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# A Commentary On Gottfried Wilhelm Leibniz's Discourse on Metaphysics #19

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A Commentary on Gottfried Wilhelm Leibniz's *Discourse on Metaphysics* #19

by

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of the requirements for the degree of  
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## Abstract

This commentary on article #19 of Gottfried Wilhelm Leibniz's *Discourse on Metaphysics* is for the purpose of promoting the understanding of Leibniz on the role of teleology in physics. Understanding Leibniz on final causes is crucial to understanding his overall natural philosophy. If one approaches Leibniz with a bias regarding either final causes or protestant Christian theology, such that they ignore these aspects of Leibniz, such a person is in danger of completely misunderstanding this philosopher. Leibniz is a mix of natural philosophy, mechanical physics, and protestant Christian theology. The rationale behind this study is to cause the student of philosophy to consider a somewhat ignored side of Leibniz which stems from his combination of two politically incorrect words in academics today, “intelligent” and “design”. Both these words are found in article #19. Both of these terms are employed in concert with the Christian idea of God, a combination which is highly charged in academics today, and most politically incorrect. To address the political incorrectness of this combination of terms, however, is to engage in the understanding of what it meant to think and argue in seventeenth century Europe. To wrestle with these terms in article #19 therefore, is to wrestle with those positions which caused great tension in early modern culture. The approach taken for this work is a line by line exposition of the text, unearthing the arguments involved and those philosophers who made them. Once into this particular text, article #19 turns out to be enormous in its scope of Leibnizian thought. Its subject matter mirrors the thinking of Leibniz, and is background material for other projects Leibniz was involved in at the time, such as the laws of motion in optics. The significance of the work to the discipline is that Leibniz,

one of the most intellectually gifted men in human history, no less the co-discoverer of the calculus, argues that reality is an intelligent design created by a loving person who only wants to be loved by the creation in return. This puts him at odds with pure mechanists in his day, and it puts him at odds with many in philosophy today. For all those in philosophy who argue that there is no reason for reality existing, at least not as it does, Leibniz provides a very clear counter argument. Leibniz's point in article #19 is that there is a place for end purposes in calculating the laws of nature, and that those who dismiss end purposes do so for insufficient reasons.

## Introduction

In this essay I will comment on article #19 in Gottfried Leibniz's *Discourse on Metaphysics*. My thesis for this essay is that a proper interpretation of article #19 involves the context in which the discourse is written, opposing philosophical viewpoints, and three Leibnizian themes; final cause, intelligent design, and machinery. In some respects article #19 mirrors Leibniz's entire philosophy. As each individual substance mirrors the universe, both past, present, and future within its very being, so the words of #19 reflect the entirety of Leibniz's thinking within their words.

Gottfried Wilhelm Leibniz (1646 – 1716), co-discoverer of the calculus, refiner of the principle of least action, and a champion of teleological applications for the laws of physics in optics, says that physical reality is the product of an intelligent design by a loving person, God. For Leibniz there is a sufficient reason why there is something rather than nothing. There is also an end purpose towards which physical reality, the machine, moves. Understanding article #19 assists the philosopher and student of Leibniz in understanding this position. He does not present his position within any formal system or major work. There is no Leibnizian system in terms of a major work in which Leibniz carefully spells out his position. Leibniz is a reactionary thinker. He spends his philosophical career reacting to positions of other thinkers such as Descartes, Spinoza, Gassendi, and Hobbes. Interpretations of his thinking must be gleaned from personal correspondence, unpublished essays like *Discourse on Metaphysics*, articles published in

Acta Eruditorum, and his only published book *Theodicy*.

Leibnizian scholarship is continually challenged by the newly edited and published works by Leibniz which bear upon previous interpretations. Compound this with the fact that Leibniz changed his mind about things during the course of his career, a feature of not having a formal system, and fresh new interpretations are a constant feature in Leibnizian scholarship. This commentary includes one of these translation features, his *Systema Theologicum* written in the same year as *Discourse on Metaphysics*, 1686. This work has a particularly significant impact on interpretations of the *Discourse on Metaphysics*. Both are written for the same personal audience, and, therefore, both must be interpreted within the context of the other.

What is unique about interpreting #19 is that its subject matter and heading “The Utility of Final Causation in Physics” is not currently in favor within academic philosophical scholarship. It was not in favor at the time Leibniz wrote it either. A movement was underway in his time to abandon final causes as a legitimate mode of explanation for the physical world.<sup>1</sup> The young Leibniz decided at the age of fifteen to join the movement and abandon substantial forms in favor of the new mechanism. He understood the rightness of those discoveries in the scientific community, which were more accurately describing the workings of the machine, and he embraced the new understanding. In his early years, however, he discovered that not every physical phenomenon could be explained mechanically. As a result, he will come to the position before his middle years that there are just some things that must be explained both metaphysically than mechanically. As a result, he will come to embrace both.

