QUESTIONS ON THE NOTION OF INHABITING AND ITS RELATIONSHIP WITH SPACE:

Ontology and Topology

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ABSTRACT

The present article presents a discussion on the concept of dwelling and its relationship to that of space. To pose the question about dwelling implies to address the link between the same and the other through the concept of limit. This relationship constitutes a space. In ecological thinking this questions involves the relationship between man and nature (where they are opposed, where they are different, where they exhibit a local intersection). In political thinking, the issue at stake involves the relationship between the same and the foreign, (what is a community, who and what counts as such): In social and economic thought, we deal with the ways in which social frontiers are constructed (be it between countries, inside cities or in an architectonic space).

Keywords: *Ontology, Topology*

How to inhabit the world? It is now the most urgent question worldwide. The question points to multiple directions at once: it is an ecological question: what relationships can and should we establish with the surrounding natural environment? Policy: what can and should govern relations among men? and economic-material: how can and should you use the scientific-technical and production capacity of man? To ask about inhabiting is to do it by the forms of relationship between the self and the other as well. Men and nature, men and men, men and things. From the outset, these relationships are defined by opposition; the same *against* the other, or the other *outside* of the same, and reveals the inadequacy of the terms. What does it mean when we define the same and the other? Boundaries, borders. How do we live in the world? Does it mean how to think, exercise and live the limits? The limits are left to be understood as borders or edges, sometimes as boundaries, sometimes as a separation.

The question of inhabiting, conceived as a thought and praxis of bounds, must be understood as a topology, a question for the spaces: social, cultural, environmental, symbolic and political spaces. How to inhabit the world? It is a fundamental question with regards to the essential way to how any category relates to itself and its (s) other (s). Science, technology, politics, everyday life, words (whether they are rigorous concepts or common words) are structures where the world is defined and it acquires its differentiation. It is in them where the world is broken and distributed according to regions, areas and records. What should count as the same and as the other, which is a set of variations, forming unit, dispersed without collection, which shares a border and what is disconnected, the interior and exterior, all of them are not only part of a conceptual network, but of a game and configuration of limits.

What do we do with the limits and emergencies in today's world? The task of philosophy is to think about the essential link between what we find today is most urgent to solve: poverty,

environmental catastrophe, the domination of some over others, with the history of thought where our categories have emerged , our conceptions, our institutions, our ways of conceiving, producing and reproducing the world. Once shown this link, your task continues by providing coordinates to penetrate, with thinking and practice, different areas, so that they can inhabit in other ways. Finally, if you can inhabit in other ways, this implies a relationship between thought and construction, as space implies a dual enrollment It is what we think and what we inhabit, the object of thought and the site where thought is written and developed.

PHENOMENOLOGY, ONTOLOGY AND THE ISSUE OF SPACE

In the early twentieth century Husserlian phenomenology tried in a highly radical way to understand how the overall experience takes place and how every question, practical or theoretical, takes on its connection and relevance: a concrete world in a world of life. This world of life means that every activity is located in time but also in space. Following this line, Heidegger radicalizes the momentum of phenomenology and tries to give it new life.

Heidegger tried to understand violence, destruction and catastrophe by analyzing existing historical tradition in science, but also Western thought in general, and he developed his concepts and his peculiar way of understanding the world as a whole. This lets you see how far modern science is and has , in addition to technical, been of social, political and economic nature. To this science lies a concept of space that should be investigated and addressed. Heidegger allows us to take a first direction to reinterpret existing sciences and to rebuild their historic tradition and their underlying assumptions, making visible the way they shape

our way of inhabiting the world- this common space. However, it is an approach to the Western philosophical tradition and his science which also permits seeing that his way of conceiving space was never unitary. Therefore not only an ontological criticism is necessary, in the sense of Heidegger, of current science and his concept of space, but also a reconsideration of other concepts of spatiality in general, both of the philosophical tradition and of contemporary science is needed . A key role is played in this regard by mathematics.

