



## **“I think that we’re definitely at the beginning” An interview with Lev Manovich**

**M (Marta García Quiñones and David Ranz):** The first question has to do with the title of the book, which is *The Language of New Media*. But do you think there's only one language?

**Lev Manovich:** I mention that in the introduction... I don't think there's a single language. I use the word "language" simply as another way to say "techniques" or "strategies" or "conventions". I didn't want to call the book *Aesthetics of New Media* because for the general public "aesthetics" means beautiful or not beautiful, and I'm not interested in that. I didn't want to use the word "poetics", because "poetics" has a kind of structuralist meaning and also it's a very specialized word. I thought there are a lot of books called *The Language of ...* like *The Language of the Novel...*

**M.:** Yes, it's a handbook title...

**L. M.:** Yes, it is a handbook title... It's almost like a textbook.

**M.:** But you could have called it *The Language(s) of New Media*.

**L. M.:** Yes, I agree... In fact it was something that was suggested to me by a couple of people...

**M.:** Where do you place your book in the evolution of digital media? Because Peter Greenaway was once interviewed for our magazine and he said that he thought that in the evolution of every art there were three stages: the outbreak, the consolidation, and the collapse of the language...

**L. M.:** The collapse in what sense?

**M.:** In the sense, maybe... of rethinking the fundamentals,... a rethink of the fundamentals in every art...

**L. M.:** You mean like, in the case of film, we can say... we have the early decades, the 1890s and the 1910s, when cinema was a technological novelty,... and...

**M.:** It would be like Eisenstein, Welles and Godard.

**L. M.:** Yes, that's right... In the 1910s and 1920s we have the classical language and then in the 60s people kind of begin to rethink the fundamentals.

**M.:** How do you see this in relation to new media? How do you see your book in this framework?

**L. M.:** That's a wonderful question... I think of myself like somebody trying to write the theory of cinema in the 1900s, because I think it would have been nice to have somebody to do that. So my book is a ... record of the language of new media as it was in the 1990s, and also an attempt

at theoretical understanding. At the same time I try to map out some large historical trajectories that have gone on for many centuries and I think they'll continue. I guess that now that the book is finished (it was written two years ago) I can see some things that won't apply any more... But it's interesting that most of the things I talk about-most of the conventions, most of the elements-they're still like that. Even though now we are living in a very different economic climate-it happened with film-it seems like the language of new media consolidated or codified very quickly. The thing for example of web design... Within five years it's a very codified language. It's already codified but, on the other hand, I don't think that the true, unique aesthetics of new media has really been developed yet. And what we have in the 1990s is very much a kind of replaying, replaying old forms, replaying old conventions in a digital format. So maybe what it is... it's hard to make these analogies... but maybe it's where film was in 1905... There was already a kind of language, but then some years later something different came along. I think that we're definitely at the beginning...

**M.: In this sense your book has a paradoxical nature, because it's like trying to establish the language when the field is at the beginning... Like you're prophesising...**

**L. M.:** Yes, yes,... What I'm trying to do in the book is place new media in a kind of historical framework, because I think that it's only that way that we can say what is old and what is new about it. I think I'm doing two things in the book. On one hand I'm talking about CD-ROMs, or websites, or virtual spaces, as they got developed in the 80s and 90s... and you can find many elements which come from cinema, or come from theatre, or from the book... But I also talk about some principals which are unique to computers, like variability.... But it's something which you can't see in the finished products. That's why I published this article called "Avant-garde software" where I was trying to suggest that perhaps the real new media art, or the real avant-garde art is the software itself. Because it's actually software-like Microsoft Word, or Final Cut Pro, or browsers, or.... languages-where you see the new principals at work; there's much more theory... But the finished cultural products... they're too conservative.

**M.: The cinematic language you talk a lot about... new digital media taking models, structures which belong to the cinema... What do you think is going to happen with textual language? Because at the beginning it was more about text than...**

**L. M.:** Well, I think that we can think about this in a high, theoretical mode... but in fact we can think of it in a much more economical, material mode... the way computers are designed... If you think about the first interface it was like a typewriter... You couldn't work with images or moving images because it didn't have enough resolution, it didn't have enough memory, it didn't have enough storage space... Of course in the 80s the primary use of computers was word processing and that's why we had this whole hypertext movement and they'd think about hypertext... And I think that what we have in the 90s is a certain convergence-cultural convergence but also economic convergence-of the film and television industry and the computer industry. The best place to see it is computer games, because computer games became much more cinematic and really became like interactive films. And one of the reasons it happened is because the entertainment industry, which is the largest part of mass culture, at least in the States... it's not really books... it's film and television.