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1 Clatterbaugh, Kenneth. *The Causation Debate in Early Modern Philosophy 1637 – 1739*. Routledge: New York, N.Y., 1999, p. 4



This embracing of both will be spelled out in his Doctrine of the “Interpenetration of Causation”, where two sets of laws will operate simultaneously with each other, affecting the same phenomena without adversely affecting one another. The laws of motion in essential causation will operate alongside the final cause for the movements of physical bodies. This doctrine is firmly set in the mind of Leibniz at the time of the writing of *Discourse on Metaphysics*. In article #19, one will find this doctrine firmly in play but never mentioned. God operates physical reality like a machine according to mechanical laws, and for his glory. Leibniz's opinion is that unless one sees reality this way, one's understanding is incomplete.

In interpreting any specific passage in the history of philosophy, a knowledge of the context within which the author writes is required. In the case of article #19, the context is specific within the intelligent design argument of articles #19 – #22 and general within *Discourse on Metaphysics* as a whole. By “Intelligent Design” Leibniz means that physical reality is a creation by an intelligent agent. Upheaval in European thought and culture surrounded Leibniz's thinking as culture boiled over in disputes regarding science, religion, and politics. The scientific dispute turned on the transition from Aristotelean substantial forms to mechanism based on laws of motion as introduced by Descartes, Leibniz, and Newton. The religious dispute was between Protestants and Catholics, and the political dispute was between nationalism and Christendom. These three disputes overlapped depending on issues and circumstances, and the European citizenry was caught up in the battles which ensued. Leibniz was a diplomat who worked towards positions of mutual agreement between disputing parties in all three of these areas.

Causation in physics was one of the major scientific issues of Leibniz's day. Article #19 is a statement about the metaphysical application of the laws of physics. In #19 Leibniz attacks those who deny the utility of final causes in physics. He calls them “the new philosophers”. It is not that their understanding of essential causation is in error. His argument against them is that their rejection of final causes leaves them, and those who buy into their philosophy, with an incomplete explanation of the machine.

The two main “new philosophers” that occupy his thinking are Descartes and Spinoza. However, a proper and complete interpretation of #19 also includes individuals named in lists in other works before the writing of *Discourse on Metaphysics*. Leibniz engaged them all in his career, but their participation in this work pertains exclusively to the prejudices of his audience, Antoine Arnauld.

For Leibniz, reality is a “machine”. Though he never uses the word in article #19, he gives three examples which illustrate how the machine works; animal structure, the eye, and the prince and the cannon. Animal structure is a scientific issue in Leibniz's day. He sees it as one of the evidences of the design of an intelligent creator. The example, however, which best illustrates his purpose for writing #19 is the human eye. It is God, he will say, who has created the eye. Why? For seeing, of course. It is what he says about the workings of the rays of light when they reflect off of the eye that greatly enhance the significance of his illustration in #19. He says that the rays of light behave according to two sets of laws, mechanical, and teleological. They move according to laws of physics and for the end purpose of eyesight. Leibniz will argue this position because he will demonstrate to himself that rays of light, though they have infinitely many paths to take, always take the easiest path. They never vary.

Subsequently, by always taking the easiest path, rays of light fall under the concourse of a loving person who thought it wise to create beings with eyesight so that they might behold his glory when he presented himself to mankind in the personage of Jesus Christ. This is the point of the final article #37. Leibniz finishes #19 with the illustration of the prince and the cannon. God has created a machine. The machine did not create itself, nor does it run itself. God both creates and runs the machine so as to accomplish the purpose of his self-revelation to, and his personal relationship with, those who love him.

## Chapter One: The Context For Article #19

A proper interpretation of Discourse #19 involves the context in which Leibniz wrote. First, Leibniz wrote within the context of his intelligent design argument in articles #19 - #22. In the work as a whole, the words “intelligent” and “design” are mentioned in #19, but not before, and in #22, and not thereafter. Second, Leibniz wrote within the context of *Discourse on Metaphysics* as a whole. This work is part of a “one two punch” combined with the *Systema Theologicum*. Together they are designed to assist Catholic/Protestant reunification. Third, Leibniz wrote within the context of the political, religious, and scientific turmoil of early modern Europe. The “Thirty Years War” had ended in 1648,<sup>2</sup> but the political, religious and scientific differences between factions boiled during Leibniz's lifetime. Fourth, he wrote to Antoine Arnauld, a Roman Catholic theologian, philosopher and mathematician. The first letter in the Leibniz-Arnauld correspondence contains only the thirty seven major headings. The entire text of *Discourse on Metaphysics* never found its way into Arnauld's hands.

