

## Research Article

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# Rethinking Organismic Unity: Object-Oriented Ontology and the Human Microbiome

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**Abstract:** In recent years, a vast array of thinkers have been invested in challenging the long-standing binary division between the human and nonhuman. The notion of the human microbiome especially attests to the truth of such a complication, since current research in biology strongly suggests that we are at the very least as much microbe as we are human and that the number of microorganisms in the human body outnumber distinctly human cells considerably. In this article, we aim to bring the biological notion of the human microbiome in dialogue with Object-Oriented Ontology (OOO) so as to ultimately show that there can be a fruitful exchange of ideas between the two currents of microbiome research and OOO more specifically, and that Graham Harman's top-down account of objective emergence can be fruitfully a bottom-up approach according to which the parts of an object also impact and constrain the whole.

**Keywords:** human microbiome, Object-Oriented Ontology, biology, ontology, emergence, microorganisms

The history of Western thought has, to a very large extent, constructed ontologies centred around the institution and sustenance of strict binary divisions between the realms of the human and the nonhuman. However, since the end of the twentieth century, a vast array of thinkers and philosophical movements have in different – and often divergent – ways been invested in challenging and complicating long-standing binaries such as the strict separation between the human and nonhuman. To be sure, many are not simply denying the division in order to liquidate reality into a slew of undifferentiated and indifferent entities, such that a more accurate claim would be that they seek to *complicate* it in such a way that the notions of the human and nonhuman become simultaneously ontologically irreducible and indissociable. To maintain that these notions are irreducible is to say that one cannot simply claim that reality must be “flattened” in such a way that the human is reducible to its alleged other(s), or *vice versa*. Nevertheless, they are also indissociable to the extent that what counts as human is often defined over and against the notion of what counts as “other” (relative to the human). In this way, and especially relative to progressive discoveries in fields such as ethology, ecology, biology, animal behaviour, and animal studies, the old maintenance of a binary division between humans and non-humans would prove to be problematic for at least two reasons; first, and as we shall show, it ignores the fact that humans are themselves composed of large swathes of non-human entities. Second, it also forgets that non-humans are responsible both for the genesis and maintenance of human life.

The notion of the human microbiome especially attests to the truth of the human/nonhuman complication. This biological notion refers to the assorted community of bacteria, fungi, viruses, and archaea that inhabit the human body and play a decisive role in sustaining the organism's overall mental and physical health. Current research in biology strongly suggests that we are at the very least as much microbe as we are human; the number of microorganisms in the human body outnumbers distinctly human cells considerably, even if recent research also suggests that this may vary depending on factors such as individual physiology and

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environmental influences. The absolute majority of these microbes are not only beneficial, but in many cases crucial for both our physical survival and psychological flourishing. We humans are, in essence, an ecosystem of mutualistic relations between human cells and microbial allies. We take seriously the possibility that these microbes are crucial for the sustenance of both human psychological and physiological well-being, while also recognising that the relative infancy of microbiome research would give this article a somewhat speculative dimension when it comes to its philosophical implications.

Although the concept of the human organism as a multitude has been a topic of discussion in both the philosophy of biology and the discipline of biology itself for some years now, this article offers an original contribution to the debate by linking, for the first time, the conceptual framework of Object-Oriented Ontology (OOO) to contemporary discussions on the human microbiome, emphasising how the latter notion impacts the interplay between the concepts of identity, emergence, and essence in the specific sense used by OOO. This article presents a collaborative experiment between a biologist and a philosopher, and its fundamental aim is to answer the following general questions: If a human individual is a composite of microorganisms and human cells, then what can one make of the notion of identity in OOO? Furthermore, what implications would this “composite” view have on top-down and bottom-up approaches to mereology in the specific context of OOO? In order to answer these questions, we shall proceed as follows: first, we shall consider what we call OOO’s “thesis of irreducibility,” namely the notion that an object broadly construed refers to any entity that is ontologically irreducible to its parts or effects. We then go on to analyse aspects of Harman’s fourfold model of objects. As is well known, Harman’s model of objects is developed along two axes, namely the object-quality and the real-sensual axis. For the purposes of this article, our focus shall be on the relation between the real object and its real qualities, along with Harman’s account of the emergence of “form” as a tension between these two poles. We then move on to give a concise description of the notion of the human microbiome, before finally proceeding to show its implications for personal identity in the context of OOO specifically. By the end of this article, we hope to show how microbiome research can allow us to better understand and develop, but also complicate the notion of personal identity in OOO. More specifically, we shall demonstrate how the notion of the microbiome allows us to supplement Harman’s top-down account of objective emergence with a bottom-up approach according to which the parts of an object also impact and constrain the whole.

