

When the part mirrors the whole: interactions beyond simple location

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Abstract

Reductionists believe that we can make sense of the whole in terms of its parts. Emergentists react and reply that the reductionist program is unattainable partly due to the existence of emergent properties. Under the celebrated banner “the whole is more than the sum of its parts”, such holistic stance is particularly relevant to the study of life and mind, where interactions amongst system components and environment are key. However, both antithetical tendencies of reduction and emergence betray a commitment to what Whitehead called *simple location*: the idea that things are simply where they are. Here we show the problematic consequences of adopting such a view when trying to understand the notion of identity. Dynamic interactions indeed denote “togetherness”, and yet they are *external*: no matter how much one is eager to emphasize their role, each element that “inter-acts” still exists and can be thought regardless of any essential reference to other elements. We uncover and reject such stance. Within an organismic philosophy, we propose an alternative based on *internal relations*, which allow to conceive each relationship entering into the essence of an entity. We discuss the fallacy of simple location in the context of abstraction, and end by drawing its implications for a theory of perception. In sum, we argue that the challenge is to conceive “inter-identities” as “intra-identities”. We are not enduring interacting substances, but internally related processes.

Keywords: simple location, internal relations, interaction, identity, perception

*“Berkeley afirma: Sólo existen las cosas en cuanto se fija en ellas la mente.
Lícito es responderle: Sí, pero sólo existe la mente como perceptiva y meditadora de cosas.”
(Borges, 1925)*

*“It has been usual, indeed, universal, to hold that spatio-temporal relationships are external.
This doctrine is what is here denied.”
(Whitehead, 1925)*

1. INTRODUCTION

The idea of identity has not ceased to obsess the modern imagination. Physicists went after it by decomposing matter. Biology, imitating the model of physics, set itself the same agenda (ironically, at the same time that physics itself was realizing its futility): to study living organisms by breaking them into tissues, tissues into cells, and cells into molecules. Biologists did not go further since once one dives inside the molecule, quantum physics changes the game. Carried away by an architectonic metaphor, they thought that decomposing things into their fundamental elements would reveal the “bricks of the real”, all simple, all identical. This turned out to be an architectonic delusion.

The intellectual boldness of physicists taught us that when one gets to the smallest bits, not only doesn't the universe look like a uniform pile of bricks, but that such a zoo of particles within exotic families (quarks, leptons, gauge bosons, etc) are not localizable or distinguishable from the field in which they move, and from which they appear and disappear. Activity ceased to be a by-product of stability, but rather the other way around. The elemental was conceived as an expression of the perturbed. Substances, upon close inspection, turned out to be stabilized processes. The foundations upon which Western thought is built were literally and metaphorically shaken.

And yet, for any formulation or adoption of a cosmological theory, it seemed necessary to postulate matter with permanent attributes that persists and retains its identity over time, a matter that changes but is numerically identical to itself and maintains its *identity* despite all accidents and transformations. This idea has shaped the basis of scientific materialism for the last centuries. We can recall the scientific formulation of activities associated with empty space that, in the nineteenth century, produced the materialistic ether as the substratum of all transformations and changes.

But one does not need to ponder the ethereal. In *Process and Reality*, Whitehead uses the example of a stone. Today we conceive the stone as a set of separate molecules in continuous agitation: “But the metaphysical concepts, which had their origin in a mistake about the stone, were now applied to the individual molecules. Each atom was still a stuff which retained its self-identity and its essential attributes in any portion of time —however short, and however long— provided that it did not perish. The notion of the undifferentiated endurance of substances with essential attributes and with accidental adventures was still applied.” (Whitehead, 1929, p.78). According to the English mathematician and philosopher, that is the substantialist foundation of materialism. Matter becomes a metaphysical concept, a final reality, imperceptible, and that exists regardless of its qualities, regardless of its being observed. Such an “ontology of stones” has transferred from the stone to the particle, and then from the particle to everything else, including animals and human beings.

The majority of sciences are still based upon the Cartesian conception of reality, which is one of “bricks and mortar”, atoms and their interactions. Note that the mortar does not change the brick in any way, but just its external relationship with other bricks in space. A brick remains a brick, regardless of all the other bricks. Each brick of reality has a place, where no other brick can be.

