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ORIGINAL RESEARCH

Psychophysical neutrality and its descendants: a brief primer for dual-aspect monism

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Abstract
A key ingredient of the metaphysical doctrine of dual-aspect monism is a psychophysically neutral domain, of which mental and physical aspects arise as epistemic descendants that manifest themselves by decomposition. This primer first introduces some elementary notions to define the basic concepts needed to understand the approach, such as those of states, state spaces, observables, partitions and correlations. Using these notions, the concepts of decomposition and manifestation are explained, and a differentiated view of the mereological distinction of wholes and parts is outlined. Next, a number of historical and contemporary accounts of psychophysical neutrality with philosophical (Plato, Spinoza, Schelling, Kant), scientific (Bohm, Pauli, Jung, Connes, Gibson), and artistic (sculpture, music) flavor are given as illustrative examples. Finally, correlations between the psychophysically neutral, the mental, and the physical domain of reality are discussed, in which these correlations are substantiated by meaning.

Keywords Dual-aspect monism · Decomposition · Holism · Meaning · Psychophysical neutrality

1 Some elementary notions first

The notion of *psychophysical neutrality* is crucial for the position of dual-aspect monism and characterizes a domain of reality without the distinction of the mental and the physical. Before going to details and then to concrete examples, some elementary notions need to be introduced in a mildly formal way, that are inevitable for a cogent understanding of the approach. The very first concept that is generally required to characterize a system is the concept of a *state*. Any system, however it may be specified in more detail, is in some (more or less crisply defined) state, denoted

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as ψ. A psychophysically neutral state ψ_{PPN} is neither a mental state ψ_M nor is it a physical state ψ_P. The psychophysically neutral domain PPN does not incorporate the distinction of the mental M and the physical P.

This is an essential feature of a dual-aspect metaphysics that is neither dualist (like Cartesian dualism or panpsychism), nor physicalist (reductive or non-reductive), nor idealist (subjective or objective). Dualist approaches claim two fundamental domains of reality as ontologically primary, with systems in mental states ψ_M and in physical states ψ_P, yielding a bipartite picture. Physicalist approaches claim ontological priority for physical states ψ_P from which mental states are assumed to be somehow derivable. Idealist approaches claim ontological priority for mental states ψ_M from which physical states are assumed to be somehow derivable. Both physicalist and idealist approaches reduce the bipartite picture of dualism to a "single-partite" picture.

A metaphysics including psychophysically neutral states ψ_{PPN} expands the overall conception of reality to a *tripartite* picture and lifts the discussion to a new level. It has been called *dual-aspect monism*, with the mental and the physical as dual epistemic aspects of an ontologically underlying psychophysically neutral domain. With this structure, dual-aspect monism integrates an epistemic dualism (which is not Cartesian) with an ontological monism (which is neither physicalist nor idealist) of a psychophysically neutral domain of reality.

Spinoza is the first proponent of such dual-aspect thinking in modern (occidental) philosophy, though it has roots and precursors in Platonic and neo-Platonic approaches. In the 20th century, it has been revitalized and refined, with different emphases, by scholars such as William James, Bertrand Russell, Carl Gustav Jung, Wolfgang Pauli, Arthur Eddington, John Wheeler, David Bohm and Basil Hiley. For in-depth discussion see the monograph by Atmanspacher and Rickles (2022), for which the present primer offers a kind of precis eschewing too many digressions and details.[1]

The state of a system is mathematically represented as a vector in some vector space called *state space* X, endowed with an appropriate topology. In order to specify a state more concretely, one can define functions $f : X \to \mathbb{R}$ from the state space onto the real numbers or, more generally, self-adjoint operators O acting on X with a real-valued spectrum.These functions or operators represent the properties that can be associated with a state; they are called *observables*. They define an algebra of observables that can be commutative ($O_i O_j = O_j O_i$ for $i \neq j$ in classical systems) or non-commutative ($O_i O_j \neq O_j O_i$ for $i \neq j$ in quantum system). If the algebra of observables is complete, their quantitative values (with uncertainties) define the state of a system as exhaustively as possible.

In addition to quantitative valuations of observables within $\mathbb{R}$, qualtitative valuations are conceivable as well. For instance, experiences may be characterized as pleasurable or painful, which can be covered by a mapping $X \to \{0, 1\}$ expressing any kind of dichotomization. Yet another option is the use of Likert scales expressing, for instance, the degree to which an experience has been pleasurable (or painful) on a scale from

[1] In particular, it is obviously beyond the scope of this primer to do justice to numerous and rich Eastern traditions that share similarities with dual-aspect thinking. For related material addressing the tradition of Advaita Vedanta see Deutsch (1969), Vimal (2010), or Silberstein (2017), but there are obviously far more frameworks of thinking in Hinduism, Buddhism, Daoism, and others.

0 to n, $n \in \mathbb{N}$. In this case, the observable in question would be characterized by a mapping $X \rightarrow \{1, ..., n\}$. Qualitative valuations are especially important if quantitative measurements are unfeasible, which is often the case for the phenomenal content of states of non-physical systems.[2]

The topology of X can be represented by an appropriate *partition* $P(X)$ on X, such that each cell of P is a state. The trivial partition is the entire state space itself, which is the coarsest partition possible. It entails that there is only one overarching state covering the entire state space: $\psi = X$, admittedly not a very informative choice. The other extreme is the so-called identity partition into singletons, the most refined partition possible. It entails that all points $x \in X$ represent states ψ. Such states are called non-dispersive, idealized "as if" there could be complete (infinite) information about them.

Empirically relevant state definitions are based on a finite partition into finite subspaces of X, between the extremes of identity and trivial. In this case, an observable f induces an equivalence relation $\sim_f$ on X: $x_i \sim_f x_j$ if $f(x_i) = f(x_j)$ for $i \neq j$. The resulting equivalence classes of points $x \in X$, which cannot be distinguished by f, partition the state space into mutually exclusive and jointly exhaustive subspaces $A_i, A_j, ...$, such that $A_i \cap A_j = 0$ for all $i \neq j$ and $\bigcup_i A_i = X$. These subspaces then represent coarse-grained states ψ. Such states are called dispersive states, referring to the realistic case that there is only incomplete (finite) information about them. Compare beim Graben and Atmanspacher (2009) for technical details.

