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Not peer-reviewed version

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Lucia Urbani Ulivi and Primavera Fisogni *

Posted Date: 7 June 2024

doi: 10.20944/preprints202406.0359.v1

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*Article*

# Processes. A View from Inside

**Lucia Urbani Ulivi [1] and Primavera Fisogni [2,*]**

[1] Professor of Philosophy at USI-FTL Lugano 1; lucia.urbani.ulivi@usi.ch
[2] Journalist at La Provincia daily newspaper, Como; pfisogni@gmail.com
* Correspondence: luciaurbaniulivi@gmail.com; Tel.: +39-3387482229

**Abstract:** A processual texture lies at the core of phenomena that undergo change. Philosophers have observed the incessant becoming of our world from antiquity to the present day, but an explanation must still be found in terms of contemporary metaphysics. This article strives to bring the focus on the domain of *possibles*, an under-theorised philosophical issue that dwells in the ontological realm between the possibility and its actual realization. Sketching a more comprehensive concept of the possible unravelling the thread of its main meanings, the process of change will be not simply clarified from inside, but also understood as an activator of reality. Finally, the discussion will argue for a principle of prudence and responsibility derived from an ontological basis.

**Keywords:** possible; logical possibility; ontological possibility; achievability; system thinking; change; augmented reality

## 1. Premise

The era in which we live, thanks to the global framework in which all events unfold, even those that are seemingly less relevant, has accelerated, made changes more macroscopic and visible, and has re-launched—in a new and unexpected perspective—the dynamic texture of different phenomena. At the light of radical changes in the world system, traditional models of analysis in economics, environmental emergencies, and anthropology, just to name but a few, have been undermined. With perhaps unprecedented clarity, the emerging feature of contemporary complexity can be seen precisely in the interweaving and interchanging. The problem of becoming, which is as old as early philosophical thought, open itself to the contemporary thinker's gaze. It questions the drive for change in entities. Today's approach to the issue of change requires two steps. First and foremost, to set the problem in a contemporary context is needed: this framework profoundly altered by the changing of the historical conditions makes it a somewhat "new" problem. Secondly, to introduce and to develop concepts previously scarcely available which make it possible to address aspects of reality, in particular processes, hardly treatable with traditional categories of thought. The thought goes immediately to systemic thinking, a powerful source of renewal for many aspects and concepts of doing philosophy today. But how does systemic contextualisation provide new tools for understanding the ancient problem of becoming? [1] Let us briefly recall the features of systemic thought that are endowed with explanatory power to improve the understanding of the problem of becoming in the light of possibilities.

## 2. The Change in the Perspective of System Thinking

A general assumption guides the way in which general systems theory looks at the world of life. Systems set the theoretical framework of the current investigation on transformation processes. Entities considered as systems are not simple aggregates of parts or sums of constituents, but dynamic and coherent units with qualities that depend on innumerable processes of interchange, both internal and external to the system, in relation to other systems and to the environment. Like a stone in a pond, General Systems Theory, by virtue of its interdisciplinary applicability to multiple forms of knowledge, has offered an effective key to understanding change and complexity. Since the

 doi:10.20944/preprints202406.0359.v1



beginning, it has presented itself as a valid alternative to the theoretical fragmentation of reductionism and the substantial sterility of analytical thought. Its orientation has not only been profitably applied to biology and physics, as well as to psychology, economics and medicine, embracing the entire sector of the human sciences, but it has also proved disruptive in the epistemological field, because it has made it possible to reintroduce the conceptual tools of modernization, worn out by time, and others (one of which, above all, is finalism), as well as to forge new ones, such as self-organisation and emergence, or to widen the range of investigation of others, derived from the sciences, such as equivalence, with heuristic outcomes of undoubted relevance.

Systemic thinking has thus responded, through its conceptual generative capacity and interdisciplinary dialogue, to the objections of its fiercest opponents, inspired mainly by vague, imprecise concepts derived from the superficial level of the *sensus communis*. In a relatively short period, a critical mass of knowledge has been activated to legitimise concepts such as totality, global unity, purposeful processes, specific functions, multi-level realities and emergent properties. By explicitly linking the behaviour of phenomena to hidden variables that remain opaque to direct knowledge, the conceptual core of general systems theory leads us to consider the relevance of the unobservable at the origin of what we observe. This is also the path we follow in addressing the question of the concept of possibility as an explanatory source of change or, if you prefer, becoming. Returning to the possibilities of understanding introduced by systemic thinking, two conceptual contributions seem relevant: 1. The modality expressed by the keyword DYSAM (a recent coinage that refers to DYnamic uSAge of Models), which inserts the transformations undergone by an object/system within the arrow of time, theorising the irreversibility of the process. 2. The systemic approach brings into play morphogenesis, a concept revealed by biology as a more precise description of some modalities of becoming, the process that occurs when an organism or biological structures are formed.

