

I. Biographical Notes

Humberto R. Maturana¹

Biologist, Cybernetician, Scientist born in Chile in 1928, Maturana invented his theory of autopoiesis following in the pathways of Bateson, Wittgenstein, the social 'ricorso' of Vico, the self-production notion of Paul Weiss, and many others. He has spent his career elaborating this theory within a biological research programme in his laboratory in Santiago, 'Experimental Epistemology Lab'. Known world-wide, he continues to elaborate his theory generating experimental evidence for the thesis that reality is a consensual communal construction while appearing to be 'objectively' existing.

Francisco J. Varela²

Born in 1946 in Chile, Varela received a strong classical education from the German Lyceum in Santiago, which instilled in him a deep and lifelong appreciation of literature, art, philosophy, and science. He received his M.Sc. (Licenciatura) in Biology in 1967 from the University of Chile in Santiago, where he studied with the neurobiologist Humberto R. Maturana. According to the story Francisco was fond of telling, as a young undergraduate, he one day burst into Maturana's office and enthusiastically declared that he wanted "to study the role of mind in the universe." Maturana responded, "My boy, you've come to the right place." He got his PhD in Biology from Harvard in 1970.

On Autopoiesis and Cognition The Realization of the Living (1973)

It has had a tremendous impact on a wide range of scientific domains, ranging from philosophy to cognitive sciences through law, sociology, etc.

II. Authors' Questions, Purpose & Premises

The authors' fundamental questions:

'What is common to all living systems that we qualify them as living?' (74-5)

'What is the organization of living systems, what kind of machines are they, and how is their phenomenology, including reproduction and evolution, determined by their unitary organization?' (76)

The authors' purpose (ironically!):

'To disclose the nature of the living organization' and more specifically *'To understand the organization of living systems in relation to their unitary character'* (75)

The authors' premises:

...we make a starting point of the unitary character of a living system (p. 75)

¹ This information was taken from the following website: <http://www.oikos.org/maten.htm> [online], February 16th 2009.

² This information was taken from the obituary of Francisco J. Varela by Evan Thompson <http://psyche.cs.monash.edu.au/v7/psyche-7-12-thompson.html> [online], February 16th 2009.

... Also we think that **the maintenance of identity and the invariance of defining relations** in the living unities **are at the base of all possible ontogenic and evolutionary transformation** in biological systems... (p. 75)

We maintain that living systems are machines... (p. 76) (definition of machine is below)

Our approach will be **mechanistic**: no forces or principles will be adduced which are not found in the physical universe (p. 75)

III. Core Concepts

System: any definable set of components (p. 138, glossary).

Homeostasis: the condition of maintaining constant or within a limited range of values some of their variables (136).

Machine: a unity in the physical space, defined by its organization, which connotes a non-animistic outlook, and whose dynamism is apparent (136).

- In other words, “What is significant about the machine is the relations of the properties of the components & the network of interactions and transformations (the actual nature of the components and their particular properties are irrelevant)” (77).
- Therefore, the organization of a machine is independent of the properties of its components which can be any, and a given machine can be realized in many different manners by many different kinds of components (and many different structures) (77).

Allopoietic machine: machines that have as product of their functioning something different from themselves (as in a car) (135)

Autopoietic machine: 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 interactions and transformations **regenerate** and realize the **network of processes** (relations) that produced them;
- 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 (78-9).

In other words, autopoietic machines are **homeostatic** machines (p. 78) and autopoietic machines maintain constant **the relations between components**, rather than the components themselves (p.81).

Autopoietic vs. allopoietic: the difference between the two can be illustrated by looking at **four** ‘consequences’ of autopoietic organization... (80)

- i) Autopoietic machines **are autonomous**

(i.e. they are subordinate all changes to the maintenance of their organization, independently of how profoundly they may otherwise be transformed in the process);

ii) Autopoietic machines **have individuality**

(i.e. they actively maintain an identity which is independent of their interactions with an observer) (*as opposed to allopoietic machines* which have an identity that depends on the observer and is not determined through their operation, because its product is different from themselves);

iii) Autopoietic machines **are unities**

(i.e. their operations specify their own boundaries in the processes of self-production) (*as opposed to allopoietic machines* whose boundaries are defined by the observer, who by specifying its input and output surfaces, specifies what pertains to it in its operations);

iv) Autopoietic machines **do not have inputs or outputs**

(i.e. they can be perturbed by independent events and undergo internal structural changes which compensate these perturbations and are always subordinated to the maintenance of the machine organization)

Living systems: Autopoiesis in the physical space is a necessary and sufficient condition for a system to be a living one (p.84).

IV. Close Reading Questions

1. “...the space defined by an autopoietic system is self-contained and cannot be described by using dimensions that define another space” (p. 89, bottom)
 - How do you interpret ‘self-contained’?
 - What does it say about the autopoietic organization as a system: is it open or closed?
 - Does autopoiesis accept or negate the possibility of intersubjectivity?
2. “It would be long to state why we depart from this radical empiricism. Let us simply say that we believe that epistemological and historical arguments more than justify the contrary view: every experimentation and observation implies a theoretical perspective, and no experimentation or observation has significance or can be interpreted outside the theoretical framework in which it took place.” (83, bottom)
 - Are the authors contradicting themselves by eschewing categories and external observation, but then accepting theory?
 - Considering they are observing autopoietic machines, are they really shifting away from categorization and external observation (refer yourself to the quote from question 1)?
 - Furthermore, what does their theory imply for the production of knowledge, especially with respect to the point of view from which one is observing? Are the authors implying that objectivity doesn’t exist?
3. “There seems to be an intimate fear that the awe with respect to life and the living would disappear if a living system could not only be reproduced, but designed by man. This is nonsense. The beauty of life is not a gift of its inaccessibility to our understanding.” (83)
 - Do you think this opens new ways of thinking about bioethical dilemmas?
 - Can/should living systems be human-made?