Another basic concept concerns the *correlations* that a state (and its associated observables) may exhibit with other states (and their associated observables). If these relations are relations across time, they are represented by a *trajectory* in X. Then one speaks of temporal, diachronic correlations, which are traditionally explained, or substantiated, by causal laws (in the sense of efficient causation). However, there may also be correlations between different state spaces which are not diachronic but synchronic: they are atemporal and cannot be explained by causal laws because (efficient) causation is tightly related to an earlier-later distinction. For instance, there are well-known correlations between X_M and X_P, so-called psychophysical correlations or mind-matter correlations. Since they are atemporal, they cannot be substantiated by causal laws.

There is a lot of systematic knowledge about states, observables, and their diachronic as well as synchronic correlations in physics, i.e. in X_P. We also have some knowledge about those pertaining to psychology, i.e. in X_M, although observables in X_M are not as canonical as those in X_P, so their correlations are not as well specified by lawful causal regularities as those in X_P. By contrast, our knowledge about X_{PPN} is comparatively marginal. However, there are corresponding speculations from different points of view, and one purpose of this primer is to point out a number of potential candidates for PPN that might be helpful to develop some intuition about it (in Sect. 3) and its relation to P and M (in Sect. 4).

[2] Note that the degree Φ of conscious awareness in information integration theory intends to "quantify the qualitative" in a different way. While Φ derives from the quantitative characterization of brain (or other physical) network structures in P, Likert scales derive directly from qualitative assessments in M.

2 Now to the big picture

2.1 Decomposition into manifestations

Dual-aspect monism comes in two variants, which have been dubbed compositional and decompositional. The compositional picture, best known due to William James and Bertrand Russell, assumes that the domain PPN consists of psychophysically neutral elements. Depending on how they are composed, the resulting configurations give rise to physical or mental states and observables. The decompositional picture, whose basic framework goes back to Spinoza in Western philosophy, assumes that the domain PPN is one undivided whole at its base level. Decompositions of this whole create differentiated expressions, and one of these differentiations is that into M and P. This amounts to an overall big picture whose architecture posits M and P on the ground of PPN. Alternatively, from a genealogical point of view, M and P can be seen as descendants from PPN.

Only at its base level, PPN entails holism *in toto*, referring to a trivial partition of X_{PPN}, which effectively is an unpartitioned state space. Overall, the holistic domain PPN is not as unstructured as it is at its completely distinction-free base level. For any *decomposition* that does not split into M and P is still admissible within PPN. Hence, holism of PPN is generally to be understood as holism with respect to undifferentiated domains M and P. In analogy with the quantum concept of entanglement, holism without the M-P partition can be expressed by a psychophysically neutral state ψ_{PPN} that is not a product state: $\psi_{PPN} \neq \psi_M \otimes \psi_P$. In other words: states ψ_{PPN} describe wholes that do not consist of parts assignable to M and P.

The central message here is that *wholeness* must always be defined as relative to a partition of the relevant state space. The most encompassing wholeness relies on a trivial partition which leaves the entire state space unpartitioned. No room for wholeness at all is provided by the identity partition, where every point of the state space is separable from any other point. Any finite partition between trivial and identity introduces a kind of wholeness relative to each partition cell, so that states within such a cell are undifferentiated with respect to the observable inducing the partition. In this sense, a state (partition cell) $\psi_{PPN} \in X_{PPN}$ can be holistic insofar as it does not decompose into state spaces X_M and X_P induced by mental and physical observables, and yet it can be separable with respect to subspaces of X_{PPN} induced otherwise.

In a dual-aspect framework, states in X_M arise when a state ψ_{PPN} becomes a conscious mental state, and states in X_P arise when a state ψ_{PPN} becomes an observed physical state. This transition into M or P, or both, occurs as a decomposition of ψ_{PPN}, transforming it into a product state: $\psi_{PPN} \rightarrow \psi_M \otimes \psi_P$. However, this is not the end of the story. Since ψ_{PPN} lives in a state space X_{PPN} that differs essentially from both X_M and X_P, it does not have mental or physical properties associated with it. So its decomposition must go along with an expression or unfolding or *manifestation* of ψ_{PPN} (shown by upward arrows in Fig. 1) in such a way that mental and physical states arise which are not actualized as long as ψ_{PPN} remains a non-product state. These are then epistemically accessible as conscious mental states $\psi_M \in X_M$ or as observed physical states $\psi_P \in X_P$.

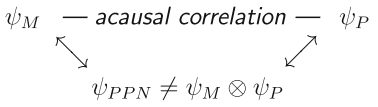

Fig. 1 Decomposition of a non-product state ψ_{PPN} into correlated separable states ψ_M and ψ_P (upward arrows) and backreaction from ψ_M and ψ_P into ψ_{PPN} (downward arrows)

We do not yet have an elaborate conclusive idea about how this expression or unfolding or manifestation of ψ_{PPN} happens in detail. This must have to do with the relations between PPN on the one hand and M and P on the other which are further discussed in Sect. 4. In general, such manifestations are epistemic in character, so they are supposed to generate knowledge. For P the paradigmatic example of knowledge generation is measurement or observation. For M any mental generation of novel conscious insight is a corresponding example of knowledge generation.

However, it is worth emphasizing that the manifested states ψ_M and ψ_P cannot be simple consequences of a classical "common cause" ψ_{PPN} predetermining its effects, because ψ_{PPN} is a non-product state with respect to ψ_M and ψ_P. Here we have another analogy to quantum entanglement: The specific manifestation of ψ_M and ψ_P is not predetermined by ψ_{PPN} but has a strongly "creative" aspect. The state ψ_{PPN} produces and constrains its range of manifestations, but does not specifically fix them within that range.

Another important point is this: In addition to the manifestation act $\psi_{PPN} \rightarrow \psi_M \otimes \psi_P$ that produces ψ_M and ψ_P as product states, there are strong reasons to believe that this act entails an (acausal) backreaction from M and/or P to PPN (shown by downward arrows in Fig. 1). The backreaction from M to PPN: because anytime some insight pops up in M, something has to change in PPN—otherwise any psychoanalysis would be pointless. The backreaction from P to PPN: because any observation of a system in P entails an uncontrollable change of the observed state. In other words: epistemic access in M and P is generically connected to a change of ψ_{PPN}, implying a modified homeostatic equilibrium in PPN.