HEIDEGGER, TIME AND SPACE

Heidegger breaks into the philosophical thought of the twentieth century with the question that asks about the meaning of being and seeks a profound questioning of the contemporary world. The fundamental text is *Being and Time* (Heidegger, 1977) As the title suggests, it is essential to show the relationship between self-realization and a time horizon. In a direct way: time is the horizon over which the self makes sense to us. Time should not be treated however only as history, but as compared to the past and the future. The past is left to be conceived by Heidegger as a source, an origin, from which the story takes its direction. The future, meanwhile, emerges as a project, as a point to move forward to in order to make a possibility. But the essential key lies in *Being and Time* which resides in the relationship that Heidegger establishes between time and death. Time will no longer only be lived, nor this time where things and events come to meet us. Time will be related to *death*. But how is that possible? How can one relate to what denies living, where it is not already, nor can it be? For Heidegger death will not be the negation of life, but rather the way she faces her most intimate possibilities. Heidegger avoids talking about man and proposes the German term *Dasein*, composed of the particle "da" which means there,

here; and the noun "sein," which means being. Translated as "being-there" *Dasein* is the name given to a man if he understood as local existence , in a here and now, thrown into a world that's not directly produced, but he understands it and where he moves within it. However, in this world where things appear to be related to each other in networks, or in other words as significant groups linked with a practical life, we are absorbed to the point where it seems immovable, an ultimate reality. The world appears as the most natural, also as what we cannot be otherwise and what devours us in our daily lives. The relationship with death, which first passes through anguish, confronts the *Dasein*, in exchange, with the nothing. Not because it is anything but because it reveals what the world has become without reason. In other words, the reasons that one finds in the world, are not the reasons for the existence of the world *as a whole*, but that it comes from an abyss, from an original possibility[1] .

The world has become and can be other ways. Existence appears before oneself as a being open to the possible, otherwise, thanks to a connection with death[2]. In his being, he is his own being, as Heidegger says.

But here is where the question is imposed, which in Heidegger remains unresolved: once the *Dasein* opens itself as a possibility, once the world appears in its radical contingency, once everyday life pales and the abyss of what comes possible, what is there to do? In other words, once the essence of existence ceases to reside in a substance or in a catalog of qualities (the definition of man, whatever it may be) the question arises *after* his confrontation with death : what, how to be now? If Hamlet can serve as a gateway to the question of Heidegger: "To be or not to be", then can that be followed by how to be? And if Heidegger says

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[1] For a discussion about the notion of the abyss in Heidegger, see Xolocotzi (2011).
[2] Regarding the path of Heidegger towards Being and Time, see: Xolocotzi (2004).

in *Being and Time* that all existence is located in a here, in a world: what can and should be the world? What exists in this world after death ? How do you live, how you can continue to live differently now, once the possibilities open abstractly? If the world is never abandoned, even when an existence is called "authentic" by Heidegger , after the relationship with death, what transformation does this suffer? What does the "there" look like of the Dasein? When the fantasy of the world that absorbs us in our daily lives through is crossed and we are convinced of being true, natural and immutable, what remains for us to do? Inhabit.

Is in the late thinking of Heidegger there finally appears a space with ontological dignity. In his text *Building, dwelling, thinking*³ , Heidegger advances the concept of the clear (*Lichtung*) which is understood as a place (*Ort*) essentially linked to inhabiting. What might be called the language of existence in *Being and Time*, it is now understood as dwelling in the land, as related to the world in the sense of dealing with limits. The question of being understood is not only in relation to time but also space. This space, however, should be distinguished from how classical science, especially under the model of Descartes, has thought. In a broad sense, Cartesian mathematics defines the world from the extension, which can be captured from coordinates, allowing that everything can be reached from points in space. These points in the plane also allow a measurement so that everything can correspond to a magnitude. Such thinking was continued by Newton and served as the basis of the mechanistic world view. This mechanism will also serve as the basis for the industrial revolution and scientific and technological development of the modern era.

For Heidegger this concept of space and its involvement in contemporary science makes the world a mere remedy available to calculation and planning. The world ends up being

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³ In German: Bauen, Wohnen, Denken, in: Heidegger (2000).

transformed into raw material. As raw material , it is input into a production that has no other horizon than domination and control. The clear concept of *Lichtung* that Heidegger proposes, searches for thinking, however, in a space that does not dominate but lets them be. Clarity is only one *place* where being comes about and only serves as a backup of its game of giving and taking (which in *Being and Time* was anticipated as related to death). In another late paper, *The thing*[4] , Heidegger seeks to think of the world as a quaternary that also reflects an idea as a meeting space. This space is a bridge between earth, heaven, divine and mortal. Leaving aside the mystifying language, space appears as a link, but mostly as a meeting place without unity.

