Nitesh Mathur

Dr. Futch

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Substantivalism versus Relationalism: A Discussion on Time and Space

Sir Isaac Newton and Gottfried Wilhelm Leibniz were two of the towering figures during the seventeenth century amidst the so-called "Scientific Revolution." These two accomplished philosophers conflicted numerous times over their lifetimes, especially over the debate of receiving credit on discovering calculus. One of the other important debates that took place between Newton and Leibniz involved space and time, evident in the Leibniz-Clarke correspondences. Newton favored absolute time and space, while Leibniz favored relative time and space. Newton's point of view would come to be known as substantivalism, while Leibniz beliefs would be known as relationalism. Although both of them had distinct views concerning a superior power, God was a backdrop assumption for both these theories. Although Leibniz held implicit assumptions, he utilized the "Principle of Identity of Indiscernibles" and the "Principle of Sufficient Reason" as a means to disprove substantivalism and defend relationalism.

Newton's philosophy, which was known as substantivalism, revolved around the idea of absolute space and absolute time. Leibniz exclaimed that Newton "maintain[ed] that space is a real absolute being," which "appears to be eternal and infinite" (Leibniz 252). Newton denied that space and time were substances; rather, they were substance-like. Substantivalism postulates two independent realities of space and time, where they are distinct from objects in space and changes in time. This presupposed condition states that if there is no space and time, then there is no place nor a time for change to occur in physical bodies. Furthermore,

substantivalism asserted that space is an infinitely vast expanse and cannot have empty spaces between bodies. A key underlying concept to this theory is that even if there does not exist any bodies at all, space and time would still exist. Therefore, Newton was content with the idea of a void. In addition, an important characteristic of this viewpoint is that space and time are causally inert and inactive. They are indifferent to things placed in them. In substantivalism, space is "intimately present to the body contained in it and commensurate with it" (250). Lastly, substantivalism proclaims that time exists independent of the ordered history subset, meaning that the span of time does not depend on the history set. Overall, Newton asserted that space and time, which are absolute, are ontologically basic necessities.

Relationism was a stark contrast from substantivalism since it assumed time and space as a relative framework, not absolute. In this theory, material things that are undergoing change impact space and time. An alteration in the state of bodies alters the space and time. Therefore, independent space and time does not exist; rather, they can be described through a series of spacial and temporal relations. While substantivalism accepted absolute space and time, Leibniz portrayed "space to be something merely relative, as time is" as "an order of coexistences" (252). The foundation of relationalism rested on the idea that time cannot exist without change in the object, and space is defined in terms of things existing. In addition, Newton considered matter as the "most inconsiderable part of the universe," and Leibniz assumed that "every created substance is attended with matter" (253). Unlike Newton, Leibniz maintained that "there is no void at all" because "the more the matter there is, the more God has occasion to exercise his wisdom and power" (250). Another contrasting element to substantivalism is that time is considered to be a logical construct out of the history system, not independent of it. Finally, another stark difference is that it did not consider space substance-like. Leibniz argues that "if

space is an absolute reality, far from being a property or an accident opposed to substance, it will have a greater reality than substances themselves" (255). As a whole, the basic tenets of Leibniz's relationalism differed drastically from substantivalism, against whom Leibniz argued.

In order to defend relationism, Leibniz employed the Principle of Identity of Indiscernible (PII). He claimed that "there is no such thing as two individuals indiscernible from each other" (Leibniz 254). Rather, he claims, that "to suppose two things indiscernible is to suppose the same thing under two names" (254). He utilized this theory to provide arguments against substantivalism. He claimed that moments of time, which are points of space, taken on their own are indiscernible from one another. The idea that "the universe could have had at first another position of time and place than that which it actually had, and yet that all the parts of the universe should have had the same situation among themselves" is a contradiction according to Leibniz. He utilized to argue against a void because "extramundane space is imaginary proves that all empty space is an imaginary thing" (255). Newton claims that if two separate objects with the exact same characteristics are observed at separate times, then they will differ due to the existence of absolute space. Leibniz, on the other, conveys that because of this principle, these objects are indiscernible from each other and therefore, are the same. As a whole, the Principle of Identity of Indiscernibles was one of the tools Leibniz utilized to counterattack Newton, just like the Principle of Sufficient Reason.

The Principle of Sufficient Reason (PSR) asserts that for everything that exists, there is a reason why it exists and why it exists the way it does. We do not necessarily need to know what the reason is, just need to know that a reason exists, i.e. a 'self-explaining explanation.' Leibniz exclaims that "if space were an absolute being, something would happen for which it would be impossible that there should be a sufficient reason—which is against [his] axiom" (252). This

principle rules out the existence of absolute space and time because if space and time existed independently, then not all things are explainable. For example, if the relative positions of given bodies are the same, there are infinitely many ways of bodies placed in absolute space, but there is no sufficient reason to prove this. This problem only occurs while assuming absolute space, not relative space. Altogether, Leibniz employs the Principle of Sufficient Reason along with the Principle of Identity of Indiscernibles to support relationalism.

Newton objects to the Principle of Identity of Indiscernibles because even if the objects are qualitatively the same, they differ with respect to their relative property and extrinsic denominations. This is one assumption that Leibniz holds in order to employ PII in order to defend relationalism. He says that since space is uniform, "there can be neither be any external nor internal reason by which to distinguish its parts and to make any choice among them" (255). Otherwise we would have to "discern what is indiscernible or choose without discerning" (255-256). In order for any extrinsic denomination to be discernible, the intrinsic characteristics need to be discernible. Two moments of time cannot differ in terms of one another of space. In essence, all relational differences must be grounded upon non-relational differences. As a whole, there can be no purely extrinsic denomination unless some characteristic differs in the intrinsic denomination.

All in all, Leibniz utilized the Principles of Sufficient Reason and the Identity of Indiscernibles to carefully refute Newton's claims. Later, in the twentieth century, with the advancement of physics and the Albert Einstein's Relativity Theory, a transformation occurred in the point of views concerning time and space. As a whole, Newton's substantivalism was the more popular view prior to the twentieth century, but it did have competitive theories like relationism through the didactic arguments of Leibniz.