Insofar as PPN is the joint ground of both M and P, states ψ_{PPN} do not only manifest themselves as ψ_M and ψ_P, they also co-create acausal orrelations between ψ_M and ψ_P, as shown in Fig. 1. The decomposition of any holistic state into partial states leaves correlations between the latter, as a necessary byproduct as it were, without any direct causal interaction between M and P. *This is one of the great benefits of dual-aspect monism*: it explains, and even predicts, correlations between the mental and the physical in a most elegant and deflationary fashion, rather than stipulating them *ad hoc*. Moreover, it even gives rise to concrete empirical research about them (see Sect. 4 for more details).

Notably, the making of a distinction, so crucial for all kinds of decomposition, is *not* limited to distinguishing activity in M, as much as this may seem a natural way of thinking. We know for a long time how important distinctions are in the physical domain P, where they are usually discussed as symmetry breakings, independent of any mental activity. The breakdown of symmetry characterizes the transition (e.g. phase transitions or other instabilities) from disorder to some kind of order, which leads to observables and correlations that the disordered state does not exhibit. They can occur induced by

perturbations from the outside or spontaneously. Nothing speaks for such distinctions to be restricted to M or P. In a general sense, it is natural to assume they also happen in PPN, leading to states that are neither mental nor physical.

Since mind-matter correlations link two different domains of reality, M and P, they cannot be diachronic, hence they cannot be explained causally. And yet they should not be random or arbitrary because they have a common ground in PPN constraining their expression. And they cannot be expressed in purely quantitative terms, since that would leave the phenomenal quality of mental states ignored for their correlation with physical states. This is a crucial difference from quantum correlations, which are always quantitative and can, thus, be evaluated statistically. As an alternative, the qualitative concept of meaning suggests itself as an ideal candidate to substantiate mind-matter correlations. Why ideal? Because meaning is an in-principle relational concept connecting something that means to something that is meant.

If we are looking for a more detailed description of PPN and a state space X_{PPN} with states ψ_{PPN}, we need to look for concepts that underlie M and P in ways that do not require, and make no use of, their distinction. A number of potential candidates for such concepts have been proposed over the centuries. Some of them are outlined by way of illustration in Sect. 3. But before we turn to these, some remarks concerning the mereological notion of wholeness are in order, clarifying its status within and outside of space and time.

2.2 Wholeness in and out of spacetime

In decompositional dual-aspect monism, the psychophysically neutral domain is not conceived of as a set of elements to be composed but as a whole, or wholes, to be decomposed. Therefore, it is important to understand how the concept of wholeness is defined and utilized. A key point for a corresponding clarification is the distinction between kinds of wholeness in space and time and other kinds of wholeness that can be characterized without reference to spacetime. The concept of partitions plays an essential role in this distinction: wholes and parts are always to be defined relative to partitions (and their inducing observables) of an appropriate state space.

Beginning with Spinoza (1677), states ψ_{PPN} in the psychophysically neutral domain (Spinoza's divine and its attributes) are not located in the conventional categories of space and time: they are "spatially" infinite and "temporally" eternal. This implies that the wholeness of states ψ_{PPN} must not be understood spatially or temporally. Rather, states ψ_{PPN} are holistic insofar as they incorporate no mind-matter divide, meaning that their state space is unpartitioned with respect to mental and physical properties. X_{PPN} has no subspaces X_M and X_P.

The most radical wholeness of this kind originates from the trivial partition, with only one overarching holistic state in which "all is one". However, other partitions of X_{PPN}, more refined than the trivial one, can generate separable states outside of spacetime as long as they don't partition into X_M and X_P. In Spinoza's system, the attributes of the divine can be conceived of as based on such a partition in X_{PPN}. Once the transformation of the divine attributes of thought and extension into manifestations as the modalities of the mental and the physical is in place, X_M and X_P are distinct, so

that states ψ_M and ψ_P are separable and can be distinguished. And the conventional categories of space and time become relevant.

In physics there are a number of ideas how spacetime may emerge from a space- and timeless domain, but the issue is not ultimately resolved yet. It is assumed that the origin of spacetime has to do with a symmetry breakdown in a pregeometry without space and time, such that gravity gets separated from the other fundamental interactions (Wheeler 1980; Bohm et al. 1981, and more recent approaches, see e.g. Rickles 2013). Likewise, there are ideas about why mental time appears to be correlated with physical time, but this issue is also far from finally clarified (Primas, 2017). Some, like Penrose (1994), even speculate that the riddle of how to unify the fundamental interactions of quantum physics with gravity in general relativity can only be solved together with the riddle of how to include consciousness in the picture.

As soon as X_M and X_P are separate state spaces, they still hold the potential for holistic states, namely with respect to space and time. This holism, however, is not holism within PPN (with the trivial or more refined partitions), but it refers to subspaces of X_M and X_P over finite distances in space and time. These subspaces due to finite partitions are spatial domains within which there is no shorter or longer, and temporal domains within which there is no later and earlier. Such kinds of holism are produced by so-called entangled quantum states and are also denoted as quantum nonlocality: within those finite domains states ψ_M and ψ_P are not localized. Bell-type arguments in quantum physics have provided much theoretical and empirical evidence for them (see Gilder 2009 for an excellent introduction).

Beyond the established version of quantum nonlocality, which is usually interpreted as the nonlocality of an entangled system in space, one can also speculate about its temporal equivalent: nonlocaliy in time. This version has been introduced by Leggett and Garg (1985), and a decent review of experimental tests is due to Emary et al. (2014). Atmanspacher and Filk (2010) used the Leggett-Garg scheme to discuss the idea that not only physical but also mental systems may exhibit an extended present, which is experienced as a *window of nowness* rather than a sharp boundary between past and future. The size of the extension may vary – in certain kinds of experiences (see also Sect. 4.2) it can be exceedingly long.

From this point of view, a most extended present can be imagined as its infinite limit—with no past nor future and with no time slices within it. It is tempting to see finite temporal and spatial nonlocality in the mental and the physical as rudimentary intimations toward Spinoza's infinity and eternity of the divine. One may tend to understand these nonlocalities as concrete examples of his pantheist or panentheist *dictum* that the divine itself is present in all of profane nature as well, albeit in imperfect and attenuated ways.

