

# Virtual Presence in the Early Modern Conception of Immaterial Entities

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Virtual Entities in Science: A Virtual Workshop

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“Virtual” presence is a late Medieval doctrine that holds that an immaterial being is not in space in the same way that a corporeal body is present.

(Other names, often applied quite differently by different philosophers: virtual extension, presence by power, extension of power)

“A body is said to be in a place . . . [by] the contact of dimensive quantity; but there is no such quantity in the angels, for theirs is a virtual [*virtutis*] one. Consequently, an angel is said to be in a corporeal place by application of the angelic power” (Aquinas, *Summa Theologiae*, I Q.52).

While virtual presence is a theological issue, it would become an important topic in the natural philosophy of the Early Modern period for two reasons:

1) God was accepted as the ontological foundation of space, and hence the relationship of immaterial entities to space was contrasted with how material entities were related to space.

2) Some natural philosophers (e.g., Leibniz, pre-critical Kant) employed virtual presence concepts to explain how matter emerges from immaterial beings (monads).

- Part 1: Kant's monadology and its aftermath demonstrates that virtual presence is central to understanding the evolution of his natural philosophy (not just his theology and/or philosophy of mind).
- Part 2: Concepts associated with virtual presence can be useful for examining the spatial relationship between the foundational and emergent levels in contemporary quantum gravity theories.
- We will only have time for Part 1.

## Part 1

Virtual presence is is closely related to the concept of “ubeity”.

“The Scholastics have three sorts of *ubeity*, or ways of being somewhere.” (Leibniz, *New Essays*, II.xxiii.21)

Leibniz’ analysis of ubeity provides a conceptual scheme that can help track the relationship between the spatial properties at the foundational level of being (God, monads) and the spatial properties at the emergent level of matter—and the same holds true for modern quantum gravity theories (minus the immaterial entities, of course, in Part 2).

“The first is called *circumscriptive*. It is attributed to bodies in space which are in it point for point, so that measuring them depends on being able to specify points in the located thing corresponding to points in space. (*New Essays* II.xxiii.21)”

That is, the extension of body is congruent with the extension of space under circumscriptive ubiquity.

Newton accepts circumscriptive ubiquity

The “determined quantities of extension” thesis in *De grav* stipulates that God’s spatially extended being grounds bodily properties, rather than corporeal substance:

“[God's] extension takes the place of the substantial [corporeal] subject in which the form of the body [i.e., the determined quantities] is conserved by the divine will” (*De gravitatione*, 29).

In short, there is only one spatial extension for both God and other beings. Same for Henry More and other Cambridge Neoplatonists.

“The second [ubeity] is the *definitive*. In this case, one can ‘define’—i.e. determine—that the located thing lies within a given space without being able to specify exact points or places which it occupies exclusively. (Leibniz, *New Essays*, II.xxiii.21)”

Definitive ubeity holds that immaterial entities are situated in the points of space, such that they are completely present in each point, and thus indivisible. This was the accepted view among the Scholastics and various Early Modern philosophers (also known as “holenmerism”, “virtual extension”).

“The divine substance is supremely indivisible and whole at any time and any place” (Gassendi 1976, 94).



“The third kind of ubevity is *repletive*. God is said to have it, because he fills the entire universe in a more perfect way than minds fill bodies, for he operates immediately on all created things, continually producing them”.

(Leibniz, *New Essays*, II.xxiii.21)

On Leibniz’ unique interpretation, repletive ubevity holds that God’s being is not situated in space, but only God’s action of preserving the world is in space.

“God is not present to things by situation” (*Leibniz-Clarke Correspondence*, L.III.12).

God discerns things “by the dependence on him of the continuation of their existence, which may be said to involve a continual production of them” (*ibid.*, L.V.85).

# Newton and Clarke reject Leibniz' repletive ubeity

“He [God] is omnipresent not only *virtually* [*virtutem*] but also *substantially*; for action requires substance.”  
(Newton, General Scholium, *Principia*)

Clarke: “That God perceives and knows all things not by being present to them, but by continually producing them anew, is a mere fiction of the schoolmen, without any proof” (*Leibniz-Clarke Correspondence*, C.V.83-88)

Newton and Clarke thus accept a locality principle for substances: namely, substances can only act where they are present (in being, not virtually).

Leibniz' repletive ubeity concept, i.e., virtual presence, also helps to explain the relationship between his monads (which are immaterial) and matter.

## Monads are not in space

“There is no spatial or absolute nearness or distance among monads. And to say that they are crowded together in a point or disseminated in space is to use certain fictions of our mind” (Loemker, 604).

# Matter emerges/supervenes on monads

“Certainly monads cannot be properly in absolute place, since they are not really ingredients but merely *requisites* of matter” (Loemker 607)

“Properly speaking, matter is not composed of constitutive unities [monads], but *results from* them” (Ariew and Garber 179; emphasis added).

