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The Basic Dualism in the World: Object-Oriented Ontology and Systems Theory

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Research Article

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Abstract: Graham Harman writes that the "basic dualism in the world lies…between things in their intimate reality and things as confronted by other things." However, dualism implies irreconcilable difference; what Harman points to is better expressed as a dyad, where the two components imply one another and interact. This article shows that systems theory has long asserted the fundamental character of Harman's dyad, expressing it as the union of internal structure and external function, which correspond exactly to what Levi Bryant, characterizing Harman's views, refers to as the intra-ontic and the inter-ontic, respectively. After interpreting Harman's dyad in terms of the ontology of systems theory, the article illustrates his dyad with a variety of examples, including conceptions about truth, ethics, value, and intelligence. The structure–function dyad is a spatial conception of a system as an object. It is usefully augmented with a temporal dimension, expressed in a third component or with an additional orthogonal dyad. Adding a temporal dyad to the structure–function dyad joins the idea of an event and/or process to the idea of an object.

Keywords: Graham Harman, speculative realism, object-oriented ontology, continental philosophy, systems theory, systems metaphysics, dualism, structure and function, intra-ontic and inter-ontic, Rosenstock–Huessy's cross of reality

> The basic dualism in the world lies not between spirit and nature, or phenomenon and noumenon, but between things in their intimate reality and things as confronted by other things.
>
> —Graham Harman[1]

1 Introduction

In the above epigraph, what Harman sees as the most basic dualism in the world is more accurately seen as a dyad. In a dualism, one asserts that the two components are mutually exclusive and thus affirms only one of them. In dyads, however, the two components are intrinsically linked; each requires and thus implies the other.

It isn't necessary to insist that the dyad of "things in their intimate reality and things as confronted by other things" is *the* basic dyad in the world. Suffice it to say that this is *one* of the basic dyads in the world. There are other dyads that are arguably as fundamental or nearly so: for example, the dyad of matter and form, or the yin-yang dyad that is basic to Chinese thought. While matter-form and perhaps also yin-yang might be correlated with Harman's dyad, it is unlikely that all fundamental dyads can be similarly correlated.

1 Harman, *Guerrilla*, 74.

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Note that the difference between phenomenon and noumenon is actually an example of Harman's dyad: The noumenon is a thing in its intimate reality, and the phenomenon is the thing as it confronts human cognition. But the Kantian dyad of noumenon and phenomenon differs from Harman's dyad in at least two ways. Kant's perspective is "human-centered," i.e., it focuses on how a human being is confronted by things, whereas Harman's formulation is "world-centered," i.e., it considers how anything might be confronted by another thing. This "world-centeredness" as opposed to "human-centeredness" is a defining characteristic of speculative realism and more specifically of the object-oriented ontology that Harman advocates.[2] Also, for Kant, the noumenon is inaccessible but "things in their intimate reality" need not be completely and permanently unavailable for interaction.

To use Bryant's terminology to describe Harman's dyad, things in their intimate reality are "intra-ontic" and things as confronted by other things are "inter-ontic."[3] Bryant writes,[4]

> However, as we have seen as a result of Harman's arguments, we run into insurmountable ontological problems if objects are reduced to exo-relations. With Harman and traditional substance ontology, we therefore grant that objects must also be thought in terms of their endo-relations or their intra-ontic structure as radically independent of their exo-relations or inter-ontic relations. In short, lest we fall into the vacuous hall of mirrors so colorfully described by Harman and thereby fall into the impossibility of explaining how change is possible, it must be granted that objects have some sort of substantiality independent of their exo-relations and that they hold something in reserve in relating to other objects. In short, it is necessary to account for the being of relata or objects independent of their relations.

Note that the last sentence treats the word "relations" as synonymous with exo- or inter-ontic relations, which accords with a common use of this word in Continental philosophy. However, in an earlier sentence, the appropriateness of speaking also of endo- or intra-ontic relations is recognized and asserted.

The dyad of intra-ontic and inter-ontic characterizes being in general and thus is ontological (about being as such) and not merely ontic (about particular beings). Either component of this dyad might be privileged. Harman discusses the philosophical error of overvaluing one component of the dyad and undervaluing the other component. He refers to the overvaluing of the intra-ontic and undervaluing of the inter-ontic, which is done in conventional downward (inward) reductionism, as "undermining," and to the overvaluation of the inter-ontic and undervaluing of the intra-ontic, which is done in an unconventional upward (outward) reductionism, as "overmining." Harman writes,[5]

> While the first approach "undermines" objects by trying to go deeper, we can coin a term and say that the second strategy "overmines" objects by calling them too deep. Although undermining is obviously a more familiar English word, overmining is a far more common philosophical strategy for dissolving objects. To some extent it might even be called the central dogma of continental philosophy. This can be seen in correlationism and in full-blown idealism, which grant no autonomy to the object apart from how it is thought — no horse-in-itself apart from the horse accessed by the human subject. It is seen in relationism, which finds it nonsensical that things could be real apart from their system of relations.

