Luc Steels was born in 1952. He currently lives in Paris and Brussels. Steels studied linguistics at the University of Antwerp (UFSIA and UIA) and computer science and electrical engineering at MIT (Massachusetts Institute of Technology). Since then, he has conducted research in several areas of Artificial Intelligence (AI). In 1983, he founded the Artificial Intelligence Laboratory of the Free University of Brussels (VUB), which is enjoying international acclaim in the field. The laboratory has been conducting research in reflection and meta-level architectures for knowledge representation and behavior-based approaches to AI through the experimental use of physical robots. More recently, in 1996, he became director of the Sony Computer Science Laboratory in Paris, where his focus is on the origins of language and the emergence of grammar in autonomous robotic agents. Recently, Steels has participated in a variety of contemporary art exhibitions and projects, developing experiments on the meaning of colors and collaborating with the artist Olafur Eliasson.

This interview was recorded in Paris in April 2002.

Hans Ulrich Obrist:
You are a scientist, but I once saw you on the cover of a Belgian art magazine featuring your work in performance art. You looked very young in this picture. So already in your student years, you were a cultural protagonist and a science apprentice? Were you already interested in building bridges between the two disciplines?

Luc Steels:
My work has always focused on trying to understand the process of creating meaning. This is at the core of both language and art. It is also a central element of theater or performance, and these fields interested me enormously as a student. At that time, I was heavily involved in organizing exhibitions, doing performances and playing music, much more than in science. As a student, I studied languages and philosophy first, and only much later computer science and electrical engineering. It was only at the very end of my studies in language that I became interested in science, so maybe if that hadn't happened I would have become a curator or an organizer of art events or perhaps an artist.

Hans Ulrich Obrist:
Was it a chance encounter that led you in the direction of science?

Luc Steels:
Yes, it was a completely chance encounter. A student in my dormitory told me about a course in computing and he invited me along. I said, “Yes, why not,” although I did not have any clue what computers were. I came almost entirely from a humanistic background (philosophy, literature, psychology, art, theatre, etc.) although I was extremely interested in linguistics and logic already. The Chomskian revolution was taking place in Europe around that time, and the development of Montague grammar in logic. But then I suddenly encountered computing.

Hans Ulrich Obrist:
What year was this?

Luc Steels:
1971.

Hans Ulrich Obrist:
Early days!

Luc Steels:
Yes, there was only one computer at the university and we all had to take punched cards to a big machine that would run once a day. It was a very archaic situation compared to today. What I found attractive about computers is that they provide a way to test theories and to make very powerful models. For me, it is a lot like using clay to make a model for a sculpture, or the way that an architect makes a model of a house in order to visualize it and experiment with it. I was very surprised to discover (basically on my own) that you could use computers in that way for studying language. I had intuitions about certain aspects of language, for example about how we parse together sentences, but when I tried to make a computer model, it did not work. I realized that my intuitions had been completely wrong. So computer modeling is a way to advance in your thinking. Later, I used robots in the same way—to test ideas and make models of cognitive phenomena and behavior. This whole thing fascinated me so much that I became less and less involved in art, by necessity. Then I moved to the United States, to MIT, to study computer science and AI seriously. At MIT, there was an intense activity in science and engineering, but in terms of art, there was not much happening. This was the mid-70s.

Hans Ulrich Obrist:
The only area of this art activity that I know of is from this magazine art-


That picture was actually taken at documenta V (1972) in Kassel, where we were doing unscheduled, unofficial performances on the side. We played in all sorts of artsy venues with a changing group of young artists. Antwerp was a breeding ground of art—it always has been, so it was very natural to do these things. I also worked in a gallery at that time, as a student. There was the MTL – Art in Project Gallery in Antwerp.

HUa: 

Wow! These were pioneer galleries in the '70s!