Repletive ubeity explains this relationship

“I do not think it appropriate to regard souls as though in points [of space]. Perhaps someone might say that souls [monads] are not in place but through operation, speaking here according to the old system of influx” (1709, *Leibniz-Des Bosses Correspondence* 123-127)

# Kant's Pre-critical Period Monadology

The Leibniz-Wolff school followed Leibniz by associating their simple substances with force, and by conceiving the material world as an emergent/supervenient effect of force.

“There would be no space and no extension if substances had no force to act external to themselves. For without this force there is no connection, without connection, no order, and, finally, without order, no space” (*Thoughts on the True Estimation of Living Forces*, 1747, 1:23).

“A substance is either connected with and related to other substances external to it, or it is not. Because every independent entity contains within itself the complete source of all its determinations, it is not necessary for its existence that it should stand in any connection with other things. That is why substances can exist and nonetheless have no external relation to other substances, or have no real connection with them. Now since there can be no location without external connections, positions, and relations, it is quite possible that a thing actually exists, yet is not present anywhere in the entire world” (*True Estimation* 1:22-23).

Given this hypothesis, Kant claims that “God may have created many millions of worlds” (*ibid.* 1:22).

## A potential problem in the *True Estimation*:

“[s]ince there can be no location without external connections”, it would seem to be the case that substances are located once these external connections are established.

In the *Physical Monadology* (1756), Kant sets out to address this issue, since it potentially leads to the problem that if space is divisible, and the foundational entities from which space emerges are now situated in space, then these allegedly indivisible entities must be, on the contrary, divisible.

Kant's solution invokes a difference between a monad's non-spatial "internal determinations" and its "external determinations", or "sphere of activity", the latter giving rise to space.

"Though any monad, when posited on its own, fills a space", yet "the filled space is not to be sought in the mere positing of a substance but in its relation with respect to substances external to it. . . . It must, therefore, be granted that the monad fills the space by the sphere of its activity" (*Physical Monadology* 1:481).



“Space itself is the orbit of the external presence of its element. Accordingly, if one divides space, one divides the extensive quantity of its presence. But . . . there are other, internal determinations; if the latter did not exist, the former would have no subject in which to inhere. But the internal determinations are not in space . . . . Accordingly, they are not themselves divided by the division of the external determinations. . . . It is as if one were to say that God was internally present to all created things by the act of preservation; and that thus someone who divides the mass of created things divides God, since that person divides the orbit of His presence—and than this there is nothing more absurd which could be said” (*Physical Monadology* 1:481).

- Kant, thereby, sanctions Leibnizian repletive ubeity—and, importantly, he supports his conclusion via an analogy between a monad’s sphere of activity and God’s presence “to all created things by the act of preservation”—a description that matches Leibniz’ account, whereby God “operates immediately on all created things, continually producing them”.
- That is, just as Leibniz characterizes God’s repletive ubeity through the act of preserving the world, so Kant posits a monadic repletive ubeity that similarly denies the presence in space of a monad’s substance (internal determination).

- Kant's *New Elucidation* (1755) also follows Leibniz by implicating God's preservation of the world as the basis of the inter-monadic connections:

“[T]he ground of [monadic] reciprocal dependence upon each other must also be present in the manner of their common dependence on God. . . . The schema of the divine understanding, the origin of existences, is an enduring act (it is called preservation); and in that act, if any substances are conceived by God as existing in isolation and without any relational determinations, no connections between them and no reciprocal relation would come into being” (*New Elucidation* 1:413-414).

This explanation, which appeals to God's "understanding" and "conceiving" to bring about space (via inter-monadic connections), can also be seen as anticipating the final destination of Kant's evolving conception of space: while divine cognition may no longer play this fundamental role in the critical period, a subjectivist/idealist cognitive construction of space would remain, albeit limited to the human sphere.

That is, the "unity" of space is no longer secured by God in the critical period, but by the human mind.

Euler, who rejects the Leibniz-Wolff school's monadology, accepts repletive ubevity for souls and God.

“My soul, then, does not exist in a particular place, but it acts there, and as God possesses the power of acting upon all bodies, it is, in this respect, we say, He is every where, though his existence is attached to no place” (*Letters to a German Princess*, 92, 1761)

“This union of the soul with the body undoubtedly is, and ever will be, the greatest mystery of the divine Omnipotence—a mystery which we shall never be able to unfold” (*ibid.*, 270, 1760)

By the time of the *Inaugural Dissertation* (1770), Kant had grown skeptical of his earlier monadology.

Rather than employ repletive ubeity to explain the relationship between monads and extended matter/space, he now employs Euler's conception of repletive ubeity to separate God and immaterial monads from the material world altogether. That is, believing that only God's actions are in space is but a small step away from taking a purely metaphorical interpretation of divine (and monadic) presence.