Both undermining and overmining are philosophical errors. As Harman writes,[6] "To reduce anything to its pieces (undermining) and to reduce anything to its effects (overmining) are equally defective maneuvers." If objects are undermined or overmined, their ontological status is diminished. It follows that any adequate ontology must encompass both the pieces and the effects of objects.[7]

Harman's assertion of the basic character of the intra-ontic and inter-ontic dyad has long been recognized and asserted by systems theory. This article expresses this dyad in systems theoretic terminology which is mereological and recursive; mentions several examples of this dyad; explores how its intra-ontic and inter-ontic components

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2 For further discussion of "world-centeredness" versus "human-centeredness," refer to Zwick, *Elements and Relations*, 56–7; and Zwick, "A Systems Theoretic View."

3 Bryant, "The Ontic Principle," 269.

4 Ibid., 273.

5 Harman, "On the Undermining of Objects," 24–5.

6 Harman, "The Only Exit," 143.

7 Harman also criticizes what he calls "duomining," in which an object is both undermined and overmined. A systems theoretic assessment of this notion is beyond the scope of this article.

are related; shows how this dyad, which is spatial (or space-like) and synchronic, can be supplemented with a third temporal component or an orthogonal temporal dyad; and calls attention to the possibility that either the intra- or the inter-ontic view might be privileged to the point where the other view is ignored or denied.

This article continues an earlier study[8] which examined some key ideas of several speculative realists, especially as expressed by Bryant et al.[9] and Kleinherenbrink,[10] and showed that these ideas – notions of object, difference, irreduction, relation, internal dimension, and unity – are salient features of systems metaphysics, in which they are articulated very clearly. The present article focuses more narrowly on the idea that defining objects in terms of (external) relations must be augmented by including their internal dimensions. This focus is captured succinctly in the introductory quote by Harman.

A more expansive discussion of systems metaphysics, closely aligned with Bunge's[11] conception of the systems field, is offered in my book[12] recently published by Springer. An earlier exposition of aspects of systems ontology that specifically analyzes its anti-reductionism is offered in an earlier article.[13]

2 The Systems Theoretic Structure–Function Dyad

The simplest definition of "system" is a set of elements and a set of relations that organize the elements.[14] This definition is intrinsically mereological, being about wholes and parts. A more elaborate definition, discussed below, speaks of elements, *attributes* (properties, qualities), and relations, where relations organize elements *via* attributes. These definitions do not mention the fact that systems have environments, but this is implicit in the recursiveness of the definitions. An element is itself a system at a lower level of organization; a system is equivalently an element of a higher level of organization. What is not included in a system (but is relevant to it) is its (relevant) environment.

The systems concept encompasses two core ideas: order and distinction. A system is "partial whole"[15] ordered by its internal relations and is also defined by some external system–environment distinction.[16] The environment is also ordered – is itself a system and may contain systems – and the system participates in this external order. Just as the idea of order applies also externally, the idea of distinction applies also internally – in the fact that elements in the system are distinguished from one another, as are the relations in the system. The idea of distinction, explored for example by G. Spencer Brown[17] from the perspective of mathematical logic, is the system theoretic analog of "difference" in Continental philosophy.

Further, element and relation are Janus-faced. Looking inward, a system is a relation that organizes its elements (multiple consistent relations can be subsumed by a single relation); looking outward, it is an element that participates in external relations. I will refer to this duality as the "Janus principle." It accords with Harman's assertion[18] that "every relation is itself an object." But, as will be explained below, this does not mean that a system presents itself to its environment only as a unitary (singular) object.

