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Transubstantiation and Quantum Physics: The Parallels of Mystery in Religion and Science

For hundreds of years since the Council of Trent, the Holy Catholic Church has taught that the Eucharist is truly and uniquely the Body and Blood of Jesus Christ at its deepest level. It is surprising then, to find that a Catholic priest and head of the UCA news would disagree with this claim and would cite modern physics as his reasoning for disagreeing. Father Michael Kelly argues that “the mystery of the real presence of Christ in the Eucharist carries the intellectual baggage of a physics no one accepts” (CWN 2010). According to Fr. Kelly, there is no way to rationalize the belief in transubstantiation as the Church defines it, “Because Christ our Redeemer said that it was truly his body that he was offering under the species of bread, it has always been the conviction of the Church of God, and this holy Council now declares again, that by the consecration of the bread and wine there takes place a change of the whole substance of the bread into the substance of the body of Christ our Lord and of the whole substance of the wine into the substance of his blood. This change the holy Catholic Church has fittingly and properly called transubstantiation” (CCC 1376). How can this be so? How can a Catholic priest disagree with a fundamental teaching of the Church on the basis of modern physics? He claims not only that transubstantiation is wrong but that such discussions are, “meaningless in the post-Newtonian world of quantum physics” (CWN 2010). If transubstantiation is a reasonable belief, there must be some way for it to be understood, or at least accepted in post-Newtonian, or quantum physics.

This paper seeks to describe how Fr Kelly is incorrect in his assumptions regarding quantum physics disproving transubstantiation. The metaphysical realities behind this notion are very solidly reasonable and compatible with a quantum understanding of the world. However, this can only be best understood by analyzing both transubstantiation and quantum physics within the context of mystery. There is clearly a great deal of mystery in the understanding of Christ in the Eucharist, but more often mystery in the quantum world is called uncertainty. By comparing mystery and uncertainty it becomes clear that if a quantum understanding of the world is a reasonable one, then transubstantiation is a reasonable understanding for a metaphysical phenomenon. The leading and ever prominent question to ask when discussing scientific and religious understandings is: what is reasonable? If it considered reasonable in a scientific understanding of the physical world to hold as profound an uncertainty as the dual nature of an electron, then surely the metaphysical understanding of the transubstantiation of the Eucharist must in turn be a reasonable claim. In order to make this claim, the understanding of each mystery or uncertainty must be explicated, starting with the metaphysical and moving downward to the physical. Each mystery must be explored within itself before they can be compared and shown to be equivalent in their respective realms.

An important quality of any mystery is a form of controversy. In order for a mystery to be present, in either the physical or metaphysical world there must be some tension of reason. If there is no struggle in reason, then there is likely no mystery. It would be remarkably unreasonable to accept the concept of a mystery with such a reasonable strain to not include a measurable effort to understand. An acceptable and reasonable mystery would possess a tangible effort to reason through the mystery, or rather, to posit alternative explanations. It would be akin to laziness to simply reach a difficult concept and to retreat all intellectual effort. Dawkins

scoffs at religious endeavors to understand the world, “Dear scientist, don’t work on your mysteries. Bring us your mysteries, for we can use them” (Dawkins 159). For naturalist atheists like Dawkins there is the misconception that religion tends to exonerate mystery rather than to pursue it. The discussion of transubstantiation and the tension of reason are very old. P.J. Fitzpatrick opens this discussion quite well with his analysis of the mystery in *In Breaking of Bread*, his critical exemplification of the understanding of transubstantiation and alternative understandings of the Eucharist. Within this text, Fitzpatrick both acknowledges the current understanding of the “true, real and substantial presence of the whole Christ in the Eucharist” (Fitzpatrick 2) and remarks upon a number of the danger of rhetorical “combining of terms from the system in a way that makes no sense” (Fitzpatrick 46). His criticism is that in the rhetorical phrasing of this metaphysical change there is no method of how the change occurs. This is his strongest criticism of transubstantiation as an occurring reality. He compares the idea of transubstantiation to a metaphysical sort of “plasticine” or clay (Fitzpatrick 5). While it is easy to mold and change clay’s shape without changing its substance, metaphysical characteristics cannot be molded. His argument is that transubstantiation allows for no understanding of method. There is no acceptable explanation as to how this metaphysical change occurs and he is frustrated in the understanding that it is generally accepted all the same. This is an ideal strain of reason for such a mystery.