This is what, according to Locke, gives each brick its identity. Bricks are what they are by virtue of their instantaneous being there. Locke's *principium individuationis* states that “the only thing which differentiates one atom from all others is its spatial location at a certain particular instant and nothing else” (Locke, 1689, II:XXVII). Differences are thus only differences in spatial location. This entails the possibility to endow a definite portion of space with well-defined boundaries. The modes of thought based on a substance ontology thus easily lend themselves to materialism, reductionism and also mechanicism: the world is made of (and reducible to) building blocks, which are all physical, each occupying a different place in space. Being external to one another, their identities are, in essence, independent. Their spatiotemporal location grants them their identity.

And so we are led to think that at the bottom such bricks are identical, since what makes them different is only where they are. Note that not only can we hardly conceive what an electron really is, but we are convinced that there is such thing as two identical electrons. Leaving aside Whitehead's puzzling remark (“an electron within a living body is different from an electron outside it, by reason of the plan of the body” (Whitehead, 1925, p.79)), the fact is that it is not possible to delineate any such entity. We do not know where an electron starts nor where it ends. They are expressions of activity in a field. Its localization has proven problematic.

This habit of the intellect also applies to macroscopic objects. We see a cat running after a mouse. Despite being in interaction, both the cat and the mouse are deemed to be trivially distinct and separate. According to this worldview, all things are conceived as having modes of existence that (no matter how much one wishes to emphasize their interactions) are fundamentally separate. But, is an essentially disconnected universe still a universe? How to avoid such a fundamental separation?

Even if one supplements such a worldview with the possibility that every bit of stuff can act on every other bit, such action is a displacement in space: A pushes B. Thus, in a world made of particles, their relationship occurs via *inter-actions*. Interactions are mechanical insofar as the type of change allowed is not transformation but re-arrangement. All change is due to the displacement of discontinuous, rigid, compact units guided by mechanical laws. These units are what they are, and will remain what they are, by virtue only of themselves; located in space and unchanging in time.

In such a world, differences in kind must be apparent. The spatial configuration of the elements can change, but their inner natures cannot. There is not only separation between objects, but also within them when it comes to their qualities. A classic example that both illustrates and defies this point is that of the cloud, yellow at dawn, white at noon and pink at sunset. Color would not be something inherent to the cloud, since it changes as the light changes. Since Locke, the idea that color was inherent in things was abandoned. The object, well defined, had been separated from its color (and, as we will see later, from the subject that perceives it).

Moreover, such a universe would need to read Braille, since the only way to know about one another is by touch, by direct contact, by impact. In sum, a cosmos conceived as a great billiard board of *simply-located particles*. Each bit of matter would, by construction, be individually independent, and thus “regarded as fully describable, apart from any reference to any other portion of matter” (Santos & Sia, 2007, p.91). Ironically and paradoxically, relations would be both deprecated and at the same time necessary to glue the world together. In a world made of *externally related “stuff”*, any relation to another entity is always secondary, if not counterfeit.

2. SIMPLE LOCATION

What is the foundational assumption upon which this notion of identity rests, and which at the same time creates so many theoretical problems? Whitehead argues that it is *simple location*: “By simple location I mean one major characteristic which refers equally both to space and to time (...). The characteristic common both to space and time is that material can be said to be *here* in space and *here* in time, or *here* in space-time, in a perfectly definite sense which does not require for its explanation any reference to other regions of space-time. (...) and, so far as simple location is concerned, there is nothing more to be said on the subject” (Whitehead, 1925, p.49).

Thus, *simple location* is the notion that there are portions of matter that are fully describable apart from any reference to any other portion of matter, so that any relation to other entities, existing or not, is secondary. Relations thus cannot really say anything about the internal constitution of a bit of matter. Regarding space, this means that there can really be entities in a vat. For time, it means that change is sequential, not serial. Both aspects imply a fundamentally disconnected universe in space and in time. Thus, the acceptance of *simple location* is what needs to be criticized at the core, as “[t]his idea is the very foundation of the seventeenth century scheme of natural” (Whitehead, 1925, p.58).

