

DOSSIER

Nature-Life continuity: is there a necessary method of inquiry?

A Continuidade da Natureza à Vida: existe um método necessário de investigação?

Sofia Stein¹

ABSTRACT

In *Linguistic Bodies*, Ezequiel A. Di Paolo, Elena Clare Cuffari and Hanne De Jaegher (2018) propose a dialectic method to explain organism's movements and exchanges, i.e., life interactions and evolution, that can also explain the evolution from life to cultural relations, that include linguistic interactions. One of the main questions *Linguistic Bodies* wants to answer is how to explain human life and culture without a reductive scientific thought. If one defies radical reductionism, one of the central risks is to dissociate physical inquiries from biological investigations. In the book, the authors oppose the analytical mode of thinking present in many natural sciences to a dialectical mode of thinking that would explain living beings' interactions. It is relevant to question if they succeeded in defending the dialectical model they profess to be the best suited to explain human social phenomena. Following this line of rationale, in this paper, I will, first, show that dialectical methods are over-ambitious and, second, inquire into the anti-reductionist attitude present in the dialectical model advocated in *Linguistic Bodies*.

Key-words: Linguistic bodies, Radical reductionism, Dialectical model.

RESUMO

Em *Linguistic Bodies*, Ezequiel A. Di Paolo, Elena Clare Cuffari e Hanne De Jaegher (2018) propõem um método dialético para explicar os movimentos de organismos e as trocas que ocorrem entre eles, isto é, as interações orgânicas e sua evolução, que podem também explicar a evolução da vida até as relações culturais — que, por sua vez, incluem interações linguísticas. Uma das principais questões que *Linguistic Bodies* quer responder é como explicar a vida e a cultura humanas sem um pensamento científico redutivista. Se desafiarmos, no entanto, o redutivismo radical, um dos principais riscos no qual incorremos é o de dissociar investigações fisicalistas de investigações biológicas. No livro, os autores opõem o modo analítico de pensamento presente em muitas ciências naturais ao modo dialético de pensar, que explicaria interações entre seres vivos. É relevante questionar se eles tiveram sucesso em defender o modelo dialético que professam ser o mais adequado para explicar os fenômenos sociais humanos. Seguindo essa linha de raciocínio, neste artigo, mostrarei, primeiramente, que métodos dialéticos são excessivamente ambiciosos e, em segundo lugar, investigarei a atitude anti-reducionista presente no modelo dialético sustentado em *Linguistic Bodies*.

Palavras-chave: Corpos linguísticos, Reducionismo radical, Modelo dialético.

¹ Universidade do Vale do Rio dos Sinos - UNISINOS - Programa de Pós-Graduação em Filosofia. Av. Unisinos, 950, Prédio B09, 4º. Andar, 93022-000, São Leopoldo, RS, Brasil. Email: siastein@me.com.

1. Starting Point

In *Linguistic Bodies*, Ezequiel A. Di Paolo, Elena Clare Cuffari and Hanne De Jaegher (2018) propose a dialectic method to explain organism's movements and exchanges, i.e., life interactions and evolution, that can also explain the evolution from life to cultural relations, that include linguistic interactions. They are inspired by Maturana's and Varela's (1992) vision of how life evolved in organisms that have autonomy, that organize themselves internally (*autopoiesis*), and that adapt —structurally couple— to their environment through this same *autopoiesis*. Varela's, Thomson's and Rosch's embodied cognition theory (1992) delimits the boundaries of Di Paolo's, Cuffari's and Jaegher's linguistic bodies explanation system. Using dozens of other authors, like Bakhtin, Hegel, Lakoff, Marx, Merleau-Ponty, Piaget and Vygotsky, they create a dialectical model that should be able to explain, among other events, autonomy, adaptability, sensorimotor agency, social interaction, participatory sense-making and linguistic bodies interactions.

