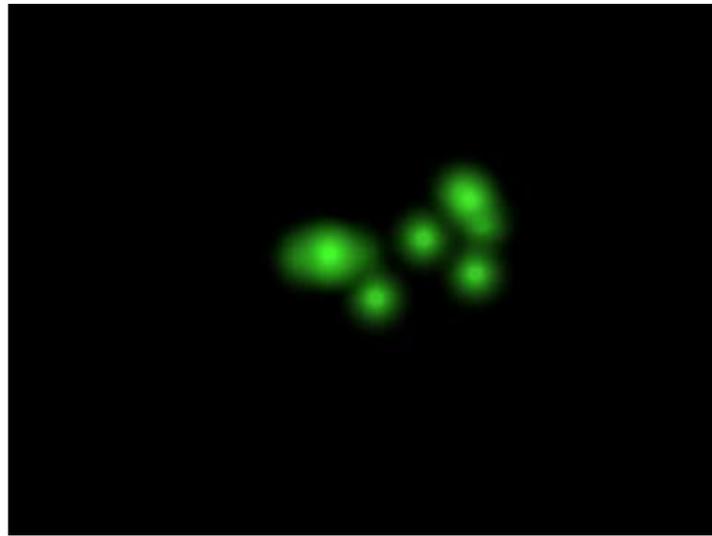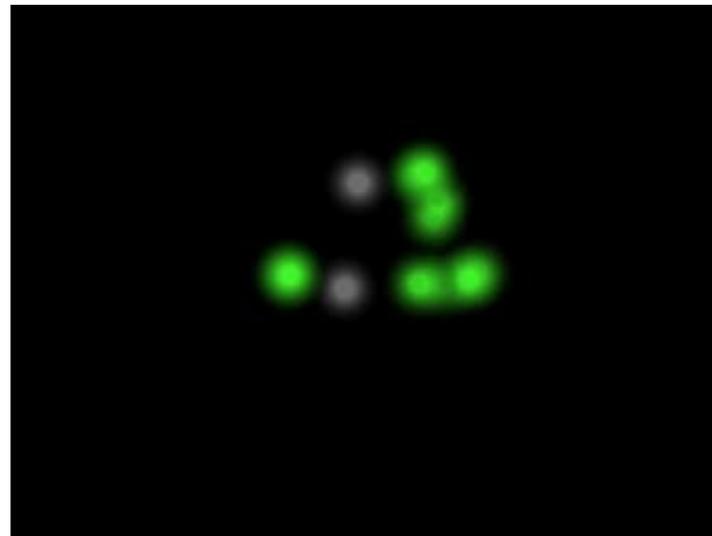
Screenshot, detail



Screenshot, detail

**Swarm Simulation**
**Swarms, consisting of independent agents, exhibit spontaneous expansive and contractive macro behavioral patterns. This interactive piece attempts to use swarm behavior as a device for generating auditory and visual patterns. Here, two or more agents that come in proximity of one-another, light up and exhibit a tone, each of which is unique. When the user taps one of the agents, the entire swarm contracts towards it, only to expand again once a critical mass has been reached.**

Self-Organizing Networks

Screenshot, detail



Screenshot, detail

import/export
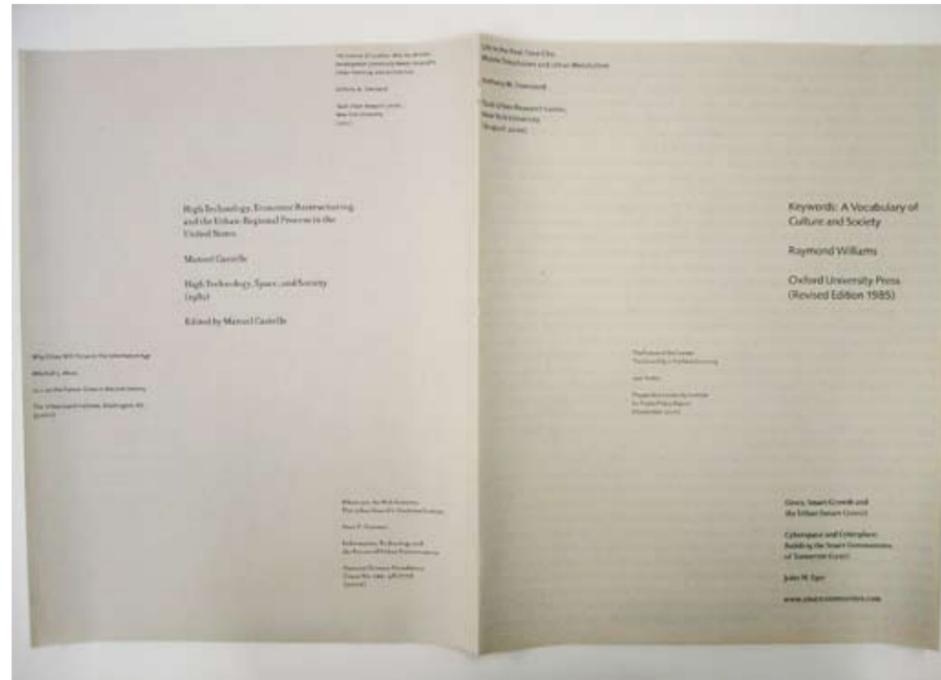
**Spread, 12" × 16"**



**Spread, 12" × 16"**

**Keywords**

**This large-format newsprint piece combines and contrasts various texts on the definition and evolution of the city. The design of the piece becomes interpretive, showing a gradual progression from an orderly, grid-like to a layered and more organic arrangement, making a visual reference between cell structures and the modularity of the grid.**

