Autopoiesis: Social & Anti-Social Machines

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This paper looks at the concept of autopoiesis, a term that originates in biology but has been applied to both social and technological systems. It asks how the concept might be useful in understanding our increasingly algorithmic culture, in which technology mediates society, identity and political subjectivity. Drawing out the importance of social creativity in politics, it suggests links between algorithms, ritual and art that may allow us to adopt critical positions from which to enact social change.

Autopoiesis means self-making. The term was developed as a concept by the the Chilean biologist Humberto Maturana in 1972, and explored with his colleague Fracisco Varela in an essay later published in English in the book Autopoiesis and Cognition. Autopoiesis concerns autonomy and aliveness, it was Maturana's attempt to answer the question "what is common to all living systems that qualifies them as living?"[1] The answer that Maturana and Varela give is that they have an autopoietic organisation, that they are self-maintaining through a continuous process of self-making. For them, a system's organisation is distinct from its structure. While structure describes the components that make up a system, organisation describes the "processes and relations between processes" that allow for interactions between properties of those components. A unity, or system that can be separated from its background, is defined by its organisation, not by its structure.

Maturana and Varela propose that while it is the properties of the components of a system that generate the relations necessary to its organisation, it is the organisation of the relations that give the system its identity, not the the components themselves. The identity of a living system is the result of its very specific organisation.

"An autopoietic machine is a machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components that produces the components which: (i) through their inter-actions and transformations continuously regenerate and realize the network of processes (relations) that produced them;"[2]

For Maturana and Varela an autopoietic system is alive because it is organised in such a way as to be able to constantly make and remake the relations between its components. It is homeostatic, or rather "relations-static," despite constant internally and externally produced changes to its structure, and as a result constantly produces itself. It is this self-production that generates the autonomy, and the aliveness, of living systems. The identity of the system is defined by its autopoiesis, the maintenance of the ability to maintain itself, with all change subordinate to that maintenance. Understood in this way, even if a component fails, as long as the processes and relations of processes are maintained the

1. Humberto Maturana and Francisco Varela, *Autopoiesis and Cognition* (Dordrecht: D. Reidel, 1980), 75-75.
2. Maturana and Varela, *Autopoiesis and Cognition*, 78-79.

identity of the system persists. Having a pacemaker doesn't make you a cyborg, in Donna Haraway's sense,[3] because it functions precisely to keep your autopoietic identity stable. Your structure might change, as it does constantly, but your organisation remains the same.

Applying these ideas more broadly, as many have done, gives us useful tools for understanding identity, autonomy and unity, as well as the relation of parts to wholes, individuals to societies. Key to this is how we think about boundaries. As Katherin Hayles points out in *How We Became Posthuman*, whether boundaries are produced by autopoietic systems themselves, or are the product of the observation of those systems, is not entirely clear. Maturana and Varela state that "it is a defining feature of an autopoietic system that it should specify its own boundaries"[4] but also that "there is no specification in the cell of what it is not."[5] Though perhaps not a direct contradiction, the difficulty of resolving these two statements could be seen as a root of the disagreement between Maturana and Varela about what kind of systems autopoiesis can apply to. At cellular level the cell membrane creates a physical boundary that coincides with its unitary identity as an autopoietic system. For higher level unities, multicellular organisms and multi-organism systems, it becomes less obvious where exactly a boundary should be placed. The boundaries I draw around myself are based on my self-conscious, self-observation, but self-observation must necessarily come from an imaginary external position. Whether the bacteria in my gut are part of my autopoietic organisation or not is perhaps a question without a single definitive answer. Where the boundary between me and not me is placed will be different depending on the real or imagined position from which the observation is made. Beyond the cell wall, the boundaries of an autopoietic system become difficult to pin down precisely, especially as properties of components of those systems may be part of multiple larger systems that may or may not be autopoietic themselves. Varela limited autopoiesis to the cellular level, where questions of boundaries are easy, while Maturana expanded it to the level of human society, where the question of how something can specify its boundaries without specifying "what it is not" become much more complicated, but also very interesting. Haraway's cyborgs appear where technology adds an extra level of complexity to the question of the boundaries and identities of both social and biological systems.