So far it seems that the thinking of clarity has nothing to do with science, and that the latter is overwhelmed by ontological thought. However, Heidegger insists that in while in the structure of science man is in danger it is true that "where the danger grows, there grows redemption" (Heidegger, 2000, p.29). That quote is taken up by Hölderlin and shows the profound ambiguity towards science. For Heidegger the essence of science is a productive attitude, it is $\pi o i \eta \sigma \iota \varsigma$ (creation) (Heidegger, 2000, pp. 30-31). In German the word *Wesen* can also mean matter. As a verb, which is now in disuse, *wesen* means staying in existence (*verweilen*). Now, every temporal permanence requires a place, a "there". The temporal permanence is called a dwelling and inhabit, returning to *Being and Time*, it could be read as a being-in. The relationship that philosophical thought can establish with science and technology is through the production (*hervorbringen*) of space as such. We must then ask whether science, against the harsh statement by Heidegger that she does not think, can help to suggest fundamental questions. We must

[4] In German, Das Ding en: Heidegger (2000).

examine then whether science can think of time as a radical evolution and space as spaciousness, both thought of as a dwelling. Among all the sciences, it is perhaps mathematics that, since the nineteenth century to date, has made from space the object of the deepest and most fruitful reflections.

OONTOLOGY AND TOPOLOGY

Never approaching this topic enough, Heidegger knew, however, that mathematics was about ontology, that is, the question of being, to address the issue of space[5]. In a course dedicated to the dialogue of Plato's *The Sophist*, Heidegger refers to Hermann Weyl, a mathematician who made fundamental contributions in the field of topology, and who from a philosophical positon exposes a key issue in contemporary mathematics: the continuum. In his text *The Continuum* (1918) Weyl advocates for a conception of it which does not start from the point. While Descartes thinks the continuum (of a line for example, which in mathematics is the set of real numbers $\mathbb{R}$) as an aggregate of points, Weyl sought to think of it as an origin, starting from oneself and beyond the quantitative relationship. Heidegger's reference is crucial in that it binds with the mathematical tradition of topology.

Heidegger says in his course on The Sophist (1992): "The question of the *continuum* has been deployed again in contemporary mathematics. If you come back to Aristotelian thought, as one learns to understand that the *continuum* cannot be solved analytically, but must come to be understood as a given (*Vorgegebenes*), before a question can be made on its analytical insight. Work in this direction has been done by mathematician

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[5] For the relationships of Heidegger with the science of his time see: Xolocotzi (2009). Heidegger also dealt with the theme of space of Aristotle in: (Heidegger 2003).

Hermann Weyl doing particularly fruitful efforts for the fundamental problems of mathematical physics. In this understanding of *continumm* arrives a relationship to the theory of relativity in modern physics, which, in comparison to the geometry of distances (*Ferngeometrie*, which could be interpreted as a global geometry, generic, AR) as that results from the position of modern physics of Newton, the concept of a field (*Feldbegriff*, of its own local geometry, or *Nahgeometrie*) becomes crucial. The physical being is determined by the field- " (…) I only give this indication to aim at how Aristotle, away from any hasty theory, to results today as to how natural-scientific geometry is pursued in an inverted manner". (Heidegger, 1992, pp.115-116).

That topology pursued philosophical issues in an "inverted" manner is already, by Heidegger, a whole concession: that of thinking. Science thinks in an inverted way. This inversion is not a fault, but only marks a distance between philosophy and mathematics, that is, that they are irreducible, that one cannot *justify* the other. And yet, there exists an essential relationship. This relationship is given by the intersection of the purpose with the theme of space.

The term was coined *topology* in mathematics by Listing in 1848, and responds to the need, as noted by Leibniz (in his *situs geometry*) does not think of the space starting with the magnitude, but from *purely qualitative* relationships. Topology arises from the need to consider the modalities of space and, more properly, spatial insights from concepts. In the field enters the definition of n-dimensional spaces with constant or variable curvature, the establishment of groups of symmetries and transformations, graphs and analysis of knots and the spaces that they imply. Listing writes that topology must be a "doctrine of manners relations of space objects, or the laws of the set (Zusammenhang), a reciprocal situation and the sequence of points, lines, surfaces, bodies and their parts or their aggregates in space, regardless of size and magnitude relationships "(Listing, 1848, p. 814).