In the book, the authors oppose the analytical mode of thinking to dialectical thinking. One of the likelihoods with choosing a method and staying with it is not recognizing the object's autonomy to be something other than what the method observes in it. We continuously claim to explain the totality of the world, and we find it difficult to accept a partial and incomplete view of what is outside us. In this desire to explain the totality, we may end up imposing our reasoning and its forms on the phenomena that often present themselves disconnected to our senses. Following this line of rationale, in this paper, I will, first, show that dialectical methods are over-ambitious and, second, inquire into the anti-reductionist attitude present in the dialectical model advocated in *Linguistic Bodies*.

2. Dialectical Methods

Regarding Kant, Hegel sometimes speaks with great admiration and respect and sometimes as his greatest opponent. Hegel considers the Kantian system as a major milestone in the history of philosophy, but he also considers that it has serious flaws, such as the consolidation of the subject-object dualism. Hegel's criticism of Kant focuses mainly on his assertion of the existence of an external world that is epistemically independent of the subject and, above all, not accessible to human knowledge, which would be the thing-in-itself. It is of paramount importance for Hegel to overcome Kantism as understood as containing an unresolved dualism.

According to Kant (1957b), teleological judgment of nature is compatible with nature's mechanical explanation. Without the *a priori* principles of understanding, it would not be possible for us to have any knowledge of our intuitions. However, the natural phenomena that result from the determination of judgments about nature may appear in our judg-

ment as mere aggregates and be explained only mechanically. The categories of understanding are often insufficient in the logical account of natural phenomena and in their investigation. Therefore, it is essential for judging about nature to have the subjective perspective of the reflexive judgment. Through it, nature is evaluated as a technique whose forms have a purpose. However, whether in the teleological judgment or in the determinate judgment, it is not a question of nature and its forms as they are "in themselves", but only in the way we know or think them.

Enactivism would not be compatible with Kantian transcendental idealism because the Kantian methodology is not ambitious enough: it establishes limits to our understanding of nature—but not, obviously in a Cartesian spirit, of the human mind. According to Kant, our knowledge of nature is always limited to our cognitive capacities and is determined by them. In some sense, nature is what we "suppose" it is. Hegelian approach and method intend to overpass Kantian epistemological restrictions, presupposing unlimited human capacity to know about natural and cultural developments. In *Linguistic Bodies'* enactive approach, we recognize these Hegelian assumptions:

We can understand the enactive approach as resolving the classic contradiction between subjectivity and world that other approaches in philosophy of mind do not resolve (enhancing, instead, one term of the relation at the expense of the other). Subject and world do not meet as two ready-made poles of being that must be put into some harmonious relation, in an operation that leaves the terms (and the relation) external to each other. There is a passage from world to subject and from subject to world. Enactivists "resolve" this passage by thematizing the third element between the static poles: bodies in action and their world-transforming practices. Thus the whole system is set in motion and ontological questions are neither reduced to epistemology nor severed from it. As we have seen in the first part, significance is enacted by bodies in the world, which are also bodies of the world. But this is nothing if not the dialectical transformation of a solid dichotomy into a fluid, dynamic, ongoing becoming of bodies in action. This is at the core of the original formulation of enactive ideas when it is said that enaction brings forth a world (Varela et al. 1991). (...) In this sense, dialectics is, and has been since the start, one way of thinking enactively (Di Paolo et al., 2018, p. 186).

According to Hegel (1948), the dialectical method is the only method that allows knowledge of the pure forms of thought, so that this thought is objective, with all its natural or spiritual content. It is the dialectical method that enables He-

gel to think subject and object together, preserving the essential difference between the two. Just as sensitive certainty observes the coexistence of opposites in the world: health-disease, sadness-joy, ... so it is also through the relationship between opposites that the absolute develops in Hegel. The internal contradiction to the absolute system means its very survival and even its existence. It is through contradiction that thought has evolved and, with it, reality: thinking is objective.