Once with simple location, several scientific and philosophical problems ramify: how to conceive memory, causation, induction, evolution, ethics? Because the present is external to itself in time (like a particle is to itself in space), the past is excluded from it. Again, by which artifice can it be linked back? If we take simple location seriously, the movement of a particle becomes impossible. Simple location causes serious problems to induction as well. If each configuration of matter has no inherent references to any other place or time—if nature is really like this, external to herself—then induction is not based on anything inherent in nature; “the notion of 'simple location' is inconsistent with any admission of 'repetition’” (Whitehead, 1929, p.137). The consequences that Hume pointed out were correct, had his premises been true. Furthermore, external relations do not allow for evolution. If one is to have something else than mere *unfurling*, a doctrine of *internal relations* is necessary: “The aboriginal stuff, or material, from which a materialistic philosophy starts is incapable of evolution. (...) There is nothing to evolve, because one set of external relations is as good as any other set of external relations. There can merely be change, purposeless and unprogressive. But the whole point of the modern doctrine is the evolution of the complex organisms from antecedent states of less complex organisms.” (Whitehead, 1925, p.107). Simple location must also be rejected in order to allow for personal development and ethics. Identity, as the quality of being the same to oneself, leads to the following situation: A may interact with B, and some properties of A may even be affected; but A will still remain equal to itself. If “things” (by definition, externally related) are what is most fully real, and enduring things are self-identical through

time, then no true development can occur. In addition, an ethics in which your relationship with others is fundamentally different than with yourself seems doomed to failure.

Contemporary versions of emergentism try to correct reductionism with the help of mereology. This is certainly important, as we need to be able to distinguish between different senses of “parthood”. How the parts relate to the whole is what is at stake. Is the whole prior to its parts? If so, is it logically or ontologically? Yet, those who reject reductionism in favor of holism still adhere to materialism (Gilbert & Sarkar, 2000), perhaps in order to save the idea of *simple location*. One may trust that by supplementing the parts with dynamic interactions one can ameliorate the situation. But emphasizing interactions of otherwise simply located elements does not bring forth a more internally related universe. In other words, the taint of simple location cannot be cleansed by rubbing; the cloth must be abandoned. The problem of interactions is itself problematic. The adoption of simple location is a major drawback to the commendable “fix” of emergent properties.

It is worthwhile revisiting the concept of mass to see how holistic narratives can still carry out the baggage of the notion of simple location: “Newton defined it as *vis insita*, that is, literally, as *force residing* within the location occupied by matter and constituting, so to speak, its substantial nucleus which is related *externally* to other particles. The belief in the simple location of sharply defined corpuscular entities could have hardly found more accurate formulation: the essence of material particle is its resistance to acceleration, reacting *hinc et nunc* against the *external* influences of other equally well defined corpuscular entities” (Čapek, 1991, p.209). Čapek then quotes a critique of Ernst March to Newton: in the principle of inertia there is “an abbreviated reference to the entire universe” and so “the neglecting of the rest of the world is *impossible*” (Čapek, 1991, p.210). If we ask what is simple in an atom, electron or stone, we realize that, when we knock at the door and open its bricked window, what lies inside is virtually an immense diversity and richness far away from simplicity.

The critique extends not only to mass but also to other levels of interaction: “to isolate one particle and force from the whole dynamical context is as artificial as to claim that buying may take place without selling” (ibid). Maxwell saw that Newton's 3rd law unifies action and reaction as one dynamical phenomenon: *stress*. Action and reaction are two opposite effects of the same reality, in the same way that in “commercial affairs the same transaction between two parties is called Buying when we consider one party, Selling when we consider the other, and Trade when we take both parties into consideration” (Maxwell, 1992, p.27). For Faraday, “matter is not merely mutually penetrable, but each atom extends, so to say, throughout the whole of the solar system, yet always retaining its center of force” (Faraday, 1839). After Faraday and Maxwell, modern physics irreversibly stumbled upon the problems that *simple location* creates.

A century ago such concept was left virtually unrecognizable after Relativity Theory and Quantum Theory. Due to the principle of indeterminacy and entanglement, precise boundaries become ill-defined and particles cannot be localized anymore. James and Bergson had started dismantling simple location a few years before the revolutions in physics started in the 20th century. Whitehead, inspired by them and also by the progress of modern physics (and it would not be hard to defend that he was one of the very few philosophers of the time that really grasped the scientific and philosophical implications of those revolutions), bluntly denied the concreteness of simple location. He did not prune it; he pulled it out from its root. Let us see how.

