# Machine (Self-)Consciousness: On Gustavo Romano's Electronic Poetics

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*[NB: This is a work in progress and thus should not be taken as a polished theoretical statement either on autopoiesis or on the IP Poetry Project. It is a first approach to these topics, and I plan to expand the logic contained in this paper into a full-length academic article in the near future. --SW; 7/1/11]*

Today I'd like to present a case study that attempts to think through the question of machine consciousness by way of a generative poetry project by Gustavo Romano, an Argentine visual artist and member of the art collective *findelmundo*. I'll explore the technological creation of poetic texts and their subsequent recitation by cyborg-like automatons in Romano's innovative IP Poetry Project, using the biological concept of *autopoiesis* as my theoretical apparatus. I should say, before I begin my examination of both autopoietic theory and the intricacies of the IP Poetry Project, that my paper draws on Belén Gache's contextualization and analysis of Romano's work in an essay called "De poemas no humanos y cabezas parlantes", as well as my graduate student Heather Fletcher's recent article in the current issue of the *Arizona Journal of Hispanic Cultural Studies* (14.2010) which I edited with my colleague, Luis Correa-Diaz .

I'd like to begin my discussion of the question of consciousness in Romano's IP Poetry Project by briefly defining the often-murky conceptual framework of autopoietic theory, as I understand it, and as it applies to the kind of analysis I'm attempting to do here. I should say that won't try to present a complete portrait of the complexities of Maturana and Varela's radical reformulation of concepts like cognition, consciousness, the observer problem, etc.; nor will I address Lukhman's application of autopoietic theory to social systems, for example. Following my discussion of autopoiesis, I'll present a rather schematic summary of the IP Poetry Project, and then describe an initial attempt to think through Romano's poetic bots as autopoietic machines.

The term *autopoiesis*, from the Greek for self-creation or –production, was coined by Chilean biologists Humberto Maturana and Francisco Varela in the early 1970s. The theory was originally developed in the context of the effort to revise the definition of living systems, and describes the organization of that which is living by way of its individual autonomy as well as its production and maintenance of the components necessary for the continuation of its life processes. The basic, mechanistic model of the cell is paradigmatic for Maturana and Varela's conceptualization of life through autopoiesis; they describe an autopoietic machine as follows: a machine organized (defined as a unity) as a network of processes of production, transformation and destruction of components that produces the components which: (1) through their interactions and transformations regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it as a concrete unity in the space in which they exist by specifying the topological domain of its realization as such a network (Autopoiesis and Cognition 135).

On the other hand, systems that do not make use of the products that they produce in order to continue functioning—such as a chemical factory or an automobile assembly line—are deemed *allopoietic.*

For Maturana and Varela, in their radically constructivist early work, especially in Autopoiesis and Cognition, there is no concept of an objective reality—the construction of what we would call "reality" by living systems is a function of the specificity of their autopoietic organization, insofar as the external world triggers responses in the organization of the autopoietic system. This argument avoids solipsism, at least according to Maturana, since the domain of interactions between autopoietic systems, "structurally coupled" in the specific (and often seemingly idiosyncratic) terminology of the two Chilean biologists, is the space of the construction of a shared environment. In other words—and turning to their somewhat odd formulation of language and linguistic interaction—it is in these overlapping domains between structurally-coupled human beings where linguistic phenomena take place. Language thus is considered to be a perception-like phenomenon triggering a response from another system. Their preference for using the gerund "languaging" instead of the noun most usually employed points to the way in which language is conceived of as a trigger that causes autopoietic systems to become structurally coupled (Hayles 147), rather than as a stable code or source of information with an external reality all "its" own. I would also add that despite their strange (or at least unfamiliar) definitions of terms like organization, structure, language and reality, they made a strong and influential case for a new way to address the observer problem in systems theory, stating that: "The observer is a living system and any understanding of cognition as a biological phenomenon must account for the observer and his role in it" (Autopoiesis and Cognition 48). Living systems, then, are recursive insofar as they interpolate other living systems through a shared domain, and reflexive given that they demonstrate *self-consciousness*: as Katherine Hayles has suggested in this context, "The observer generates self-consciousness...when he endlessly describes himself describing himself" (Hayles 144-5)—thereby characterizing self-consciousness as a linguistic epiphenomenon subordinate to autopoietic processes. Or, in terms of cognition, according to Hayles, "For autopoiesis, cognition emerges from the recursive operation of a system representing to itself its own representations" (Hayles 156).