“But the presence of immaterial things in the corporeal world is a virtual not a local presence. . . . But space contains the conditions of possible reciprocal actions only in respect of matter. But as to what constitutes the external relations of force in the case of immaterial substances, whether those relations be between the immaterial substances themselves or between immaterial substances and bodies: that is quite beyond the human understanding, as the extremely perspicacious Euler, for the rest a great investigator and judge of phenomena, penetratingly noted (in letters sent to a certain princess of Germany)” (*Inaugural Dissertation* 2:414).

[S]pace, which is the sensitively cognised universal and necessary condition of the co-presence of all things, can be called PHENOMENAL OMNIPRESENCE (For the cause of the universe is not present to each and every thing simply in virtue of the fact that that cause is in the places in which they are. It is rather the case that places exist, that is to say, that relations of substances are possible, because the cause of the universe is inwardly present to all things.) (*Inaugural Dissertation* 2:410)

Hence, with omnipresence now confined to the phenomenal world of matter, immaterial entities have been excluded, thus heralding the beginning of Kant's critical turn.



End of Part 1

## Part 2

Leibniz' ubevity concept is also useful in characterizing Quantum Gravity (QG) hypotheses, which attempt to unify Quantum Mechanics (QM) and General Relativity (GR).

- In QG theories, usually either QM or QFT (Quantum Field Theory) is the foundational theory, and GR is the emergent theory.
- That is, just as matter and space emerge from God or monads in the Early Modern period, in modern QG theories, GR emerges from QM or QFT.

Circumscriptive Ubeity (shared metric structure at both the foundational level and emergent level)

Which modern QG theories resemble circumscriptive ubeity (like Newton)?

Answer: Older forms of covariant quantization (extension of QFT to gravity), older versions of String theory

A classical metric is retained by these theories, both at the foundational and secondary levels (emergent GR and/or for all dynamics).

Definitive Ubeity (shared topological structure between foundational and emergent levels, i.e., the points of space, and not distance in space)

Which modern QG theories resemble definitive ubeity (like Gassendi)?

Answer: Loop Quantum Gravity (LQG), since a point manifold is employed at the foundational level (via the spatial diffeomorphisms required to form  $s$ -knots from the spin networks).

Repletive Ubeity (no shared metric or point manifold structure between foundational and emergent levels, i.e., the quantum substrate is not in spacetime)

Which modern QG theories best resemble repletive ubeity (like Leibniz and the pre-critical Kant)?

Answer: non-spacetime QG theories, e.g., Causal Sets, Quantum Causal Histories, etc., since the metric and manifold of GR are now emergent features that are not applicable at the QM substrate level.

Leibniz' interpretation of ubeity is also relevant to the debate concerning "local beables" in QG theories.

A "local beable" refers to the locality of a theory's fundamental objects within a definite spacetime region. The problem, roughly, is that non-spatiotemporal entities are not localizable. On Maudlin's estimation, "local beables do not merely exist: they exist somewhere" (Maudlin 2007b, 3157), so it follows that any theory which admits beables that cannot be localized does not achieve "physical salience" (3167).

Intriguingly, in addressing the local beables issue for non-spacetime QG hypotheses, Huggett and Wüthrich (2013) put forward a detailed analysis of locality that mirrors Leibniz' three forms of ubeity and the respective QG hypotheses listed above, as well as matches some of Leibniz' descriptions.

Circumscriptive ubeity: Huggett and Wüthrich comment that, on a simple reading of String Theory, which would match the older pre-1980s versions, "it looks exactly as if strings are local beables, bits of stuff describing worldsheets in a classical spacetime" (2013, 280). That is, beables and spacetime share metric structure.

Definitive uberty: “The problem is that any natural notion of locality in LQG—one explicated in terms of the adjacency relationship encoded in the fundamental structure—is at odds with locality in the emerging spacetime. In general, two fundamentally adjacent nodes [i.e., of two spin networks] will not map to the same neighborhood of the emerging spacetime” (2013, 279).



That is, the adjacency or neighborhood among spin networks—topological relationships—are not preserved at the emergent level of spacetime.

Leibniz: “The second [uberty] is the *definitive*. In this case, one can ‘define’—i.e. determine—that the located thing lies within a given space without being able to specify exact points or places which it occupies exclusively. (Leibniz, II.xxiii.21)”. Like LQG, the adjacency relationship is not preserved under definitive uberty.

Repletive ubeity: As regards casual sets, a non-spacetime QG theory, “take localization in causal terms, and argue that it is the causal nexus [among the non-spatiotemporal basal elements], rather than spatiotemporally understood locality, which supplies the condition relevant for empirical coherence [of the theory]” (2013, 278-279).

Hence, just as Leibniz’ God and monads are not situated in space, but God’s actions and the monads’ “results” (i.e., matter) are situated, so it seems that the elements of causal set theory are not spatially located, but one can obtain a proxy notion of locality via their causal structure.