4. Recall how they emphasize that “*autopoietic machines do not have inputs or outputs*” (81).
 - Then, how can a cell or foetus be autopoietic if it requires food?
 - Is anything really autopoietic besides the universe?

V. General / Course-Related Questions

1. Can we apply the concept of autopoiesis to non-biological systems (social, political, economic)?
2. If so, how does it relate to societal issues (family therapy – politics)? Please refer to Beer’s example of family therapy & a socialist country (p. 71, 1st par.).
 - Do you agree capitalism is an autopoietic system?
 - If so, how can it be disintegrated (ex. current financial crisis, revolution, state intervention)?
 - How can we apply to a family situation?
3. What does the notion of autopoiesis mean for view of the environment/ecology and our relationship as human beings to the world (our anthropocentricity)?
4. What does the absence of teleology (purpose) mean for other areas of philosophy and the meaning of human life?
5. How are the authors proposing what Beer calls a “genuine interdisciplinary model” that goes beyond interdisciplinarity (“it transcends them”)? Do you agree with (Beer’s) idea that disciplines are based upon disciplinary/academic paranoia? If so, how can we use their concepts in practice for academia?
6. Do you think the reading of these authors opens new windows for thinking about your own thesis, either in terms of content or methodology?
7. “*A universe comes into being when a space is severed into two. A unity is defined. The description, invention and manipulation of unities is at the base of all scientific inquiry. Autonomy and diversity, the maintenance of identity and the origin of variation in the mode in which this identity is maintained, are the basic challenges presented by the phenomenology of living systems to which men have for centuries addressed their curiosity about life.*” (73)
 - How can we link this to the authors of the past weeks (Guattari, Wittgenstein, Husserl, and James) and *their* approach to phenomenology?
 - From this excerpt, what does this mean for notions of identity and diversity?
 - What came before the universe?

VI. Relevant Bibliography

Books

- Fischer-Lichte, Erika (translated by Saskya Jain), *The Transformative Power of Performance: a New Aesthetics*, Abingdon: Routledge, 2008.
- King, Michael, *A Better World for Children?: Explorations in Morality and Authority*, London; New York: Routledge, 1997.

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- Mingers, John, *Self-Producing Systems: Implications and Applications of Autopoiesis*, New York: Plenum Press, 1995.
- Philippopoulos-Mihalopoulos, Andreas, *Absent Environments: Theorising Environmental Law and the City*, Abingdon, UK; New York: Routledge-Cavendish, 2007.
- Sletter, Stephen (ed.), *Territorial Conflicts in World Society: Modern Systems Theory, International Relations and Conflict Studies*, Abingdon, UK: Routledge, 2007
- Teubner, Gunther (ed.), *Autopoietic Law: a New Approach to Law and Society*, Berlin; New York: W. de Gruyter, 1988.
- Varela, Francisco J. and Shear, Jonathan (eds.), *The View from Within: First-Person Approaches to the Study of Consciousness*, Thorverton, U.K.: Imprint Academic, 1999.
- , Thompson, Evan, and Rosch, Eleanor, *The Embodied Mind: Cognitive Science and Human Experience*, Cambridge, Mass.: MIT Press, 1991.

Material Archive

- ✓ Francisco Varela's Homepage (http://www.franzreichle.ch/images/Francisco_Varela/Human_Consciousness.htm)
On this site, you can get access to his entire bibliography, including his latest articles on neurophenomenology and first person methods, as well as on human consciousness.
- ✓ The International Society for the Systems Science (<http://iss.org/world/index.php>)
Founded at Stanford Center for Advanced Study in Behavioral Sciences in 1954 as the Society for General Systems Research, the International Society for the Systems Science (ISSS) adopted its current name in 1988 to reflect its broadening scope. The ISSS is among the first and oldest organizations devoted to interdisciplinary inquiry into the nature of complex systems.
The initial purpose of the society was "*to encourage the development of theoretical systems which are applicable to more than one of the traditional departments of knowledge*". It has now become a forum reaching out to people from the academia, as well as from the business, government, and non-profit organizations, coming together to share ideas and learn from one another.
- ✓ Monte Grande: What is Life? (starring Varela and the Dalai Lama), A film by Franz Reichle, 2004.

Academic Journal and Special Journal's Issue

Francisco Varela's Neurophenomenology of Radical Embodiment, Phenomenology and the Cognitive Sciences, Kluwer Academic Publishers, Volume 1, Number 2 (2002).

The contributions in this special issue are selected papers from a conference entitled «*La nature de l'esprit: à la croisée de la philosophie phénoménologique, de la neuro-biologie et des traditions spirituelles -- Journée en hommage à Francisco Varela*», organized by N. Depraz in Paris, October 13th 2001, at the Maison Heinrich Heine (Cité Universitaire), under the auspices of the Collège International de Philosophie.