It is clear from Fitzpatrick, however, that there is a clear and measurable effort to posit alternatives to transubstantiation. In this endeavor, Fitzpatrick explores the popular alternative to the substance-changing definition of the Eucharist as he explores the understanding of transignification. This conception of the mystery of the Eucharist is the understanding that the bread and wine are merely signs of Christ’s presence, and in no way a manifestation of Christ.

This idea strongly demonstrates an effort come to understand a metaphysical phenomenon through alternative measures. Even within this context, Fitzpatrick remains highly critical of the theory. The narrowest understanding that he reasons for this idea is that “Personal presence goes deeper than spatial presence, and is more subtle and demanding. Spatial presence is essentially local.” (Fitzpatrick 55). In a transignificant understanding of the Eucharist, the physical presence of Christ is not as important and foundational as his personal presence. In this way, transignification looks to the sacrament as a sort of interpersonal communication regardless of location. Fitzpatrick criticizes this understanding as well, arguing that sense interpretation alone is a somewhat weak grounds for an understanding of the Eucharist. This type of thinking ignores the deeper levels of thinking about the metaphysical reality of the event.

His voice is not the only one involved in this matter. Modernist authors like Mary Durkin seem to favor this sort of approach. She makes the argument that the “Eucharist is both an object and an action” (Durkin 13) and that one of the essential components of the sacrament is “active participants whose experiences help to shape the ritual” (Durkin 18). From her perspective, transubstantiation is an entirely experienced and subjective phenomenon “humans interpret experience through symbols” (Durkin 20). While this is directly opposed to thinkers like Fitzpatrick and to Aquinas who writes, “shallow minds not looking closely into the truth of this mystery imagined that Christ’s Body and Blood are not in this sacrament except in a sign” (Aquinas 17, ST Q75.I), it is clear evidence that there is some attempt to explain this reality in a contrary way. In short, there is an effort to understand the truth of the metaphysical reality, including that of widely varying theories.

Having demonstrably shown that transubstantiation can be considered unreasonable by some rhetorical confusion and frankly no explanation of method, it must now be shown that a

similar vein runs through several of the conceptions of modern physics, specifically quantum uncertainties. The strain to reason within quantum physics regards the behavior of very tiny particles, or perhaps waves. One of the most principal and holistic examples of this uncertainty involves the understanding of the twin slit experiment and the exploration of the nature of electrons. In this experiment, the dual nature of both electrons and light becomes evident. By passing electrons through a single slit of an absorbing material to a material that can register the electrons, one can see the familiar pattern of a single slit worth of electrons with some amount of diffusion relative to the distance between the slit and the receptacle. This is an incredibly typical result of behavior of particles. If this were completed with ping pong balls instead, the same result would occur, as these particles would function similarly. The confounding uncertainty becomes apparent when an additional slit is added. If ping pong balls, or particles, were used in a double slit, one would expect that the patterns would simply overlap. However, what is noticed is that there appears a diffraction pattern on the absorbing material (Forrest 72). This type of pattern would only be consistent if electrons functioned as waves and had the ability to interfere with each other in the way that can alter their paths. This exonerated the wave/particle duality that is some of the best evidence for uncertainty in quantum physics. Researchers decided to see if this interference was caused by electrons colliding with one another. They arranged the experiment to fire a single electron at a time to unlock the fundamental question: which slit did an electron pass through? There is no clear answer to this question, because the experiment demonstrates that as a particle, the electron passed through neither slit, but as a wave it passed through both. This leads to the only conclusion that the electron is acting as both a particle and as a wave, or as some indivisible combination of the two. This is a remarkably

unreasonable idea, contradicting the most basic principle of reason: something cannot both be and not be in the same respect and at the same time.

As with the issue of transubstantiation, it must be determined that this is not a loose struggle with a concept; there must be a dialogue regarding these issues. There were certainly several researchers debating and arguing the understanding the quantum world at its beginning and Jim Baggott explores this establishment of the uncertainty in *Beyond Measure*. In his second chapter, titled “Farewell to certainty”, he explains how phenomenon like the wave-particle duality is explored by the quantum pioneers, DeBroglie, Einstein and Bohr. He concludes that, just as his title suggests, “the subatomic world of the fundamental particles of matter and radiation was much stranger than anyone had ever imagined” (Baggott 24). As he explains the theories, including also wave functions and matrix laws, it is clear that many thinkers worked hard to try and unravel the mystery. He also introduces the secondary crux of the uncertainty argument by explicating Heisenberg’s theory of the same name. As he does so he makes a very startling claim, “[Heisenberg] did not believe it was necessary to use terms like ‘wave’ or ‘particle’ when talking about quantum phenomena and preferred, instead, to continue with the supposition that the theory merely provided a ‘consistent mathematical scheme [that] tells us everything which can be observed” (Baggott 38). Heisenberg had formulated a mathematical approach to try and identify either the speed or location of an electron within its orbital, but this definition is not as important as the parallel it draws directly relating to the metaphysical discussions of transubstantiations. While it is important to notice that transubstantiation is a metaphysical and not a physical concept, we can see how rhetoric serves the metaphysicist in the same way mathematics serves the physicist. With this in mind, it is clear that Heisenberg’s response to quantum dilemmas is parallel to the rhetorical difficulties Fitzpatrick exemplifies