There exist various classifications of different types of systems. For purposes of this article, a useful classification distinguishes between "concrete," "abstracted," and "conceptual" systems,[19] where concrete

8 Zwick, "A Systems Theoretic View."
9 Bryant et al., *The Speculative Turn*.
10 Kleinherenbrink, *Against Continuity*.
11 Bunge, *Method, Model, and Matter*.
12 Zwick, *Elements and Relations*, Chapter 2. An Exact and Scientific Metaphysics, 43–78.
13 Zwick, "Systems Theory and the Metaphysics of Composition."
14 Hall and Fagen, "Definition."
15 Murdoch, *Metaphysics*.
16 For many but not all systems theorists, the system–environment distinction is objective, in accord with Harman, who depicts objects as confronting other objects, not only human subjects. For further discussion of the objective or subjective nature of the system–environment distinction, refer to Zwick, "A Systems Theoretic View."
17 Spencer-Brown, *The Laws of Form*.
18 Harman, "On Vicarious Causation," 207.
19 Miller, *Living Systems*.

systems are physical, the subject matter of the natural sciences; abstracted systems are also physically embodied but their physical attributes are not focused upon – these systems are the subject matter of the social sciences (and have other exemplifications as well); conceptual systems are systems not physically instantiated at all. This classification of types of systems calls to mind the variety of ontologies posited by speculative realists;[20] these range from ontologies restricted to natural objects, here called concrete systems, to ontologies that are more ecumenical and encompass even what are here called conceptual systems.

For concrete systems, looking inward, a system is a form (relation); looking outward, a system is a substance (element). Yet as it confronts other systems, it presents itself to them as form, i.e., as relations mediated by attributes, some upwardly emergent as properties of substance, others downwardly emergent from its external relations. (This dual emergence is discussed later in this article in connection with Figure 3.)

This system–environment distinction is depicted in Figure 1(a) as a "view from nowhere"[21] where the system is the unmarked (privileged) term of this dyad. This depiction is spatial, but the system–environment distinction is actually a more general idea. It is spatial for concrete systems, but need not be spatial for abstracted or conceptual systems. Call the internal order of the system "structure" and its participation in the external order of the environment "function."[22] Note that the word "structure" also has a more general meaning: a relation or set of relations independent of the relata. This is its meaning when the word is used in various types of "structuralisms," including structuralist philosophies.[23] This general meaning of "structure" is close to the notion of "system." In this article, "structure" is used in a narrower way to refer to relations and relata that are internal to objects.

The structure–function dyad is shown in Figure 1(b) as two cones with a common apex, where the widening cones signify open-ended recursiveness (fractal character) of structure and function, and can be understood as follows:[24]

> The elements of the system organized by its relations are themselves systems, namely subsystems that include sub-elements organized by sub-relations and so on. So as one descends to lower levels of organization, structure expands. Being recursive also means that the system as a whole is an element, namely a supra-element, organized in the environment by supra-relations and so on. So function also expands as one ascends to higher levels of organization.

This conception of system thus emphasizes "the central" – the apex of the double cone of Figure 1(b) – as opposed to "the fundamental," namely the ultimate bottom level of structure, the ultimate top level of function, or both.

Figure 1(b) is a view from the perspective of the system itself. This structure–function dyad is fundamental to systems ontology; it might alternatively be referred to as a dyad of being and behaving[25] or of essence and exchange.[26] This dyad can be interpreted either symmetrically or asymmetrically. In the symmetric interpretation, structure and function are both constitutive;[27] the system is the union of or an interface between internal and external orders, i.e., between the regions of the double cone close to the common apex. In the asymmetric interpretation, structure is often taken to be what a system "is" and function to be what it "does"; in this case, the intra-ontic is privileged over the inter-ontic because the former but not the latter is

20 Bryant, "The Ontic Principle," 270.

21 Nagel, *The View from Nowhere*.

22 Purpose is not implied here by "function." Sometimes, structure–function means static-dynamic, but here it refers instead to internal vs external order.

23 Puntel's *Structure and Being* is an example of a structuralist philosophy that interprets "structure" in a very general way fundamental to ontology and epistemology. "Structural realism" is a school of thought oriented toward science and aligned with analytic philosophy that also treats structure as fundamental.

24 Zwick, "Words and Diagrams about Rosenstock-Huessy's Cross of Reality," 10.

25 Gerard, "Concepts and Principles of Biology."

26 Du Coudray, *Mentius Nuncius*.

27 Here, "constitutive" means essential, intrinsic, and necessary as opposed to non-essential, extrinsic, and contingent. In this use of this term, the constitutive is not opposed to the causal: Both the constitutive and the non-constitutive can be causal. Causality is most clearly defined for concrete systems; it has varied possible meanings for abstracted systems; it is not relevant at all for conceptual systems (but has an analog in the notion of entailment).