## 3. The Question of Change

When considering the question of becoming as the realization of the possible, a preliminary question arises, which can be formulated as follows: which idea of change accounts for becoming in its multiple meanings? Three main meanings are particularly interesting to highlight.

### *3.1. Change as a Process. An Entity Changes Keeping Its Identity and/or Enters in Larger Systems*

In this dynamic the subject of change remains the same. The system retains its identity, in its observable and attested processuality, to the extent that the balanced flow of acquisitions and dissipations falls within the realm of its specific possible realizations. Identity here should be understood from a processual perspective, which avoids both essentialism and the negation of identity. In terms of life, it is an ongoing experience in which we are constantly active participants. Human growth and development involve a series of phases, including childhood, adolescence, youth, maturity, and old age, which result in the acquisition and loss of emerging properties.

### *3.2. Dissolution. An Entity Loses Identity*

Phenomena attributed to this group involve the disappearance of the subject, rendering it unidentifiable. An example of this is the end of biological life, which occurs when the organism's functional activity ceases, resulting in the termination of the individual entity.

### *3.3. Morphogenesis. An Entity Is Formed and Acquires Identity*

Within the process of change, this word expresses the literal meaning of 'metamorphosis'. Morphogenesis describes the frame in which new entities, in whatever ontological sphere, emerge from the ashes of dissolution. New terms may be necessary to identify these entities. Borrowed from biology, where it refers, for example, to cellular differentiation as it occurs in embryonic development, this transformative process can be seen in the phenomena of life, at both microscopic

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and macroscopic levels. The concept is also widely used in geology to describe the modelling of the earth's relief due to exogenous or endogenous factors.

## 4. Many Manners of the Possibles

1. Logical possibility. Bound to non-contradiction
2. Ontological possibility, bound to an entity
3. Possibles achievable, bound to environment

### *4.1. Logical Possibility. Bound to Non-Contradiction*

Imagine one day you go to work and, suddenly, your life takes an unpredictable turn because you enter a completely different world, as "another me". Something similar happens in the film "Sliding Door" (1998), starring Gwyneth Paltrow. Is this science fiction? Not really, at least not from the logical point of view that gives space to other environments, different from the world of life we know, where possible things can live without contradiction. This is the land theorised by the philosopher David Lewis within the frame of the modal realism.

The sort of possibility here at the stake is *logical possibility*. It is concerned not about the existence of objects considered in term of the laws governing the physical world, but about the *modes* in which something can be. Thus, it follows that whatever can be thought—being intelligible—it can be also possible. In *modal logic* at large, a proposition is possible if it's true in some possible world, the very key idea on which this theoretical perspective is rooted.

For Lewis, the plurality of worlds is not just a concept, because every single possible object is a real entity according to the logical possibility framed into the modal perspective. He argues that our world is just one among many; the possible worlds are something like distant planets that cannot be framed in the traditional space-time coordinates. "For instance, we know a priori that besides the donkeys among our world mates there are countless other donkeys, spread over countless worlds. They are other-wordly donkeys, 'merely possible' donkeys, but donkeys nevertheless" [2] (p. 110). Far from the "incredulous stare" that such a statement provokes, Lewis's logical point discloses a logical realm as vast as the object that can be thought ("There are so many other worlds (…) that absolutely *every way* that a world could be is a way a world *is*"; [3] (p. 86)). Although Lewis's theory seems to resound Leibniz's doctrine of the possible world, they are antithetical. For Leibniz the possible worlds are compossible only in God's mind, while real things are ontologically rooted in the (divine) causation/creation. For Lewis does not matter the distinction between the real and the possible things, because they both exists without any contradiction.

And, finally, what would Lewis say about the fact that I work in Milan, but it can be "another I", similar to me, that work, say, in New York? Well, he could claim that me and my "double" [3] are counterparts, thus we both exist [4]: precisely I exist in an A1 world and my double inhabits the A2 world.