regarding transubstantiation. This means that a similar criticism can be brought up regarding the contradiction present within a mathematical formula that defines out one of its terms when the other is present (ie one can only know either the location or the speed at a given time). In the end, there is no denying there has been a struggle to understand the nature of the quantum world, for as Baggott quotes Heisenberg, “Could nature possibly be as absurd as it seemed?” (Baggott 39). Struggle or not, there is uncertainty.

With the establishment of both transubstantiation and wave-particle duality as uncertainties, it is clearer now how both methods of thought possess their own unique uncertainties. What remains still unclear is the relationship between these two schools of thought. It must be asked: is it reasonable at all to compare the physical uncertainties of the quantum world with the metaphysical uncertainties of the sacrament of the Eucharist? Or rather, what place does physics have in a discussion about sacraments? While it must be again emphasized that this is merely an argument of parallelism, the relationship between transubstantiation and physics as a whole is an important exploration to make given the current established facts. Even if it is accepted that there is a parallel between what is called uncertainty in the quantum world and mystery in the religious, until the relationship between the two is established to be reasonably similar it cannot be said that transubstantiation is a reasonable understanding.

The discussion on the place of physics in the understanding of transubstantiation began 85 years ago and was primarily a response to the understanding of quanta as described by Bohr and Einstein. As the debate intensified toward the middle of the twentieth century, three views began to materialize. These three understandings are best described as exclusive materialism, divisionism and hylomorphism. The first understanding is such that there is no metaphysical

reality at all and thus no discussion is necessary. In a way, this mentality mirrors the ideas that Fitzpatrick confronts in transignification and is suffers the same crucial flaw; exclusive materialism does not confront objects in the real world on a deep and substantial way. It instead relies on the world as a purely experienced phenomenon. This way of understanding the relationship between physics and the Eucharist suffers from Aquinas's previously referenced "shallow mind" syndrome, in that it refuses to accept metaphysics as a possible explanation of reality. Even Sagan, in his article *Wonder and Skepticism*, sought a balance between openness and skepticism, and exclusive materialism falls too far on the scale of skepticism to be called a balance. Therefore, exclusive materialism is a weak hypothesis.

The second way, that is divisionism, is the understanding of the metaphysical and quantum physical to be mutually exclusive. In this understanding there is stronger argument. Richard Cipolla works to summarize these arguments, between Italian thinkers in his article, *Selvaggi Revisited: Transubstantiation and Contemporary Science*. In particular Cipolla describes Msgr. Carlo Colombo who fought very strongly for this sort of understanding of the relationship between the two classes of thought. His argument is that, "in transubstantiation we are dealing with a purely metaphysical change as opposed to a physical change" (Cipolla 669). Colombo excludes the two classes from interaction. He argues that there is no common ground between physics and metaphysics, that the two realities are "quite distinct and irreducible to each other" (Cipolla 669). With this understanding there is no way to compare physics and metaphysics for they each occupy separate domains. If divisionism is to be believed then there can be no parallels between the physical and metaphysical worlds and this argument for transubstantiation as reasonable cannot be valid. Divisionist understanding invalidates the argument that uncertainty and mystery are comparable.