Articles #19 - #22 contain Leibniz's entire intelligent design argument within *Discourse on Metaphysics* work as a whole. Discourse #20 is about “overly materialistic philosophers” with *Phaedo* 96b – 99c as the backdrop. In this Platonic discussion, the question is about how things come to be, and whether or not an intelligent agent is the

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2 Parker, Geoffrey. (Editor). *The Thirty Years War*, 2<sup>nd</sup> Edition. Routledge: New York, N.Y., 1997, p. xii “It is often claimed that Samuel Pufendorf, the eminent seventeenth century jurist and historian, was the first to claim the term 'The Thirty Years War' to describe the series of conflicts which ravaged Europe between 1618 and 1648.”

first cause and the designer of reality.<sup>3</sup> Socrates says to Cebes, “I heard someone reading, as he said, from a book of Anaxagoras, and saying that it is Mind that directs and is the cause of everything. I was delighted with this cause, and it seemed to me good in a way that mind should be the cause of all.”<sup>4</sup> This passage, the first two chapters of *Genesis*, and the first chapter of *Romans*, served as the philosophical and theological textual sources for Leibniz's argument. Discourse #21 is about the wisdom of the designer and the mechanical workings of bodies. Leibniz says, “Now, since we have always recognized God's wisdom in the details of the mechanical structure of some particular bodies it must also be displayed in the constitution of the laws of nature.”<sup>5</sup> Discourse #22 contains Leibniz's explanation of the cause of the machine, “by final causes and by efficient causes.”<sup>6</sup> He says, “Both ways are good and both can be useful, not only for admiring the skill of the Great Worker, but also for discovering something useful in physics and in medicine.”<sup>7</sup>

*Discourse on Metaphysics* as a whole, is an article of Christian faith written by a natural philosopher who happens also to be a protestant theologian. God is an “absolutely perfect being” who acts perfectly metaphysically and morally.<sup>8</sup> Reality consists of individual substances that express the whole universe in their very being. The events of individual substances, their circumstances, and the whole sequence of external things”

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3 Ariew, Roger and Daniel Garber (Editors). *G.W. Leibniz, “Philosophical Essays”*. Hackett Publishing Co.: Indianapolis, In., 1989, p. 53 In footnote #85, Ariew and Garber quote Leibniz's marginal note: “The passage from Plato's *Phaedo* where Socrates ridicules Anaxagoras, who introduces mind, but does not make use of it, is to be inserted.”

4 Cooper, John. *The Complete Works of Plato*. Hackett Publishing Company: Indianapolis, In., 1997, p. 84

5 Ariew, Roger and Daniel Garber (Translators). *G.W. Leibniz, “Philosophical Essays”*, Hackett Publishing Company: Indianapolis, In, 1989, p. 53

6 Ariew and Garber, p. 54

7 Ariew and Garber, p. 54

8 Ariew and Garber, p. 35

are “included” in their own notions.<sup>9</sup> All individual substances, whether thinking or non-thinking, exist as a result of design. The design of the machine is for the purpose of thinking substances to dwell in a loving relationship with God in and through Jesus Christ. The “ends” of creation is the revelation of the kingdom of God in and by Jesus Christ. Leibniz says, “Jesus Christ has revealed to men the mystery and admirable laws of the kingdom of heaven and the greatness of the supreme happiness that God prepares for those who love him.”<sup>10</sup>

Leibniz wrote within the political, religious and scientific context of early modern Europe. Politically, the Germany of Leibniz was divided into numerous small states, and was undergoing a slow transition to nation statehood. Religiously, Europe was torn between Catholics and Protestants, and scientifically, Europe was torn between the causation of Aristotelean substantial forms and the causation of what will come to be known as Newtonian mechanics..

Leibniz addressed *Discourse on Metaphysics* to a French Roman Catholic theologian named Antoine Arnauld (1612 – 1694).<sup>11</sup> Arnauld was a Jansenist, who, because of the Jansenist/Jesuit controversy, was forced to go into hiding in Paris for twenty years. Some time after this, he was forced to leave France and settle in Brussels where he spent the last sixteen years of his life. It is doubtful that Leibniz was writing to the right Catholic to aid him in church reconciliation. Even if Leibniz was to have been

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9 Ariew and Garber, p. 40 – 41

10 Ariew and Garber, p. 69

11 In their work *G.W. Leibniz, Discourse on Metaphysics and Related Writings*. Manchester University Press: New York, N.Y. , 1988, p. 1, editors Martin and Brown say “The system that is first expressed in the *Discourse* owes much to the inspiration of Malebranche. Leibniz once conceded that it is to him that I owe my foundations in this subject' (from *Mathematische Schriften von G.W. Leibniz, C.I. Gerhardt, 7 Vols.*, Berlin and Halle, 1849 – 1860, ii 299). Leibniz admired much in Malebranche's style of philosophical writing and the *Discourse* is influenced by the form, style and content of Malebranche's *Treatise of Nature and Grace*.”

successful in persuading Arnauld, it is doubtful whether or not Arnauld could have persuaded the Roman church hierarchy to seriously consider Leibniz and his *Discourse on Metaphysics* as thirty-seven reasons for unification.