The evolution of consciousness (Hegel, 1952) is a historical evolution if we think it as universal or as a universal spiritual consciousness that, through several stages, overcomes itself and understands itself as that same evolution, understands itself as the whole process. Absolute knowledge, therefore, is not external to sensitive certainty but contains the various moments that it had to go through and that it always goes through again to be characterized as a maximum, absolute knowledge. Absolute knowledge is the global movement of consciousness and, at the same time, self-awareness, which is known to be that same movement and carries within itself all the determinations that were subsumed (*aufgehbt*).

Contradiction (Hegel, 1948), which appeared, at the beginning of the *Wissenschaft der Logik*, as part of being, reappears in further parts of this book as a product of reflection and is subsumed by reason. Reason reflects on itself, rising above the indifference of opposites and determining itself as a result of that indifference. Reason overcomes indifference and, at the same time, retains contradiction as its truth. The self-reflection that reason operates is not the resolution of the contradiction that resulted from the interaction between opposites, because contradiction proves to be the true essence of speculative thinking and, therefore, to be insurmountable. Contradiction as part of a dialectical method is comprised in the dialectical model of *Linguistic Bodies*:

We will also discuss how a realm of ideality emerges from embodied and linguistic practices, one with its own grounded normativity. In all these developments, the tensions that start with our initial dialectical situation undergo changes and become differentially expressed, but they never entirely disappear. As a consequence, linguistic bodies remain unfinished, always becoming, even in adulthood, and navigating a sea of meaning-engendering and person-constituting utterances and relations, not all produced by them. Linguistic bodies are self-contradictory, social products and personal achievements, sustaining displaced relations to themselves, committing to choices and abiding in potentiality, coupling flows of self- and other-directed utterances (Di Paolo et al., 2018, p. 28).

Pure essence, the content of logic (Hegel, 1948), when exposed conceptually, moves dialectically. The movement of the essence is the same as that of thought. The essence of

thought is the essence of objects: thought and object develop their truth dialectically. Their truth is the same: thought and object have the same essence. That is why Hegel calls the thought of the essence objective thought, and that is also why, starting from the being, from immediacy, one arrives at the concept that was already presupposed in the being and which, in turn, presupposes the being. Being is a moment of the concept, but the being contains the concept in itself. *Linguistic Bodies'* dialectical model follows Hegelian logic:

Our approach to continuity is not about reducing language to a way of interacting; neither is it a deflationary strategy. We introduce a dialectical method that will precisely show that it is possible to construct new categories out of previous ones without deflating or reducing language. Starting from the general and relatively abstract situation of embodied agents acting and making sense together during social interactions, we will see how each move toward a concept of linguistic agency in turn affects and even redefines the previous moves (...) (Di Paolo et al., 2018, p. 27).

Even so, the dialectic model described and established by the authors in *Linguistic Bodies* is not strictly speaking a Hegelian model, because it is a materialistic one, closer to Marxist theories of history, society, human nature, education, developmental psychology, linguistic and culture. Nevertheless, the way the model is presented in *Linguistic Bodies* resembles more Hegelian dialectics than Marxist dialectics since it is mainly presented formally, with few examples, as if the model would come before the facts it explains.

Marx retained Hegelian formalism and idealism when writing about the future of humanity, projecting a dialectic movement of history, society and politics that did not have to do anymore with economic dialectic evolution. Instead of just predicting a natural outcome of economic evolution, Marx was concerned with establishing a historical outcome normatively. That was Marx's weakness as a social researcher.

I would not advocate just letting history happen. Doing that would be ignoring the role of intentionality, purpose and politics in human society. As alleged by many Marxist's critics, one thing is to explain what happens or to suppose different possible historical outcomes, another entirely different thing is to say that one knows as a fact what will and what *should* happen in the future, without being open to changes in our precognition. One of the Marxist's Hegelian inheritance (Marx, 1976) is determinism: not only dialectics is the way human society, economy and politics evolve, but it can determine the social, economic and political outcome. More than that: if humans get conscious of how human history evolves, they can alter —according to their will, based on ethical norms—, intentionally, consistently and necessarily the outcome. I would not say that *Linguistic Bodies* advocate this kind of determinism. However, it reappears every time dialectic

methods seek to fill the dualistic gap between the epistemic subject and its objects because it seems that mastering the rational method that corresponds ontologically to how reality evolves gives us power over the results.