LS: Yes, and so I had deep exposure to the conceptual artists of that time, such as the people from Art and Language, and Gilbert & George (they were just there at the door one day). But also Lawrence Weiner, Joseph Kosuth, and Sol LeWitt: they were all exhibiting in that gallery at the time. So I knew quite well what was going on. My own art practice was in performance, and we did a lot of performances in those days. It was a combination of music, of "musique concrète," and electronics, and various odd behaviors with theatrical props. Occasionally, the police would disrupt our performances or the public would get mad at us. In the early '70s, we didn't have any synthesizers or anything like that, so we built our own electronics. Various kinds of acts and performances would take place in the streets without any warning. They were often very bizarre events. I guess some of our inspiration came from earlier works in Happenings, such as those by Allan Kaprow or John Cage.

HUa: 

"We" means that you were with a group of artists at the time?

LS: Yes, actually I created a group called [laughs] "Dr Buttock's Players Pool," which was a mixed group of people. One of the great things about this time was that we didn't document anything—it was almost a part of the philosophy.

HUa: 

So there were no traces....

LS: Just a few pictures, and even those have since been destroyed. All of this was done in a totally pure spirit. There was no commercial or institutional aspect to it. We did not take ourselves seriously for a single moment. And it was fantastic fun.

HUa: 

But somehow a sense of radical experimentalism is common to your work, from these artistic experimentations to your later scientific work.

LS: Yes, though in science you cannot always be so radical.

HUa: 

Why less radical?

LS: Because you must have discipline. In order to be accepted, in order for a paper to get published in a journal, you have to satisfy all sorts of requirements in terms of method and precision. This is, of course, also a good thing because it provides quality control. At the same time, one of the good things that happened when I went to MIT was that I met Marvin Minsky, who became my mentor. He was, and still is in some ways, a very controversial figure. He was also a playful experimentalist, and that's why I like him. Of course, he has upset many people with his provocative statements. In any case, I always want to go ahead and push further. As soon as something becomes too established, I try to break it down and go beyond it.

HUa: 

What was your early work at MIT about? On what subjects did you start writing your first papers?

LS: As I said, the thing that fascinates me is the making of meaning. I now see this as the thread through all of my work. It's really a fundamental question that I think is still unsolved: how do people create new meaning, and how do they create representations as part of the process of creating meaning. I emphasize that meaning is a process and not a fixed thing that you can grasp or put on a table or that is somewhere in your head. I believe that representations are a key to creating meaning. As part of this activity, we create representations. Of course, this is what artists do all the time, and this is why I am so interested in it. But language, which is the main topic of my scientific investigations, is the main medium that people use to create and communicate meaning. Scientific model making (like with robotic models and computer models) is also a way to make representations, and they also help us to create new meanings, communicate them to others, and explore them. My investigations into creating meaning started first with language, language and linguistics,
but I found the climate within linguistics very stifling. There was Chomsky at MIT and I was a student in his classes, but it was a very strict and dogmatic way of seeing things, and many of my fellow students seemed to follow him blindly as with a guru. So I decided that this was not creative enough or it wasn't going to be fruitful for me to remain within that little world where people invent and engage with formulas with no outside forces challenging them. It was like a sect playing with secret formalisms. So I got into AI, which is a fantastic field actually; it's a very creative and open field.

Hua: So creativity is the reason why you turned to Minsky who, basically, pioneered the field of AI. You left the field of language and linguistics for AI—was it a critical moment or did it happen gradually?