On the other end of this spectrum is the understanding of hylomorphism, that is, a more profound overlap (rather than a connection) between the metaphysical realities of the world and their physical counterparts. For this end, Cipolla describes Filippo Selvaggi S.J., who explains that one of the struggles of theology is to explain metaphysics in a physical sort of way. While Cipolla will try and shed favorable light on Selvaggi, it is clear that Selvaggi takes this line on thinking too far and obscures the line between metaphysics and physics. Even Cipolla, being quite generous, describes Selvaggi's approach as "naïve paste-and-scissors approach to advances in modern physics" (Cipolla 672). Hylomorphism cannot stand if it makes such a poor attempt at comparing the two ways of thinking. Luckily, Cipolla himself stands on this side and makes a more compelling argument towards an overlap of the two sciences. His argument is that the physical world as described by modern physics "is itself mysterious, partially hidden, symbolic" (Cipolla 684). The quantum world thrives on thought experiment and hypothetical realities just as metaphysics does. In this way, Cipolla argues that "the sacramental world should be seen as continuous with and including the physical world" (Cipolla 684). Even Selvaggi, as described by Cyril Vollert in *Controversy on Transubstantiation*, reaches to this same point in his understanding, "Bread is a thing that can be viewed on different horizons of knowledge" (Vollert 401). Vollert ends his own discourse on the controversy by stressing, "the harmonies prevailing among revealed truths" (Vollert 425), so as to imply the compatibility of the two methods of thinking. Within hylomorphic understanding of the relationship between the physics and metaphysics of the Eucharist, there lies the possibility of the parallelism that would make transubstantiation reasonable according to this uncertainty/mystery argument. However, there seems to be equal favor between hylomorphism and divisionism, so a further source must be consulted.

Typically, the concept of hylomorphism is attributed to Aquinas's study of the human body and soul, so an investigation into Aquinas on this matter is not neatly cleared up by the term. Instead, an explication of his works regarding the Eucharist is necessary. Question 76 of the *Summa Theologiae* is the most fruitful example of the fact that Aquinas falls somewhere just between hylomorphism and divisionism, slightly favoring hylomorphism. In this question, Aquinas examines the reality of Christ in the Eucharist in a bit of both senses of physical and metaphysical. He makes it clear in ST 76.3, "Christ's body is not present in the way in which the dimensive quantity of a body is under the dimensive quality of place" (Aquinas 34). This is to say that the Eucharist is not exclusively a physical presence of Christ in the exclusive materialist understanding. In ST 76.6 it becomes apparent that Aquinas does not fully favor divisionism, "The same thing cannot be in motion and at rest at the same time; otherwise there is a contradiction in the same subject" (Aquinas 41). While seeming to only remark on the stability of the law of non-contradictions, Aquinas uses the term same subject. He makes it very clear from those two words that he is not a divisionist. The presence of Christ is absolute in both a metaphysical and a physical sense. In this way, Aquinas favors the hylomorphic argument and breaks the tie.

Aquinas's support undoubtedly favors the overlap between the physical and the metaphysical because within his time there was no strong distinction as there is today. Nevertheless, it is otherwise clear that the hylomorphic understanding holds strength over divisionism in that it does not succumb to that intellectual laziness that works to restrain reason when it begins to struggle. Just because it is difficult to align physics and metaphysics parallel does not mean that it is wrong to do. In just this way there can be drawn powerful conclusion

about the reasonability of transubstantiation and the parallels between physical uncertainty and religious mystery.

With the establishment of a reasonable overlap between metaphysics and physics as regards transubstantiation it is absolutely essential to clarify that metaphysics and physics are not interchangeable. There are major differences both in premises and execution, in means and ends. They are not the same domain, but they do show strong parallels, especially as regards the understanding of mystery or uncertainty. If it is therefore possible to look to the mysteries of metaphysics and of the sacrament of the Eucharist, a mystery Carl Sagan despise so much, and to see reflected in the material world the similar mysteries under the name uncertainty. Sagan advised a “judicious mix” (Sagan 23) of openness and skepticism. If that balance suitably allows a scientist to express uncertainty about fundamental aspects of the ‘stuff’ material world interacted in everyday, then surely it allows the believer that same reasonable belief that bread on an altar can at one moment be bread and at another become a fundamentally new and Divine reality.

So what of Fr. Kelly? It would be very easy, and also very incorrect, to simply write him off as wrong-minded. He seems to make a similar mistake to the divisionists, who find it prudent to divorce physics and metaphysics. This is a mistake, primarily because the divisionist conception of reality does not allow for a holistic picture of reality. In his response to Fr. Kelly’s unbelief, Stephen Barr makes the very astute observation that quantum mechanics makes a straightforward connection between what appears empirically and what is “really there: more obscure than it was in Newtonian physics, and to that extent would make it easier rather than harder to affirm the doctrine” (Barr 2010). Barr perfectly targets the parallel this paper has made between the quantum world and the metaphysical one. The quantum understanding of the world

hinges on uncertainty and mystery, though it hardly uses the later word. By truly understanding this modern physics, it becomes clear that mystery and uncertainty are important parallels between the physical and metaphysical world. If it is reasonable for such uncertainties to exist regarding the very fundamental forms of matter than it is reasonable to also believe that at its substantial level, the wine and bread become the true Body and Blood of Christ.

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