**M.: Yes, it's what people are doing in their leisure time.... going to movies, not reading books...**

**L. M.:** Well, lots of books are still sold...

**M.: Only sold I think, not read.**

**L. M.:** For me a very interesting development has been what's called "motion graphics". In fact I think there's a sort of renaissance in text. We have a lot of texts actually in television, we have film titles, we also have texts on the Web... but it's moving text, it's animated text. And I think

we're now beginning to see this trend of moving text, animated text, also being applied to print... When photography came along and took over the function of painting, of representing reality, then painters had to figure out what to do.

**M.: They had to do abstract painting...**

**L. M.:** Yes... And I think that now something like that is happening... I think that either consciously or subconsciously people making films, people making television, people making books, people making architecture, people designing architectural spaces for boutiques... have to understand that they have to compete with the Internet, and they have to compete with screen culture. And that's one of the reasons why in the last five years there's this whole new trend in book design, "books as objects": very beautiful design, picture books, text designed in a very interesting way... In a way is a sort of renaissance of text... Text is very alive, but not in a traditional way. And on the other hand if you look at electronic books they're much more traditional. Electronic books, e-books... they're much more traditional than, for example, a book by Rem Koolhaas. And that's really a funny thing that has to do with computers... Different fields of culture are competing with each other. And everybody is feeling the pressure of computers to innovate.

To summarize: I think that there have been very interesting developments in terms of book design and textuality, traditional books... In terms of computers, it's actually rather traditional. And in effect if you go to some American publishing sites-like The New York Times, or even The Wire or Salon-the design is very conservative.

**M.: Well, it's like a magazine.**

**L. M.:** In a way it's more conservative. Well, that's what I think after I've finished the book. You see, the book is very much about new media *per se*, like websites, CD-ROMS, multimedia, digital images and digital film... But at this point I'm much more interested in the huge cultural effect of computers. You know... Maybe somebody is doing things like music, or architecture... and that person is not using computers, but they live in a computer world. How are they reacting to screen culture, to new perceptual modes, new cognitive modes? And that's a bit like the San Francisco show, because they're trying to mix works made by computers, but also works that are responding to computer culture but not necessarily using computers.

**M.: Also relating different cultural expressions... Computers are now trying to improve the way they perform cinematic language... They're pointing to technical perfection in perspective, resolution, camera movement... All the same, there's a new trend in cinema, especially in Europe-I'm thinking of the Dogma movement-which is trying something like a return to a more naturalistic approach, rejecting technical improvements like artificial lighting, sound effects...**

**L. M.:** Well, I don't remember what the Dogma people are talking about specifically... I actually wrote an article about this "new reality" media . To me what's interesting is how films are reacting to computers. On one hand you have Hollywood, which has become more about special effects, spectacle... and then you have a kind of counterpoint to it, which is the use of TV and the Dogma people-now lots of people, also people here-how they use TV and they go for that kind of realism. And I think it's a kind of reaction to special effects and artifice. And historically it's interesting that in the 60s there was something similar... Because in the 60s you had television, and then film was reacting to television by basically becoming more about special effects-there was the widescreen and cinerama... and then you also had *cinéma vérité*, which was reacting to it, and basically it would be like this "new realism". And it's always the same structure, always being replayed now. You know... For example, you can say that Hollywood is reacting to the Internet by giving you this super-spectacle, and then Dogma and our TV-people are reacting to Hollywood by doing this "new realism"...

**M.: Yes...**

**L. M.:** I think it's interesting to see that kind of substructural connection...

**M.:** Do you think that the "usability" debate has anything interesting to say? You know...  
Mainly in marketing there's this new trend, like they say that the new Flash developments  
on websites confuse the user... Well, I don't think it makes any sense, but...