LS: First, I never left the subject of language. I just left the institution of linguistics. I think it came earlier, when I discovered the computer and then when I saw what some people were doing with it, like Terry Winograd who had built this computer program called Shridu at the MIT AI lab, which was a program for processing natural language by robots. You could give it commands like "pick up the red block" and it would execute the command. It was still in software simulation, but the goal was to do it on a real robot. When I saw this, it had a force that is comparable to artwork. It was not like a performance, but almost. It was a demonstration of something that was magic. Some of the earlier robots like Shakey, which were built at the beginning of the 70s at SRI [Stanford Research Institute] in California, were magic as well. These were the things that opened my mind from linguistics and philosophy into the field of computing and robots. I must say there was another major opening of my mind, which happened around 1984 or 1985, which was when I met [Ilya] Prigogine for the first time. This was at a dinner in Brussels (with Minsky as well). I didn't know Prigogine's work, so I thought I better read his books before I went to this dinner. And so I read Order Out of Chaos (La Nouvelle Alliance. Metamorphose de la science, 1979), which he wrote with Isabelle Stengers. In that book I found so many ideas that were completely new to me, and surely to linguistics and computer science, and it seemed to offer a window on all sorts of mechanisms and ways of looking at intelligence, coming from biology and physics. So I opened my mind further to all these fields and got into a very interdisciplinary context. That is still going on. One week I might give a talk at a physics conference, and then the next week it might be at a psychology conference, the week after that at a biology workshop or a linguistics meeting. I read books coming from all these different fields and am absolutely fascinated by them all.

Hua: You oscillate between these fields.

LS: All the time. And those people invite me; it's not always necessarily that I seek them out. But other scientists can see the interdisciplinary possibilities of my work that are very exciting. The multi-disciplinary influence is also an important factor for me; I'm always seeking inspiration from other fields. For me, science is one big field. When some people in biology have interesting insights into living systems that they get from studying genetics, for example, why not use them? When a psychiatrist has ideas about the breakdown of mental representations of the self, why not incorporate that somehow? So it's about pooling knowledge and realizing that there are ways of making abstractions from the specifics of a certain field that carry over to another field. Of course, in chemistry, the field of Prigogine, they deal with molecular reactions, but that is not so important. What's important is the systemic aspects of complex non-linear chemical phenomena: the insight into the way such dynamic systems work. That is how I still get inspiration—by looking into other fields, and not just scientific fields.

Hua: And with contemporary art, what is specifically driving you now?

LS: What I find interesting about art, and not just contemporary art, but older art as well, even prehistoric art, is the idea of representation and how and why people do what they do. What is the process of making meaning, and what are the meanings that are behind it? How do representations get transformed in the process of interpreting them? All these kinds of things.

Hua: When we met five or six years ago, you already had those two labs, the Sony Lab (Sony Computer Science Laboratory) in Paris and then the Artificial Science Laboratory at the Free University of Brussels. How did this come about?

LS: For a while I worked at the MIT AI Lab, until 1980, with Minsky, and I was also very influenced by Seymour Papert. He's a key figure in education. He was a mathematician, but he worked with
[Jean] Piaget in Geneva and from there he went on to work at MIT with Minsky. Papert is obsessed with children and their learning of mathematics, and it was he who invented the LOGO language. I think he's causing a revolution in the teaching of mathematics, slowly. At the moment, I am also very much involved in discussions on the future of education. One of Papert’s most recent books is *The Children’s Machine*, by which he means the computer (*The Children’s Machine: Rethinking School in the Age of the Computer*, 1993). Minsky was also very much influenced by cognitive development and Piaget, so what they were trying to do was to link a conceptual analysis of thought and on how the mind works and develops, with concrete computational and robotic experiments. And that is also what I am trying to do. I try to get very deep intuitions and then materialize them in terms of experimental models. That is another interesting connection to art, because this is also a field where people take very abstract ideas and materialize it somehow, so that it has an immediate impact on the viewer. With experiments too, you hope that they will have an immediate impact, so that somebody who sees it says, “Oh wow! You’ve changed my viewpoint!”

**HUa**: So it’s about catching people’s attention?

**LS**: Yes, catching people’s attention and stimulating them enough to change their minds. And that is what an experiment is about—Bruno Latour also talks about this. Experiments, such as those by Pasteur, are not just about doing the science and writing the paper. It is also about convincing an audience, your colleagues and the public at large. Galileo did the same thing with his experiments—it’s like trying to create an instant effect or shock in somebody else’s mind.