This brief summary of Maturana and Varela's attempt to redefine the classification of living systems, I think, offers a useful and innovative way to reassess a key question posed by

Belén Gache in the context of Gustavo Romano's *IP Poetry Project*. Gache inquires, regarding the IP bots—whose structure and organization I'll describe shortly—"Their bodies may consist of different technological gadgets, but their mouths retain a human shape. Are they machines with human mouths, or is man a talking machine instead?" ("On Non-Human Poems and Talking Heads," *IP Poetry Project* 117) With this question in mind, I'd like to turn to Romano's IP Poetry Project to see if we might describe the system as autopoietic, or at least learn something about this generative poetic project through autopoietic descriptions of cognition, consciousness, life, and language. If in fact we are able to identify the larger system of the IP Poetry Project—user, bots, user interface, poems, internet search, etc.—as autopoietic, then might we say that it is a thinking machine, that it has consciousness, or that it's alive?

For those of you not familiar with the IP Poetry Project, its operation collects snippets of text from the internet—fragments based on user-entered data or pre-generated poems, in the case of an installation. Its four internet-connected automaton-bots, each endowed with the image of a human mouth on a TV screen, recite the generated poems (composed of phonemes "learned" by the machines) on screens displayed at public performances or installations. According to Romano,

The IP Poetry project studies the role of poetry and of poets themselves. On the one hand, as far as the construction of the robots is concerned, it highlights the increasing subjectivity of technology, which is endowed with certain artificially enhanced human characteristics (in this case, memory, and the ability to speak and listen). On the other hand, as concerns the resulting poetic structures, it uses the virtual arrangement of the collective human memory found on the Internet to compose poetry that has both mechanical and random elements (105).

I'll focus here on the web-based version of the program/installation, the "IP Poetry Creator," in which a user to Romano's project website may create his or her own virtual poem and see it recited by the bots. The user must first create an account, and then is prompted to enter a title for the poem, as well as four short phrases—two search terms ("búsqueda 1 y 2") and two "sentencias". The lead fifth bot, or the "Master of Ceremonies," searches for phrases beginning with the user-entered search terms and saves these sequences, while the "sentencias" are used intact in the poem—or, as Romano describes, "as wildcards or for the refrain" (106). The user may then define the structure of the poem, arranging the newly-"created" poetic verses and selecting which of the four "subservient" robots—named Arthur, Boris, Charlie and Dante—is to recite which line. I might add that after numerous attempts to create my own IP poems, the server has consistently timed out and resulted in the infamous 404 Not Found error—therefore I'm doomed to wallow in my own non-post-human poetic creations . In any case, according to the program's website, upon finalizing the poem's structure, the user may preview his or her poem in order to modify it in some way or save it in the program's database for recital by the bots—either online or perhaps at a future exposition.

The recital of the poem is really where the deliberate blurring of the line between man and machine hits its most striking visual and aural chord. After the user finalizes the poem, the MC bot instructs the other four bots to recite the poem via a voice synthesizer programmed with over 2,000 pre-recorded phonemes, and display a video of four human mouths—one for each humanoid bot— "pronouncing" the words that compose the poem. It is noteworthy that the programming includes "room to grow," given that it includes an algorithm to expand the enunciatory capabilities of the bots. Romano himself writes,

Since the number of resulting "theoretical" syllabic combinations was in excess of 25,000, it was decided to create a program to "teach" the robots how to speak. In other words, as sounds are found which are not yet in the program, a list is generated so these sounds can be subsequently recorded and added to the program, until all the phonemes used in Spanish are generated (106).

Whether or not this learning process is an indicator of something like cognition or intelligence is an idea that I'd like to pursue here, as it bears on my evaluation of autopoiesis as a theoretical paradigm for evaluating the "machine consciousness" performed by the IP Poetry Project. But first let's take a look at the recital of a poem by the bots, in order to get a feel for the kind of poetic activity taking place here. The following is a pre-recorded poem from the IP Poetry Local Viewer, a text appropriately titled, "sueño que soy". This was part of several installations from 2005-2008— recited on the banks of the Río de la Plata, as well as at the Instituto Cervantes in New York and in Beijing, for example—and is available in text-only and in "active" form on the *findelmundo* website:

1. http://ip-poetry.findelmundo.com.ar/localviewer.cgi
2. http://ip-poetry.findelmundo.com.ar/txtviewer.cgi

It is clear that the cyborg aspect at play in Romano's text is a deliberate blurring of the line between man and machine—Heather Fletcher has described this feature of the IP Poetry Project as a kind of reverse-cyborgology, since the machines acquire human characteristics and not the other way around (341) . But as I watched an IBM-designed machine named Watson defeat Jeopardy! uber-champions Ken Jennings and Brad Rutter in February—while reading Maturana and Varela's *The Tree of Knowledge*—I started to see thinking machines all around us— just defined in a different way than I had previously considered . I'm not proposing some kind of Turing test, a Searlean Chinese room experiment, nor a rigorous examination of the bots via new discoveries in AI. I simply want to know if we might consider these man-machine hybrids as self-conscious in the rather specific sense in which autopoiesis classifies cognitive systems. For Maturana,

A cognitive system is a system whose organization defines a domain of interactions in which it can act with relevance to the maintenance of itself, and the process of cognition is the actual (inductive) acting or behaving in this domain. Living systems are cognitive systems, and living as a process is a process of cognition. This statement is valid for all organisms, with and without a nervous system (Autopoiesis and Cognition 13; in Mingers 68).