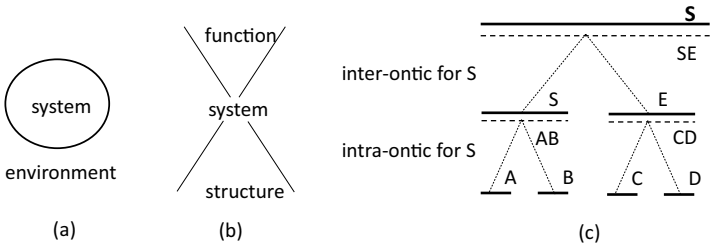

Figure 1: Structure and function: (a) System–environment distinction, (b) structure–function dyad, and (c) system as elements (bold solid lines) ordered by relations (dashed lines). In (b) and (c) but not (a), verticality is spatial.

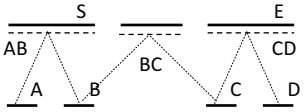

Figure 2: Direct relations between internal elements of two systems. E is the environment of S, but is also a system in its own right. The two systems each have two elements and one relation, which are their *intra*-ontic orders: elements A and B and relation AB for system S, elements C and D and relation CD for system E. The *inter*-ontic order is elements B and C related by BC. In keeping with the Janus principle, this BC relation is itself an element (system) but this is unlabeled in the figure.

constitutive. The reverse is sometimes true: Function may instead be constitutive and structure merely one possible instantiation. However, systems thought is often biased toward regarding structure but not function as constitutive, just as Continental idealism has the reverse bias.

Structure constrains but does not uniquely determine function since function rarely requires a unique specific structure. To the extent that function is emergent from structure and thus dependent on it, the structure is indirectly revealed. This is so for aspects of structure close to the structure–function interface, but deeper aspects of structure (the intra-ontic order that is represented by the lower part of the bottom cone of Figure 1(b)) are increasingly isolated from function. So in function, which is presence or presencing, structure is concealed. Conversely, in structure, it is function that is concealed. But what is concealed is not absent. Also, being concealed or isolated is only partial and provisional.

Figure 1(c) illustrates and expands upon Figure 1(b). The "system" is the focal object of interest, and it defines what should be regarded as intra- versus inter-ontic. The double lines (bold solid and dashed) illustrate the Janus principle that element and relation are two sides of the same coin. The figure shows the simplest possible example of internal (intra-ontic) order – the AB relation that links elements A and B and by the Janus principle constitutes system (element) S – and of external (inter-ontic) order – the SE relation that links system S and environment E and by the Janus principle constitutes suprasystem (element) **S**. To avoid making the diagram too complex, double lines are not used for elements A, B, C, and D; that is, these elements are also systems, but this is not shown. Figure 1(c) is a simplification also in that systems generally are organized by multiple relations and relations need not be dyadic but this figure shows only one dyadic relation that organizes the system and also only one dyadic relation that organizes the environment.

Figure 1(c) illustrates the fact that for many systems one needs to consider only three levels:[28] the lower level of elements {A, B, C, D}, the focal level of system and environment {S, E}, and the higher level of suprasystem **S**. But this is not always true, since some systems are inherently multi-scale and distant levels are not adequately subsumed in the levels immediately adjacent to the focal level. Note also that because of the intrinsic recursiveness of the definition of system, what is intra-ontic for S in Figure 1(c) is inter-ontic for A and B; what is inter-ontic for S is intra-ontic for **S**.

The dyad in Harman's quote that introduces this article – "[…] things in their intimate reality and things as confronted by other things" – is precisely the systems-theoretic dyad of structure and function. As shown in

28 Lendaris, "On Systemness."

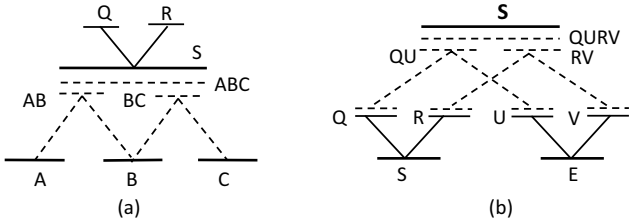

Figure 3: Adding attributes to the definition of system: (a) Attributes Q and R of system (equivalently, element) S emerge upwardly from the system's internal relations, which are AB and BC, unified in the single relation ABC. (b) By virtue of these Q and R attributes, system (object, element) S enters into relations QU and RV, unified in the single relation QURV, with environment (system, object, element) E which has attributes U and V, to form, via QURV, suprasystem (equivalently, element) **S**, whose attributes are not shown.

Figure 1(c), structure is intra-ontic order; function is (participation in) inter-ontic order. In Continental philosophy, function is what is taken by default as constitutive and thus is privileged over structure. A systems theorist, however, encountering the articles of speculative realists is apt to be surprised that these authors feel the need to argue that (external) relations do not exhaust what an object is, since from a systems perspective, this truth is obvious.

