Visual Vicissitudes: Digital and Otherwise

Special Double Issue
INTERVIEW WITH ROBERT J. KRAWCZYK

Robert J. Krawczyk is on the faculty of the College of Architecture at the Illinois Institute of Technology. During his nineteen years at IIT, he has developed and taught a series of CAD and digital design courses covering 2D and 3D CAD, and is currently teaching image composition, animation, and form generation methods. In addition to teaching courses, he is an advisor in the PhD program on form generation, fractals, 3D blob modeling and other related digital design methods.

His work is currently being shown at SIGGRAPH 2001 International Traveling Art Show for the next 2 years (www.sigraph.org/tas/#TAS01) and his images are included in "Fragments of Infinity: A Kaleidoscope of Math and Art," by Ivars Peterson, John Wiley & Sons, 2001. His work will also be included in the upcoming show Computer Art International 2001, Rolland Art Center, February 2 to March 2, 2002, University of Saint Francis, Fort Wayne, IN. Recent exhibits are at www.netcom.com/~bitart/spexhoo.htm, and more of his work is at www.netcom.com/~bitart

This interview was conducted via email by Torrey Nommesen.

Torrey Nommesen: Can you tell me a little about your background and how you got into making spirolaterals?

Robert Krawczyk: My education is in architecture and I have been consulting and teaching computer applications to architects for about 22 years. I wrote my first graphics computer program about 25 years ago. Over the years I have taught: classes in word processing, 2D drafting, 3D modeling, digital composition, computer programming, web design, and animation. About 7 years ago I started researching fractals and how they could be used to generate or suggest architectural forms... At about the same time I encountered spirolaterals, generated a few and then left them. Most of my time was spent teaching and consulting. When my teaching load decreased, and after meeting Javier Barrallo and Nat Friedman at Mathematics & Design 1998, I found a group of people with common interests which resulted in my looking at the spirolaterals a second time - again from an architectural focus.

At the next few conferences, I examined the mathematical background of generating spirolaterals. All the images I was producing were single line drawings.

Somewhere along this investigation... the idea of increasing the line thickness was tried. The spirolaterals then took on an artistic interpretation that I never noticed before. I rewrote all my software to account for the thickness and started to generate as many [spirolaterals] as I could.

When I ran out of [regular] spirolaterals to try - I tried 100's, keeping over 300 of them - I thought that an interesting variation would be to try to curve them. This brings me to the last year or so. The progression of curving started with curve fitting and splines, to transformations that now include hypocycloid curves, epicycloid curves, antiMercator, circular, normal and harmonic mean inversion. I have found and had suggested to me about 10 other transformation I might try.

Over a year ago, I also started to look at three dimensional possibilities and have developed a 3D series, but I am still working on them. My overall goal is to return to forms that suggest architecture or are at least sculptural in nature.

TN: What was the climate like for computer graphics programmers when you first were writing programs?

Krawczyk: Two items come to mind - one is the technology, the second is the feeling that everything you did was new... Information of what other schools were doing came only through journals and conferences... All of the graphics work was in basic technology and not that much in applications. The first graphics programs I wrote were ones that used the printer characters as the painting tool. [This was] most likely influenced by the early work of Ken Knowlton. Pen plotters were difficult to find.
I did very little work in 2D art type images. I remember
one project I did for an art class, a series of random
squares on many pages of greenbar computer paper, [I
was] spending most of my time trying to write programs to
do 3D modeling and perspectives. I was not that aware of
the computer being used for art, I was mostly tracking
what was happening in architecture. I [started doing] that
at school first (University of Illinois at Chicago) then at
the architectural office I worked at, C. F. Murphy Associates,
now Murphy/Jahn. Helmut Jahn is a very prominent archi-
tect and I had an opportunity to write a variety of software
for what we would call visualization today. Except that all
the drawings were done on
a very slow pen plotter, no
rendering, no hidden-line
removal, just perspective
wire frames. All the pro-
grams were written in
Fortran, the programs and
data were prepared on
punched cards. There was
no preview of the image,
since graphics monitors
were very expensive. There
were no interactive graph-
ics as we know it today.