In the spirit of Emmet (1945) and Devlin (2008), who emphasized the important role of analogical thinking in metaphysics and mathematics, respectively, Atmanspacher and Rickles (2022) suggested to use similar Bell-type arguments as a pull-back metaphor for wholeness in PPN. The general idea of a pull-back metaphor is to try to understand something that is only marginally explored by finding analogies with well explored territory. This must not be misunderstood as a misplaced application of physics to the psychophysically neutral. Rather, since the mathematics of separation can be applied independent of its target, we can utilize this mathematics,

i.e. tensor product decomposition, in principle for any situation in which wholes are sliced up into parts. In this sense, decompositions into tensor products can be seen as core tools to understanding the emergence of dual aspects M and P with space and time from a space- and timeless PPN. Moreover, the same procedure can be applied to decompositions within X_{PPN}, outside of space and time, to break the wholeness of a trivial partition in X_{PPN} into finite partitions not yet leading to X_M and X_P

So the idea is to "pull back" states ψ_{PPN} as non-product states with respect to mental and physical properties—as outlined in Sect. 2.1—to entangled states ψ_P in physics that are non-product states with respect to certain physical properties (such as spin). In physics, these states can be concretely written down: for bipartite systems they are the Bell states (Bell, 1964), for tripartite systems they are either GHZ states (Greenberger et al., 1989) or W states (Dür et al., 2000). For multipartite systems larger than tripartite, there are infinitely many equivalence classes of such states, so the complexity of a possible classification explodes. It has been speculated by Atmanspacher and Rickles (2022) to consider the tripartite case as a model for the tripartite system of M, P, and PPN. Formally grounded speculations in this direction may involve the advanced mathematics of knots and primes (arithmetic topology).

3 Going concrete: examples of psychophysical neutrality

The history of ideas from antiquity to today hosts quite a number of concepts that elude the distinction of mental and physical, hence fall neither into M nor into P. They are obvious candidates for approaches that try to better understand the nature of the psychophysically neutral domain PPN of reality. Interestingly, these approaches are of very different status and form, so they present themselves as a plurality, not as a unity. Any framework that incorporates elements that are neither mental nor physical can be seen as psychohysically neutral. Some of these frameworks are philosophically or even religiously colored, others more mathematically or scientifically, and over and above those the arts offer paradigmatic examples with astonishingly concrete and practical significance. Table 1 gives a compact synopsis.

Table 1 Ten examples of psychophyscial neutrality in decompositional dual-aspect monism from philosophy, sciences, and arts

	Psychophysically neutral structures
Plato	Forms, ideas
Connes	Primordial mathematical objects
Bohm–Hiley	Implicate order
Spinoza	Divine attributes
Schelling	Unground, indifference
Kant	Possibility of experience
Jung–Pauli	Archetypes
Gibson	Affordances
Beuys	Social sculpture
Rickles	Music

A key feature of Plato's metaphysics is the distinction between the essence of things and their particular appearances, or phenomena. Plato refers to essence as form, also as *eidos* or *idea*. The essence of a phenomenon is that which makes it that phenomenon, a kind of suchness that is the ground of the multiplicity of its appearances. Forms are unchanging (eternal), they are perfect, they are indivisible and they exist outside of spacetime. (Compare the discussion of spatial and temporal nonlocality in Sect. 2.2.) Appearances are changing, imperfect, divisible, and in spacetime. Reframed in the tripartite picture of PPN, M, and P, Platonic forms are structural elements of PPN, while particular appearances belong to M (mental domain) or P (physical domain).

Closely related to this Platonic metaphysics is mathematical Platonism, a position in the philosophy of mathematics that has been promoted by many outstanding mathematicians from Gauss to Frege, Gödel, Penrose, Connes, and others. Mathematical Platonism posits primordial mathematical objects that can be manifested both mentally and physically, but are neither mental nor physical themselves. Their correspondence with Platonic forms can be seen in abstract principles outside of space and time, such as symmetries, i.e. invariances under transformation. For instance, a circle is invariant under rotation around its center by any angle; this is called a continuous symmetry.

For the Platonist, the task and target of mathematicians is to discover such primordial objects and their relations with one another, not to perform calculations that a computer could perform as well. Mathematicians prove theorems with their mental capacities, but the truth of a theorem is anchored in the psychophysically neutral domain. That mathematical objects are so effective in describing structures and processes in the physical world is a consequence of the latter being manifestations of the former. Particularly illuminating is this quote by Alain Connes (Connes et al., 2001, p. 26):

> I maintain that mathematics has an object that is just as real as that of the sciences, but this object is not material, and it is located in neither space nor time. Nevertheless this object has an existence that is every bit as solid as external reality, and mathematicians bump up against it in somewhat the same way as one bumps into a material object in external reality. Because this reality cannot be located in space and time, it affords—when one is fortunate enough to uncover the minutest portion of it—a sensation of extraordinary pleasure through the feeling of timelessness that it produces.

Connes, a first rate expert in non-commuative algebra and geometry, compares the nature of mathematical "objects" with the solidity of external physical objects insofar as both are not at our disposal; they provide resistance if one encounters them.

An excellent example for how the psychophysically neutral domain of mathematics manifests itself in its physical aspect is due to Bohm and his collaborator Hiley (see Bohm et al., 1981), who couched this manifestation in terms of a transition from implicate to explicate orders. They showed how the implicate order of certain algebraic structures can be explicated as the description of basic physical structures pertaining to quantum physics. More precisely speaking, elements of non-commutative Clifford algebras (idempotents and ideals) are the psychophysically neutral basis which gets transformed into central elements of Hilbert space quantum mechanics (projection operators and quantum state vectors). Although this will be largely intransparent for non-expert readers, there is much beauty and stringency in this mapping from PPN

to P. Unfortunately, no equivalent of it has been worked out for the transition from PPN to the mental domain M so far.

Spinoza's main opus, the *Ethics* (Spinoza, 1677), outlines a metaphysical system that emphasizes the divine as an eternal and infinite substance, which has infinitely many *divine attributes*. Due to the restricted knowledge acquisition capacities of human beings, only two of these attributes express or manifest themselves as the *modes* of the mental and the physical. As Alain Connes sees the option of immanent access to the reality of primordial mathematical objects, Spinoza sees the option of immanent access to the divine by way of "intellectual intuition", the highest form of knowledge, also dubbed *amor dei intellectualis*. As it happens to be the case for all models of psychophysical neutrality, also Spinoza's could not be less anthropocentric or -morphic. They are not focusing on a human minds's point of view (that would be idealist), but underline the point of view of eternity: *sub specie aeternitatis*, as Spinoza does not get tired to insist.