Furthermore, the clean separation of inter-ontic and intra-ontic orders in Figure 1(c) is a simplification. The system–environment interaction rarely relates system and environment solely as unitary elements as shown in that figure. Rather, it can and usually does include direct relations between elements internal to the system and elements internal to its environment. This is illustrated by relation BC in Figure 2 in which environment E is shown as another system. The intra-ontic order for system S (A and B related by AB) and for system E (C and D related by CD) thus need not be fully concealed as implied by Figure 1(c). The *inter*-ontic order is B and C related by BC, so the inter-ontic and intra-ontic orders in fact overlap. While some speculative realists hold that the intra-ontic is isolated from interaction, in the systems view this is true only partially but not completely. Nothing about an object is intrinsically and necessarily and thus permanently inaccessible to interaction with all other objects. With respect to the human–object relation, there is no noumenon that can *never* be a phenomenon. In the systems theoretic perspective, objects are *not* necessarily internally *totally* withdrawn from one another.

Figure 2 might relate to Harman's idea of "vicarious causation,"[29] whereby "two entities influence one another only by meeting on the interior of a third, where they exist side-by-side until something happens that allows them to interact." In Figure 2, the inter-ontic relation BC by the Janus principle is also an element, i.e., an object (which in the figure is not named). This object or entity might be considered to at least resemble the "third entity" that Harman is referring to. For Harman, however, this third party involves intention or some other aspect of the human–object relation, and thus, in the terminology introduced earlier, is human-centered. In the above figure, however, this "third party" need not involve humans at all and fully qualifies as being world-centered.

One implication of the fact that elements internal to the system can interact directly with the system's environment is that the system does not confront the environment as a unitary object. That a system appears to its environment as a multiplicity rather than a unity also results from its multiple attributes that mediate its external relations; attributes are discussed in Section 4.

3 Examples of the Dyad

The structure–function dyad is fundamental to systems ontology, which attempts to describe the most general features of reality. However, in analyses of many phenomena, sometimes, this dyad is seen as a dualism, which

29 Harman, "On Vicarious Causation," 190

is resolved by focusing solely on either structure or function. Following is a list of examples of structure–function pairs that could be viewed as dualisms but are actually dyads, where both structure and function are ontologically real and inextricably tied together, and where consideration of both are thus also epistemologically necessary. However, it may be that in a particular example either structure or function might be salient; systems ontology and epistemology can encompass such occurrences as limiting cases.

The list that follows does not differentiate between examples that reflect an ontological perspective and those that reflect an epistemological perspective or between examples of concrete, abstracted, and conceptual systems. The purpose of this list is merely to offer instances of the structure–function dyad in many domains to illustrate the ubiquity of this dyad. Many more examples might be invoked. In all these examples, a case can be made that both terms of the dyad are necessary, i.e., that these are not dualisms where one must choose one term or the other. Some examples may be controversial or appear to be oversimplified, but this article is not an appropriate venue to discuss these examples in detail.

- **Nature–nurture**: One of the most prominent examples of the structure–function dyad is nature–nurture. An undermining narrow focus on nature characterized the short-lived field of sociobiology, which was an attempt to argue that virtually all important aspects of human behavior are biologically determined. This field was vehemently opposed by those who focus equally narrowly on nurture and overmine the human object by arguing that human beings come into this world with a mostly blank slate.
- **Language:** The views of Chomsky and Skinner[30] about the origin and basis of human language exemplify the nature–nurture polarity. For Chomsky, the capacity for language is innate; for Skinner, language is learned from the people with whom the child interacts.
- **Intelligence:** The sources of human intelligence are commonly divided into structural (innate, usually genetic) and functional (environmental) factors.
- **Artificial intelligence:** Top-down AI was an attempt to generate "intelligent" software by theory-driven programming of postulated internal processes of cognition; this reflected a structural approach to AI. It has largely been superseded by bottom-up AI, an attempt to generate "intelligent" software by data-driven statistical learning; this reflects a functional approach to AI.
- **Development of science**: The development of science is viewed by some as primarily driven internally by its intellectual content; others see it as primarily driven externally by societal forces.
- **Economic development:** A developing nation might deploy whatever comparative advantages it has to integrate into the external world economy; alternatively, it might focus on its own internal economy and aim instead at autarky (self-sufficiency).
- **Definitions of "planet":** The original definition of a "planet" was dyadic: Structurally, it needed to be approximately globular, being held together primarily by gravitational forces; functionally, it needed to orbit a star.
- **Definition of "species":** The notion of species can be defined structurally, for example, by the features common to a class of organisms. It can alternatively be defined functionally, either behaviorally, for example in terms of which other organisms it can mate with, or more broadly in terms of the ecological niche that it occupies.
- **Criteria of truth**: Two well-recognized criteria of truth are truth of coherence, which is internal (structural), and truth of correspondence, which is external (functional).
- **Rational vs empirical inquiry:** The rational–empirical dyad correlates well with the internal–external distinction and with the dyad of the coherence and correspondence criteria of truth mentioned above.
- **Emic vs etic inquiry:** In the anthropological study of culture, emic inquiry considers culture as viewed from an internal perspective (structure); etic inquiry considers culture as viewed from an external perspective (function).
- **Inherent vs instrumental value:** Economic value can be regarded as inherent, e.g., in the stored free energy of fuel defined thermodynamically, or instrumental (functional) in terms of exchange or use value.