## 1 The Thesis of Irreducibility

The topic of the present article specifically concerns the implications of the human microbiome for the original version of OOO as articulated by Graham Harman. It bears noting at the outset that OOO upholds a “flat ontology” according to which “all objects are equally objects.”<sup>1</sup> This does not imply that all objects are exactly alike, that there is no difference between the multifarious ways in which different organisms deal with their surroundings, or that all entities are exactly on a par at an ethical and political level. It does however entail that all objects may be said to exist equally and that there are basic features which are necessarily shared by all possible objects at the most basic ontological level, irrespective of whether the object in question is a bacterium, human, virus, rock, or plant. With this in mind, we shall start by exploring the general meaning of the term object in OOO since it is clear that this general structure must also apply to humans, their specific microbiomes as collections of microorganisms, as well as the individual microbes themselves.

It would be important to note that the term “object” is historically and philosophically loaded, and has often been taken to refer to the opposite or correlate of a subject, or more colloquially to so-called “mid-sized entities” such as tables, chairs, and books. Within the framework of OOO, the term is however given a broader scope and meaning. For OOO, social entities such as money, bank accounts, cocktail parties, and the tiny island of Filfla would count as objects. Yet so would physical entities such as photons, chairs, and rocks, as well as ideal ones such as the number six and the square root of four. While recognising that it is impossible to clearly demarcate the realm of nature from that of culture, OOO also counts living beings – including humans

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<sup>1</sup> Harman, *Quadruple Object*, 5.

themselves – as objects within this specific framework. The fact that the term object is philosophically loaded, and the fact that OOO does not place a *prima facie* distinction between different categories of beings – e.g. the living versus non-living – might lead to the assumption that it reduces a living organism to its use-value, i.e. that it “objectifies” beings. This would however be mistaken. In order to avoid such an assumption, and given the rather expansive list of entities which would fit the category of “object” as understood here, we should thus seek the minimal conditions for something to count as an object in this specific sense.

At the most basic level, and always within the context of OOO, the term object is used as a loose placeholder term referring to anything which may be taken to be ontologically irreducible. For convenience, we may call this the “irreducibility thesis.” To reduce something here simply means to broadly claim that a given entity of any scale is nothing more than its most fundamental parts or external relations. Harman calls such a procedure of reduction “radical” in that thinkers who follow this logic are said to reduce an object to a single *radix* or root.<sup>2</sup> The “radical” philosophers who reduce everything to parts or relations are in turn called “underminers” and “overminers,” respectively, within the framework of OOO.<sup>3</sup>

In essence, “undermining” steers away from actual beings in order to claim that these are merely the effect of a more basic reality. For these thinkers, objects do not form the most fundamental basis of all reality, since there is ultimately nothing more than a mere “surface effect of some deeper force,”<sup>4</sup> such that the multifarious entities which populate the world are in fact ultimately nothing more than an *aggregatum* subservient to some deeper stratum which constitutes them. Harman maintains that “undermining” has roots planted firmly in the pre-Socratic philosophies of thinkers such as Thales, Anaximenes, Heraclitus and the ancient Atomists (Leucippus and Democritus).<sup>5</sup> He nevertheless also insists that this undermining attitude also lies at the heart of some contemporary scientific and philosophical forms of reductionism and eliminativism.<sup>6</sup>

Conversely, the overminers maintain that entities are nothing over and above the collection of their manifest qualities, affects, relations, or derivations of our linguistic habits. Such philosophies are also popular in contemporary process philosophies and philosophies of becoming,<sup>7</sup> as well as in varieties of social constructionism. Harman deems overmining to be a more obstinate “central dogma of our time,”<sup>8</sup> in that a sizeable number of contemporary thinkers either follow Kant in reducing reality to the “correlation” between thinking and being,<sup>9</sup> or instead refuse this human/world relation, but only in order to maintain that entities are to be reduced “upward” to nothing more than their inter-objective relations.

Crucially, and as we shall show in more detail below, OOO does not deny that any given object has parts or that it enters into relations. For instance, a human being is clearly made up of a quasi-infinite array of sub-personal components and also entertains various relations with entities which are in many cases – but not always – crucial for its identity and persistence. Nevertheless, reductive or “mining” philosophies take such an intuition further by claiming that given entities are *nothing more than* their parts or relations, such that the thing encountered becomes nothing more than a mere epiphenomenon. Contrastingly, the object in OOO *prima facie* refers to an irreducible singularity, namely *this* or *that* specific object bound to its individuating traits.

## 2 The Basic Structure of an Object in OOO

Aside from the aforementioned characterisation of objects in terms of what we have called the “irreducibility thesis,” OOO also gives a more positive characterisation of the term “object.” Before considering the relation

<sup>2</sup> Harman, *Prince of Networks*, 154.

<sup>3</sup> Harman, “Undermining, Overmining, Duominig.”

<sup>4</sup> Harman, *Quadruple Object*, 6.

<sup>5</sup> Harman, *Bells and Whistles*, 86.

<sup>6</sup> *Ibid.*, 87.

<sup>7</sup> Harman, “Whitehead and Schools X, Y, and Z.”

<sup>8</sup> Harman, “Realism without Materialism,” 71.