This delimitation of topology not be possible without the formal definition by Riemann of space. In his inaugural lecture, Riemann [6] proposes a research program where (a n-dimensional) advanced ideas are generalized and Gauss [7] and Lobachweski on the intrinsic qualities of space that give rise to non-Euclidean geometries. Very generally, it can be said that these geometries are based on a fundamental assumption: a spatial figure can be defined intrinsically, without reference to space and the environment where it is inserted. A simple example is the sphere. If it is embedded in a Euclidean space of an environment of three dimensions , it has no peculiarity. In other words, all geometric and metric properties are shared with Euclidean space ($\mathbb{R}3$). But if the sphere is taken as a surface (S2), then their properties are very different. The famous Euclid postulate on parallels states that given a line A and a point P outside of it, there can only exist one line parallel to A and B passing through point P. In the case of the sphere, however, lines are actually curves, called geodesics, drawn on its surface. Thus, for S2 the following applies: given a line (here a geodesic must be taken as a maximum, such as the line of the equator) and a point outside of it, there is no line parallel to B because B always intersects A at two points. On the sphere there are no parallels. If in Euclidean geometry the sum of the angles of a triangle add up to 180 degrees, in spherical geometry its value will be higher and in hyperbolic less geometry it will be less. That means that the properties of the figures are not inherent in the figures, but depend on the spaces where they are embedded or immersed. Hence there is the need to differentiate between a figure: one that is rigid and has dependent metric properties of the space environment, and a form, that is a structure with intrinsic properties.

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[5] The reading is titled: On the Hypotheses which lie at the Bases of Geometry.in Riemann (2013).
[8] Gauss (1828).

Riemann generalizes these ideas and presents the mathematical program,rigorously thinking about the concept of "multiply extended magnitude", which is "susceptible to various metric relations", being a consequence of the fact that the "theorems of geometry" of nature are not empirical and transcendental a priori (Riemann and Ferreirós, 2000, p.2). This means that a metric space has intrinsic properties and classical geometry, in other words, are Euclidean and do not have an absolute value. On the contrary, certain axioms can vary (such as parallels), that maintaining a consistent system where the properties of the figures who enroll in it are different from the Euclidean space. Later the concept of variety (*Mannigfaltigkeit*). For Riemann any *quantitative* determination is possible where there is a "general concept that supports *various* determinations", which are "a continuous or discrete choice depending on whether or not to place continuous transitions from one to another of them"; and stresses that if the natural language can name discontinuous varieties, it is hard to imagine the continuum, which can be presented from examples like "the colors and positions of sensory objects", both constituting an extended variety in multiple dimensions " (Riemann and Ferreirós, 2000, pp. 3-4). A variety may be continuous or discontinuous, but its main quality is to be defined from a number n of dimensions. Second, a continuous range is defined from a function of continuity, that is, from the possibility to differentiate infinitely. Two spaces are part of the same one if can be deformed into each other continuously. A Riemannian variety can be defined, more formally, as a space that locally obeys Euclid's postulates, but not on a global level. The concept of the Gauss geodesic advanced the idea that a space may vary locally in its qualities

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[6] Su lección se tituló: „Sobre las hipótesis que están a la base de la geometría": en Riemann (2013).
[7] Gauss (1828).

(the curvature of a surface can vary from one region to another). Following this idea and, again, generalizing in n-dimensional spaces , for Riemann all variety is Euclidean in a local manner in the limit, but the structure may vary from point to point and be *globally* very different. The space is no longer homogeneous and no longer a limited by a particular metric. Moreover, figures, or what we could say that "appears" to its limits and its properties, does not depend more than the figure as such, but the space in which it is designed and registered. And if there are variations of space, this means that every figure can take many metric properties depending on their "location" in the variety.

In the coining of the concept of underlying variety is the attempt to rethink space based on non-metric relations and through general concepts such as continuity, discontinuity, town, locality, and continuous transformation. Additionally, topology could speak about the limit and border, of the compact and open or the hole, but also figures that combine time , such as folding or twisting. Space can be thought of starting from its area, intrinsically and not necessarily as a homogeneous variety- indifferent given a priori- and can be given as the opposite of the space that underlies Newtonian physics and that Heidegger makes the target of his criticism.