**L. M.:** Well, I don't like the "usability" people, because I think they don't have any aesthetic sense,  
and they want to do something that is very, very boring... I think that in terms of Flash and in  
terms of design for the Internet again... there're always many factors... many factors at play, like  
the novelty factor... Now many people are doing Flash and developing Flash... But I think it's not  
simply that they're creating a kind of competition in style, because I think that we're really talking  
about a new kind of design. We're talking about interactive design, and time-based design.  
Motion is also used as a way of attracting people's attention and trying to orchestrate people's  
attention over time, and establish identity... So I don't think it's simply a form of decoration. If  
we're talking about Web design, it also has a kind of functional role as well...

**M.:** Yes, but in a way the user is losing control over the Internet experience... Because,  
well... you have to wait until the motion ends... When you find a web with a Flash movie, it  
will keep you waiting until... Well, it depends always on your technical...

**L. M.:** Yes, but if it's well designed you can always skip it, right?

**M.:** Yes, well, you skip it...

**L. M.:** I think that for better or for worse there's something we have to accept. We have to accept  
that the Internet is changing. Because maybe five years ago it was possible to talk about a single  
Internet. Well, I don't think that there's a single Internet now. The Internet is not a single medium.  
It's maybe a dozen media which happen to use the same technical platform. But each medium  
uses very different conventions, it has a different style. For example e-mail is old media, chat is  
old media... And maybe you have sites which are more informational... For example if you go to  
search engines, they don't have Flash. None of the search engines has Flash, because you go  
there for information. But then there are also sites which are maybe more about entertainment or  
culture, whatever... which are becoming more like television films... They're more cinematic, sort  
of more visual, you have to wait... they're more immersive... They're developing in their own  
direction and I think it's okay, you know... Because when you get your e-mail you don't get Flash.  
So I think it's okay as long as we accept the Internet as a kind of platform for a half a dozen or a  
dozen different media... Why does everybody have to go in the same direction? I'd also like to  
say that for me this question relates to another question, which is a kind of opposition between  
two concepts, which I find useful to think about new media... This opposition between fiction-in  
the sense of artistic fiction, like films, novels... even some fantasy-and information. Because the  
way we use new media and computers very often is basically like information tools, pure  
functional tools. But we can also try to use them like... to play some kind of fantasy, some kind of  
fiction... you know... CD-ROMS, and maybe some sort of websites or... films. And it's interesting  
to see how these two different functions are fighting each other. So I think that in a way this  
debate about "usability" vs. Flash developments is also a debate between information and fiction.  
Some people want to have more information, and others say like "we also want fiction". And I  
guess I'm on the side of... I think that they have to be combined. Because we live in an  
information society where so much of our life is about getting information, answering e-mail, you  
know... checking some directory... I think we want to bring some element of fiction, and some  
element of pleasure, some element of surprise into it.

**M.:** That would be the concept of info-aesthetics...

**L. M.:** Yes, that too, right... So for me pleasure is interesting... When you have something which  
at first was information but then becomes something else... something non-functional...

**M.: Yes... but sometimes it's so confusing...**

**L. M.:** And maybe it also has to do with the collapse... the lack of distinction between work and leisure... Because when I'm in front of my computer I'm mostly working all the time... Well, I'm working, but I'm not only working, I'm also playing... So maybe I'll stop working and play, then go back to work, work for maybe three hours and then go to the cinema... So maybe it's also about trying to make work more playful and not completely functional. So maybe it's okay to be confusing once in a while...

**M.: (laughs)**

**L. M.:** And particularly you, coming from a country like Spain, you know... It's not like here in America, I mean, you have *siestas*...

**M.: Nooo, we don't have *siestas*!**

**L. M.:** Ok, sorry... you don't have *siestas* any more... Not any more, I'm sorry...

**M.: Nooo...**

**L. M.:** Well, I was in Italy and they still have them...

**M.: Where in Italy? In the south? Naples?**

**L. M.:** Well, no, I was... I mean that in Italy people work but they also have fun... Whereas here in the States people work, work, work... Well, we have flexible work... And you can work in sneakers and that kind of clothes... then go to a party, go back to work... But I think it's something similar to a kind of interface...

**M.: Well, most of the time "flexible work" means working more, basically...**

**L. M.:** Yes, yes... Like I work all the time but I try to get pleasure from work... like I'd be sitting here with you now... and you're nice people...