30 Shah, "The Animals Are Talking."

- **Ethics:** The focus on character in virtue ethics, the moral assessment of action based on motivation, and deontological notions of the good all reflect an internal view. By contrast, consequentialist and utilitarian ethics reflect an external view, although some versions of virtue ethics attempt to subsume consequentialism, and vice versa.
- **Literary criticism:** Some literary criticism focuses on the individual work "as a self-contained artifact" but other approaches see the work as "the product of relations with other texts or discourses, literary and nonliterary."[31]
- **Therapy:** Internally- vs externally oriented approaches are exemplified, respectively, by psychodynamics and family therapy.

4 Beyond the Structure–Function and Element–Relation Dyads

As is implicit in examples in the above list, sometimes one component of the structure–function dyad may be privileged to the point that the other is denigrated or denied. Focusing only on structure or on function might be motivated by ideological commitments. For example, nature (structure) is often privileged by the right and nurture (function) by the left. The impulse to ignore or suppress structure might be unconsciously motivated by fear of being judged guilty of the philosophical crime of essentialism.

But even if both components of the dyad are adequately appreciated, the dyad still needs to be augmented. There is interaction between the internal and external. Interaction effects are symbolized mathematically in regression equations by adding a term that specifies the interaction, for example, the term including parameter c in equation, $z = ax + by + cxy$. A classic illustration of an interaction effect is the notion that the character of a person is not determined solely by nature or solely by nurture, but also by interaction between the two. Similarly, a comprehensive account of the development of science would include not only internal intellectual factors and external societal factors operating separately but also some interaction between the two.

A different approach to augmenting the structure–function dyad is to identify something that mediates between the two components of the dyad. This is illustrated by the triadic definition of "system" in terms of elements, attributes, and relations, where relations organize elements via attributes. This is depicted in Figure 3(a), where the external attributes of system (equivalently, element) S, namely Q and R, are emergents from the internal relations AB and BC (which are unified in ABC). For visual simplicity, while the attributes of system S are shown, the attributes of its elements A, B, and C are not shown. Figure 3(b) shows how attributes which emerge from the structure of S are the basis of its function, i.e., allow it to participate in QU and RV, the system–environment relations, unified in the single relation QURV which is analogous to relation SE in Figure 1(c).

Properties (qualities), here called attributes, thus mediate between structure and function. The Humean argument that objects are just bundles of properties overmines since it ignores the fact that properties are upwardly generated and bundled together by the internal relations that organize the object, relations usually concealed from the human observer. In Figure 3, if E is such an observer, it sees Q and R, but the object itself (system S) and even more so its internal relations AB and BC are isolated from this observer. If E is just another system, S, AB, and BC are equally isolated from it; nothing in the isolation of objects is specific to human observation. Note also that attributes are multiple, and this is one way that the system presents itself to its environment as a multiplicity. As noted above in Figure 2, it can present itself as a multiplicity also when its internal elements interact directly with the environment.

Figure 3(b) introduces another idea: Attributes are shown as double lines to indicate that they are carried not only by elements but also by relations. This is a dualism rather than a dyad, since an element can have an attribute but the relation that calls for this attribute might be absent, or vice versa. When both aspects of an

31 Augustyn, "Deconstruction."

attribute are present, they may or may not be compatible. If elements are related in an ideal way, the attribute as carried by the element and the attribute as carried by the relation are identical, but the two determinations of the attribute could instead differ and be partially incompatible. The classic example of this is a round peg that is supposed to fit into a square hole.