The first question, then, is whether or not the series of structurally-coupled individual systems, comprising user, bots, user interface, poems, internet, and Romano himself as programmer, constitutes a closed, higher-order autopoietic system. We might ask: what does the material with which the bots are provided—decontextualized fragments from the internet and entered by users—really have to do with the production of components that give rise to and maintain the system's autopoietic closure/organization? What role does "learning" play here, in terms of the addition of new phonemes to the enunciatory capabilities of the bots?

If we take the user input of poetic search terms and refrains to be an example of the kind of "languaging" that triggers the structural coupling of human and machine, then we can see how the arbitrary nature of the internet search to compose "poetry" shows that there is no intrinsic "value" to the information selected. This is a very phenomenological move that also jives with

autopoietic theory, insofar as information is only "for" a unity or observer. Maturana himself famously remarked that "[a]nything said is said by an observer" (8), suggesting that abstractions like meaning and causality are present only in the domain of the observer. The user, then, interpolates the IP Poetic system by languaging and becomes structurally coupled to a machine that recursively turns back on its own capture of arbitrary linguistic signs. It "tries" to imbue these signs with human inflection, even going as far as attempting to "master" Spanish phonetics by "learning" new phonemes. By mechanistically acknowledging the distinction between known and unknown linguistic elements, the bots therefore make distinctions through languaging—thus demonstrating the kind of effective interaction triggered by an environment that autopoietic theory would call "cognition" or "self-consciousness." This recursive generation of distinctions resembles Maturana's discussion of the way in which an organism becomes an observer by "generat[ing] discourse as a domain of interactions with representations of communicative *descriptions* (orienting behaviors)" (29). This is, for Maturana, *self-consciousness*, which I'd like to posit as a feature of the IP bots in their autopoietic structural coupling with aspiring posthuman poets.


Belén Gache, following Romano's project's ironic humanoid implications, writes:
In the case of IP Poetry, we are witnesses to a paradigmatic event: while many of these new digital formats are anonymous, here each robot takes the opportunity to leave its personal stamp on the text recited. Each robot defines its own "humanoid" personality, which includes its own recitational characteristics. Such is the case of Astor, a bot that is characterized by reciting love poems. In the series Love Poems for Astor, this bot is introduced as a desperate, tragic reader, in that it seems to be struggling against the limitations imposed by its non-human body.
Astor reawakens the unsettling fantasy of inorganic beings who become organic, of robots come to life…
In fact, it is not only Astor who comes across as tragic when reciting his love poems, but the other bots as well, who, by insisting on their own names, vainly try to save an illusory subjectivity which, in fact, they never had (136).
While the tragicomic nostalgia for the presence of an absence that Gache describes here is certainly poignant, what the bots "do," at least in terms of the theoretical apparatus I've tried to elaborate above, is quite far from the metaphysics of presence or humanizing interpolation of the humanist reader. If the user-initiated structural coupling with these cyborg entities produces something other than aleatory strings of text—which we might or might not call "poetry," per the complex and often contradictory historization of the term—I don't know that it's necessarily related to their "struggl[e] against the limitations imposed by [their] non-human body." Rather, with respect to the specific definition of self-consciousness that I've described in terms of autopoietic theory, Astor's "plight" is linguistic in nature, insofar as he's a languaging machine reflexively maintaining his autopoietic organization by seeking strings of text on the Internet, fragments whose selection is triggered by users of the program. That said, I would argue that the answer to Gache's question—"Are they machines with human mouths, or is man a talking machine instead?"—is that we are as much (higher-order autopoietic) machines with human mouths as the IP bots are talking machines. Romano's talking robots, in addition to being

prostheses, cyborgs, surrogates, etc., also show us the way in which language is in essence an artificial and inhuman code that circulates well beyond our control—even beyond the poetic dreams of supposedly sentimental languaging machines.

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See also Fletcher's MA thesis, "El potencial literario: una perspectiva sobre dos proyectos digitales del *Findelmundo.com.ar*" (<http://web.mac.com/heathermfletcher/iWeb/6EE306D4-2AD0-4A10-B8D6-CCD2E2013DE5/E361AD3A-BD49-4135-8BC4-BEBA9FE389D7.html>).

According to a recent email exchange with Romano, this error is a result of changes to the Yahoo! search engine platform, which was used to power the interface (email from Gustavo Romano, June 1, 2011).

See also Deleuze, Haraway, Hayles, et al. In the Latin American context, I recommend J. Andrew Brown's recent book Cyborgs in Latin America (New York: Palgrave 2010).

See Stephen Baker's Final Jeopardy: Man vs. Machine and the Quest to Know Everything (New York: Houghton Mifflin, 2011) for a journalistic account of the IBM Jeopardy project.