3. INTERNAL RELATIONS

That the properties of A depend on B causes no theoretical problems. But claiming that the essence of A depends on B actually defies the intellect. Our intention and challenge here is to think identities as intrinsically relational. by means of Whitehead's *event*-notion of individuality and his doctrine of *internal relations*.

The negation of *simple location* is accompanied by an affirmation. Whitehead's philosophy is both repulsive and propulsive. In discussing Einstein's relativity, Whitehead put forth the notion of *internal relations*¹. Space-time relationships have been generally understood as external relationships, and Whitehead denies that. He resembles Leibniz when he states that the relations that an event has are all internal relations: "This internal relatedness is the reason why an event can be found only just where it is and how it is, that is to say, in just no definite set of relationships. For each relationship enters into the essence of the event; so that, apart from that relationship, the event would not be itself. This is what is meant by the very notion of internal relations. It has been usual, indeed, universal, to hold that spatio-temporal relationships are external. This doctrine is what is here denied" (Whitehead, 1925, p.122-123). Put plainly, an internal relation is a relation between entities such that it is not possible for them to exist without each other. Thus, from the stance of the doctrine of internal-relations, inter-actions are "add-ons" to substances; a glue between "things" (which, in fact, and as we have seen, do not need the glue for their being).

That A and B are related so that their relation is primary implies that one could not properly speak about A if one leaves B out (because A owes to B what it is). A stronger criterium is the following: an internal relation also entails that the essence of A is due to its relation to B, and vice versa. Namely, an internal relation is a relation that determines the essence of related beings. Let us provide some examples within a somewhat heterogeneous list of cases for the purpose of gaining intuition about the notion of internal relations. A baby (born, but also specially as a fetus) and her mother are internally related. Another case of entities whose existence is intrinsically relational is the bee and its hive. So is quantum entanglement, where purely physical systems A and B, despite not being in interaction at the present time, are inseparable beyond accounts based on shared memory. Escher's drawing of the hands drawing each other may serve as a visual analogy to grasp internal relations. In the realm of cognitive psychology, a curious gathering is a magic trick: the magician cannot do magic without a spectator (it is easy to fool oneself, but it is impossible to do a magic trick to oneself).

When it comes to examples for the notion of internal relations as determining of the essences of the beings in relation we can, in the interest of brevity and in order to avoid

¹ Let us note that, first, internal relations do not denote a contrast between inside and outside (internal versus external), but between intrinsic versus extrinsic. Second, Moore discussed *internal relations* before Whitehead, but not in the same sense (Moore, 1919). Third, one must be cautious with some definitions of the notion of *internal relation*, especially when provided by analytic philosophers, influenced by Russell (see for instance Stanford Encyclopedia for Philosophy about internal and external relations). He thought that internal relations determine the related beings and thus make freedom impossible. Russell favors external relations. He did not think in terms of transformation of essence. Yet, self-determination of human essence through internal relations to other essences is arguably the highest form of freedom.

excessive technicalities, enumerated these: Bergson's interpenetrating experiences of our *durée*, Whitehead's *prehensions* between actual occasions, or Sartre's claim that human existence transforms its essence. In turn, one could argue that Hegel anticipates Whitehead's doctrine of internal relations, and that the Christian doctrine of the Trinity (Father, Son and Holy Spirit) is another of example of it. In fact, the idea of absolute spirit, universals, and actual entities is omnipresent in idealist philosophy and religion (Hemsell, 2017).

In contrast, virtually all "things", as usually conceived not only by the professional scientist (and the philosopher) but also the layperson, are deemed to be externally-related entities. As such, (and as we will argue below) they are not concrete, but abstractions. It is true that one can conceive things in external relation and still claim that it is impossible, for some of them, to exist without the other. The real challenge is to conceive a mode of relation that determines not only the possibility of existence but the essence and identity of two "things". Process philosophy—at least in Whitehead's flavor, which we are trying to explicate here—undertakes such task.

Let us also note that a rigorous understanding of internal relations discards dynamical systems since their relations are external. For instance, as usually conceived relations do not determine the essence of the related molecules in Rayleigh–Bénard convection, chemical systems, springs, electric circuits, or coupled pendulums. The relation between coupled non-linear pendulums that behave self-organized or even deterministic chaotically is external because they can be separated from each other without changing their essence (mass, shape) or ceasing to exist (Koutroufinis, 2014). In that sense, organicism may become dominant and even popular (Jaeger & Monk, 2015; Dupré & Nicholson, 2018), but it is so in its dynamical "process-light", rather than hard-core process flavor. We believe such efforts to be necessary but not sufficient to step away from mechanicism and reductionism (as they still embrace materialism).