I do remember one
project a student did for
me at a local community
college I briefly taught at -
it was a walk through of
the architecture building on
campus - about 100
frames. The data for the
model and the viewpoint
for each frame was punched onto cards, carried over to
the computer center and processed... They were brought
back over to the classroom, where a paper tape was made
from them and then the paper tape was read by a flat-bed
plotter to produce a single drawing [repeated 100 times].
The results were amazing. In essence we produced an 8
1/2 x 11 flipbook.

For my first years teaching at the College of
Architecture at the Illinois Institute of Technology, I taught
graphics programming. This was before AutoCAD. Once
PCs arrived, [with plotting and 3D programs] my time was
spent teaching applications with these packages and
assisting architectural offices to do the same.

TN: How would you describe your work in the context of
fine art? Where is the artist's hand in your work, and how
important is it in the process

Krawczyk: In the last few years my greatest influence has
been the work of Sol LeWitt. After I saw one of his wall
paintings for the first time, I went home and wrote a JAVA
program to mimic the concept - it's on my web site
(www.ill.edu/~krawczyk). I can closely identify with his
approach to developing the concept and instructions, and
then having his crew actually produce the work itself. I
also can identify with the working out of variations and
enumerations of possibilities of a single concept as he
does. This very much works with my architectural educa-
tion. LeWitt has not written very much, but [in] one set of
thoughts he [wrote]:

if you were to replace
his word "draftsman"
with "computer pro-
gram" it would, at
least to me, still make
sense. I only write
the instructions. I do
not actually do the
artwork. I then judge
the results and modify
the instructions. So
for me the resulting
artwork does not have
as much value as, I
hate to have to say
this, the computer
program I wrote and
the process I went
through to get some
specific result. In
doing this, many
times, I do not know
where I am going; I follow each interesting variation. This
I find very exciting, In a perfect world I would like to write
the program, put it up on the web, have a viewer create
their own image, and then have some third party print it
and frame it, and of course, collect some money.

TN: What first impressed me about your work was that it
seemed like something deeply symbolic, something you
might see as a tattoo (the brown tones helped to give this
pression). I reacted more to the circular spirilaterals with
sharp edges and variable line width rather than to the
rigid straight-line spirilaterals.

Krawczyk: I was very surprised and pleased to see that the
images that were produced by curving the spirilateral were
ones that seemed to be familiar to me, not copies of
ancient ritual symbols or such but that could belong to a family of known symbols. I have a number of books on symbols and ornamentation, so I had some reference point in my mind. Now the question arises - do I pick images that are pleasing to me because they are based on my educational and visual experience or am I really seeing something new? Is anyone able to judge a new aesthetic that is not based on one's past experience and visual history? If I continued to investigate and develop images based on mathematical concepts - because of me - will I ever find something more new and exciting? That is why my web site has a JAVA program that anyone can generate their own image - because I know which ones please me, they may not be the same ones that please you. As a matter of fact, before your work in different, perhaps unexpected ways?

Krawczyk: Jewelry was been mentioned. IIT just got a laser cutter, so I am going to try to produce some of the designs in brass or some other metal. I can see the 3D version as being furniture. I still have not produced any. Eleanor [Kent] also suggested embroidery. But I would like to return to architectural forms at some point. I am fighting the thought of actually having to build something by hand - I want to use a technology that can.

TN: You do not want to work with your hands? Is this more of a practical concern or would it in some way be cheating to, for example, carve a chair out of wood by hand?

Krawczyk: I was trying to make that point because much of the art world has such a great investment in the hand of the artist in the final work. I do think craftsmanship and artistic ability should be celebrated and rewarded. But I also think there is craftsmanship of the mind as well as craftsmanship of the hand. Both should be celebrated.

Having heard more traditional artists and sculptors speak about their work and how they do it, especially ones that deal with mathematical concepts, how they also start to develop ideas for variation while in the middle of a piece, trying different materials, trying a different tool to get a different texture, combining materials, colors changes, etc. is no different than the process I go through when writing a program. The variations stream from the current work. You want to quickly finish the current piece so you can go on to the next.

