Robot Art: An Interview with Leonel Moura

Leonel Moura

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Abstract: In the wake of his inclusion in the landmark 2018 "Artists and Robots" show at the Grand Palais in Paris, Leonel Moura reflects herein on his own work and its place within the broad spectrum of techno-art; and of particular current interest is his reliance as an artist on emergent phenomenon—i.e., the ability of relatively simple systems to exhibit relatively complex and unexpected capabilities—which has recently come back into focus with the spectacular ability of the "deep learning" family of computer algorithms to perform pattern recognition tasks unthinkable only a few years ago.

1. Introduction

Arts:

As you know, Leonel, the title of our special issue is "The Machine as Artist (in the 20th Century)". Can you please give our readers an overview of how you will be approaching the subject?

LM:

Can a Machine make Art? This question, bizarre back in 2001 when I started working with artbots, is today recurrent. Why? Because robots are invading our world, artificial intelligence is a reality, and art itself, on the path of Marcel Duchamp, accepts almost anything. However, the main issues remain the same since mid-20th century pioneers started using computers and algorithms to produce a new kind of art. Are machines really creative? Or are they just another tool in the hands (and minds) of human artists? I will try to answer based on my own work.

2. Robots

Arts:

For those of us who were not lucky enough to see your installation at the Grand Palais, or who are otherwise unfamiliar with your work, could you please give us a description?

LM:

My artbots are quite simple (Moura and Pereira 2004). They are autonomous, have an onboard microchip, sensors to avoid obstacles and detect colours, and a device to actuate a colour marker pen (Figure 1). They move in a haphazard way inside an arena (Figure 2), but with each sensing the colour over which it is then passing and reacting by either raising or lowering its pen when a certain threshold is sensed, that is, when a certain amount of colour is present. This reaction to the marks left by other robots is thus an indirect form of communication known as *stigmergy*, as originally described by Pierre-Paul Grassé (Grassé 1959). The process is emergent (Whitelaw 2004): from a random start, soon randomness is replaced by a reactive mode generating patterns and clusters of colour.
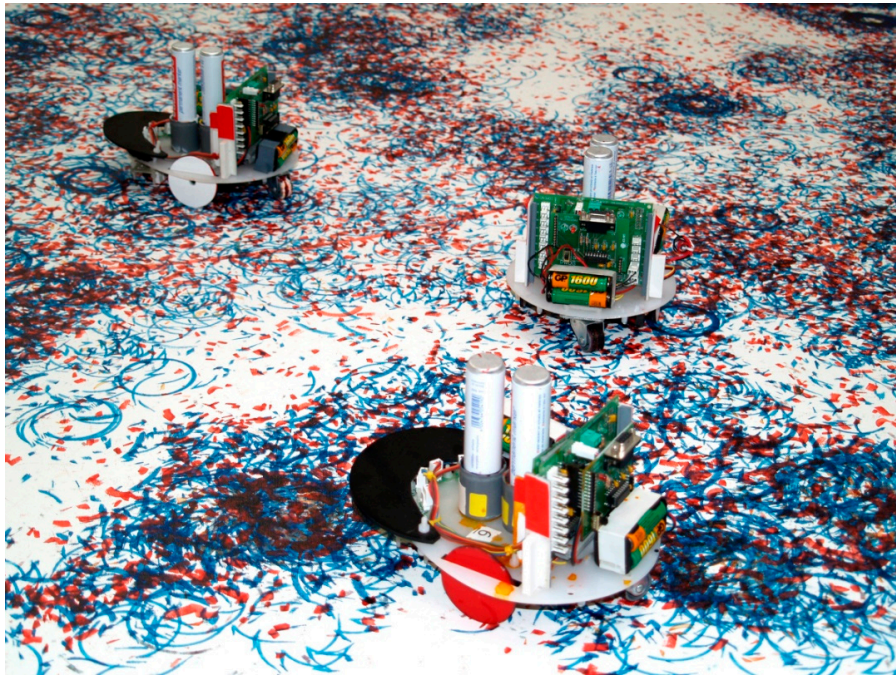
Figure 1. Three artbots at work. Photo ©2001 Robotarium and used by permission.