**HUo**: Were there other people at MIT who you interacted with a lot?

**LS**: Yes, of course. One of them was Danny Hillis.

**HUo**: ... who built a supercomputer with 64,000 processors in 1985, and named it the “Connection Machine.”

**LS**: Yes, to me he is an absolute genius. I haven’t spoken to him lately, but at that time it was amazing what he was doing. He would work for weeks on a lock on a box that you could open by a ball rolling around in the box, if you did it right. This was a birthday present for Margaret Minsky! He conceived it and built it, and when you opened it there was nothing in the box: it was simply the act of opening it that was fun. He also built this big computer out of Tinker Toy sticks.

**HUo**: It’s a beautiful sculpture actually.

**LS**: Yes. And at some points, the lab was full of these sticks. It was like a huge children’s playground. All of this stuff was going on when I was there, and it was a very creative environment. This was before the MIT Media Laboratory started.

**HUo**: The MIT Media Lab was founded by Nicholas Negroponte with Jerome Wiesner and opened its doors in the Wiesner Building, designed by I. M. Pei, in 1985. Was Negroponte already around at the time?

**LS**: He was around, but in another department. I never met him. He was doing his Architecture Machine, and he had another project in Paris, at the Centre Mondial de l’Informatique [The World Center for Computers and Human Development]. In the ’70s, the creative activity at MIT took place at the AI lab.

**HUo**: Why did you leave MIT?

**LS**: Well, I ran out of money and we were expecting a child, so I went to work for two or three years in an industrial research lab in Connecticut. This was also a very interesting experience because I learned how the industrial world works. We were involved there with geophysics, which was a completely different subject, and geology, trying to build systems that could take measurements. There, I learned a lot about the world of signal processing, making measurements of geological structures. This was another step to open my mind to other disciplines. Remember that geology was the original source of inspiration for Datwin as well. I thought that all this was quite interesting. Then in 1983, I came back to Europe and founded the AI lab in Brussels.

**HUo**: Can you tell me about the very beginnings of this laboratory?

**LS**: Well, I really started with nothing. I didn’t even have a room. I took a lot of risks, also financially, and had to start building a group of graduate students from scratch. At the beginning, we did a lot of
work in knowledge engineering, in knowledge-based systems, and this led in all sorts of directions, looking at robotics and vision and complex systems, also at language. Any kind of topic would come up. At one point, this lab had thirty people working there—that was in the mid-'80s, working on all sorts of different subjects and coming from all sorts of disciplines, from physics and engineering to philosophy and linguistics.

HUa: But you've always run it yourself, haven't you?

LS: Yes. I have to find money for it and do all the management, which is a very tiring activity.

HUa: The robots were there from the beginning?

LS: No, the robots only really came in at the end of the '80s. This is when I met Rodney Brooks, so that was a very important shift in my thinking as well. Before that time, AI was focusing on disembodied intelligence. Symbolic AI emphasizes the idea that intelligence is essentially the processing of symbolic representations. I also followed this paradigm and worked a lot in symbolic AI. But then there was a paradigm shift. I organized a series of workshops that contributed a lot to this shift and launched the term "behavior-based AI" as an antidote to "knowledge-based AI." (William J. Clancey was also in one of these workshops, as well as Chris Langton and Francisco Varela, and of course Brooks and his students like Maja Mataric and Cynthia Breazeal who later built Kismet.

HUa: What was specific about post-symbolic AI?

LS: It is like a pendulum. You can swing too far in the direction of purely symbolic cerebral thought processes, and then intelligence is like a monk sitting in a room saying, "I think therefore I am." There is no connection with the world. A chess player is a little bit like that in that she makes decisions completely in her mind. But in true human intelligence, you have a body and you have emotions and you have the real world. So what we tried to do with this paradigm shift is to get back to embodied intelligence. With purely symbolic AI, you cannot really explain where meanings come from, because the only things you have are formal symbols, which the system manipulates. It's like a logical machine, and it doesn't have a connection with the world. But to get new meanings you have to interact with the world and with other people.

HUa: So you need a body.