TN: Because of artists like yourself and other Yiem members, I am working at a time when technology and art are not seen as the mutually exclusive disciplines they used to be. In the past, only the architect was both the analytical realist and creative artist. But now you are seeing art disciplines like the degree I hold in ‘Conceptual and Information Arts’ or university departments like ‘New Media,’ ‘Computer Arts,’ and ‘Art and Technology’ to name a few. As a professor, what is your take on these disciplines? Would your work be any different if you had had the opportunity to study in one of these areas where Art and Science meet?

Krawczyk: Well, science and art do meet in architecture, so maybe my start was the best. I know the opportunities to pursue a variety of technologies would have been presented in an Art/Tech education. But I have thoroughly enjoyed working in the architectural profession and to be able to bring that experience to my artwork. I now have PhD students who are working in seashells, blobs, fractals,
and possibility in music, and one Master's student in the
Mobius strip, and I am currently researching forms based
on the interpretation of 3D cellular automata. Where else
could I be involved in such a wide range of interesting
ideas? Starting in an art education most likely would have
taken me down another path.

Architecture is a won-
derful education [that
allows you] to do a num-
ber of things profession-
ally - very few of my
graduating class ended
up being traditional
architects. This educa-
tion taught me how to
examine a very complex
problem, break it up into
its core components,
solve each with some
technology and then
assemble it into a com-
plete living environment.
It brings art and tech-
ology together on a large
scale (most of the time
successfully).

But not having a for-
mal art education or
math or computer science forces me now to work that
much harder to learn the things I need. I try to salvage
from these fields as much as I can. Maybe not having the
formal education frees me to see things [in] a less con-
strained fashion. Experts in a single field are sometimes
limited by their own knowledge. What makes Ylem very
interesting is that these people are willing to cross fields...

Krawczyk: And Carlo Sequin and Brent Collins' work also
are similar in nature. Brent's [sic] sculptures are larger
scale in wood or cast in bronze. Unbelievable beauty and
craftsmanship. What Carlo and Bathsheba do on a small
scale Brent does on a large scale by hand. There is a
good description of Bathsheba's and the others work in
the MOSAIC 2000 proceedings. [sic] I
believe that the basis
of their work is differ-
ent - covering poly-
hedra, knots, and curved
surfaces. What is
amazing is that Brent
is not educated in
mathematics or com-
puter science.

But what is the
same or similar is hav-
ing a mathematical
framework to work
within, to develop vari-
ations and a variety of
interpretations from
[that framework].

TN: Could you tell me a little more about your involvement
with Ylem and what you have gotten out of it?

Krawczyk: From the newsletter I get a better insight into
others' work - many of which are very different from mine.
I see other work it encourages me to follow my own path,
and documenting current work is very important. Outside
of conferences, there are not too many places where we
can write and meet about our work. The part I do miss,
not being in San Francisco, are the member meetings
maybe it is time to open regional chapters or hold a yearly
meeting.

TN: Bathsheba Grossman's work might be considered free
form 3D spirolaterals in metal. I saw her work and spoke
with her at the Ylem 20th anniversary show. Her work is
“modeled by hand and eye, not generated by mathem-
atics,”

Footnotes

1 the Sol LeWitt reference is “Do Wall Drawings,” Art News:
New York 3, #2 (June 1971), you can find it at page 376 of
the retrospective catalog. Also “Sentences on Conceptual
Art,” Art-Language 1, #1 (May 1969), page 371 of the catal-
og, have many digital/concept relationships.

2 Art statement at www.bathsheba.com/about
n. pronounced ey lum, 1. a Greek word for the exploding mass from which the universe emerged.

An international organization of artists, scientists, authors, curators, educators, and art enthusiasts who explore the intersection of the arts and sciences. Science and technology are driving forces in contemporary culture. Ylem members strive to bring the humanizing and unifying forces of art to this arena. Ylem members work in new art media such as Computers, Kinetic Sculpture, Interactive Multimedia, Holograms, Robotics, 3-D Media, Film, and Video.

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