Schelling, after an initial phase of idealist follow-up to Fichte, turned back to Spinoza and introduced his dual-aspect model, most concisely in his *Freedom Essay* (Schelling, 1809). He explored the idea that mind and matter (spirit and nature) are two aspects under which a primordial totality can be viewed—a base reality conceived as psychophysically neutral beyond the mind-matter distinction and without space and time. This reality is a dynamic self-organizing activity indifferent with respect to even the most fundamental opposition of subject and object. Schelling's system offers a delicate balance of the mental and the physical as correlated manifestations of that underlying reality. Its perfect symmetry is a hallmark of dual-aspect thinking, as is the link between them and their psychophysically neutral origin. In his own words (Schelling, 1809, translation HA):

> How could we call it other than the ur-ground, or rather *unground*? Since it precedes all oppositions, they cannot be distinguished in it, nor can they exist in any way. Therefore it cannot be denoted as their identity, but only as their *indifference*. ... This indifference is neither a product of opposites, nor are they implicitly included in it—rather it is its own essence, distinct from all oppositions, which is nothing else than their non-being, and therefore has no predicates except that of having no predicates—and yet it is neither nothing nor no thing.

The structures in the psychophysically neutral domain set the stage for what is possible (and what is impossible) in the mental and in the physical domain; they are a domain of possibilities. In modal accounts, what is possible is not necessary, so possibilities are not actualized by necessity. Yet possibilities are not "just possible", they are already part of the reality of which the physical and the mental are actualized descendants. In this sense, Kierkegaard (1844), in his *Concept of Anxiety*, speaks of the *reality of the possible*, when he discusses "anxiety as the vertigo of freedom,... which looks down into its own possibility and grasps the finite to hold fast on it". A fascinating philosophical account of what happens when an unstable state with many open possibilities relaxes into a stable state in which one of those possibilities is actualized. Clearly, this

is all about the making of a decision. Both possibility and actuality are real; they are subdomains of that wider reality,[3]

In this spirit, Kant's "conditions for the possibility of knowledge" refer to possibility states ψ_{PPN} from which states ψ_M and ψ_P derive if they manifest themselves. Kant formulated these conditions as synthetic judgments *a priori*, i.e. logically prior to any actual experience, which must be placed outside empirically accessible realities in M and P. In dual-aspect monism, their specific formulation in terms of space, time, and causation (among others) seems misleading since the possibility space X_{PPN} is void of spacetime and has no place for (efficient) causation (see Sect. 2.2). Nevertheless, the idea of such conditions, and thus of possibility spaces *per se*, remains unrestrictedly relevant, and Kant can be seen as an early voice emphasizing them.

Another route to the psychophysically neutral relies on the concept of *archetypes*. This concept goes back to Plato again, who refers to archetypes as metaphysical ideas grounding all phenomenal appearances. The psychiatrist Jung picked up on this together with the physicist Pauli with their concept of archetypes as ordering structures that manifest themselves as mental and physical objects and processes, respectively, and organize their appearance. A fairly succinct essay sketching the main ideas is due to Jung (1954). The Jungian account of archetypes locates them in the psychophysically neutral domain of the collective unconscious, which does not distinguish between mental and physical. The most basic archetypal pattern, the so-called *unus mundus*, would amount to the trivial partition of X_{PPN}, a state of totally undivided wholeness.

Similar to Platonic forms or mathematical objects or Spinoza's divine attributes, archetypes à la Jung and Pauli are seen as structures in PPN which are indifferent with respect to the M-P partition. These archetypal structures manifest themselves in mental and physical states together with psychophysical correlations between those states. Moreover, the Pauli-Jung conjecture predicts backreactions from both M and P into PPN that are capable of changing archetypal activity. All this amounts to a fairly detailed and comprehensive qualitative heuristic that adresses numerous features of dual-aspect monism and offers much potential for empirical research by exploring its heuristic value.

Gibson (1979) was among the first to point out that organisms always have to be regarded together with the environment (hence the notion of "ecological psychology") in which they are embedded. In order to cover what the environment offers to an organism he developed the concept of *affordance* referring to the possibilities an organism has for the perception of and action in its environment. With this characterization, affordances clearly are to be located beyond the distinction of (mental) perception and (physical) action, which appear linked in a perception-action loop. As much work in ecological psychology has been conducted since Gibson, the concept of affordance may be one among the psychophysically neutral concepts that has least "abstract" flavor and is immediately applicable to empirical research.[4]

[3] Another analogy, *mutatis mutandis,* would be the measurement of a quantum superposition state, which actualizes the value of some measured variable.

[4] Interestingly, Turvey (2015) compares the notion of an affordance with quantum superposition states, and with a little stretch his notion of "direct realism" may make sense in a dual-aspect framework, where percept and perceived are acausally and nonlocally correlated.

In May 1974, the German artist and philosopher Joseph Beuys was invited to perform at the opening of René Block's gallery in Manhattan, in the shadow of the twin towers at 409 West Broadway. Beuys, wrapped in felt, spent three consecutive days, eight hours a day, with a living coyote with whom he interacted through symbolic gestures. The coyote was docile and occasionally hostile, tugging at the artist's felt. The performance was ironically titled "I like America and America likes me". Beuys himself saw performances likes this as exemplars of what he called *social sculpture*, a concept he invented to refer to the transformative potential of the arts for humanity. A significant aspect of psychophysical neutrality in the 1974 performance is this: the distinction of artist and piece of art, creator and creation, subject and object, perception and action, is evidently undercut in the performance. Beuys designed it and also made himself an object in it, thus presenting a whole that is neither subject nor object—fairly disturbing for those visitors who were capable of realizing this in the performance.

The idea of the psychophysically neutral has gained some status even in the philosophy of music. What kind of entity is Bach's h-minor mass, or a Beethoven symphony? Obviously they are neither completely characterized by a listener's phenomenal experience nor by the physical organization of sounds that a performer produces. Musical structure includes elements such as meter, melody, and more, which are not as distinctly assignable to either mind or matter as, e.g., phenomenal affect and sensation versus physical frequency and duration are. As Rickles (2018) convincingly argued, the ambiguity of several elements of musical structure can be traced down to a notion of musical reality that simply does not offer the subject-object distinction which is required to lift the ambiguity. Rather, a piece of music *as such* with its psychophysically neutral elements is the ground upon which its subjective and objective components are built.

Whoever remembers the first bars of the Scherzo in Beethoven's *Eroica*, the horror cue for many conductors because meter and rhythm appear as ambiguous as possible between a 2- or 3-measure, will know how this feels. And whoever heard Beethoven's piano sonata op. 111 in an appropriate interpretation (e.g. by Igor Levit) will realize that the second movement, set up as an apparently innocent 9/16 measure, turns out as a rhythm that is hard to resist hearing as ragtime jazz in the third variation of the theme.