Regarding attributes in this dualistic way allows the representation of Figure 3(b) to encompass the fact that some attributes of a system might not be upwardly emergent from its internal relations, but might instead be downwardly emergent from the relations of the system with its environment. For such systems, function is constitutive.[32]

An attribute might be jointly determined by element and relation in a different way: The element might specify what an attribute is while the relation might specify its value, or vice versa. Consider, for example, the structure–function dyad of language. If the grammar of language was embodied in some set of parameters that specify such features as whether or not nouns are gendered or the ordering of subject, verb, and object, then it is conceivable that the set of parameters would be innate (nature), but the setting of the values of these parameters for the grammar of a particular language would be acquired (nurture).

A final remark about "attributes," a synonym here for "properties": Harman's "quadruple object"[33] consists of "real" objects and their properties and "sensual" objects and their properties. Using the terminology introduced early in this article, this might be regarded as a fusion of the world-centered perspective and the human-centered perspective. Alternatively, it might be regarded as a regression, a reversal that again privileges the human observer, a privileging to which speculative realism originally objected. This partial return to human-centeredness is understandable given the influence of Heidegger on Harman, and Harman's linking of OOO to Heidegger's thought. From a systems theoretic science-oriented perspective, however, the fusion of world-centeredness and human-centeredness is an attempt to have one's cake and eat it too.[34] But what is even more problematic about Harman's quadrupole is that the intra-ontic is nowhere visible among its four terms, yet it is precisely the ignoring by Continental philosophy of the inner realm of objects that speculative realism objected to.

Another way of augmenting the structure–function dyad is by noting that both components are spatial as shown in Figure 1(a) (or non-spatial analogs of this dyad) and synchronic, and need to be supplemented by diachronic considerations that specify the qualitative and typically irreversible changes that accompany, and indeed define, the passage of time.[35] Such temporal augmentation might be conceptualized in at least three different ways, as shown in Figure 4.

In Figure 4(a), time parameterizes the structure–function relation, so structure–function at time *t* changes to structure–function at time *t'*. Alternatively, a third component that introduces the temporal dimension might be added to the structure–function dyad. Such a third component of history, as shown in Figure 4(b), is discussed by Gerard,[36] who speaks of the triad of being (structure), behaving (function), and becoming (history). Being-behaving is synchronic; becoming adds diachronics. The cyclic arrows in Figure 4(b) convey the notions – especially appropriate for biological systems – that structure is the basis of function via emergent attributes, and function gives rise to history via qualitative temporal change, for example, caused by natural selection, and history leaves structure as a residue.

Following are a few examples from the list given above in 3 Examples of the dyad of the third term of history augmenting structure–function.

- **Definition of "species":** Following Dobzhansky[37] who said, "Nothing in biology makes sense without the context of evolution," the historical definition of species in terms of evolutionary branchings is a necessary supplement to the structural and functional definitions mentioned above.

32 This possibility is discussed in Zwick, "A Systems Theoretic View," 279.

33 Harman, *The Quadruple Object*.

34 Interestingly, some systems theorists have had similar ambitions; refer to Zwick, "A Systems Theoretic View," 267.

35 Synchronics, as the term is used here, encompasses dynamics that do not involve qualitative change.

36 Gerard, "Concepts and Principles of Biology."

37 Dobzhansky, "Nothing in Biology."

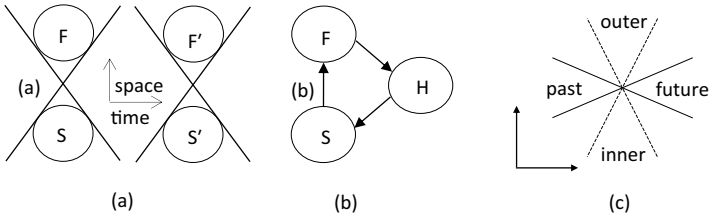

Figure 4: Adding time to the spatial structure–function dyad: S, structure; F, function, H, history. (a) Time is a parameter, so the S–F dyad changes over time to the S'–F' dyad; (b) time is represented as H and the arrows to/from it, so S gives rise to (supports) F which gives rise to H which leave traces as S; (c) time is depicted in the horizontal double cone (solid) of past-future that augments the vertical spatial double cone of inner-outer (dotted).