Figure 2. Artbot arena as installed at the Spring 2018 Grand Palais exhibition "Artists and Robots". Photo ©2018 Aldo Paredes RMNGP and used by permission.

The finalization of the work is determined by a kind of negative feedback, i.e., when robots stop reacting as a certain density of colour is achieved.

The general behaviour of my robot swarm is inspired by ants. These insects communicate among themselves through chemical messages, the pheromones, with which they produce certain patterns of collective behaviour, like following a trail. I have replaced pheromone by colour. In this way, the swarm of robots create unique paintings, impossible to anticipate, and in which an abstract composition with different levels of colour concentration can clearly be recognized by the human viewer (Figure 3).
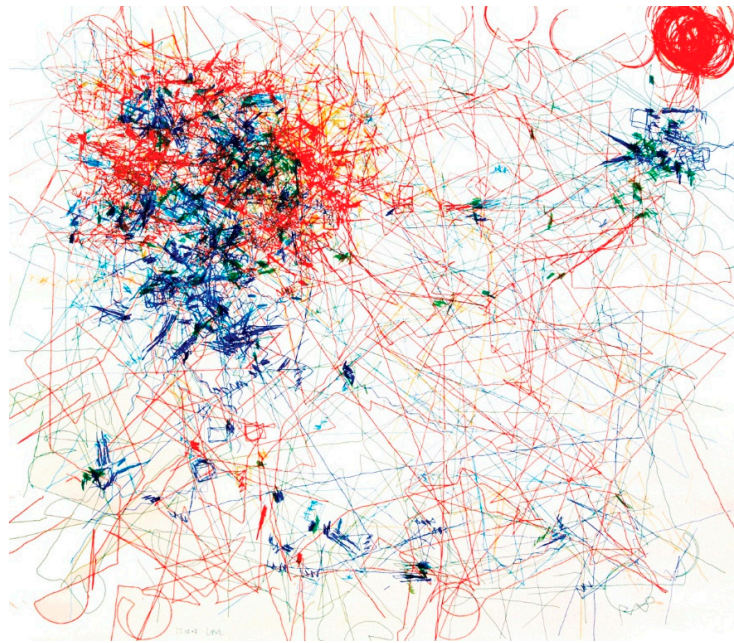
Figure 3. *RAP (Robot Action Painting)*, 2007, ink on canvas, 150 cm × 170 cm. ©2007 Robotarium and used by permission.

3. Art

Arts:

Thank you, Leonel, for this quite precise description of how your "artbots" create their output; but we come now to the inevitable question—is it Art?

LM:

Purists in respect to human uniqueness will say "no": only humans can make art. This, however, is an outdated concept. It has been understood since at least the birth of abstraction that the main issue in art is neither its production nor the individual artistic sensibility by which it is guided. The main issue of art is art itself: its history, evolution, and innovative contributions. Anything can be considered art if validated by one of the several art world mechanisms including museums, galleries, specialized media, critics, curators, and/or collectors. Only in this way has the Duchampian ready-made and most of the art produced since been accepted and integrated into the formal art realm.

Whether a work of art is made directly by a human artist or is the product of any other type of process is nowadays of no relevance. Recent art history shows many examples of art works based on random procedures, fortuitous explorations, *objets trouvés*, and arbitrary constructions. Surrealism, for example, even tried to take human consciousness out of the loop. More decisive is whether or not a new art form expands the field of art. Since the advent of modernism, innovation has become a more important criterion in evaluating artistic projects than personal ability.

Art made by robots also raises other kinds of issues. For the moment, robots and their algorithms remain human creations. In this sense, it can be said that their artistic production originates in the will and skill of the human artist. But since robots like those I use are able to generate novelty, it must also be recognized that they have at least some degree of creativity. Essential information in creating their composition, such as the detection of colour and small shapes, is gathered directly by the robots. Moreover, the emergent process implies that the resulting art works cannot be predetermined even by the person who initiates the process. Hence, the painting as a composition is the product of machines without decisive human intervention.

The algorithm and the basic rules introduced thereby via the robot microchip are not so very different, furthermore, from education. No one will claim that a given novel is the product of the author's school teacher. To the extent that the author, human or machine, incorporates new information, the art work becomes not only unique but also the result of the author's own creativity. In short, I teach the robots how to paint, but afterward, it is not my doing.