4 And finally: how is all this linked together?

The tripartite structure that decompositional dual-aspect monism offers expands the metaphysical architecture of bi- or single-partite structures in dualist, physicalist, and idealist models. This entails that the network of relations between the parts, i.e. PPN, M, and P, is more complex than a dualist relation between M and P or just internal relations within M or within P in idealism or physicalism. The inclusion of PPN introduces a deep structure into the picture that lifts the discussion to a new, elevated level and offers additional room for analysis. The hope is that such an analysis may yield clues about how the three parts are linked together as well as about the pairwise links between any two of them.

Observing a correlation, the typical reflex of a scientist is to look for a causal explanation. The laws of physics have been an extremely successful example in this respect, to such an extent that the lack of a causal origin of an event is simply attributed to randomness. Causal explanations in physics are (almost) always quantitative. Lawful regularities in P can be tested by observations in which numbers are assigned to observables: a physical observable is a mapping from the state space of a system onto the real numbers (cf. Sect. 1). Now, in the tripartite situation of dual-aspect monism, we have at least two parts, M and PPN, that offer less precise quantification than P, or even none at all.

4.1 Meaning, reference, sense

How can a correlation be interpreted, or substantiated, if it is not (purely) quantitative? Generally speaking, any concept that is relational by definition might be a candidate. In addition, it has to be designed in such a way that it links the domains between which correlations are found or to be expected. An ideal option for the M-P link is the concept of meaning, broadly construed. Meaning always links something that means to something that is meant. For instance, a mental representation refers to what it represents; this is its meaning. Notably, the protagonists of 20th century dual-aspect thinking whom Atmanspacher and Rickles (2022) discuss extensively (Jung, Pauli, Eddington, Wheeler, Bohm, and Hiley) all focused on *meaning* as a key concept, albeit with different shadings, for the interpretation of correlations between M, P, and PPN.[5] And no one less than Kurt Gödel (in a letter to his mother of Oct 6, 1961) emphasized the role of meaning as an extension of causation in a worldview broader than that of science alone (Wang 1991, p. 217):

> The idea that everything in the world has a meaning is an exact analogue of the principle that everything has a cause, on which rests all of science.

Historically, the relation that links a mental representation to what it represents has been introduced with the term *intentionality* by von Brentano (1874), who proposed the mental representation of such reference, or aboutness, as the hallmark of the mental domain. It is evidently relational: the intentional content of a mental representation in M refers to what it represents in the physical domain P.[6] Frege 's notion of reference in his influential essay "On Sense and Reference" (Frege, 1892) expresses a concept very similar to what Brentano called intentionality. Meaning as reference is a relation that connects the mental aspect of reality with its physical aspect.

However, here is the other variant of meaning, as Frege (1892) discusses it: sense. While meaning as reference refers to, or is about, something that is meant, sense is the mode in which that something presents itself. Frege's well-known example is Venus, which is the referent of both morning star and evening star, whereas morning

[5] To obviate digressions unnecessary for this primer, we disregard the rich area of linguistic discussions of meaning.

[6] Affordance-based accounts as indicated in Sect. 3 are particularly suitable to extend intentionality to direct perception-action couplings, "intentional arcs" according to Merleau-Ponty (2012), in organisms that do not form internal representations.

star and evening star are different modes of its presentation: their sense is different while their reference is the same. Frege intended his notion of sense to open up a metaphysical dimension to the concept of meaning—as a relation to a domain that is more fundamental than its mental and physical aspects: the psychophysically neutral domain of reality.

Another example, alluding to mathematical Platonism as the psychophysically neutral domain: writing 20+8 is one way to express 28, one mode of presentation as it were, and writing 1+2+4+7+14 is another. What's the difference? While the first version depends on the representational choice of the decimal system, the second version points to the wonderful structure of perfect numbers in number theory which is representation-independent. An integer number is perfect if it is the sum of all its divisors (except itself). 6=3+2+1 is the smallest perfect number, 28 is the next (and the next two are 496 and 8128). The second mode of presentation of 28 given above offers a glimpse into one of the many deep and interconnected mysteries of number theory, for instance the relation of perfect numbers to prime numbers.

The key to a proper understanding of both kinds of meaning, sense and reference, is that they are *relational*. They relate states within the subdomains M and P to one another, as well as to states within the psychophysically neutral subdomain PPN. Frege's sense is the meaningful relation between those structures that are neither mental nor physical (PPN) and their manifestations in the mental (M) as well as in the physical (P). With respect to the former, sense characterizes relations between psychophysically neutral structures and our mental representations of it. With respect to the latter, sense characterizes relations between psychophysically neutral structures and their physical manifestations.

However seductive it may be to regard the concept of meaning "simply" as an element of the mental domain, the view presented here considers this as flawed. It would amount to the fallacy of a *misplaced reification of a fundamentally relational concept* – far too "simplistic" (i.e., too cheap) to do justice to the subtle intricacies of the mind-matter problem. True, meaning (as reference or intentionality) can be attributed by a subject, so it has a subjective aspect. But the attribution must not be confused with the meaning itself, which substantiates the relationship of this subjective aspect with the physical aspect of reality.

4.2 Deep structure of meaning

Distinguishing reference from sense allows us to distinguish a surface structure of meaning (by reference) from its deep structure (by sense). There is remarkable agreement among the proponents of decompositional dual-aspect monism presented by Atmanspacher and Rickles (2022) that meaning has such a deep structure relating M and P to PPN. This subsection tries to elucidate this for two examples taken from Sect. 3: mathematical Platonism and the Pauli-Jung conjecture.

However, before this happens it is instructive to illustrate the meaning correlations to be discussed as a simplex structure with M, P, and PPN as vertices, depicted in Fig. 2. Pair correlations are drawn as σ_i ($i = 1, 2, 3$) along the edges, and triple correlations as ρ in the gray area circumscribed by the edges. Dashed lines are the bisectors

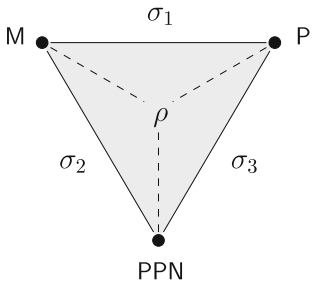

Fig. 2 Simplex representation of the reality domains M, P, and PPN with their pairwise correlations σ_i $(i = 1, 2, 3)$ and triple correlations ρ

meeting at the center of the simplex. The (solid) edges represent triple correlations as decomposed into three pair correlations, the (dashed) bisectors represent triple correlations decomposed into three separate states. Intradomain correlations within PPN, M, and P are to be imagined within the three vertices. The surface correlations σ_1 are substantiated by meaning as reference, or intentionality, or aboutness: states ψ_M are "about" states ψ_P. Correlations σ_2 and σ_3 are deep correlations between states ψ_{PPN} and states ψ_M and ψ_P, respectively, substantiated by meaning as sense.