Now, if things are not really things nor really where they are, does this mean that they are everywhere? Whitehead claims: "In a certain sense, everything is everywhere at all times. For every location involves an aspect of itself in every other location. Thus every spatio-temporal standpoint mirrors the world" (Whitehead, 1925, p.91). At first, this may seem a disproportionate claim. Whitehead's proposal is not so much that a particle is everywhere but that, in a precise sense, it also can and must be where it is not. The critique of simple location implies the negation of well-defined regions in space and time. Events are spread out and, importantly, they also have temporal width. Their boundaries are fuzzy. Upon inspection, a "thing" is not everywhere but it is somewhere else. Whitehead's cosmological scheme involves the complete abandonment of the notion of simple location as the way in which things are in space-time.

In closely examining his critique of simple location, Čapek qualifies Whitehead's "mirroring the universe" by means of emphasizing the causal cone of events: "each particular event reflects that part of the universe which acts on it as well as the potentialities of its own future effects; *but it remains causally unrelated to those events which neither act on it nor will be acted upon by it*" (Čapek, 1991, p.215). Thus, events are not simply located but at the same time they are circumscribed to causal influences. This supplements the principle of internal relations. It limits the repudiation of simple location. In other words, while one can still say that "each particular event mirrors the world", what is meant by the word "world" is not a complete entity outside of time, since "the act of mirroring *takes time*, that it is itself a time-consuming process" (Čapek, 1991, p.213).

As we mentioned at the beginning of this piece, common sense constantly suggests that there are objects “out there”, simply located. But Whitehead insists that to try to understand his proposal in terms of our everyday notions of time and space will inevitably bring great paradoxes. However, “if you think of it in terms of our naive experience, it is a mere transcript of the obvious facts” (Whitehead, 1925, p91-92). There is no element apprehendable in immediate experience were simple location is to be found. And yet, again, a pervasive and paradigmatic rebuttal reads: “if our experience shows the contrary, so much worse for experience!” (Čapek, 1991, p.205). Strangely enough, simple location does not adequate to the concrete facts; it contradicts our immediate experience.

4. MISPLACED CONCRETENESS

The problem with simple location is not simple location itself. It is that we take such *abstraction* as *concrete*. In other words, the fundamental problem and error is not to abstract but to confuse abstraction with reality. This is what Whitehead called *the fallacy of misplaced concreteness*.

Are we then talking about a denial of the reality of atoms? Yes and no. Atoms are both invented and discovered. No one has ever directly seen one. There is empirical evidence for them. However, upon close inspection, their essential properties crumble, as could otherwise have been expected². In sum, they are useful abstractions. The problem is to forget that “atomicity is only one aspect of nature” (Čapek, 1991, p.198). Let us to go back to Maxwell and quote him at length: “We are accustomed to consider the universe as made of parts, and mathematicians usually being by considering a single particle, and conceiving its relation to another particle, and so on. (...) To conceive a particle, requires a process of abstraction since all our perceptions are related to extended bodies, so that the idea of *all* that is present in our consciousness is perhaps as primitive an idea as that of any individual thing. Hence there may be a mathematical method in which we proceed from the whole to the parts instead of from the parts to the whole” (Maxwell, 1875). Upon abstraction, the intellect assumes not only that things are isolatable in our mind but also that they are isolated in reality. We conflate useful ideas as fundamental statements about reality.

Abstraction is paradoxical: being a lie, it works. In contrast, it seems that truth, precisely because it is true, is somewhat inoperant. But there is no doubt that so many abstractions are indeed useful. We are constantly abstracting in our daily life. If we want to take a train, we abstract from the train only that which is of our interest: schedule, price, destination. We do not attend to the color of the upholstery, the decoration of the toilets, or where the engine was made. And we do the same in our personal relations. The experience of thought (and desire) is an ongoing abstraction. The advantage of abstractions is that they limit thought to things and relations that are clearly defined (Cartesian clarity is often at odds with Bergsonian precision). The error does not lie in making abstractions,

² “Al descender hasta los microprocesos nos ha fallado el supuesto substancial; pero como íbamos cabalgando sobre los mismos procesos, haciendo caso omiso de su relación con una substancia, resulta que no nos hemos dado cuenta del cambio de corcel. Hemos abandonado la substancia y nos hemos quedado con la sola función. La sorpresa surge cuando se quiere atribuir substancialidad a los que eran simples comportamientos, o mejor dicho, meros cambios de propiedades de unas remotas substancias que ya no estaban inmediatamente “sustentando” los procesos elementales” (Panikkar, 1961, p.281).

but in taking them as concrete. If what abstraction excludes does not conform to experience, then our modes of thought become inadequate.