Lewis invites us to consider our world as one of the possible worlds, that is, a member of the domain of logically possible worlds. In that domain**,** our world will be, like the others, 'real' and also 'existing'. But a number of crucial questions arise: is the domain of logical possible worlds the only domain of "reality" and "existence"? The domain of logically possible worlds saturates ontology? Being an empirical entity is nothing but being a logically possible entity? If we support this thesis, we are committed to consider scientific knowledge, common sense, cultural heritage as irrelevant. If we value other forms of knowledge beside logic, we are *de facto* accepting pluralism both in epistemology and in ontology. Pluralism asserts that there are many and different domains of reality, irreducible to each other, which must be investigated with different tools, each valid in its own domain of application.

In the light of pluralism the question of what is 'real' and what is 'existing' is more a matter of ontology than semantics. If the ontology is monist, the terms 'real' and 'existent' will also have one and only one meaning, if it is pluralist, they may have different meanings, depending on the domain in which they are used. Lewis is clearly monist and reductionist: he has a logically strong position,

 doi:10.20944/preprints202406.0359.v1



which leaves our world, the world in which we live and which we strive to understand and explain with all the conceptual tools at our disposal, unexplained.

*4.2. Ontological Possibility. Bound to an Entity*

The field of logical possibility encompasses everything that is not contradictory: in it elephants that fly, bees that speak, liquid water that is not wet can be included. In that world those strange entities are real, they exist. If, faced with that strange world, we ask: "are those entities possible?" most likely we are not questioning if they can be thought, or if they are intelligible, but we want to know whether those entities are ontologically possible, if there is a possibility that we meet them in our empirical world. We are shifting the question from the plane of logic—or to be more precise, from the plane of the ontological domain of logic—to that of the ontology of the physical world. In our world, as for the knowledge we have at this moment, elephants cannot fly, bees cannot speak, liquid water wets. They are possible from a logical point of view, but impossible in our physical world.

Many entities logically possible are ontologically impossible: the domain of the ontological possible is narrower than the domain of the logical possible: not everything that is non-contradictory presents the conditions for realisation in the physical world, where it is subject to physical laws and to various types of constraints. Every real entity subject to change in the physical world can only implement a limited number of ontological possibilities in the dynamics of its historical journey. The domain of the so-called impossible objects clearly shows the crucial difference between a logical possible entity and an ontological one: impossible object can be represented in two dimensions but cannot be constructed because they fail the reality test. This is the case, for example, with Escher's lithographic art and the Penrose triangle. The construction of "Relativity" (1953) by Escher combines several perspectives and makes them converge in a single focus, that of the observer. A condition that is not allowed in reality. Something similar happens with the Penrose triangle, which consists of an impossible overlapping of lines with different perspective constructions. It appears as a solid made up of three-square prisms joined together with three straight corners to form a triangle. Given that in Euclidean geometry the sum of the interior corners of a triangle is 180°, there can be no more than one right angle. The two-dimensional possibility is contradicted by the three-dimensional texture of the world of life. Logical possibility undergoes ontological possibility whose main claim is about the impossibility that something exceeding physical laws of the world of life can possibly exist. Pegasus, the mythological winged horse, cannot fly in the domain of biological animals because the muscular strength that the wings would have to have to support it in the air is greater than that available in the horse's organism. Pegasus is a good example of an entity that has always been regarded in philosophy as a possible entity, whereas it is now clear that it is logically possible simply because the concept of 'horse' does not contradict that of 'winged', and it is ontologically impossible because such an entity cannot be created in the reality we know, where the behaviour of a body is subject to laws.

This allows to draw two philosophical consequences that can be summarized as follows:

First: our knowledge of what is ontologically possible is subject to severe limits. We observe the change, but what activates the change is not reachable through direct observation: it lies in the opaque world of the unobservable. We can only say with certainty that something was possible when we see it realised, when it has moved from the realm of the possible to that of the actual. We know that Dumbo cannot exist in the physical world, but we don't know what changes a physical elephant can meet.