Mathematical objects from the point of view of Platonism are elements of PPN. They are connected to M via σ_2, and experiencing this correlation corresponds to the quote by Connes in Sect. 3: "a sensation of extraordinary pleasure through the feeling of timelessness that it produces". Likewise, they are connected to P via σ_3 and provide insight why, to the provocative astonishment of Wigner (1960), mathematical structures are so effective in describing the physical aspect of reality. The history of mathematics reveals that σ_2 may even be realized before σ_3 is recognized: mathematical structures may be discovered before their application in physics becomes clear.

Structures in PPN orchestrate structures in M and P together with their surface correlation σ_1, and they do this by way of σ_2 in combination with σ_3. We may speculate that this is the metaphysical basis of the seemingly trivial fact that minds can be in relation to matter at all, i.e. the possibility that perception in M can be inherently linked to elements of external reality in P. This seems trivial if one thinks that the object-subject link is exhausted by signal transmission from an object to its perceiver. But a second thought may encourage us to see that the acausal but highly functional M-P link between an object and its phenomenal experience is a very subtle matter, and surely far from trivial after all. It might even raise the correlations ρ and σ_i to key elements of Kant's program to look for conditions for the possibillity of experience.

Another approach to the psychophysically neutral are archetypal patterns as proposed by Jung and Pauli. Their descendants in the mental and the physical are inner psychic images and the behavior of material systems, respectively. Pauli wrote about archetypes in a letter to his colleague Fierz on 7 January 1948 (von Meyenn 1993, p. 496f, emphases original, translation HA):

> *The ordering and regulating factors must be placed beyond the distinction of "physical" and "psychic"*—as Plato's "ideas" share the notion of a concept and of a force of nature (they create actions out of themselves). I am very much in favor of referring to the "ordering" and "regulating" factors in terms

> of "archetypes"; but then it would be inadmissible to *define* them as contents of the *psyche*. The mentioned inner images ("dominant features of the collective unconscious" after Jung) are rather *psychic* manifestations of the archetypes which, *however*, would *also* have to put forth, create, condition anything lawlike in the behavior of the corporeal world. The laws of this world would then be the *physical manifestations of the archetypes*. … *Each* law of nature should then have an inner correspondence and vice versa, even though this is not always directly visible today.

The final phrase in this quote expresses essentially the same as what was said above about mathematical structures expressing themselves in the behavior of material objects and their mental perception in parallel. In Jung's parlance, this would amount to a very basic type of "synchronicity", a term he introduced for meaningful psychophysical correlations. Jung originally wanted the term to be reserved for so-called numinous, revelatory, transformative experiences, which he was familiar with from his analytical practice. However, the Pauli-Jung conjecture actually predicts a wide spectrum from regular and stable mind-matter correlations, such as psychosomatic or psychoneural correlations, to the most evasive and exceptional ones (where exceptional means that they deviate considerably from established reality models that subjects develop).

In this spirit, Atmanspacher and Fach (2013) proposed to distinguish stable, thus reproducible, structural correlations from unstable, thus irreproducible, induced correlations. The stability of structural correlations defines a robust baseline from which less stable induced correlations deviate. Since these deviations can be negative or positive, a further distinction has to be drawn. In excess correlations mental and physical states that are usually disconnected get connected (coincidence phenomena such as Jungian synchronicities), while in deficit correlations mental and physical states that are usually connected get disconnected (dissociation phenomena such as out-of-body experiences).

Based on these terms and conditions, the Pauli-Jung conjecture leads to a taxonomy of exceptional (unstable) phenomena that has been supported by large bodies of empirical data concerning reports of their *phenomenal* experience (see Fach 2023 for extended discussion; see also Taves et al. 2018, Taves 2020, and Luhrmann et al. 2021 for additional studies along similar lines). The originally fourfold taxonomy into internal (mental) and external (physical) phenomena as well as coincidence (excess) and dissociation (deficit) phenomena of Atmanspacher and Fach (2013) can be elegantly compactified by a twofold classification into coincidence and dissociation phenomena that are expressed as weighted superpositions of mental (internal) components Ph_M and physical (external) components Ph_P.

The general structure of such superpositions is a convex combination $\alpha Ph_M + (1-\alpha)Ph_P$, $0 < \alpha < 1$, expressing relational experiences connecting M and P by the degree to which mental and physical components contribute to them. Purely mental phenomena Ph_M are covered by $\alpha = 1$, while purely physical phenomena Ph_P are covered by $\alpha = 0$. If a reported experience connects mental and physical components in an optimally balanced fashion this is reflected by $\alpha = 0.5$, for both coincidence and dissociation phenomena. The continuous parameter α weighs mental and physical

contributions to the experience which itself is generically relational, between mental and physical. The substantiation of corresponding correlations is meaning as reference.

The distance d of an experience from the baseline (at $d = 0$) is assumed to grow with the intensity of the meaningfulness of an experience which, in turn, increases as its stability and, thus, reproducibility decrease. While the phenomenal experience of the meaningfulness of an M-P correlation σ_1 belongs to the surface structure of meaning as reference, the intensity of such an experience depends on the intensity of the archetypal activity in PPN that orchestrates the M-P correlation σ_1. In other words, it depends on the deep structure of meaning as sense, as expressed by σ_2 and σ_3. Hogenson (2005) introduced the notion of symbolic density to address the intensity of archetypal activity that is crucial in this argument. His innovative proposal includes the prediction that the symbolic density of different archetypal patterns gives rise to a power-law distribution of their manifestations in an apppropriate representation.

This last sentence clearly needs some unpacking, and Jung's word association experiment (Jung, 1910) can be used as an excellent example. The experiment consists in presenting hundred stimulant words to the subject. When faced with each word, subjects must say out loud the first thing that comes to their mind. They should do this quickly and, as much as posible, without rational deliberation. The responses are written down and some other contextual factors are noted. Among them, the time it takes to give the response, its latency, is especially important for our purpose, as it can be hypothesized to be related to the symbolic density of the archetypal activity (in PPN) manifesting itself in the subject's mental experience (in M).