**M.: (laughs)**

**L. M.:** Anyway...

**M.: What do you think about the political utopias related to the Internet like, you know... the Internet as a way of developing a free community, connecting people and allowing people to work together... A lot of people are involved in those movements, in Eastern European countries too... networks which try to stand up to the political establishment...**

**L. M.:** Yes, yes, sure... of course... Yes in Europe, but also in Asia... in many places...

**M.: Yes, of course. But I was thinking of Eastern European countries because it seems as if the Internet in a way has replaced the communist utopia, which disappeared some years ago... And there are a lot of things going on there, a lot of people thinking about it, like in the former Yugoslavia...**

**L. M.:** Well, I think that in those countries one of the reasons for the heavy use of the Internet for opposition activities, the oppositional political culture, is that the post-communist governments were quite often not authoritarian, but very closed. They didn't allow access to newspapers, you couldn't do radio... People also started using the Internet for net-radio. And because the Internet

was a new medium the government was very slow to react to it. So it was also a question of necessity. In the States you could actually publish a communist newspaper, but nobody would read it. It's a different form of control, a more efficient form of control... it's control by information explosion. You have so much information, you know...

**M.: Yes.**

**L. M.:** In a way you could say that there are two different forms of social control for the twenty-first century: info-control in the communist countries, based mostly on censorship-you only have one message, which is the official message-and a latter-day development in the capitalist countries, where there are so many messages that your message gets lost...

**M.:** I'm thinking of the World Bank meeting, which was going to take place in Barcelona... I got a message from the nettime listing before I took the plane to San Francisco. Somebody was talking about the paradox of having on one hand, all this utopian cyberculture, and on the other hand, the fact that the World Bank was cancelling the meeting and moving it to the Internet. So the Internet happened to be a more controlled place where this meeting could take place without the public.

**L. M.:** That's right.

**M.:** ... without people demonstrating on the streets... Because there was really a lot of things going on in Barcelona against this meeting... a lot of people organizing demonstrations and everything...

**L. M.:** Well, I think that again I'd go back to a similar idea about the Internet. Because if we're talking about the idea of a computer network, for example, there are all kinds of private networks in the world-banks use their own networks, companies have their intranets... And these private networks are important... So, on one hand, you have the public here, but you also have private or semiprivate structures. For better or for worse, that's how it works.

And also these things again lead us back to the economic level... Because in the States for quite a number of years now you have paid almost nothing for telephone access...

**M.: Yes, unlike in Spain...**

**L. M.:** ... whereas in Europe you pay by the minute. And that ultimately has been extremely important. In a way I think that in Europe the Internet is still a kind of novelty, it's still a kind of special thing, and in the States it's like the telephone, it's almost like unnoticed.

**M.: Yes...**

**L. M.:** And this also has to do with the development of net-art. Because one of the reasons why net-art developed in Europe is because in Europe in the 90s access was expensive. To get access you had to be in an institution... and it's been like that for a long time... It was something special... Artists were able to develop... because artists realized how special it was developing work for this new medium.

But in the States it got developed so quickly, and you got cheap, almost free access so quickly... that nobody actually looked at it, because it was like a telephone. And why should you make art for a telephone? And in a way I think that exactly the same thing happened again in my favourite period, in the 1910s and 1920s, when...

**M.: Your favourite period?**

**L. M.:** Yes... when lots of avant-garde artists, designers and architects from Europe looked to

America for a new model of aesthetics. In America there were then skyscrapers and cars and elevators... and Europe was really poor after the war. And it's interesting how this whole new aesthetics thing in America was like usual... Nobody was paying attention in a way. And then the Europeans developed Bauhaus, and all that... And then the Americans got like: "Oh, my God, there's a whole new aesthetics", the same aesthetics that they already had here. The same thing has happened with net-art. We have the Internet, which got developed in the States, but nobody pays attention... Whereas in Europe people start making net-art... And then around 2001 American curators and American magazines start saying: "Oh, net-art, net-art... Europe has net-art". So it's the same thing: 1, 2, 3.

**M.: Yes... Let's see... I have another question... It's about the use of the term *object*. I just read the other book on Russian visual culture...**

**L. M.:** Oh, my God, you read the other book...

**M.:** Yes, but I think that the use of the word there is a different thing... In your book *object* doesn't have anything to do with the Russian word *vesch*... I wonder if in your book the use of the word *object* relates to metaphysical concepts... Because you prefer the word *object* to other possible words like *art work*... You talk about *objects* to refer to many different things...