Commenting on the technopolitics seen by many as central to the indignado or 15-M movements in Spain, political and communications consultant Antoni Gutiérrez-Rubí states that "Today, the digital ecosystem enables you to live with various identities and to explore your multifarious identity,"[6] going on to suggest that this is what allowed so many in Spain, as elsewhere, to break with the traditional social structures that regulated political expression. This is what philosopher and activist Raul Sanchez-Cedillo calls the techno-political matrix—the "interface of bodies, brains and computers through the mediation of algorithms." Algorithms play an ever-increasing role in in how society and culture are organised. Ted Striphas states that "Culture now has two audiences: people and machines" resulting in an "algorithmic culture" in which computers do the work of "sorting, classifying, and hierarchizing people, places, objects, and ideas." This leads to what Emily Rosamond has termed the "algorithmic witness"[7] which assigns us 'character' based on the data-trail left by our behaviour. Such behaviour includes online activity—who you follow, what you like—but also academic grades, credit applications, how often you move house, which brand of toothpaste you buy. Anything that produces data can be fed into an algorithm that characterises and catagorises you. The effects of this include what Rosamond calls "algocracy,"[8] decisions made by algorithms, but also what John Cheney-Lippold calls "soft biopower", control based on suggestion.[9]

It seems to me that what both Gutiérrez-Rubí and Sancez-Cedillo are seeking in technopolitics is a new way to identify, characterise and legitimate new kinds of political subjectivities, constituencies, majorities without the need for pre-existing, traditional catagories and political identities. Sanchez-Ceillo is explicit that this requires

3. See Donna Haraway, "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century," *Simians, Cyborgs and Women: The Reinvention of Nature* (New York: Routledge, 1991), 149-181.
4. Maturana and Varela, *Autopoiesis and Cognition*, 109.
5. Maturana and Varela, *Autopoiesis and Cognition*, 91.
6. Antoni Gutiérrez-Rubí and Oleguer Sarsanedas, "Technopolitics and the New Territories for Political Action" *OpenDemocracy*, June 20, 2016.
7. Emily Rosamond, Algorithmic Witnesses, (Goldsmiths, University of London, January 25, 2016).
8. Emily Rosamond, Algorithmic Witnesses.
9. John Cheney-Lippold, "A New Algorithmic Identity: Soft Biopolitics and the Modulation of Control." *Theory, Culture and Society* 28 No. 6 (2011): 164-181.

an "autopoietic algorithm," one that acts as an external observer, setting boundaries to produce a unitary identity, separate from its background. For him, the algorithm can specify the boundaries of a network that, just like the biological cell, does not specify what it is not. The idea of having a group that does not define itself by exclusion, or against an other, is politically very appealing and the idea that an algorithm could identify commonalities between people that they cannot see themselves—that it could autopoietically create and maintain relations between components or properties of those components, that it could find the common ground, the agreed social norms, from which the resolution of social antagonisms could take place—is a very interesting one. Its already the type of work that algorithms are being asked to do, in law enforcement and warfare as well as consumer profiling.[10] It's also an idea I have some reservations about. Even if you consider technology to be neutral, any specific application of that technology cannot be neutral. Tarleton Gillespie, a researcher for Microsoft's Social Media Collective, has described how "We prefer the idea that algorithms run on their own, free of the messy bias, subjectivity, and political aims of people ... But its simply false"[11] or as Maciej Ceglowski puts it "Machine learning is like money laundering for bias. It's a clean, mathematical apparatus that gives the status quo the aura of logical inevitability."[12]

The hope that algorithms can be neutral witnesses, observers or arbitrators might be misplaced but there's also a way that this conception of the algorithm as an external organising agent ends up replicating some very traditional forms of social structure. The things that Sanchez-Cedillo asks of an autopoietic algorithm are strikingly similar to what Jodi Dean expects of the party form, which "responds to the subject [the political subject of the people] by recognizing it in the crowd and thereby making the crowd into something more than it is." [13] While the algorithm might do away with the need to have a hierarchical party organisation, Rosamond and Cheney-Lippold show that it still evaluates and ranks hierarchically.

It might be possible to identify two conflicting conceptions of the role of the algorithm in the techno-political matrix. One is to algorithmicise the social, in order to mediate, at scale, between the individuals and groups that make up society, in a way that can produce and legitimate authority without leadership, though it is perhaps only without explicit, visible leadership. The other is to socialise the algorithm, so that decisions are made, and boundaries are set, at the level of face-to-face communication, where no one can hide behind authority or objectivity. It is, I would suggest, in these social, discursive deliberations, that an unbounded, autopoietic identity might emerge.

The definition of a social system that Maturana gives in his introduction to Autopoiesis and Cognition is both broad and specific: "Any biological stabilization of the structures of the interacting organisms that results in the recurrence of their interactions, may generate a social system."[14]

When organisms stabilise each other, in such a way that they continue to interact, they become social. However, when this stabilisation occurs at the scale of human society new kinds of problems emerge. By subordinating all change to its maintenance, and its ability to maintain itself, Maturana says that "A social system is essentially a conservative system" and that its essential quality of prioritising stability means that it tends towards totalitarianism. That social systems change is clear, but a social system must be organised in a way such that change does not destabilise its identity, primarily by stabilising human conduct. This then impacts how we understand social change, or social creativity.