<sup>9</sup> Meillassoux, *After Finitude*.

between the notion of the microbiome and OOO, it would then be best to explore the most fundamental positive features of objects in some detail. Before proceeding, it would be important to stress the following two points. First, and as is well-known, OOO puts forward a general metaphysics composed of a fourfold structure composed of two axes, namely one axis comprised of the distinction between the real and the sensual, and another pointing to the difference between an object and its qualities. Due to restrictions related to space and priority, we shall here emphasise only three elements of Harman's ontology, namely the notions of the real object, its form or infrastructure, and real qualities, since these aspects are the ones which are most pertinent to our present task. Second, we shall here also only restrict our analysis to a class of real objects which, for lack of a better word, may be called multicellular living organisms, since inanimate objects fall beyond the scope of the present article.

The irreducibility thesis discussed above may be understood as “negative” in the restricted sense that it defines what an object is *not*, namely just its parts or relations. More positively, we can however also claim that OOO's sense of object shares many similarities with a specific sense of Aristotle's notion of substance. As is well known, Aristotle distinguishes between a primary and secondary substance. While the former refers to an individual *haecceity* as a bearer of properties, the latter denotes a (reified) genera or species. It is most certainly true that contemporary biology challenges the essentialist view of species or genera by recognising that species are dynamic and subject to change over time. Nevertheless, at least on some accounts, it also continues to emphasise variation between concrete individuals and their significance in the process of adaptation and evolution. For OOO, an object – which, as a reminder, also includes living beings more generally and human beings in particular – is thus always this or that specific being, and never a reified general category. Even if the classification of a being into a general category is indeed possible on the basis of a strict number of morphological similarities, the latter remains the task of epistemology rather than being an ontological feature of reality. For OOO reality is only composed of individuals, and their (epistemic) recognition as a specific species derives from the fact that they share a number of genetic similarities which in turn translate into “sensual” similarities relative to the human perceptual and conceptual apparatuses. Harman calls individual entities “real objects” and in so doing, he affirms and defends the basic *sine qua non* conditions for any realist philosophy, namely the existence of a mind-independent reality composed of singular entities or haecceities. While this assertion might seem somewhat unimportant and tangential in the context of the biological sciences, it is actually a philosophically radical claim in that it staves off the vast swathes of idealist philosophies which have come to dominate post-Kantian thinking until very recently. In spite of their differences, the vast majority of thinkers since Kant built their philosophies either on the explicit denial of a mind-independent reality or on a tacit yet more obstinate “correlationist” scepticism,<sup>10</sup> according to which every ontological entity is ultimately inseparable from the strictly epistemic conditions of possibility under which we (humans) come to know it.

Pace undermining philosophies, Harman argues that a real object cannot primarily be defined in terms of its most fundamental material constitution. Rather, its identity is secured by its form. The tacit influence for such a view might very well be Harman's former teacher Alphonso Lingis who, in his wonderful book *The Imperative*, asserts that it is only as a form that “a thing is both in itself and for us.”<sup>11</sup> The term “form” once again has ancient roots, and is admittedly also philosophically loaded. For this reason, an improper characterisation might risk leading us back to an archaic Platonic view of universals imprinted into impoverished empirical particulars, and therefore also back to the notion of an organism defined in terms of its essential genera.<sup>12</sup> Against this possible conception, we should then emphasise that, in our view, the term performs three functions in the context of OOO: first, it may be taken to refer to an entity's relative autonomy, namely the manner in which the object as a whole maintains its integrity in spite of the gradual shift in parts as well as the changing context of relations.<sup>13</sup> While it might not be easy to draw a strict separation between an entity

<sup>10</sup> Ibid.

<sup>11</sup> Lingis, *The Imperative*.

<sup>12</sup> For an in-depth analysis of the critique of Harman's view as a Platonic idealism, refer to Young, “All Objects are Bound by Time.”

<sup>13</sup> Harman, “Shipwreck of Theseus.”

and its surrounding environment,<sup>14</sup> an entity's ability to withstand changes in its total current context of involvement suggests that there is something more to an entity than its relations. This "something more" as resistance to total absorption within a network of relations is what is here meant by autonomy. Second, the term "form" is used to emphasise that an object is ultimately an emergent reality. Stated as briefly as possible, the term "emergence" generally refers to a phenomenon where complex systems arise out of simpler interactions between parts. The notion is especially pertinent to the present study since, as we discuss below, our identity, health, and functionality are sustained by the intricate interplay between our body and its microbial inhabitants. In his explication of emergence, Harman draws upon the four criteria for emergence first articulated by Manuel DeLanda in his book *A New Philosophy of Society*,<sup>15</sup> and we deem it fit to retain these conditions for our current purposes. Briefly stated the first criterion is that of *emergent properties*, namely the idea that an entity taken as a whole has specific properties which are not possessed by its parts. Second, emergence challenges bottom-up approaches through the notion of *downward causation*. This refers to the fact that an entity is able to have a retroactive effect on its parts. For instance, an organism as a whole is capable of affecting its parts causally so as to perform an array of complex actions. The third criterion for emergence is *redundant causation*, which entails that an emergent whole can gain or lose parts while maintaining its integrity. Fourth, emergent entities are able to *generate new parts*, and this is especially visible in processes such as cell multiplication in embryonic cells. Finally, "form" in the context of OOO serves to emphasise that any given entity is primarily unified rather than an *ad hoc* collection of parts. This last point is especially important for our current purposes, since the conception of the human as a collection of human cells and microbiota might very well complicate the idea that an object is an "*identitas*" or self-same entity. Its elaboration would require a further analysis of Harman's ontology, and shall thus be dealt with later.

