

Chapter 12

Self-Referential Complex Systems and Aristotle's Four Causes

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ABSTRACT

In this chapter the author addresses a need for inclusion of all four Aristotle's causes (material, efficient, formal, and final) in modern science. Reality of modern physics (beyond Newtonian physics) and science of consciousness (and life and society) should include all four causes and tangled hierarchies (no scientific discipline is the most fundamental – the starting point for the author was Jung, then Rosen, and Aristotle was included much later). The four causes resemble rules for a machine or software (computation that "glues" everything together (Dodic-Crnkovic, 2012)), but a non-deterministic "machine" not replicable in a different medium. "Self-reference" from the title includes self-awareness, something seemingly not possible without final cause. On the other hand, this recognition of our (presumed) non-determinism and freedom might remind us to be even more self-aware and anticipatory. Computation, communication, networking, and memory as something technology is good at could contribute to that goal.

INTRODUCTION

This chapter deals with systems and complexity without prejudices. It is (as far as the author is informed) a unique attempt to demonstrate how Aristotle's four causes appear over and over again in different aspects of reality, including physical interactions and psychological functions – even space-time and conservation of energy (as an outcome of tangled hierarchies) are included in the scheme. This uniqueness doesn't mean that no one has ever written anything like that, but rather that the central idea (the four causes referring to themselves – a description of reality and consciousness with tangled hierarchies explainable to a human being, but not replicable on a machine, i.e. How to program variables such as "space-time" and "causality"?) combines other people's work in a new schema. It combines the works of many authors who have come in their respective disciplines just a step from it – for instance, Robert

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Rosen, Carl Jung (and Wolfgang Pauli (Miller, 2010) – genuine results of a borderline pseudoscientific (including imagination and dreams) methodology, without ever mentioning Aristotle's four causes.

After Background and the section about people and machines we are dealing with different scientific disciplines and their pretences to be the most fundamental science (axioms, an unsuccessful attempt to avoid tangled hierarchies) that provides the most basic answers to everything that exists no matter how big, small, or complex. The overview of old scientific disciplines ends with philosophy and ideas not so new (such as Aristotle's), but nowadays mostly rejected or ignored as irrelevant or pseudoscientific. After that we acknowledge modern revisions of science including some (such as synchronicity, retrocausality, and anticipation) still not widely accepted or even known. The next section represents the author's unique approach to Aristotle's four causes and the way they (according to him) appear at different layers and in different modes of existence. The section after that one goes even further into speculation about what it means for reality (including physics, consciousness, and interactions between humans and machines) and our perception and behaviour within it.

BACKGROUND

There is vast literature on philosophy, theory of everything, and system theory. While these attempts are worthy in their respective domains, it is interesting that for instance Troncale's (2013) ambition is to search for the theory of everything in system theory rather than physics. The approach in this text is similar to Troncale's (see also McNamara and Troncale (2012)), but different in realization. Instead of looking for common denominators and axioms of reality, the idea is to look for anomalies. Since graphs, tables, and explications are used instead of theorems and equations, this is more an attempt to tell the story of everything than define the theory of everything. The reader's self-awareness will be invited to see itself as a part of the description and a methodology akin to story-telling (see Juarrero (1999) on hermeneutics and consciousness) seems to be the only way to really include consciousness in the explication as it goes. Is this approach less scientific than those aforementioned? Let's take for example strange loops. No axioms and smallest components (or, in the spirit of this book, parts of a machine) will bring you closer to a strange loop through the concept of four causes or elements. In order to identify a strange loop, you just happen to be in the middle of it. Consider Heidegger on the four causes, as "fallen from heaven" (Heidegger, 1977). (Ed.: as indicative of the fact that this is our cosmology, because this is our place in the cosmos, the frame of our situation.) There is no beginning and end, everything is overlapping and "in the middle" from within a strange loop. It has been a challenge to write about strange loops, and hopefully we can avoid getting stuck in a noose.

PEOPLE AND MACHINES, COMPUTATION, AND COMPUTABILITY

The central idea in this chapter about four causes is a critique of ideas that life, consciousness, and everything around us are reducible to causal sequences, where logical and temporal causation go in one direction. On the other hand, the author (an engineer) was inspired by machines (specifically computation, see also Dodig-Crnkovic (2012)) as he was wondering what is inside the "black box" of existence. In a way strangely, if we define computability as something reproducible on a computer or another device (for instance, an artificial neural network), it seems that reality is a computation in the sense described

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