LS: Yes, you need a body, you need sensors, actuators, a world; you need motivations and drive. Once this insight became clear I completely changed my direction and also the lab.

HUa: That was a decisive moment?

LS: Yes, I think it must have been 1988. You could say that one decisive moment was the discovery of self-organization stimulated by Prigogine around 1984 and the next one was the rediscovery of the body. It is interesting to make a parallel with art. The kind of Conceptual art that was made in the '70s was also a very disembodied kind of rationalistic art. So AI was part of the same zeitgeist. Performance art reacted to that by making the body very important again, as well as the real world experience. So you had these two opposing tendencies going on in the art world. In AI, you could call it a return to the body and the shift was profound. It turned out that many of the symbolic AI models just didn't work because they assumed that sensors would get all the information required by the model and the actuators would be like outputs to some motor or to some arm. It doesn't work like that at all. The real world is too unpredictable and dynamic and the information required by symbolic approaches to AI requires an intelligent observer.

HUa: Was there also a distance from Minsky's position at that time, or is it more complicated than that?

LS: It's more complicated than that: it's not really a matter of distance. Minsky is a very complex figure, who was also very involved with robotics earlier on. The big point is that if you're used to working with computers and getting them to do what you want, then it comes as a real shock that robots don't do what you want. Robots crash into the wall the batteries go up in smoke you make them turn 30 degrees and they turn 25 degrees for obscure reasons, etc. For a computer scientist who grows up in a neat, mathematical, predictable world, it is a very sharp dip into the real world.
So one could say that your involvement with robots was a "return of the real" to quote Hal Foster.

Absolutely. A bit later in the early '90s, another influence on me was David McFarland, who is a famous ethologist from Oxford. He showed up in the lab one day and I built with him an experiment that started out as a reconstruction of the experiments of Grey Walter, the famous cybernetician. We built an arena with a certain number of robots, and a charging station. There's also a competition for the energy in the charging station in the form of boxes, and the robots had to push against these boxes to get enough energy in the charging station. McFarland uses this as a model of animals that have to work to get their food, so we built this environment in the lab with these small robots made from Legos. That's another element of playfulness actually, because when you walked into the lab it looked like a playground with all these Lego bricks, motors, etc., all around. Through this experiment, I learnt a lot from David McFarland about biology, about drive, motivation, and evolution. It was a very fruitful moment of interaction between biology and robotics.

I am interested in finding out more about your relationship with cybernetics. Recently I interviewed Heinz von Foerster about the notion of the cybernetic legacy in relation to the current interest in self-organization. You know I'm interested in self-organization especially in terms of exhibitions. I wanted to ask you whether cybernetics is also of significance for your interest in self-organization.

All these people like Von Foerster, Grey Walter, Valentino Braitenberg; it was like a wave in the '50s of people who had been thinking about the body and about smooth interactive behavior in the environment through self-organization. They kind of got pushed into the background when AI came onto the scene in the late '50s, because AI was more about the symbolic reasoning, the chess playing, the theorem proving this kind of thing.

And cybernetics was sidelined?

Yes, it was sidelined, but we shouldn't forget that Minsky grew up with these cybernetics people. There is a historical lineage. So we built this whole set up and did lots of experiments into self-sufficiency and autonomy. In a way it was a kind of revival of ideas from cybernetics, but of course now with the help of digital computers.
Brussels lab and that was fantastic—things were happening and we were getting great results. But there has been no institutionalization of this lab, so almost every day I had to work out where the money would be coming from for the next day. This is not a good situation for really creative work, and so I decided that the lab in Brussels would be education-oriented. The average age there now is around 24 or 26, so they are young students. I give them lots of freedom and it’s more like a workshop/studio where they can explore ideas. Of course, they need training and teaching, but I try to be unimposing. Whereas the Sony Lab is a much more professional environment. We are a group of independent professional scientists that have different topics, such as neuroscience, speech, but also music or cognitive robotics. The connection with Sony gives us the opportunity to be very close to the cutting edge of technology in general and robotics and computing in particular.