In addition to the notion of the real object as form, Harman also emphasises that a real object always possesses real qualities. In order to assert this, Harman draws inspiration from Leibniz's Law, which stipulates that two entities are identical insofar as they possess the same (real, in Harman's case) properties or, conversely, not identical to the extent that they do not possess identical properties. He rightly reasons that a real object must have real qualities, for otherwise objects would be utterly indistinguishable. Harman in turn uses the term "essence" to account for the existing tension between the real object and its multifarious qualities.

The notion of "essence" has at times been rightly treated – especially in recent years – as biologically and politically tendentious. The notion of essence would only be biologically contentious in the context of species or genera essentialism, namely if one were to assert that there is a general abstract category "zebra" (*Equus quagga*) apart from existing reproductive communities of individual zebras. In other words, it would be controversial only if one were to confuse the epistemic classification of animals on the basis of their loose shared similarities with their individual being as this or that specific living organism. Relatedly, "essence" would also be politically questionable if one were to maintain that certain alleged categories of humans can be determinedly distinguished from others on account of their inherent shared superior or inferior tendencies or that the Animal in general can be abused on account of its categorical difference from the Human in general. To be sure, we recognise that the notion of essence is an admittedly loaded concept which is best avoided so as to circumvent possible misconceptions associated with it. Nevertheless, it is also clear that Harman does not subscribe to a classical understanding of essences, as there are marked differences between the two positions. More precisely, classical (Platonic) essentialism is committed to the view that reality is primarily composed of universal eternal essences and that the latter can in principle be adequately known by humans. Conversely, Harman's notion of essence simply serves to emphasise that each entity has an inherent structure, i.e. that an entity is more like a proper noun than a noun in the general singular. Moreover, and as we shall see shortly, Harman defends the idea that an object can simultaneously both have an individuating essence and be composed of a multiplicity of parts. For example, and always in the framework of OOO, in each individual human, there exists a tension between its specificity – since a human is always *this* individual being – and its multiplicity of human and nonhuman parts.

<sup>14</sup> Refer to Morton, *Hyperobjects*.

<sup>15</sup> DeLanda, *A New Philosophy of Society*.

There is more to be said of Harman's intricate ontological system, but two further salient features of his ontology stand out in the context of the current article. One is related to the ways in which entities interact with one another, while the other is related to the question of the complex relations between parts and wholes (mereology). It would be best to tackle each of these features in some detail before proceeding to our discussion of the notion of the human microbiome. With regard to the first, Harman crucially maintains that entities do not make direct contact with each other, to the effect that any form of relation between entities must depend on one object indirectly picking up information patterns (or "sensual qualities") from another object and translating it in its own terms.<sup>16</sup> To be sure, this view of relations is not exclusive to living beings alone, for Harman states that even in the case of something like an electron it "both is what it is, and also information making a difference to other realities, though in pitifully abstracted form."<sup>17</sup> Nevertheless, living beings arguably offer the best examples of this "translational" view. This is best explained through the work of Jakob von Uexküll, who distinguishes between the objective space in which we see an animal move (*Umgebung*) – but which is nevertheless inaccessible to it – and its "environment" (*Umwelt*). He describes the latter as merely "a piece cut out of its surroundings"<sup>18</sup> where the organism simply picks out the elements of its surroundings which are pertinent to it. To use one of Uexküll's well-known examples, a tick detects butyric acid emitted by the sweat glands of mammals, and this acts as a signal for the tick to leap off a branch. It then finds a patch of skin devoid of fur, senses the temperature of the blood, bores its head into the skin and sucks up the warm blood, even if it has no sense of taste. As is clear, the tick does not make direct contact with the world, but merely translates a mammal into something like "butyric acid and warmth." Without wishing to efface differences between diverse modalities of relation present in different organisms, Harman maintains that all inter- and intra-objective relations work in exactly the same way, i.e. with entities translating one another into their own terms. Furthermore, he claims that more complex living organisms eventually develop finer-grained "translational" abilities, with different "organs ranging from ears to eyes to brains [allowing] for the greater fragmentation of experience into ever finer-grained chunks or zones."<sup>19</sup> He also follows Uexküll in asserting that life is best understood in terms of its inherent "stupidity," in the sense that inanimate entities such as stones respond to different causal forces (kicking, punching, heating, throwing, etc.) in very diverse ways, while something like a muscle translates all stimuli into the same output, namely a twitch.<sup>20</sup>