With this very thick exhibition of the meaning and intention of the topology and the relationship of time and space in Heidegger we can finally ask. Can you think of clearly in a topological way? Or inversely : can topology become a thinking being?

Relations between topology and philosophy are emerging. Much is due to René Thom, who in his book *Structural Stability and Morphogenesis* (Thom, 1972) attempted to transform the first into a general theory of models. Historically it meant a fundamental transit of the concept of structure that structuralists and poststructuralists had developed under the model of a combinatorial and discontinuous logic. Thom makes from topology a theory of the structure linked to the continuum and time. The

title of his most important work is an index of his program: Think in two registers: genesis and stability. Topology will become, thanks to Thom, a general theory, that is to say a diagonal to different disciplines (mathematics, philosophy, biology, sociology, physics) of the form. The forms will be thought of in their double structural and dynamic character. Therefore, the philosophical theme of the origin of the world and its meaning will be thought of more as emergency forms stemming from other forms. The emergency will be called by Thom as a catastrophe. A catastrophe is only the point at which a function is no longer continuous (differentiable), or, more generally, the turning point in which a dynamic system changes its behavior dramatically acquiring new properties. A catastrophe is a topological change, a change in the shape of space. But by the same token, what exists, what appears, whether in the world of perception, is in embryonic development, has a dynamic form, which gives it *stability*, thus being. Topology thus becomes a thought of time and space, of the coming, of the permanence and the forms of the future.

Thom writes: "Reality is presented on the forms of phenomena , of which we discover the presence for their qualitative discontinuity", that is, the world is a game of shapes and limits; but "the objects "often suffer many slow transformations and only its relative stability allows us to rediscover within their multitude and diversity", so that the duration is inseparable from its appearance and lasting stability. There can be a general principle, namely, that "all science is the study of phenomenology," that is, that "you see, what you see, and any appearance occurs on some space." (Thom 1974). This space is a topos, a place. In this regard, Thom says "In its abstract, philosophical use the word place(*lieu*) in French has always had a strong existential connotation (…) hence the hypothesis that virtually word topos implies virtually in a human or an animal that inhabits (usually) in that place "(1999) Inhabiting is inhabiting a space, a space is the set of limits in its *advenir* (genesis), lasting (structural stability) and disappearing

(disappearance or transformation of the form). It is finally shown the connection between topology and phenomenology, including topology and the question of living[8].

For Heidegger, ontology was always more than phenomenology. Or rather, phenomenology can only be understood as ontology. As in *Being and Time* the horizon of the world was overrun and opened in its possibilities by death, the question of being goes beyond phenomenology which ponders not only on what appears, but for the conditions that it appears. Not questioned by the authorities (which appear in the world), but by his being, making possible its emergence as genesis and leaving that void that is never empty, but has the shelter of being. Well, the space that thinks topology is not the figures of the intermundane, but rather one in which these figures are displayed, with its limits and borders. The space is the a priori of the appearance, the bottom that never appears explicitly but on which everything else folds and unfolds, differs, lasts, emerges, dies or suffers a metamorphosis.

FINAL THOUGHTS

Time is the means of its subjectivity, its history and its existence. But space is the means of multiplicity, that is to say, of the community. The commonality is space. Spacing is cohabitation. Commonality is not a common denominator, the enclosed space of a category or feature that guarantees the identity of the elements. What is common is shared space. Space differentiates: it breaks and is distributed: within subjectivity, inter subjectivity exists. If you want to see it in this manner, space is the common

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[8] For a development of the ideas of Thom and new directions of the philosophical and scientific dimensions of topology, see Boi (2003) and (2011).

of the uncommon, the simultaneity of the non-simultaneous (This is what Heidegger always considered the main feature of being, that is, the difference of the present for yourself), live in the future.

Heidegger's ontology stands on two axes: time, that horizon where the game of concealment-revelation is deployed from the difference between being and entities; and space, the place where the body comes and dwells temporarily; where it inhabits; the question of cohabitating, since the idea of pilgrimage and of delay, the coming in all its forms and giving shape to the common space. Arguably, the question of being involves thinking in the common being starting from the temporal difference, the being-which is not reduced in its presence and its topology: the deployment of the limit, where the entities and men are exposed to each other and where the other becomes an ontological question, but also a decision and therefore, policy.

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