"Social creativity, as the generation of novel social relations, always entails interactions operationally outside the society, and necessarily leads to the generation, by the creative individuals, of modes of conduct that either change the defining relations of the society as a particular social system, or separate them form it. Social creativity is necessarily antisocial."[15]

10. See for example Cora Currier, Glenn Greenwald and Andrew Fishman, "U.S. Government Designated Prominent Al Jazeera Journalist as 'Member of Al Qaeda'" *The Intercept*, May 8, 2015.
11. Tarleton Gillespie, "Algorithms, clickworkers, and the befuddled fury around Facebook Trends," *Culture Digitally*, May 18, 2016.
12. Maciej Ceglowski "The Moral Economy of Tech," *Idle Words*, June 26, 2016.
13. Jodi Dean, *Crowds and Party*, (London: Verso, 2016): 473.
14. Maturana and Varela, *Autopoiesis and Cognition*, xxvi. The introduction to the 1980 English publication is written by Maturana alone, and sets out his case for the social implications of autopoiesis upon which he and Varela could not agree.
15. Maturana and Varela, *Autopoiesis and Cognition*, xxvii-xxviii.

Being part of a social system means being subordinate to the system's maintenance, and while components or their properties may change, the relations that allow the system to continue may not. New relations can only happen outside of society and are therefor anti-social. Although individuals can be part of multiple social systems at once, and while being part of multiple, separate social systems will not necessarily cause any problems of identity, by observing each of these systems "as if outside"[16] —taking a critical position in regards to the systems that you are part of—the contradiction between them might generate social problems. This is why, Maturana says, in totalitarian societies the potential to be part of other systems, and thus have multiple and possibly contradictory identities, is restricted. "An observer is always potentially antisocial." [17]

If anti-sociality is a necessary part of social creativity, then it becomes interesting to ask if an algorithm can ever be anti-social. Can an algorithmic witness be a critical observer, instead of stabilising majorities, can it act as a mechanism for social creativity? Technology can facilitate new connections and the algorithm can stabilise communication into sociality, this is what a hashtag does, but defining boundaries is always pro-social, and therefore conservative. Replacing an algorithmic with a human witness, replacing decision by machine with decision by human, means replacing algocracy with democracy. And while this might not seem like the most innovative idea, I would suggest that looking at the mechanisms, processes and institutions that can socialise, or even anti-socialise decision-making, while at the same time allowing for social-creativity and new kinds of social relations, is something that artists and theorists of art should be doing. Maturana says that to critically observe society, and to make an ethical choice to act against it "would be a work of art, a product of human aesthetic design."[18] Art, as a form of social creativity, is anti-social and so the mechanisms and institutions that allow it to be produced "operationally outside of society" are important.

Anthropologist David Graeber & Archaeologist David Wengrow's work suggests that destabilising social relations, self-consciously unmaking and then remaking differently society, is an essential quality of human culture and that in both ancient and contemporary societies this has often been codified into festival and ritual. As processes, or sets of procedures, that can contribute to the production of identity, the social algorithm and the ritual can be considered very much alike. Like algorithms, rituals can be utilised to stabilise society, redrawing or reinforcing boundaries, but Graeber and Wengrow argue that in practice things are less clear.

"Are rituals and ritual seasons expressions of arbitrary authority or venues of social creativity? Are they, in essence, reactionary or progressive? Were our earliest ancestors simple and egalitarian, or complex and stratified? Are humans good or bad? Perhaps all these questions blind us to what really makes us human, which is our capacity – as moral and social beings – to negotiate between such alternatives."[19]

Ethical, aesthetic and artistic work must always be anti-social, in opposition to the social stabilisers of human conduct and restriction of human creativity. The social algorithm, the discursive, democratic questioning of boundaries, reconfiguring relations of parts to wholes, can allow for the emergence of alternative social forms from which a dominant one might be critically observed. How we develop our capacities, individual and collective, through algorithmic, ritual and institutional procedures, for both criticality and creativity becomes a core question for what art is and how it is made.

16. Maturana and Varela, *Autopoiesis and Cognition*, xxviii.
17. Maturana and Varela, *Autopoiesis and Cognition*, xxviii.
18. Maturana and Varela, *Autopoiesis and Cognition*, xxviii.
19. David Wengrow and David Graeber, "Farewell to the 'Childhood of Man': Ritual, Seasonality, and the Origins of Inequality," *Journal of the Royal Anthropological Institute*, 21 (2015): 597–619.