HUa: Because of its corporate links with Sony research.

LS: Yes. For example, there is a lab in Sony called the Digital Creatures Lab that has built the AIBO, dog-like robot, and is currently working on a humanoid robot. They are one of the top teams in the world in autonomous robotics.

HUa: And have you been working with them?

LS: Yes. We use their platforms and give them our ideas. In the '90s it was still possible to play around with amateurish robots built with Legos and all that and do interesting work, but now the level of engineering has gone way up.

HUa: Your work in Brussels seemed to me to be close to the work of Panamarenko. There was a certain degree of “bricolage” involved.

LS: Obviously!

HUa: Was Panamarenko an inspiration?

LS: Well. I knew him and thought his work was fun.

HUa: But you think that the situation has changed since the '90s.

LS: We’re no longer in the '90s. It is true that these Lego robots look like “bricolage,” and in fact they were, because we did not have the resources to build nice, completely engineered robots. You need a team of fifty very good people to build a humanoid robot.

HUa: That no university can afford.

LS: There is no research group anywhere in Europe who is doing this.

HUa: And in America?

LS: Well, Brooks at MIT, who pioneered the revival of humanoid robotics, has similar difficulties getting funding and keeping his lab afloat. He says, “I’m no longer doing humanoid robots,” because it has become too difficult, especially in a university context where you always have new students coming in. Building a humanoid robot is like building a satellite system or something of similar complexity. You need a stable context and professional engineers.

HUa: So you are in a very privileged position because on the one hand, you have an autonomous zone in terms of your research, but at the same time, you have the resources and support. It’s an ideal situation.

LS: Absolutely. I think that at the moment this is the only way to work in this field.

HUa: How much freedom do you have to work on your own research topics?

LS: A lot. The whole purpose is to come up with new things and new ideas. We need new ideas in computer science and AI—there is no question about that. But the scientific institutions in Europe have become very bureaucratic; the universities and the European funding institutions are a disaster because they stifle too much creativity. Just imagine an artist having to predict three years from now the major work that they will produce, stating what it will be, who will be interested, how much it will sell for and so on. Then you have to write a 200-page proposal with detailed budgets predicting when you are going to travel, etc. It’s impossible to be creative if you have to do that kind of advanced planning. You are no longer in the business of creative work. Of course, I’m not saying that there shouldn’t be any plan-
ning, budgeting, etc., but breakthroughs cannot be planned. At least that's my idea. There is a need to bring some freedom back into science, freedom that artists have been able to preserve.

HUa: Are you now in a position to make useful mistakes?

LS: Yes, you have to make mistakes. If you're not making mistakes, that means that whatever you're doing is not ambitious enough. A Formula 1 racer once said that if you can keep your car on the road, you're not going fast enough! For scientific work and innovation, if you're not making mistakes then you're not doing things right. You should be able to go down a path, discover that you're wrong, and be able to decide at that very moment to do something different, and not to say, "Oh, we have this project that we have signed up for with the European Commission, therefore we will continue to work on it for the next three years even though we know it is wrong."

HUa: And then came the Talking Heads Experiment around 1999. That was the first time we were able to come together on a project for the exhibition "Laboratorium" (co-curated with Barbara Vanderlinden, various venues throughout Antwerp, 1999). You proposed the Talking Heads Experiment, which was a radical form of experimentalism within the exhibition context.

LS: I look back upon this as a fantastic project. It was very complicated though. The goal was to create a situation where on the one hand we could test our ideas about the self-organization of language, but at the same time, the goal was to try and create a set-up that could convince people of new ideas about language and meaning.

HUa: To convince non-scientists basically?