The recent case of the elephantesses in the Gorongosa National Park in Mozambique has aroused astonishment and concern among scientists. It has been observed that up to 50% of the population within the park lacks tusks [5]. This is believed to be a genetic mutation that has been selected for by the animal species to protect itself from the threat of wild poaching [6], with ivory being a highly sought-after raw material on the market. Prior to this extreme response, it was observed that male elephants born after 1995 had tusks that were 21 percent smaller than those of males born in the 1960s, and 27 percent smaller than those of females born in that period. This reduction in tusk size is indicative of an adaptive response to extreme environmental conditions. The fruit fly, Drosophila melanogaster, is a notable example of this phenomenon. The fruit fly is adept at adapting its food-

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feeding behaviour when nutrients are scarce. This is because the larval growth period is extended, allowing for additional growth and ensuring an appropriate final adult size under unfavourable growth conditions [7]. The key role here is played by hormones (insulin, peptides with glucagon-like function, and steroid hormones) that systemically exchange information and provide the other biochemical components with specific signals. Such behaviour prompts scientists to recognise the 'flexibility' of the Drosophila's metabolism, which is required to perceive and respond to alterations in external environmental conditions and its internal state [7].

Before they happened, we would have dismissed these changes as impossible from an ontological point of view, and these are not isolated cases: we are often faced with changes that we would have qualified as "impossible", and this should not be attributed to our tendency to make mistakes, but to the inherent limit of our knowledge, which can only make assumptions about the possible. Fish cannot speak in the absence of an adequate phonatory organ. However, if some varieties, through evolutionary processes, were endowed with it, then the proposition "Some fish speak" would have absolute validity, even in a metaphysical sense and the talking fish that we had qualified as impossible becomes to all intents and purposes ontologically possible.

The latest example discloses a further path of the issue debated, in the direction of epistemic possibility strictly related to ontological possibility, which refers to the current state of our knowledge in the actual world. Therefore, it can be assumed that the ontological possibility is linked to the characteristics of the world in which we live that are known to us, which remains the main reference of what we estimate to be ontologically possible.

Our pluralistic ontology extends its domain to include unobservable traits, endowed with causal capacity with what we can observe. We know the world of ontological possibilities only indirectly, not differently from the laws of physics, from other people mind, from moral constraints which we obey without knowing them explicitly. Astrophysics makes peculiar use of this way of proceeding to understand the cosmos, if we consider the fact that only a small part of celestial phenomena are known experimentally, and the remaining part is thematised on the basis of hypotheses [8,9].

Second: to explain the observable change—as well as under the microscope and the telescope—it is necessary to introduce a second hypothesis: an entity has a restricted range of possibilities, which limits the extent of the changes that this particular entity meets. Examples can help provide clarity.

The colour of human blood cannot be green or blue simply because it is composed of haemoglobin (Hb), an iron-protoporphyrin protein that gives it a red colour [10,11]. Furthermore, although fish are capable of emitting sounds, even articulate and recognisable sounds, for signalling and communication [12], they cannot speak because they lack the necessary vocal organs for speech [13].

### *4.3. Possible Achievable (PA). Bound to Environment*

Systems thinking has strongly emphasized the relevance of the environment to the behaviour of an entity. Giuliani and other biologists have observed that a cell changes its conduct and properties depending on the environment in which it is placed [14], by virtue of the interactions with other cells and non-cellular components of its own environment. This is particularly true for the metastatic pathway of a cell that seems to involve mechanical interactions between cancer cells and their micro environment [15,16], in an intelligent way [17], so that it can be concluded that "The behaviour of a cell over time (dynamics) is a function of both the state of its 'internal machinery' (...) and the local environment" [18] (p: 2368).

Exploring the domain of the possibles achievable (PAs) allows to grasp processual stages within the development of an entity, so that a veritable principle of change can be detected. Examples might give us some immediate grip on this kernel notion.

Thinking of a human being, we were to say that a child has an immense world of possibles achievable, that he can become a lawyer, an engineer, a criminal, a politician. Every path can be disclosed. As he/she grows up, that world of possibilities shrinks because when he/she goes to Law School, the other educational possibilities are eliminated. If the freshman becomes a lawyer rather than a law lecturer, the field becomes even narrower. It is a bit as if, in the evolutionary process, we

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gradually lose a cluster of possible achievable, fewer, and fewer are left. It is a bit like an ontological loss; the possible achievable are a great ontological wealth that we see gradually diminishing, for the simple reason that some are excluding others. Every newborn has the chance of learning Kyrgyz as a first language, but if the child grows up in an environment where Polish is fluent, learning Kyrgyz is excluded from the list of possibilities that that child can realize, although it was both logically and ontologically possible for him/she to speak Kyrgyz.