The second important feature is related to mereology, namely the study of the relationship between parts and wholes. One way of tackling the issue might be to create a strict distinction between what would count as a unified substance as opposed to a simple aggregate sum of parts. This distinction is especially prominent in Leibniz, who distinguishes between true substances – which are defined by their unity – and aggregates such as an army, machine, or circle of men holding hands, since the latter "have their unity in our mind only."<sup>21</sup> Contrary to Leibniz's binary division, we can follow Levi Bryant in asserting that OOO entertains a "strange mereology" according to which objects are simultaneously both substances and aggregates.<sup>22</sup> There is a sense in which an object is not an aggregate, since it has a certain inherent organisational structure or what Harman calls "form." Thus, there is indeed a sense in which "no substance has any parts at all," since an object is an infrastructural unity rather than a mere aggregate sum of parts.<sup>23</sup> Harman nevertheless also maintains that every object is in another sense also composed of parts, such that every object becomes a "multiplicity that is also somehow one."<sup>24</sup> Levi Bryant articulates this complex relation by asserting that "parts aren't parts for a whole and the whole isn't a whole for parts. Rather, what we have are relations of dependency where

<sup>16</sup> See Harman, "Zero-Person."

<sup>17</sup> Harman, "Zero-Person," 272.

<sup>18</sup> Uexküll, *Foray*, 53.

<sup>19</sup> Harman, "Zero-Person," 281.

<sup>20</sup> Harman, "Magic Uexküll," 117, 118.

<sup>21</sup> Leibniz, *Philosophical Papers*, 86.

<sup>22</sup> Bryant, *Democracy of Objects*, 214; Harman, "Plastic Surgery," 223–4.

<sup>23</sup> Harman, *Guerrilla Metaphysics*, 93.

<sup>24</sup> *Ibid.*, 96.

nonetheless parts and wholes are distinct and autonomous from one another.”<sup>25</sup> To be sure, Harman himself asserts that there is a distinction between the “domestic relations” of an object and its “foreign relations.”<sup>26</sup> Roughly stated, the former refers to those relations which are necessary for an object’s existence, while the latter refers to extrinsic relations which objects enter into and detach from. Crucially, Harman maintains that an object is not exhausted by its domestic or foreign relations. This is because an object can effectively reconfigure its alliances with the objects to which it (indirectly) relates, and is therefore not defined by its foreign relations. Nevertheless, it is also relatively independent of its domestic relations to the extent that it emerges over and above its constituent parts, such that it can gain or lose parts (within certain limits, of course) without sustaining any loss in integrity.<sup>27</sup> In spite of Harman’s emphasis on a top-down approach characteristic of redundant causation discussed above in the context of emergence, we can now actually begin to see that there is both an interesting top-down and also bottom-up feedback relation emerging. The top-down relation becomes evident through the fact that an object is more than the sum of its parts to the extent that it is not a mere aggregate, but also less than the sum of its parts to the extent that the object as a whole does not exhibit every single feature of its parts as a collection of sense data. The bottom-up relation is, however, also evident in the fact that an object is also evidently sustained by its parts, with some being more important than others in maintaining the integrity of an object.

If everything we have said so far about OOO is in turn juxtaposed with the notion of the human microbiome relative to a specific kind of “object” we call “the human” understood as an autonomous and unified agent with a specific form or essence (in Harman’s specific senses of these terms), interesting questions begin to emerge: What constitutes individual identity in OOO? Psychology or physical space? Can we replace both these with Harman’s sense of infrastructure or formal cause? If micro-organisms in the body can affect the psychological or physiological state of a human, can we say that a bottom-up approach is preferable? Conversely, if the organism as a whole restricts the action of micro-organisms to its specific context, would this be evidence for a top-down approach to identity? Do we need to choose between these two, or should we rather follow Harman’s complication of these two approaches? Before providing a more structured – even if provisional or more speculative – answer to these questions, we should however briefly consider the meaning of the notion of the human microbiome.

### 3 What is a Human Microbiome?

Narratives of human life are generally founded on the notion of the individual as a “low-entropy island,” a self-contained entity with distinct and perceptible spatial boundaries. This is the “organism,” an island or what Harman calls an “autonomous” unit embedded in a matrix of higher entropy.

The “object” (in Harman’s specific sense of the term) called the human organism, defined as the structure and function encoded by the human genome, is however a minority constituent of the human “island.” Only 10% of the cells<sup>28</sup> and fewer than 1% of the genes in the human “island” belong to the human, with the other cells and genes being mostly bacterial. The non-human component of the human island is referred to as the “microbiome,” a system of bacteria, fungi, and, depending on the circumstances, various other parasites, commensals, and amensals. The boundaries of the human island are therefore indistinct in both space and time, since the “domestic relations” of the human are ultimately sustained by entities which are regarded to be effectively non-human. In this first sense, the organism is thus a multiplicity.