3. Physical Laws, Biological Norms, Social Norms

In many relevant senses, nature does not evolve as human history, i.e., some numerous additional laws and norms rule human societies, that are not needed to elucidate natural evolution apart from cultural evolution. However, saying that should not imply that cultural development is not caused also by natural laws and norms. What it should imply is that when nature evolves and results in human's complex societies, there is the need to use additional cause-effect or dialectic models (or sub-models) to succeed in explaining human's cultural events.

Linguistic Bodies' authors criticize the ordinary causal way of scientific thought that establishes causal relations between facts. Why? Because the causal model of explaining reality is not capable to explain dialectic relations of organisms (life) that enable evolution:

The enactive approach rejects constitutive dualism but is not satisfied with a claim that nothing differentiates the mental from the biological, or the biological from the physical. One alternative to make sense of these apparently contradictory sources of enactivist dissatisfaction is to do so dialectically, through an understanding of how concepts like autonomy permit both continuity and sharp changes and transformations that do not conceptually "unhook" new "levels" from older ones, but on the contrary, reshape all "levels" in accordance with the most recent innovations. Nothing is quite left behind in the enactive story (Di Paolo et al., 2018, p. 185).

The dialectical materialist model —inspired by the Hegelian idealistic and historical dialectical scheme— seems to be well-suited to explain life and life-evolution and also seems to surpass the causal and dualistic (cause-effect) model of thought. Nevertheless, one main question that emerges from this method replacement would be if choosing the dialectical model would implicate to question other ways of phenomena explanations, such as the causal or the mathematical explanations that reduce physical and biological phenomena to equations and laws. The authors claim that: "The continuity between life and mind is a guiding statement for a nonreductive naturalism that takes our experience as concrete human beings seriously, without dualisms" (Di Paolo et al., 2018, p. 23).

As Di Paolo shows in previous writings (2003), even if we try to replicate life forms or models of life evolution, there

always remains a limit between organismic metabolism, autonomy and homeostasis and what is possible to plan and programing for non-living beings aimed at them to resemble living beings:

(...) we can already put some emphasis on the main issues: 1) an animal is a natural agent who generates its own boundaries and defines its world, a robot is an agent in virtue of external conventions of spatiotemporal and material continuity; 2) as a corollary, an animal does not simply have purposes, but generates them, a robot, alas, only has them, and it has them in a restricted sense solely in virtue of an externally imposed connection between its organization and its environment. The relation of reciprocal causality that obtains in the animal, that between what it is and what it does and endures, appears in a broken version in the robot (Di Paolo, 2003, p. 4).

Therefore, even if according to materialism the essential components of life and other non-living things are the same, i.e., subsumed by the same laws of physics and chemistry, the way former reacts to their environment —to disturbances of the environment that alter their inner *autopoiesis*— is fundamentally different from the way the latter would internally react to the same disturbances. Notwithstanding Di Paolo proposal of improving robotics (2003) by imitating living beings *autopoietic* inner dynamics, not just its outer movements, trying to simulate —not strictly replicate— "homeostatic adaptation and teleology", the gap between living beings and non-living beings that simulate the first is not, according to him, surmountable. Thus does this mean that there is, in principle, an unexplainable gap between nature and life? Or: Is life radically different from non-living matter? Or is life just different in degree from non-living matter? In other words: Is the way life evolves —dialectically— radically different from the way matter reacts? Or should we attempt to reduce life to matter in our scientific explanations?