Self-Organizing Networks



**Spread, 12" × 16"**

import / export

Self-Organizing Networks

import/export

### Meshworks & Hierarchies

In 1997, Manuel De Landa described processes creating either meshworks or hierarchies—both historical constructs—as the key to understanding cultural, technological and biological evolution. Stable states, according to De Landa, are temporary manifestations of matter or information, based not on a process of optimization, but one of adaptation. He opposes the equilibrium theory held by followers of Darwin's 'survival of the fittest' maxim, claiming that search spaces—the spaces in which the 'probe-head' of evolution operates—are characterized by selective adaptation to existing environmental circumstances, not the continued thrust towards maximum fitness. Underlying De Landa's evolutionary theory, which he bases on Deleuzian philosophy, is an abstract machine of sorting and stratification, which, similar to a river bed, first collects matter or information, then sorts it hierarchically, in a vertically stratified meshwork. De Landa is interested in moments of historical bifurcation, those instances in which the limits of meshworks (relatively stable states) are reached and a shift from one strata to another occurs, always with historically defining consequences.

The context for De Landa's hypothesis is 'Universal Darwinism'—the term coined by Richard Dawkins, author of *The Selfish Gene*. Universal Darwinism refers to the application of Darwin's evolutionary theory, originally formulated for organisms, to non-organic structures in disciplines such as anthropology, psychology and computer science, as long as there exists an alternative replicator. (To test whether Darwin's theory could actually be generalized, Richard Lewontin suggested replacing the word 'organism' in Darwin's *Origin of Species* with 'individual', and to examine whether the book still made sense. It did.) Universal Darwinism led Dawkins to his theory of memetics, postulating the existence of memes—self-replicating electrical impulses in our brains, which are, in fact, the basis of our thoughts and entire cultures. Similar to genes, memes are subject to selection and adaptation.

### Emergence & Sited Information

In his book *A New Kind of Science*, Stephen Wolfram, author of the popular software *Mathematica*, explains cellular automata, a phenomenon discovered in the 1960s, in which simple rulesets govern the behavior of bits, represented by pixels and their alternating on or off states. Early experiments uncovered that certain rulesets could lead to endlessly repeating—fractal—and endlessly non-repeating—chaotic—patterns. Wolfram's research extensively claims that cellular automata are, in fact, simulating nature, and that everything is reducible to binary operations. As in chaos theory, Wolfram observes a tipping point, in which an otherwise stable system tips over into a chaotic one, an observation directly linked to De Landa's historical bifurcations. The 'Game of Life', invented by James Conway decades earlier, is a two-dimensional

4
De Landa, Manuel. A Thousand Years of Non-Linear History. MIT Press, New York, 1997. Artist and philosopher Manuel De Landa discusses the last one thousand years in terms of meshworks, hierarchies and evolutionary theory. Basing his ideas on Deleuzian philosophy, De Landa argues that there are universal, abstract machines at work, leading to processes of sorting and stratification and the occasional moments of bifurcation, altering the course of history.

5
Aunger, Robert. The Electric Meme: A New Theory of How We Think. Simon and Schuster, New York, 2002. Aunger, a research fellow at Kings College in the UK, presents memetics from a new perspective, claiming that memes— elementary units and carriers of information, analogous to genes in biological organisms— are in fact physical, replicating entities, resulting in a re-evaluation of determinism and the human free-will.

cellular automata which simulates a living organism. Its elements seem to reproduce, move around the screen and 'die' after a certain passage of time, all again based on a relatively simple set of rules.

Cellular automata exhibit what journalist Stephen Johnson calls 'emergence.' Johnson observes self-organization leading to emergent behavior in various other phenomena, including organisms, ant colonies, cities and the Internet. Just as Kevin Kelly before him analyzed the structure of a beehive in search of its 'spirit', Johnson looks at the ant colony as an example of a decentralized system. Its reoccurring, macroscale behavior patterns are undoubtedly more complex than its individual participants could comprehend.

In *Smart Mobs*,[3] Howard Rheingold recognizes that emergent behavior patterns exist in groups empowered by mobile technology, in particular the cellular phone with its Internet capability. Through technology enabling location-sensitive, decentralized networks, he argues, groups of cell-phone users may harness their collective potential on unprecedented scale. Rheingold, who foresaw the cultural and economic potential of the Internet years before its event, claims that location-based information services might be the next major technological development. This is mirrored, interestingly, by the research into augmented reality systems currently conducted by Stephen Feiner, a professor of computer science at Columbia, who is investigating non-immersive interfaces for experiencing multiple layers of information in real (as opposed to virtual) environments. Annotated space, furthermore, is currently a popular idea, under development in several incarnations. The fundamental idea is that written annotations are linked to geographic locations, which can be retrieved by means of a handheld computer or cellular phone when arriving in their proximity. The aspect of sited information is important here—location-specific, as opposed to location-independent, as used to be the case with the Internet.

The Internet itself was born from concerns over security. Initially called the Arpanet, it was founded by the US military as a vessel for the exchange of intelligence. Its lack of a centralized data server protected the network from hackers or other threats. In all of these cases, standard views of the ways in which our world and society operate are challenged by contemporary thinking around decentralized systems.

6

Johnson, Steven. Emergence: The Connected Lives of Ants, Brains, Cities and Software. Scribner, 2002. Johnson summarizes his findings on emergent behavior, following the idea of more is more. Looking at how individual behavior influences macro behavior patterns (the beehive and the ant colony are two examples from nature) and the complexity that can result from simple rule sets, Johnson recognizes that emergent behavior is a force connecting all aspects of life, from the evolution of cities to the functionality of the human brain.