From a structural – or what Harman calls “formal” – perspective, the human island may be perceived as a network of relations between interconnected “objects” (“parts”) with distant evolutionary origins and

<sup>25</sup> Bryant, *Democracy of Objects*, 216.

<sup>26</sup> Harman, *Prince of Networks*, 135.

<sup>27</sup> *Ibid.*, 135, 188.

<sup>28</sup> Fox, *Microbe*, December 2013, 494; *Science* 342:1440, 2013; *Cell Metab.* 12:111, 2010.

subsequent stable evolution. Each of these systems, in turn, comprises its own subsystems down to the molecular level. Every “part” plays a role in maintaining the individual human for long enough to reproduce successfully and to sustain the evolutionary fitness of the population as a whole. In this sense, the organism may also be seen to be one thing.

This complex microbiome is the result of ongoing evolutionary and ecological processes, where the “human” is an ecological arena in which components of the microbiome are competing for resources. Although each component of the microbiome is only concerned with increasing its own evolutionary fitness, these ecological processes have, over evolutionary time, generated a fragile mutualistic equilibrium in which the different components of the microbiome act to increase the survival rate of individual humans and, consequently, the fitness of the human population. There is no grand design or “intent” in this; evolution has no foresight.

Despite the diverse nature of its components, the human island exhibits a remarkable structural unity. The microbiome is not a simplistically stochastic assemblage of microorganisms; it performs specific, essential tasks that contribute to the individual human organism’s maintenance of function whilst maintaining the fitness of the individual components. This creates a paradoxical existence where a human is both a multiplicity and a unity – a multiplicity of various microorganisms coexisting in a single organism, yet unified in survival and reproductive processes which allow the organism to both persist and subsist. In other words, and in view of our discussion above, the human may be seen to be a multiplicity (of microbiota and human cells) that is simultaneously also singular (a specific structural whole).

The human microbiome is involved in numerous fundamental processes, including digestion, the synthesis of vitamins, and the development of the immune system. The human microbiome has been linked to various health and disease states.<sup>29</sup> However, assessing the microbiome presents challenges, including the personalised nature of microbial communities and the influence of external factors.<sup>30</sup> The microbiome’s role in paediatric health and disease, as well as its potential to influence the development of chronic conditions, has been highlighted.<sup>31</sup> The gut microbiota has been implicated in metabolic disorders and other diseases.<sup>32</sup> The use of high-throughput sequencing has advanced our understanding of the microbiome,<sup>33</sup> and its potential applications in forensic science are being explored.<sup>34</sup> Moreover, the porousness of the organism’s boundaries is highlighted by the dynamic interaction between the human body and environmental microorganisms, which can be incorporated into the microbiome, further emphasising the organism’s open and interactive nature.

In this context, we can begin to see an interesting bottom-up system emerging whereby some “parts” – which, for OOO, are also “objects” in their own right – sustain the organism’s existence in such a way that, in their absence, the organism as a whole would most certainly not endure. More precisely, we might claim that the relationship within the organism encompasses both top-down and bottom-up interactions. The structural unity of the organism imposes constraints on its parts, ensuring coordination and coherence in function. This top-down relation signifies that the organism is not merely an aggregate of parts but a cohesive unit. Conversely, the bottom-up relation illustrates how the diverse elements of the human microbiome sustain the organism as a whole, contributing fundamentally to its overall survival.

The human microbiome is a microcosm of complex interactions between species. It poses biological and philosophical questions regarding our understanding of what it means to be an organism, emphasising the importance of the multitude of microorganisms that reside within us and around us, prompting a re-evaluation of the notions of individuality and unity in the biosphere. With all this in view, we can now go on to analyse what it might mean to speak of personal identity in the context of OOO, before finally relating this notion of identity to the elements of microbiome research just discussed.

<sup>29</sup> Liang et al., “Involvement of Gut Microbiome.”

<sup>30</sup> Robinson et al., “Intricacies of Assessing the Human Microbiome.”

<sup>31</sup> Johnson and Versalovic, “The Human Microbiome;” Ding et al., “Revisit Gut Microbiota.”

<sup>32</sup> Cani, “Human Gut Microbiome.”

<sup>33</sup> Tyler et al., “Analyzing the Human Microbiome.”

<sup>34</sup> García et al., “Impact of the Human Microbiome in Forensic Sciences.”