Let us say it more clearly: no abstraction, no thought. And without thought, there is no science. However, it is also true that: no concreteness, no life. We must abstract from the world in order to think about it, but we must also attend to the concrete particulars in order to live in it. So it is not possible to do science without abstraction, while at the same time it is possible to touch the concrete by means of our immediate experience. If we are incapable of questioning (or at least suspending for a period of time) our habitual abstractions, our work is condemned to sterility. As a collective (scientific, or otherwise) we would literally live auto-enclosed and ungrounded. In this sense, the role that philosophy plays in science is decisive. The philosopher as a critic of scientific abstractions is as beneficial as annoying to the scientist's work.

So, if one does ever really touch the "thing in itself", if science must abstract in order to study the concrete, how to tell if one abstraction is better than another? Exactitude depends on our interests, as Wittgenstein argued: "That which I defend myself is the concept of ideal exactitude, that would be given to us, so to say, a priori. At different times our ideals of exactitude are different; and none of them is ever the supreme ideal". This is a key insight. Ortega put it plainly (**Ortega y Gasset, 2015**): abstractions are subordinate to our interests, intentions, desires, and values —which are always human values. Thus, in this sense, there is no possible separation between the sciences and the humanities. Actually, from this perspective science is clearly nested in the humanities, rather than the latter being an epiphenomenal sprout of the former.

It is not only that the scale of observation creates the phenomenon, but without values we could not even act or perceive. Values entail interests. What are they? There are many and varied: to reduce a qualitative phenomenon to quantitative values in order to manipulate it and so achieve replicability and control, increasing certainty and comfort; to understand life for its own sake, gaining knowledge about what *is*. In other words, if what science does is indisputable, what it says about what it does must be disputed (**Canales, 2015**). The tools that science allows engineers to produce in turn allow us to control nature in an unprecedented way. And so, to any philosophical critique, the anti-metaphysically inclined thinker (which always enacts a metaphysics) replies: science simply works. The rebuttal has the same spirit as Johnson's refutation of Berkley by kicking a stone. Science is exact, its predictions can be confirmed and it is, above all, useful. Yet, as Ortega puts it: "It turns out that physical truths, upon their theoretical qualities, had also the condition of being profitable for the vital conveniences of men. From them, men could intervene in nature and make it comfortable in their own benefit" (**Ortega y Gasset, 2015, p.272**; our translation). Thus, scientism can be defended by bourgeois, since "comfort is simple a subjective predilection (...) but one that does not reveal by itself any superiority of character" (**ibid**). The criterium of utility need not supersede that of truth, or any other.

5. PERCEPTION

So far, thinking about matter we have uncovered the idea of *simple location* and, realizing its fallacious *misplaced concreteness*, we have replaced it with the notion of *internal relations*. We are now in position to see what this scheme offers for a theory of perception.

The rejection of simple location is not only the denial of self-absorbed nature of material objects in empty space, but it literally provides a different worldview from which to conceive perception. Casting Whitehead's example: "green is not simply at A where it is being perceived, nor is it simply at B where it is perceived as located; but it is present at A with the mode of location in B. There is no particular mystery about this. You only got to look into a mirror and to see the image in it of some green leaves behind your back" (Whitehead, 1925, p.70-71). Symmetrically, the adoption of the doctrine of internal relations is the basis for a different worldview in which things are not "out there". It is not by chance that Whitehead traces the critique back to Berkeley: "It is in the search for this wider basis for scientific thought that Berkeley is so important. (...) the key of the problem lies in the notion of simple location. Berkeley, in effect, criticises this notion" (Whitehead, 1925, p.67). Whitehead brings forward —perhaps more vigorously, but also in a more balanced way— a critique that Berkeley pioneered. The Irish philosopher questioned the existence of self-absorbed objects (and he did so much earlier than Kant talked about the "thing in itself"). Berkeley's philosophy of perception can be summarized in one sentence: To be is to perceive or be perceived (*Esse rerum est percipi*). Namely, to be is to be noticed; I perceive therefore I am. Once perception and being are equated, the world ceases to be made of things as autonomous beings.