If we accept that intelligent machines can already perform many human tasks, why not accept that they can make art? Will I myself keep making paintings if robots can do it so well? Is this a menace to human creativity? No. We have plenty of other things to do.

4. Future

Arts:

And finally, Leonel, where is all of this headed? Please share with us your vision of the future.

LM:

Robots and artificial intelligence still depend on human enterprise. Soon enough, however, machines will be able to undertake their own evolution. And this is not a question of belief but rather of necessity. The autonomy of machines is essential to the best interests of humanity, as in cases such as multiple task performance, big data management, and space exploration. These developments imply the ability of the machine to solve problems, make decisions, and evolve as needed. And the result must be the capacity of machines to build new machines following their own purposes.

Does this pose a risk for mankind? Maybe. The possibility of human/machine confrontation in the future is real inasmuch as humans don't seem to be able to think and behave rationally. One example is the intense development by the military of unmanned robots with lethal capacity.

One way to avoid such an outcome is co-evolution: in a symbiotic manner, machines and humans will continue to depend on each other. In such a context, art can have an important role, teaching humans and machines how to share common goals (Figure 4).
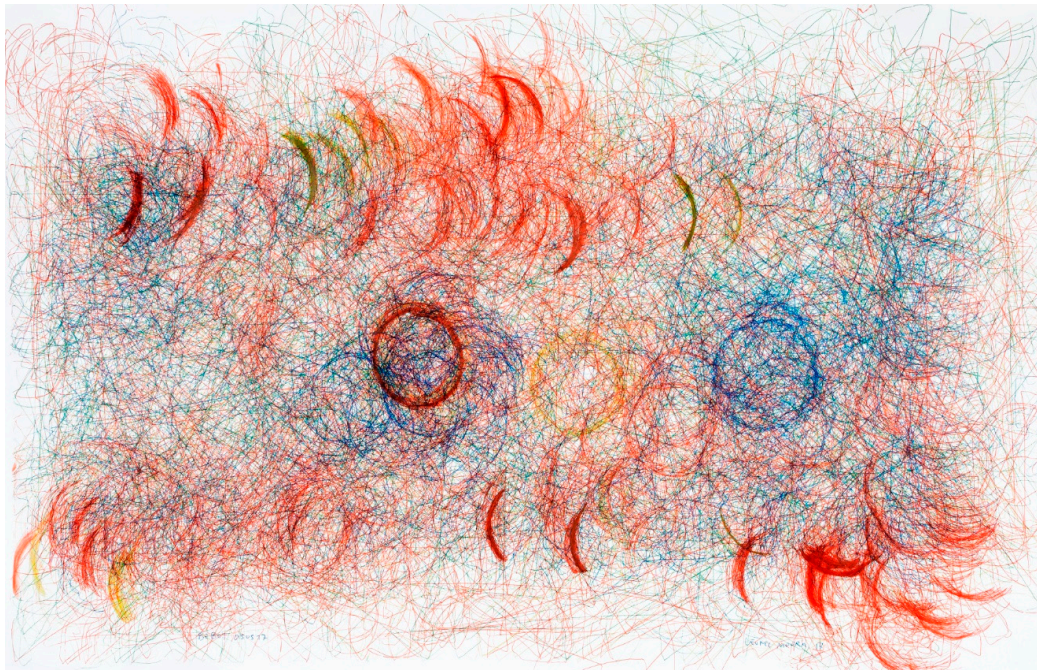

Figure 4. *Bebot*, 2017, ink on canvas, 300 cm × 470 cm. ©2017 Robotarium and used by permission.

Art-making machines are also important beyond the creation of beauty or emotional stimulation, as is typically the case in human culture, and here I refer to the fundamental process of fabricating knowledge. No knowledge, be it biological or artificial, can evolve and be perfected without exploration, experimentation, and random creativity. In fact, natural evolution is generally based on such mechanisms. Trial and error evolution can therefore be seen as an equivalent to art, since art, as opposed to science, is non-objective and non-linear. Hence, I would say that the future of robots and artificial intelligence will be artistic, or we may otherwise find ourselves in serious trouble.

Conflicts of Interest: The author declares no conflicts of interest.

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