## 4 Objective Identity

As Penelope Ironstone points out, we are living a “post-Pasteurian” moment in which microbes can no longer be conceived as antagonistic to human survival. Rather, the notion of the human microbiome should allow us to further recognise the contentious border separating the inside from the outside, and that we are more of a confederation of entities – a unified multiplicity, so to speak – as well as a singular organism; what we call the self is, in other words, “fashioned dialectically” through symbiotic “domestic relations” with microbes.<sup>35</sup> In this way, the recognition of the human microbiome in philosophy should have important ontological, epistemic, and political implications for thinking about who we are as individuals.<sup>36</sup> A large part of this shift in thinking is in large part due to advances in molecular biology and computational power, which have allowed us to perceive ever-increasing fine-grained levels of reality as well as store vast amounts of genetic data related to microorganisms, respectively.<sup>37</sup> OOO would of course welcome these important advances and recognition of new “objects,” as long as one does not undermine the human organism by reducing it to *nothing more than an ad hoc* aggregate of genetic information or microorganisms.

Relative to the above as well as the aims of this article, the most pressing issue would then pertain to the question of what accounts for the persistence and identity of a human individual over time. We, of course, recognise that the notion of personal identity in philosophy is highly complex and that an exhaustive analysis would be beyond the scope of the present article given its narrow attention to the notion of personal identity in the context of OOO specifically, rather than in a more general sense. For this reason, we shall here focus on what personal identity might mean in the context of Harman’s philosophy specifically, rather than dealing with this vast sub-branch of metaphysics more generally.

With this caveat in place, we can then follow Naga Gligorov et al. in claiming that there are essentially three potential candidates for personal identity. The first has been dubbed the “physical criterion,” which was originally characterised in terms of a “relationship of identity between the person and her body, where the body excludes the brain.”<sup>38</sup> The limitations involved in omitting the brain have, however, led to an updated version of the physical criterion dubbed the “biological criterion.” According to this condition, identity involves the persistence of the “same biological animal,”<sup>39</sup> which would in turn broaden the notion of the body to include the brain. Furthermore, if we were then to include the human microbiome with the body, we could “think of the human as a superorganism comprised of the human body plus the collection of microbes that inhabit [it],”<sup>40</sup> even if the notion of “inhabiting” would here be admittedly problematic given that this criterion – as well as OOO – recognises the organism as a kind of set or “multiplicity” which includes various microorganisms and colonies as its subsets. The second “psychological criterion” entails that a person is one and the same if and only if “they have the same psychological characteristics.”<sup>41</sup> This position takes a cue from the Lockean distinction between a human person and a human being. Crucially, the authors point out that these first two criteria might not necessarily be antithetical, since there are some positions which do not readily distinguish the physical from the psychological, and effectively claim that “the self is [always] embodied.”<sup>42</sup> Finally, the third possible candidate is that of “narrative conception of self,” according to which identity is constituted via the construction of a narrative personality which then serves to “provide a sense of consistency over time.”<sup>43</sup> As the authors point out, this option might also be influenced by the human microbiome in, for instance, the sense that if one were to become increasingly aware of their symbiotic

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<sup>35</sup> Ironstone, “Me, My Self, and the Multitude,” 332.

<sup>36</sup> *Ibid.*, 326.

<sup>37</sup> *Ibid.*, 330.

<sup>38</sup> Gligorov et al., “Personal Identity,” 57.

<sup>39</sup> *Ibid.*, 58.

<sup>40</sup> *Ibid.*, 59.

<sup>41</sup> *Ibid.*, 57.

<sup>42</sup> *Ibid.*, 61.

<sup>43</sup> *Ibid.*, 62.

relation with their microbiome, this knowledge would in turn alter the way we become aware of our personal responsibilities towards the multitude of beings we live in communion with.<sup>44</sup>

Since Harman and others working within OOO have not, to date and our knowledge, written explicitly about the issue of human identity as well as the human microbiome specifically, our best bet here would be to speculate on which one of these criteria best fits OOO's specific ontology, before later considering the implications of the human microbiome for this position. If we were to restrict ourselves to a stringent analysis of personal identity in OOO, it follows that we should exclude the narrative and psychological theories at the outset. We make this claim because the narrative theory shores up identity with a narration, and thus constitutes a form of overmining account according to which there is nothing more to identity than a self-narration. Harman's rejection of overmining allows us to deduce that OOO would refute such a position. Furthermore, the psychological criterion seems to associate identity with exclusively human characteristics at worst, or at best restrict identity to humans as well as some so-called "higher order" non-human animals such as chimpanzees and orangutans. Such a position, according to Harman, would in turn risk leading us down the route of anthropocentric characterisations according to which it is either the case that only humans have an identity, or that other animals only have an identity to the extent that their psyche is judged to somewhat resemble that of humans. Harman's clear rejection of anthropocentric discourses, along with his generalisation of "essence" allows us to eliminate this criterion as a possibility for personal identity in OOO. More specifically, if we wish to discover what identity means for OOO, and if we adhere to a "flat ontology" according to which there are shared features between objects broadly construed, then it follows that identity in OOO needs to be tackled at an ontological level deeper than that of human psychology specifically.