One of the main problems to sustain a radical difference between our way of explaining matter and life is to separate matter evolution from life evolution or to separate laws of the matter from norms or models of life. We have some possibilities when dealing with the matter-life dichotomy: 1. We can sustain that there is no gap between matter and life, but that we are cognitive limited living beings that have no guarantee of eliminating this explanatory gap; 2. We can affirm the essential difference between matter and life and also maintain that there are different methods to approach and investigate both subjects; 3. We can claim that the human method of investigating matter and life is the same, but that these are different subjects. I believe that the first option is closer to Kant's point of view because it affirms the rational and empirical limits of human cognitive capacities. The dialectical model proposed by Di Paolo, Cuffari and Jaegher seems to oscillate between

options 2 and 3 because they state a fundamental difference between non-living matter and life — especially human life — but it is not clear if they would want to expand the dialectical model they propose to other natural sciences. The Hegelian view, according to Cirne Lima's work (2012) — inspired by von Bertalanffy (1968) —, could accommodate nature inside the background of dialectic-metaphysical logic and as part of the history of the human spirit dialectical phenomenology.

One of the main questions *Linguistic Bodies* wants to answer is how to explain human life and culture without a reductive scientific thought. Therefore, it is relevant to question if they succeeded in this purpose. Reductionism is based on the belief that it is possible to reduce one scientific discourse into another, i.e., to translate one into the other, achieving at the endpoint one discourse, which is, then, seen as more fundamental. One can, for example, explain DNA by describing its chromosomes, and one can describe its chromosomes by describing its genes. However, one can also describe the genes by describing molecules and atoms through graphic and physical models that explain how, for example, a hydrogen atom works, which is its internal structure, how it behaves concerning other atoms, which physical and chemical laws — quantum laws and equations — can be applied to it. The main anti-reductionist claim that prevents scientists from adhering to the reductionist approach is the finding that when one arrives at the quantum level, the biological level of the genes and how they behave and work vanishes.

The dialectic model of *Linguistic Bodies* craves to show how human social life and meaningful linguistic bodies behave.² Moreover, it is close to embodied cognition theories that saw robotic as a way to demonstrate the dispensability of representations in general autonomous behavior. One could ask if this proximity does not challenge the methodological ambition of having a universal dialectic method to explain life and culture. If robotics — even if subsidiary to embodied cognition theories and even if it is possible to approach more and more robot behaviour to human behaviour³ — has its laws, equations and methods, what does this prove? Does it prove 1. That there are different levels of explanations that are not reducible one to another? Or 2. That we can hope to reduce in the future explanations of living behaviour to explanations of non-living behaviour or vice-versa, mainly because the base of both is the same: matter?

According to the theories of embodied cognition, we react to aspects of the environment without consciously representing those aspects, and without computing in a strict sense. That can be simulated with simple robots' commands: when spotting an obstacle at a certain angle, deflecting either left

or right. Some experiments (Del Dottore et al., 2018) show that robots collectively decide where to start self-assembly, depending on environmental conditions. At some self-assembling stage, robots create, for example, tree-like structures that grow toward the light. The results demonstrate how an adaptive growth process can be implemented in robots.

If one defies radical reductionism, one of the central risks is to dissociate physical investigations from biological investigations. The authors of *Linguistic Bodies* sustain that it is possible to surpass the gaps between levels of scientific explanations replacing our causal explanations by dialectic descriptions:

A dialectical understanding of these relations therefore implies that as we move from active matter to life "and to the realm of agency and sense-making", we simultaneously move into a sharper understanding of materiality, and also into an understanding of how active matter becomes transformed by mental phenomena. Accommodations occur at all scales. Not only do we have minds that are material and biological, but with minds, biology and materiality become minded, or partake of the complexities of the mind. This way of looking at life-mind continuity dialectically, as contrasting terms interpenetrate each other, differs from hierarchical approaches that focus on levels of causality. These approaches tend to restrict the links between the proposed "levels" (say, between biological and psychological phenomena) to a series of causal relations. For instance, information processing is implemented in the brain, so the brain is causally implicated in how information is processed, and cognition inherits several of these causal constraints, but is otherwise constitutively independent of them. With such moves, naturalism is acknowledged in the causal domain, while dualism persists in the constitutive domain (Di Paolo et al., 2018, p. 185).