- **Definitions of "planet":** Because the original dyadic definition conferred planetary status upon too many objects, a historical component of the definition was added: To be considered a planet an astronomical object must also have swept out and collected the debris in its region of space.[38]
- **Criteria of truth:** A third notion of truth supplements the coherence–correspondence dyad. This notion is truth viewed pragmatically and historically: Truth is what has proven useful over time.[39]

In the "species" example above, one might argue that the historical definition is more fundamental and informative than the structural or functional definitions. History is also salient when diachronic change is due to "frozen accidents,"[40] i.e., by initially random occurrences that become locked in (structurally–functionally). A classic example of a frozen accident is the exact spacing between railroad tracks; another example is employment-based health insurance. But just as it is possible to overemphasize structure at the expense of function (undermining) or overemphasize function at the expense of structure (overmining), it is also possible to overemphasize history at the expense of both structure and function.[41]

Alternatively, diachronics could supplement synchronics in a different way: via a second temporal dyad that is added to the structure–function spatial dyad, as in Figure 4(c). The temporal dyad is shown as a horizontal double cone, which is the vertical double cone of Figure 1(b) rotated 90 degrees clockwise. The vertical double cone represents an object; the horizontal double cone represents an event, which joins together a concentration of the past (an analog of the lower cone of structure) that leads to the event and an expansion of the future (an analog of the upper cone of function) that follows from the event. These converging and diverging cones are precursor and consequent "processes"; an "event" ties together these two processes just as "system," interpreted spatially as an object, ties together structure and function.

The result of joining the vertical and horizontal double cones is a space-time tetrad, Rosenstock–Huessy's[42] "cross of reality" which is nicely compatible with the systems theoretic perspective.[43] The notion of "system" is thus broadened beyond the purely spatial or space-like (object) to include the temporal (event and/or process); Figure 4(c) depicts this broader notion. This spatiotemporal definition of system is in accord with what Shaviro[44] calls "Whitehead's dual-aspect ontology [in which] his entities are also processes or events."

38 International Astronomical Union, "Pluto and the Developing Landscape."

39 Capps, "The Pragmatic Theory of Truth;" Hazony, *The Philosophy of Hebrew Scripture*.

40 Gell-Mann, *The Quark and the Jaguar*.

41 Such an overemphasis on history is illustrated by the insistence of Gould (1997), Margulis (1998), and other evolutionary theorists that biological evolution shows no progress, i.e., nothing justifying a vertical (higher vs lower) ordering of species (or other taxons). Margulis writes, "All beings alive today are equally evolved. All have survived over three thousand million years of evolution from common bacterial ancestors. There are no 'higher' beings, no 'lower animals'. We Homo sapiens sapiens and our primate relations are not special, just recent." One could, however, argue against this purely historical view and for a conception of higher and lower organisms based on structural and functional grounds.

42 Rosenstock-Huessy, *In the Cross of Reality*.

43 Zwick, "Words and Diagrams."

44 Shaviro, "The Actual Volcano," 285.

The use of horizontal double cones to represent the flow of time can also represent processes in yet a different way. If arranging the two cones as ><, as shown in Figure 4(c) represents an event, transposing the two cones to yield an < > arrangement represents a type of process that has distinct initiating and terminating events. The initiating event is not ex nihilo but has precursors, and the terminating event may also be a re-initiating event that has consequents, so a more complete representation of such a process would include two double cones, i.e., >< ><, where the outermost cones are these precursors (>) and consequents (<).[45]

5 Summary

In summary, Harman's dualism of "things in their intimate reality and things as confronted by other things," reconceptualized as a dyad, is a fundamental ontological notion well established and explicated in the structure–function dyad of systems ontology. Structure is intra-ontic; function is inter-ontic. Both are characterized by distinction (difference). Relations are not only external (inter-ontic) as Continental thought primarily sees them but are equally internal (intra-ontic); this also follows from the recursive character of systems.

Exemplifications of the structure–function dyad are ubiquitous. Distortions or oversimplifications of this dyad that undervalue one of the two components are also ubiquitous. This dyad, however, needs to be augmented either by introducing an interaction effect between its two components, by adding a third diachronic factor, or by supplementing it with a temporal dyad similar in form to the spatial dyad; this supplementation joins the idea of event and/or process to the idea of object.

The notion that a basic dyad in the world is the intra-ontic and inter-ontic – in systems terminology, structure and function – is likely to have a variety of philosophical implications. For example, it offers a novel way to assert the values of both the universal and the unique and also relate these two values. Uniqueness is a virtue of structure. Universality is a virtue of function. Uniqueness of structure is generative of universality of function. There are no doubt other philosophical implications of this fundamental dyad that are worth exploring.

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45 For further elaboration of this view of events and processes, refer to Zwick, "Words and Diagrams."

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