It is plausible to assume that words associated with highly activated archetypes in PPN show highest latencies (slow responses) because the association is more difficult to find and express consciously, while words associated with silent, inactive archetypes show low latencies (fast responses). A doubly logarithmic plot of latency as a function of rank, i.e. sorted in decreasing order (as in Zipf's law), leads to an approximately linear dependence with negative slope s: a so-called power-law distribution. From the data collected by Jung (1910) Hogenson extracts that s is small (close to zero) for healthy subjects, while s increases with increasing neuroticity. In addition, word associations with highest latencies may provide hints to the particular archetypal activity in PPN that is at the core of the impairment.

These considerations lead to interesting empirial questions. If the slope s of the power-law expressing the symbolic density of archetypal patterns is a measure for the intensity of an exceptional experience, then it is also a measure for the distance d above or below the baseline of structural (non-exceptional) experiences. And this, in turn, should monotonically decrease with increasing reproducibility of the experience. As a consequence, if an experience turns out to be reproducible, a criterion that is required for sound results in controlled laboratory experiments, this indicates that it cannot be an exceptional one. Many reports show that truly transformative experiences occur spontaneously and are properly regarded to be of the once-in-a lifetime type, where the question of reproducibility becomes otiose already by definition.

Overall, the triple (α, d, s) yields a heuristic way to characterize mind-matter correlations σ_1 with respect to (a) their status concerning mental and physical components, (b) their stability and reproducibility (distance from baseline), and (c) the symbolic density of the archetypal patterns that create them via σ_2 and σ_3. From the discussion

so far it may be anticipated that (b) and (c) depend on each other so that they may offer a useful option for empirical consistency checks. Increasing d, expressing the intensity of the meaningfulness of an experience on the M-P continuum, should covary with increasing s, indicating a high degree of variance among the symbolic densities of different archetypal patterns in PPN.

4.3 Fields of meaning

Meaning as reference and meaning as sense are the relational concepts that connect the physical with the mental aspect of reality, and both of these with their basis in the psychophysically neutral. Gabriel (2015) has proposed an account of meaning that goes even one remarkable step further. Namely, he conceives of meaning as *prior to* the domains of reality (M, P, and PPN) so far posited as starting points to look for their connections. For Gabriel all objects and events, be they physical, mental, or even psychophysically neutral, are something like excitations within pre-existing fields of meaning.

In a way, Gabriel's account puts the conventional approach to discuss meaning relations downside up. Meaning is always already there, even before any rigid body moves, before any thought is thought, and before any mathematical structure is related to another one. The reason why it feels for us as if we discover the meaning of something is, according to Gabriel, that we access a field of meaning (sense or reference) that we were unaware of before. Now, the question arises whether the fields of meaning that we may become aware of, which look for us as if we create the meaning, are basically mind-dependent or not. If they do not already depend on M, then there should be an influence from primordial fields of meaning onto how meaning is experienced. And this would imply that the meaning that is experienced in M is constrained and not arbitrarily attributed.

Gabriel and I agree that meaning attributions are everything else than arbitrary—existing fields of meaning may lead to appropriate or inappropriate attributions of meaning to experienced correlations. Subjects are potentially fallible when they attribute meaning. In the conventional view where meaning as reference connects the mental M and the physical P, this is quite easy to understand. As mental and physical states are joint manifestations of elements of the psychophysically neutral PPN, psychophysically neutral elements constrain the range of possible manifestations. Different neutral states ψ_{PPN} generate different manifestations ψ_M and ψ_P. And different manifestations are connected by different meanings, they are meaningful in different ways.

Note that this argument against arbitrary attributions of meaning goes deeper than arguments by convention. Of course, one could claim some form of non-arbitrariness simply by resorting to intersubjective agreement. However, the non-arbitrariness of meaning attribution proposed here would even demand that the meaning different subjects may possibly agree about must be considered as constrained. In other words, intersubjectively agreed meaning conventions can be more or less legitimate, depending on whether or not these constraints (due to PPN) are properly acknowledged.

Gabriel's account of fields of meaning as prior to any objects or events provides yet another argument against the arbitrariness of meaning attributions (Gabriel, 2023). If they were arbitrary in principle, irrespective of where they originate from, we would not be able to systematically correct ourselves and converge on getting it right when we got it wrong before. Meaning attribution may also be ambiguous: different fields of meaning may overlap and the meaning that is attributed by different subjects may therefore differ. But again, such ambiguity could be resolvable by discerning the overlapping fields of meaning.

If fields of meaning enjoy priority over the domains that the meaning connects, meaning is always already there, even if just in implicit form. Reference (intentionality) is its explicated version. Meaning as sense, as the relation between the psychophysically neutral and its mental and physical descendants, is likewise an explication of implicit meaning. Meaning has a deep structure that plays a fundamental role in the very fabric of reality. On the surface it appears as reference, or intentionality, but this alone would ignore significant factors underneath that surface that are responsible and constitutive for its formation.

Moreover, any proper attribution of meaning as reference (σ_1) is everything else than arbitrary, or a mere matter of intersubjective agreement. Rather it is *enabled and constrained* by the deep structure of meaning as sense, in relationship with the psychophysically neutral domain of reality (σ_2, σ_3). The appropriateness of attributed meaning as reference depends on a proper recognition of the sense that underlies it. Pertinent further discussion of dual-aspect monism and the deep structure of meaning can be found in Atmanspacher and Rickles (2022).

I conclude with a comment concerning the tension of ontic and epistemic domains of reality in dual-aspect monism. Although the distinction of those domains is often helpful, it should not be taken as an ultimately fundamental one. Every ontology can also be considered as an epistemology, depending on whether it is used as a basis for differentiation or as the result of differentiation. Note, however, that there is one ontic level that cannot be regarded epistemic: the base level of holism *in toto* within PPN, given by the trivial partition of X_{PPN}.

In a physical picture, bricks can be seen as epistemic objects from a perspective with elementary particles as ontic building blocks, but they can themselves also be seen as ontic building blocks from the perspective of architects or civil engineers. This is the key idea of Quine's (1969) ontological relativity or Putnam's (1981) internal realism. Both of them question the appropriateness of an absolute ontic-epistemic divide that often leads to fundamentalist positions denigrating the epistemic as subordinated to some foundational ontology, or to relativist positions denigrating the ontic as operationally meaningless.

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