LS: Yes, non-scientists. And this is very difficult because we were dealing with very abstract concepts and also a process in time. The self-organization of language takes time, obviously. So we did this set-up in Antwerp, but through the Internet there were also sites in Paris, Amsterdam, Tokyo and some other places. This was a totally different art experience, and a performance, if you can use these terms. It involved the Internet; so many more people looked at it from a distance than saw it in the Antwerp exhibition itself. Also we reached a
tried it again in a new installation. My question is always: How can you materialize these abstract ideas in a form that people can immediately grasp and understand? This was really what the collaboration with Olafur was about. And actually, I met him again in Venice recently and gave a talk in his studio at the School of Architecture. We are already thinking about other projects.

HUa: Where will it be?

LS: That has not yet been decided, but it’s a project about after-image. The great thing about working with Olafur is that on the one hand, I think he has this artistic capability of immediately materializing all sorts of ideas in a way that touches many people, but he also has a lot of insight into perception and categorization. So I think there is room for further collaboration together.

HUa: In which directions do you think the collaboration can evolve?

LS: We can bring in lots of things from our robotic models of color vision and color experience, models of the brain and the language of color, and then he can project this out, integrate it and use it in exhibitions. So I think that out of all of the artists whose work I have been attracted to, this has been a very good match, which is due to you. I didn’t know Olafur when you first proposed we have a discussion for Kitakyushu.

HUa: That’s the thing about coffee breaks—they trigger things. We did another conference called “Art and Brain” in Germany, where nothing was scheduled to happen because it’s precisely at this moment that things start to happen. It’s usually much more efficient to have a coffee break than to have a conference.

LS: I agree, but that can be difficult with some sponsors sometimes! [Laughs] It’s important to establish more common ground through talks and showing work, but that’s the idea of getting a network of people to interact together on a regular basis, and in that way the common ground can be established. It cannot be done as a one-off; it has to be an ongoing dialogue. I have had further contact with Sarat [Maharaj], for example, who was also at Kitakyushu. And also with Stefano Boeri’s colleagues, like John Palmesino.

HUa: Could you tell me about the more recent developments of your own work? There is a new text, “Language Re-entrance and the Inner Voice” that you have published in The Journal of Consciousness Studies. I was cross reading your essay and the texts of Mikhail Bakhtin, on the use of polyphony in Dostoevsky’s novels in Problems of Dostoevsky’s Poetics (sic) (1929) where he says that:

"... the plurality of voices and of independent consciousness constitute a fundamental trait of his work. What appears in his work is not the multitude of characters and destinies within a unique and objective world and elucidated by the only consciousness of the author, but the plurality of consciousness, which without fusing, combine in the unity of a given event. The principle heroes of Dostoevsky are indeed in the conception, even of the artist, not only objects of discourse, but subjects of their own discourse which is somehow immediately signified."

I was wondering whether it was just a coincidence or whether there is a link between the polyphony of Dostoevsky and your “re-entrance of the inner voice.”

LS: Yes, this paper is quite important for me. The connection you are making is totally amazing. The basic idea of the paper is the following: People are all the time engaged in making external representations: language, drawing, pretend play, gesturing, etc., and this way they bootstrap a lot of their knowledge and coordinate it with other people. But the next logical step is that this external representation making becomes internalized, that means that the brain starts to create representations for its own sake, without making them public. The inner voice, visual imagination, mental rehearsal of actions, etc., are all examples of this. It’s almost like internal sheets of paper on which one part of the brain is writing and the other part is looking at it and interpreting it. I believe this internal representation making is then the starting process for the construction of the self, multiple selves perhaps (like in the Society of Mind idea by Minsky), so that gradually this polyphony talked about by Bakhtin emerges.

HUa: So this notion of polyphony has some resonance for you?

LS: Yes, it’s a very interesting way to think about it, like you have polyphony in medieval music, many voices going on at the same
time, which sometimes are coherent and sometimes independent. It is important to see how radical the idea is. Many people believe that you first make internal representations (for example in a language of thought) and then you learn to externalize them. For me it is the opposite. External representations come first, embedded in a social and cultural context, and only later, do we start to create internal representations through re-entrance and use them to build a model of ourselves. Disorders like schizophrenia show that this self-representation can become dysfunctional, for example, when self-attributions conflict with attributions made by the social environment. I am again trying to make very concrete models of all this and doing experiments. But at the same time I am interested in how the brain re-wires itself for making representations and representation re-entrance.