For Berkeley, the world presents to us in our perceptions, rather than being represented in them. Why should we call primary that which cannot be experienced? Once one commits to the distinction between primary and secondary qualities, conclusions are concealed in the premises. When perception is degraded in favor of measurement, experimentalists cease to be empiricists. Such strategy indeed creates an objective frame of knowledge. To say that space and time are the preconditions of experience is backwards. Experience and consciousness do not admit any mediator; they are given in immediacy. Leaving his extremely idealist position aside, "being as perceiving" has a major advantage: it can actually dispense with *simple location*. For Berkeley, perception is not in the subject who perceives, nor in the object perceived. It is neither in both at the same time, nor even between both. Perception is, on the contrary, what sustains them both. It is their foundation. From this worldview, the world is not made of "things", but of perceptions. Things (as perceptions) are pointers to other things. In a sense, they are here and there at the same time. They are from where they look and in what they look.

Whitehead's philosophy is tilted towards the radical empiricism of Berkeley or James, in which reality is identified with experience. He attributes experience to all things in the world. Berkeley had pointed in that direction, but no one like Whitehead had brought so far the identification of experience with reality. The implications of *pan-experientialism*, and its often missed precise relation with pan-psychism (and the critiques therein) are beyond the scope of the present manuscript. If one claims that all is perception, one is quickly haunted by the doubt about who sustains the tree that nobody sees. We do not need to suppose a God that sees it and sustains it, nor to admit that the tree disappears. Those who perceive it hold the tree. The earth feels the roots, and the wind the leaves, and the nest the branch.

Whitehead coined the term "eternal object" (which we cannot explain here due to its technicality) to distance himself from the concept of essence. His philosophy is a critique of modern philosophy, from Descartes to Kant, which has interpreted nature and the human being through the category of substance, justifying in this way the reproach to build a solipist perspective, rather than understanding all real essences as subjects, which is the position that Whitehead adopts and that he calls the "reformed subjectivist

principle". The successful defect of the physical-mathematical scheme of the 17th century was to decide that reality is made of substances of independent existence. This was the starting point of scientific materialism, which gave way to mechanicism. The notion of simple location is a Newtonian mirage. The classical substance is self-contained, and it cannot be "in" another substance. The real, the concrete, is a continuous process of self-identity. Entities penetrate one another. They are in themselves and in other identities.

6. OUTLOOK

Our goal here has been to draw attention to the bias of certain pervasive (and may we dare to say pernicious) abstractions. We have argued that such abstractions have their common root in the ubiquitous assumption of *simple location*, which is often presented as a fact. Following Whitehead, we have put into question the habit to believe that things are *simply-located* in space and time; namely, the idea that the world is made of "things" which are merely where they are. More precisely, simple location incurs in the fallacy to locate concrete particulars in definite portions of space and time. Particulars are not particles. When referred to space, simple location precludes wholeness; when referred to time, it precludes creativity. The negation of this worldview has major consequences for the notion of identity.

The triumph of such abstractions has prompted some of the technological development that we now enjoy. Furthermore, "The world of science has always remained perfectly satisfied with its peculiar abstractions. They work, and that is sufficient for it" (Whitehead, 1925, p.66). Yet, granting scientific engineering such achievements, one must also address their contributing to the destruction of our planet (which we will not discuss here). Moreover, the statement that "they work" takes technological progress and comfort as ultimate values (a claim as indispensable as indefensible). Moreover, still in operation today, such scientific-philosophical frame is too narrow for current science; "it provides none of the elements which compose the immediate psychological experience of mankind. According to that scheme, there is no reason in the nature of things why portions of material should have any physical relations to each other" (Whitehead, 1925, p.73). Most of 21st century biology and neuroscience is based on metaphysical ideas that are centuries old and that modern physics left behind a hundred years ago.