Professing the continuity of nature and life — even conscious life — can mean many things: 1. It can mean that we believe in the ontological continuity of both; 2. It can mean that we believe that the same method of investigation can be used when researching both; 3. It can mean that we expect to achieve a global and all-embracing theory — with its laws and equations — that includes among its objects animate and inanimate ones. These three choices are not necessari-

² Antireductionism consistently appears in *Linguistic Bodies* assertions: "(...) we steer clear of such reductive interpretations of sense-making by insisting that its enactment is a condition that applies to concrete whole engagements between organisms and environment, not to any particular part of this whole" (Di Paolo et al., 2018, p. 63). Or: "Unlike other approaches, the enactive perspective takes the life-mind continuity seriously as a way to conceive of mental and biological phenomena not merely as causally connected, but as constitutively linked, without this implying a reduction of psychology to biology" (Di Paolo et al., 2018, p. 184).

³ Small robots can replicate how living beings assemble and create natural structures through adaptations between them. They can as well replicate how bacteria assemble and react to find food.

ly incompatible. The third choice would include reductionist assumptions. The second choice is complicated, because, from one point of view, if the method would be the dialectic one, this should not mean the same as taking a reductionist stance. Nevertheless, from another point of view, if we choose a mechanistic or causal method, reductionism would not be automatically excluded.

Why is it that when we criticize reductionism, the vulnerability is to fall on the opposite side and forget the continuity of nature and life? I would say that this happens because inanimate things are explained mainly by mechanistic and causal laws, and mathematical reasoning, and very often scientists and philosophers abdicate to affirm the possibility of explaining the continuity of matter, nature and life precisely to avoid using the same laws of physics to social and cultural behaviours. If we take the opposite direction and start reasoning by social and cultural events, and establish for that a specific method, that does not fit in physical or chemical investigations, the seemingly only way out is to affirm the gap between matter, nature and life, particularly human life.

4. The Nature-life Continuity

My main uneasiness when I criticize reductionism of any kind myself is to dialectically fall on the opposite side, which would be to forget the continuity of nature and life. Forgetting this continuity would sometimes mean thinking of the human being as an extraordinary being. Perhaps in order for human dignity to be taken seriously, we need to emphasize the value, relevance, and beauty of human existence. I admit it. Sometimes we do this also when we shield the lives and rights of other animals. However, ethically valuing and aesthetically admiring human beings or other living beings is not the same as scientifically explaining, through laws or regularities, or causal norms, the emergence of patterns, living patterns, or social patterns. Moreover, to emphasize the emergence of new patterns, new variations in genes, behaviours, and social interactions should *not* lead us, as Ruth Millikan alerts (1984), to consider that we are biological effects of a natural leap, which has taken us to a different level of life. To claim that we are kinetic sensitive beings, emotional thinking bodies, acting according to functions and norms, does not mean that we transcend nature.

We will probably never know everything there is to know about nature or human nature. Furthermore, the way we express knowledge is not a mirror of nature. That is for sure. However, all this does not mean that the way we express our knowledge is not the right way to know about human beings. Many theories can shed some light on different aspects of nature, life and human life. Perhaps explaining the different levels of nature does not mean strictly reducing, in the sense of explaining away, one level by another.

Nevertheless, maybe to interpret a level by another means using different lenses in different layers of the same

world. Explaining, for example, the emergence of social behaviours and patterns through a more fundamental level of molecular or atomic interactions wouldn't ever allow us to explain away our description of the behavioural level. Mainly because, as human beings, probably we won't ever be able to see all the layers or explain them all at the same time. Should we, therefore, choose a different dialectic method to explain living behaviour? I would say that this is an option among others. From my point of view, mechanistic, causal and dialectic explanations should complement each other, not exclude each other.

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