Environmental pressure imposes constraints on what is achievable. The hypothesis that the colonisation of Mars, now at the centre of the expansionist plans of China and other nations, can be planned is an example of reasoning based on what is an achievable possible: it starts from tested empirical data (e.g.,: repeated experiences in space prove the organism's adaptability to the environment; technology makes it possible to build eco-systems in which greenhouses can be cultivated, for the production of fruit and vegetables) and diagnostic investigations of the Martian soil, made possible by direct data acquisitions, to elaborate a project capable of configuring what is not yet (the presence of human communities on Mars) but has bases in reality (empirical data), with what may be in the very near future. The feasibility of the project, we might say, is legitimate by virtue of the connection of what we empirically know to what, on that basis, appears to be possible.

These considerations bring into light two fundamental laws of Pas.

* PAs force a further restriction on the field of ontological possibilities: not every possible belonging to an entity is achievable regardless to the context, only those possibilities that are permitted by the environment, are realized. What an entity can achieve is subject to the constraints imposed by the context: the expression of the possible is governed by the actual.

* Between the possible and its achievability, there is a *leap* that can be read as a creative component that is crucial to feeding reality. Without the submerged world of possibilities—in its multiple senses—nothing can be achieved. Which one of possibilities will be achieved rests in the opaque region of unpredictable.

This is the driving force behind our ability to create and introduce innovative products into the world. However, can we always control the outcome? Unfortunately, we cannot. The world holds the power, as it permits certain things to be realized while prohibiting others. What is emerging in the domain of the possible realisable is a game between us and the world. Can we say that we always hold the game? No, we cannot: the world has the game, because it allows you to realise some things and prohibits you from realising others.

Where does this consideration, gained from the transformative domain of the possible realisable, take us? Why do we need to reflect on this right now? Let us think of operations, even marketing-oriented ones, such as that of Elon Mask who experiments with the application of chips in the brain to enable people with disabilities to regain the ability to move and interact with the environment.

Elon Mask should be cautious because, on the basis of life as a process that is the constant result of concerted action between the possible and the actual, he does not know whether what he has achieved becomes harmful, harmful to the purposes of, for example, the person to whom the microchip has been implanted or the environment with which that person interacts. To know this, you have to do it, somewhat blindly, without knowing where it will lead.

And is that worth the game?

The discourse should bring a principle of prudence and responsibility on an ontological basis, not appealing to ideologies or general moral principles.

## 5. Augmented Reality

The main theoretical conquest is the relevance of the possible, to be understood not as a generic and vague philosophical category, but as that specific pool of possibilities inherent to each entity, allowing a change within parameters that together constitute the limits and constraints within which the change occurs, and can occur. A domain, as has been said, that remains opaque to direct knowledge, that must be pursued and traced only indirectly, following backwards the path from that which is shown towards that which, while not showing itself, allows its realisation. To this end, a particular inferential procedure is used, abduction, through which from what is effective, realised,

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directly observed, knowledge is drawn, indirectly and hypothetically, of what had to be operative for what is observed to be realised[1]. In the process of interaction, the possible and the actual are different on an ontological level, but not clearly separable. Upon closer examination, a more comprehensive understanding of reality emerges, which could be described as augmented reality: reality is not only present but also subject to change. Based on this premise, the possibles are effective components of reality.

## 6. Conclusions

As has been argued, the actual results from a process of interaction with the possible. In their continuous interplay, reality as presence and reality as reservoir of possibles, are the poles that realize change in its multiple meanings. In any process of whatever level of reality, the present governs the hidden world of possible, and a possible can only be be realised if it respects both the constraints of a system [20] and environmental conditions. The possibility in the sense of logic non-contradiction holds a general reference that is valuable in the domain of logic but is inadequate to explain the processes observed in the physical world [1]. Introducing three main meanings of "possible", we are not proposing a simple semantic distinction, but we are holding a pluralistic position both in epistemology and in ontology, in syntony with the multiple systemic view explored by Minati *et al.ia.* (Multiple Systems) [21–23].

To better understand our world, where we live, and think, and make any effort to describe, we need a multiplicity of concepts and methods [20], choosing the ones better suited for a domain, and we identify multiple ontological realms, without restrictions. We have here identified three meanings of "possible": logical, ontological, environmental, but we are prepared to accept other meanings that may be proposed by further research perspectives, and that should be valued as effective contribution if they help to improve our knowledge of the processes in the world.

**Funding:** This research received no external funding.
**Conflicts of Interest:** The authors declare no conflicts of interest.

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