Having eliminated the narrative and psychological criteria, it is our view that OOO would come close to what has been dubbed the "embodied self" approach according to which human identity is established through the continuity of the body. We would, however, then need to properly establish what it means to be embodied in the context of OOO. As we have already shown, OOO rejects the fundamental association of a body with the physical location of an aggregate sum of material parts, since this would constitute a case of undermining. As we have shown above, for OOO a "human object" or body always entails a specific structure or form, and the latter is in turn to be understood as a product of emergence; objects are structurally emergent beings which take up a *specific* form. The emphasis on the term "specific" here is important, in that it serves to once again iterate and emphasise the fact that "form" is not a universal abstraction which is stamped into beings (Plato), or the simple correlate of matter, as in Aristotle's "hylomorphic" theory. Instead, form simply means that a human body – but also every object in the OOO sense – *unifies its pieces* into an *emergent reality* that has *genuine qualities* of its own.<sup>45</sup> This short incisive quote in turn specifies three important facts: first, for OOO a body is *both* an infrastructural<sup>46</sup> unit as well as a composite of parts, whose parts in the case of humans necessarily include the microbiome. This might then lead to the question of what distinguishes a multiplicity from a unified object. While the object provides clues in that it is able to act as a unified being, there is also a sense in which a unit counts as one relative to scale; a microbe is not only a unit, but also a part relative to a specific microbiome, which is in turn also a unit and a part relative to a body. Second, an object emerges through interconnections between its component parts, even if it is irreducible to them. As a reminder, one of the fundamental criteria of an emergent entity is "downward causation," meaning the ability of (in this case) an organism as a whole to organise and constrain its parts. Relative to this, and in view of research centred around the human microbiome, we should also however emphasise that this top-down approach of emergence is not the end of the story, for if an object is composed of parts which include the human microbiome, and if its parts can affect the organism as a whole, then there is the need for a bottom-up relation from the parts to the organism as a whole. Harman does not stress this point, but we do not think he would deny it either. In this context, it is also important to emphasise that OOO does not reduce an object to its

<sup>44</sup> Ibid.

<sup>45</sup> Harman, "Time, Space, Essence, and Eidos," 15.

<sup>46</sup> In Harman's sense, the term 'infrastructure' alludes to a formal unity that is nevertheless not subject to being reduced (or overmined) to our specific epistemic frameworks. Refer to Harman, "Fear of Reality."

parts or whole; rather, an object is always composed of parts, yet it nevertheless acts as an infrastructural unity. Third, a body is always individuated by its qualities, which are in turn provided by its parts. There is of course a sense in which an object is a unity and is therefore more than the sum of its parts. Nevertheless, there is also a sense in which the organism as a whole does not express all the properties of its parts, and is therefore also less than the sum of its parts.

Perhaps, the final key point to underscore is that our examination of identity within the framework of OOO and its relation to the human microbiome highlights the necessity of complementing Harman's explicit emphasis on a top-down approach – articulated through the concepts of “redundant” and “downward causation” in the context of emergence, as well as the notions of form and essence – with a bottom-up perspective. This bottom-up approach acknowledges the dual role of microbiomes in both individualising the host organism and enabling its existence as a specific unit of existence.

## 5 Conclusion: The Microbiome and Identity

Having considered the issue of identity in OOO relative to the notion of the microbiome, we can now take stock of the three most important claims pursued throughout this article. First, for OOO, personal identity is necessarily constituted via the continuation of the same “body” or “object” qua structural or “formal” unit which unifies its parts into an emergent whole. Since this structural unity includes a symbiotic equilibrium of human cells as well as a system of bacteria, fungi, viruses, and other microorganisms composing our microbiome, it follows that these entities also play a crucial role in constituting and sustaining our integrity. Stated more precisely, the human must ultimately be understood as a distinct infrastructural or formal identity composed of both the human body together with its microbiome, such that the loss of any one of these elements implies the destruction of the organism's “essence” understood in Harman's specific sense. Second, it is worth emphasising. For the most part, Harman's emphasis on “structural” or “formal” unity tends to lay emphasis on a top-down approach to the organism. To be sure, while we concede that Harman is right to insist that an emergent whole is always more and less than the sum of its parts, it is also true that at least some of its parts must be present in order to sustain the object. As a result, the explicit top-down approach to formal unity pursued by Harman throughout his works ought to be supplemented with a complementary bottom-up approach which also recognises the crucial role of the parts in both the determination and sustenance of the unity of an individual human being taken as a whole. Finally, if the line of thought pursued throughout this article were adopted in the context of healthcare, it would most certainly have crucial implications for the treatment of an individual's mental and physical well-being. More specifically, if one were to acknowledge the dual role of microbiomes in both the individualisation of the organism and in enabling its existence as a whole, such a perspective would necessitate a more holistic approach to healthcare. Perhaps, this might involve integrating analyses of microbiomes into various prognostic and therapeutic processes, recognising the impact of microbes on mental health, and developing personalised treatments that consider the unique microbiome of each patient. This novel approach would then promote a more comprehensive understanding of health as an emergent property of the way in which the parts of a person's being relate to the whole and *vice versa*.

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