**L. M.:** Well, I think that the main reason why I use the word *object* is a larger strategy which I'm trying to experiment with in the book... I'm trying to see how I can use a kind of computer language as a cultural language. Let's take *database*...

**M.: Yes, but *object* is not...**

**L. M.:** Yes, *object* is...

**M.: Well, not primarily...**

**L. M.:** Yes, but in fact... Well, you can also think about *structure*... But how do you talk about some kind of software construct? You can talk about *program*, you can talk about *data*... In the book I also talk about constructivism, about objects in everyday life... But I think that primarily the main meaning for me was *software object*... because we don't know what it is...

**M.: So forgetting about the other meanings, previous meanings of *object* like in *object-subject*?**

**L. M.:** *Object-subject*, yes... *object-subject*...

**M.: So you primarily think of *object* the way that it's used in a software program...**

**L. M.:** Yes, yes... that's it.

**M.: But nevertheless you can't avoid other meanings, because the word has a long history...**

**L. M.:** Do you mean *object-subject*?

**M.: Yes...**

**L. M.:** Well, I never thought about it, but it's nice to think about it...

I mean, maybe... I don't know...

**M.: Anyway my question was heading to another point ... Do you think that we need a new metaphysics for talking about these new facts, like a new metaphysical treatise with new categories such as *ram memory, byte or binary code*...?**

**L. M.:** I see, I see... Well, I think that the closest I come to talking about it is that in the book I say that computers reflect the world in their own way... For example, if you're a computer programmer and you write a program, you're supposed to break every problem down into parts, and then organize the data in a structure, as a kind of algorithm... And it's a very particular way to think about the world...

**M.: Yes, you're right... Another way to think about this is that in the big software companies everyone is very important... Everyone has a personal routine, a different way to write a program... So when one person is programming, they have to know how he or she does it. Because if he or she is leaving, they'll not be able to retrieve all this information.**

**L. M.:** Well, they're supposed to include comments in their code...

**M.: Yes, but the really big companies making software always have two people working on the same project, because it's the only way they won't lose the information... So it's not something mathematical... each person has his or her own way of doing it...**

**L. M.:** Yes, right... But why is that important?

**M.: Because software is never finished.**

**L. M.:** Yes, of course.

**M.: For example you design a website for a company, and then they might well want to make further developments to the project and you need to retrieve information to develop it. It's not like "you order an item, you get it". You're always working, it's a process... It's a very different way of working, working with software... It's something that's alive.**

**L. M.:** Yes, yes, I see what you mean. For example even in a big company like Microsoft... the way it works is also that people are working, working, working... but then the marketing people come along and say: "Ok. These features we're going to put in, and these features we're not going to put into this release, because we don't want to give customers too much..." When they release it, they'll find bugs and make like... 6.01 update... But I won't say yes or no. Because I'm also very much interested in certain aspects of new media which I call variability, the fact that it's never finished... how it's also connected to changes in the production economy. More and more with new computer-based production networks... products get modified very quickly, you have new versions every day... You go to the store and you see some shoes which are modified products, and they can do it in two days... So it's something similar, like constant updates... because the work is also done by computers...

**M.: That's why you like shopping...**

**L. M.:** Yes, of course, it's also done by computers... It's interesting because it's not just new media. We have new media, we have software, but we also have a world of objects... And the world of objects is also created by software. So software is behind the kind of solid world we live in, the cars and everything... the electricity and...

**M.: Yes... I also wanted to ask you about a message I received from the nettime list10, from somebody who had tried the next version of Explorer. He said that this new version had a really tricky improvement, it was called... let's see... "smart tags", yes... When you access a site they underline words that would be linked to Microsoft-controlled webs... I mean... not**



the original links which the web-owner or the webmaster put there... but other tags which only appear when you use Explorer. So, for example, we have one of your texts... every title would be underlined and connected to, for example, Barnes & Noble... companies which have an agreement with Microsoft.