HUa: This is work in progress?

LS: Yes, very much so. For example, it turns out that the areas of the brain that are involved in speaking aloud are the same as the areas engaged in the inner voice: the same structures are activated. I see many completely new developments possible in autonomous robots and AI based on these ideas.

HUa: Could you tell me more about “the society of mind”? It’s a wonderful expression.

LS: Well, it’s the title of a work by Minsky, where he develops the idea that the mind is made up of a large collection of agents. So he talks about how some agents are sensitive to other agents, how some are in competition with each other. So my intention in the paper was to make a link to Minsky and his notion of The Society of Mind. I think there are still an enormous number of things to be discovered about how we create representations, how we interpret them, and how they help to construct a model of ourselves. In fact, I think we know almost nothing about it, and I am pretty sure that this will be my next main line of work. I am keen to look more at drawings, especially children’s drawings that are very creative. They easily invent new modes of expression and visual grammar, and therefore tell us something about pure, unconventional representation making at work. It would be, of course, also interesting to do this in the context of an exhibition. I mean, why do people draw? And not just drawing from live subjects, but drawing as a means of communication, drawing to help construct representations of the world and yourself.

HUa: Some heralded the death of drawing with the arrival of the computer: but if this is the case, why has it become so important in art again?

LS: They said the same about photography—if you can make a photograph, why do you need to draw? But that completely misses the point of a drawing.

HUa: And that’s also part of the discussion between Gabriel Orozco and Ikegami Takashi on drawing.

LS: Yes, but I think they look at it more in terms of externalizing certain formal, mathematical structures. But when I’m talking about drawing, I focus on meanings that are expressed through drawing. Drawings can be of models and still life and things like that, than there’s mathematical drawing, where you can visualize very complicated mathematical structures, but I’m more interested in meaningful drawing, which is not realistic, but tries to express meaning.

HUa: Here is a painting by another Belgian artist.

LS: Yes. This is not a realistic drawing but there are all sorts of meanings in it.

HUa: Hidden meanings?

LS: Hidden in some sense. Some can no longer be understood. I can understand some, for example, this here is a judge, because this is how judges used to dress in Belgium. But if you don’t know this, you would not recognize it. What interests me about drawings is: what knowledge do you need to interpret it, how are meanings selected for external representation, where does the common ground come from, how does it get communicated?

HUa: The last question I want to ask you, which is the only question that is recurrent in all my interviews, is the question of your un-built roads. I was wondering whether you could tell me about some of your unrealized projects: projects that have been too big or expensive to be realized, projects that have been censored or self-censored, projects you left on the shelf...
Many, many, many. Usually when I start out on an experiment, it is always much more complicated when you actually build it. So, for example, for the Talking Heads Experiment, I wanted a body. We worked for a while on the body, but we couldn’t get it to function because technologically it was too difficult. So I had to drop it. I am always involved in projects that cannot be done, and it is usually because the technology is not yet up to it or I cannot find the people who have the required technical competence. But I still hope that they can be done.

HUa: So they are not unrealizable.

LS: Not necessarily. The one that I would really like to do now, would involve at least two humanoid robots sitting at a table and engaging in a conversation with each other, pointing and picking things up and building a dialogue and creating meaning as they go along in the process. Maybe it will take another thirty years. That’s the biggest project, but I think we will be able to achieve it at some point, because it can be done, just not today. And when it is done, it will be absolutely stunning.

HUa: Is it possible to have a few more details on it?

LS: Well, I imagine two robots sitting at a table, face-to-face, looking at each other, or moving around in a shared space. At the beginning, they have very few concepts. They must build up concepts and language by interacting with the world. Through the expression of these concepts, they build new concepts and progressively they build up their own mind. It’s a bit like twins playing and inventing language. For me this is the ultimate experiment. This would be true Artificial Intelligence.