At the microscopic physical level, such bits of matter have not been found. Quite the contrary, the quantum physicist has bumped into an exotic garden of incredible particles which, when inspected even more closely, dissolve into energy fields. Once determined to come across the ultimate pellets of the real (the old Greek idea of the atom), 20th century scientists realized that it is more appropriate to think of them as expressions of activity.

At the biological level, it seems as if organisms have outlines that are accessible to the senses, but the senses themselves continually deny them. If we inquire into the outline of the living, we immediately notice that these boundaries are nothing more than transmission channels, filters at most. In the body, vital exchanges (breathing, vision, speech, etc) have been suppressed. The word "body", like any other, seems to account for a clearly defined reference and, however, only points to a node inserted into a network. Living organisms are alive precisely thanks to the opening of their contours; they have a vocation for adventure.

A key to abandon simple location is the concept of field, which resonates with the notion of internal relation. A field is the set of conditions that make the event possible. For Leibniz everything is linked, everything is full, everything is continuous. Kant dealt with the problem within his second antinomy: the impossibility of infinite divisibility prevents being from becoming anything. We do not know if reality is continuous or discrete. The problem probably has no solution and, as in the case of the One and the Many, all the solutions have been false closures. Physics tried to solve the dilemma through the concept of field, which is conceived as the continuous distribution of a preponderant "condition" or "magnitude", described mathematically by a gradient. The concept of field, associated with structure and correspondence, has been growing in importance in physics and this relevance is now projected on neurosciences and theories of perception. The field can be understood as the vital space of an organism and as the totality of the possible events from which the organism's behavior will derive. The reason is simple: there is always a field in which observation takes place and the meaning of it is subject to the semantic field. If the notion of field has become an essential for physical matter, it will be even more for organic matter or psychic matter.

As Borges remarked with unrivalled genius, it is notable that some qualities are considered substantives and other adjectives (**Borges, 1925**). And yet, nature is not static like a noun or secondary like an adjective, but durational like a gerund and circumstantial like an adverb. The object-subject distinction is disorienting. It already presupposes a metaphysics of differentiated subjects with privative predicates. "We find the world's contents grouped into things and their qualities." (**Bradley, 1893, p.19**). Both, matter and mind, body and soul, are substantives "too big" for Borges.

And so, in ending, we ask: what happens when we bite an apple and experience its flavor? Berkeley would suggest that the flavor of the apple is not to be found in the apple itself, nor in the person that tastes it, but in the gathering of both (**Berkeley, 1710, I.1**). This is not only applicable to flavor, it can be extended to a wide range of perceptions and thoughts. Actually, an apple is also the confluence of a seed, a tree, the rain, and the harvest. What we call "things" are actually processes whose origin becomes impossible to trace. A flavor is not different from that other encounter we call a person. The things we perceive and imagine are gatherings and they have a provisional character. Things are encounters. And identities are crossroads.

Such essential conditionality is what Buddhists call emptiness. Accordingly, one cannot say that the truth of the fugacity of things is an eternal truth, otherwise it would transform it in a product of the same kind as that which it denounces. The truth of the provisionality of identities is itself provisional and gets involved with a certain character of irony (passing truth has a soothing effect on imagination). The core of the problem of identity is that $A=A$ is either a truism or false. In fact, one of the most original ideas of the ancient Mahayana Buddhism (**Nāgārjuna, 2011, 2.19, 6.4-5, 10.16, 20.19-20**) was its critique of the notion of identity: there are not two identical things in nature; nothing is identical to another thing. According to this view, identity is impossible; $A=A$ is a fallacy. If one can't find in the world two equal beans, two exactly same cogs, even less two identical hopes or living beings. Not only there are no two equal grasshoppers, but, since they live in time, each grasshopper could never be identical to itself. The person that started read this paragraph is not the same than the one who finishes it.

In sum, we have tried to show that Berkeley was discarded too precipitately. And that Whitehead's valuable philosophy is still ungrasped. Whiteheadian or not, our exploration of *inter*-identities beyond reductionistic and mechanistic stances (even when covert in emergentism or organicism) suggests to rather conceive them as *intra*-identities. The fascinating challenge we have is to be able to think relations within, not between.

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Author Contributions. AGM and JA conceived the project and wrote the manuscript.

Funding. This work was supported by the Spanish Ministry of Science, Innovation and Universities (BFU-2015-74241-JIN grant project to AGM).

Conflict of Interest. The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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