L. M.: Oh, I see...

**M.: Even if you don't put an underline there...**

L. M.: Oh, I see, I see...

**M.: It's really really tricky and...**

L. M.: But you can turn it off, or not?

**M.: No, you can't turn it off... That's the point... You get this browser and then...**

L. M.: So, basically it's like inserting additional links...

**M.: Yes, they insert additional links always connected to their companies... I don't know if they're finally going to put it on the market but... Well... I think it might be true, it must be true... At least it can be done, so somebody will do it some day or another... It can be done... Maybe later they'll go to court, fight, lose or win... Because it's like they're not forcing you to access other sites, they're just putting in a link...**

L. M.: And you don't know...

**M.: Yes, you don't know if it's a Microsoft tag or an original tag on the site... They look just the same...**

L. M.: And it does it automatically...

**M.: Yes, maybe they set up a database with all the words which must be underlined, and then they relate them to other words... It can be done... I can forward the message to you... Aren't you on the nettime list?**

L. M.: Yes, I am, but I'm trying to work now, so I'm not reading all of them..

**M.: Ok, I'll forward it to you when...**

L. M.: Well, if that happens it would be quite a change... Because obviously there has always been a very tight connection between message and advertisement in any kind of media, but... Well, you also have what's called "product placements", you know...

**M.: "Product placements"?**

L. M.: "Product placements" are very popular in film and television...

**M.: Oh, yes, yes, I know... The products appear maybe in the background in a series... That's a very interesting thing...**

L. M.: This is like the next stage... But ultimately what the companies always try to do on the Internet is okay... Basically they try to figure out how they can get from the net to sales... That's basically what they're trying to do... But that's not... it hasn't happened yet, has it?

**M.: No, no, it's the next version of the browser...**

**L. M.:** Well, luckily there are other browsers... That's Explorer, right? So you can use Netscape or...

**M.:** Yes, but a lot of people use Explorer...

**L. M.:** Yes, yes... My God!

**M.:** It's interesting, isn't it?

**L. M.:** Well, it reminds me of an early net project, I forget what it was called, but it was like a page, it was like... this guy had every word as a link to something...

**M.:** Oh...

**L. M.:** But he did it himself.

**M.:** Yes... Every word, every single word, even articles?

**L. M.:** Well, not articles, but every single noun...

**M.:** Mm... Well... I have one question... We've talked about the rise of the Internet in Eastern European countries, but I also wanted to ask you about how you use some Marxist concepts like "digital materialism"...

**L. M.:** Yes, I see... "Digital materialism" is used in an ironic sense... Because when I grew up in Russia the only kind of philosophy which I was taught was "dialectical materialism", and it was abbreviated *diamat*... So when I was working in new media I thought that I would use the same abbreviation, "diamat", but like expanding it to "digital materialism". So it's a kind of joke... But not only a joke... Because I think that it's also a sort of description of my approach, or my methodologies... which involve paying a lot of attention to hardware and software... and also how it's being used, and the conditions of production, how designers work, etc., etc... And for me it's a kind of opposition to more traditional cultural criticism like film studies, literary studies, where people just look at finished texts, analyse texts, or often look at the readers, but they're not very much interested in looking at the moment of production and the material structures.

**M.:** Would you in a way relate your work to the Frankfurt School? Because some of the thinkers I'm most interested in belong to that school, like Kracauer, Benjamin or Adorno...

**L. M.:** Yes, yes, I think so... McLuhan too, of course...

**M.:** Yes.

**L. M.:** But I also could say that... more in terms of the history of culture.. up until structuralism more attention was given to the author. So, author, author, author... author's intentions, author's psychology... But in the 60s we have structuralism which is like "ok, let's switch from the author to the text". So they talked about the text and the structures of the text, etc., etc... Text as a system... So what to do next...? I think that in the technology of our culture very often what we have between author and text, we have software. And it also happens that between text and the reader, or the user, we also have software. So I'm trying to put more focus on... on one hand the role of software shaping what kind of texts people create... and also shaping the readers' or users' experiences of a text, or of new media... Because your creation or your reception are not just mediated but re-mediated by these technological interfaces.

**M.:** Well, ok... Let's stop, you've talked enough...

**L. M.:** Thank you...

**M.:** No, thank you...

**Related Links:**

Lev Manovich's home page

<http://www.manovich.net>

Review of Lev Manovich's *The Language of New Media*

<http://www.v2.nl/~arns/Texts/Media/manovich-review.html>

*Tekstura: Russian Essays on Visual Culture*

<http://www.press.uchicago.edu/cgi-bin/hfs.cgi/00/12371.ctl>

*Info-Aesthetics*

<http://www.manovich.net/IA/index.html>