The correspondence between Leibniz and Arnauld was a “three cornered affair”. The intermediary was “Ernst, the landgrave of Hessen-Rheinfels.”<sup>12</sup> Leibniz wrote to Arnauld in hopes of gaining a sympathetic hearing from a Roman Catholic “nobleman” concerning his views. Leibniz thought that this would help him in his quest to unify Catholics and Protestants. The Leibniz-Ernst correspondence, in which the Leibniz – Arnauld correspondence took place is 1680 – 1693.<sup>13</sup> Leibniz wrote Ernst in 1680 summarizing *The Sincere and Discreet Catholic* concerning church reunification. Protestants, Leibniz argues, should “seek with all their powers to overcome the obstacles to reunion with the Catholic church, and Catholics should “remove the abuses within the church that were associated with the division of Christianity.”<sup>14</sup> This was the main objective with which Leibniz wrote to Ernst.<sup>15</sup>

On February 11, 1686, Leibniz writes Ernst von Hessen-Rheinfels the first letter in what is to become the Leibniz – Arnauld correspondence:

Being at a place lately for several days with nothing to do , I wrote out a short discourse on metaphysics on which I should be very much glad to have the opinion of Mons. Arnauld. For the questions in regards to grace, in regards to the relation to God with created beings, in regards to the nature of miracles, the cause of sin, the origin of evil, the immortality of the soul, ideas, etc., are discussed in a way which seems to offer new points of approach fitted to clear up some great difficulties. I enclose here with a summary of the articles which it contains, as I have not had time to make a clean copy of the whole. I therefore beg your serene highness to send him this summary, requesting him to look it over and give his judgment on it. For, as he excels equally in theology and philosophy, in erudition and in power of thought, I know of no one who is better fitted to give an opinion on it. I am very desirous to have a critic as careful, as enlightened, and

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12 Sleigh, R.C. *Leibniz and Arnauld, A Commentary on Their Correspondence*. Yale University Press: New Haven, Ct., 1990, p. 15

13 Sleigh, p. 18 – 19

14 Sleigh, p. 19

15 Sleigh, p. 19

as open to reason as Monsieur Arnauld, being myself also a person the most disposed in the world to submit to reasoning. Perhaps Monsieur Arnauld will not find this outline whole unworthy of his consideration, especially since he has somewhat occupied in the examination of these matters. If he finds obscurities, I will explain myself sincerely and frankly and if he finds me worthy indeed of his instruction, I shall try to behave in such a way that he will find no cause for being dissatisfied on that point. I beg your serene highness to enclose this with the summary which I am sending and to forward them both to Mons. Arnauld.<sup>16</sup>

With this first letter Leibniz includes “the summary”, which is the list of thirty-seven article headings. Leibniz's hopes of gaining a sympathetic Catholic audience are dashed as Mons. Arnauld indeed finds “this outline whole unworthy of his consideration.”

Arnauld's first letter to Ernst in reply to Leibniz indicates this. Article #13, entitled

“Since the Individual Notion of Each Person Includes Once and For All Everything That Will Ever Happen to Him, One Sees It The A Priori Proofs of the Truth of Each Event, or, Why One happened Rather Than Another, But These Truths, However Certain, Are Nevertheless Contingent, Being Based on the Free Will of God or of His Creatures, Whose choice Always Has Its Reasons, Which incline Without Necessitating”

is particularly impossible for Arnauld to bear. So, on March 13, 1686, he wrote his initial reply to Leibniz through Ernst.

I have received Mons. the metaphysical thoughts which your highness sent me from Mr. Leibniz as a witness of his affection and his esteem for which I am very grateful to him. But I have been so very busy ever since, that only within the last three days have I been able to read his missive. And at the present time I have had such a bad cold that all I can do now is tell your highness in a couple of words that I find in his thoughts so many things which frighten me and which if I am not mistaken almost all men would find so startling that I cannot see any utility in a treatise which would be evidently rejected by everybody.<sup>17</sup>

Arnauld then proceeded to express his dismay at #13, and later on in the letter compared Leibniz to one of Augustine's correspondents who wanted to become a Christian but who had unacceptable views. Arnauld's initial assessment of Leibniz's ideas in *Discourse on Metaphysics* is that Leibniz should concern himself with the salvation of his soul, and forsake his unacceptable beliefs.<sup>18</sup>

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16 Leibnizcorrespondence.www.class.uidaho.edu/.../texts/Leibniz%20-%20Correspondence.htm

17 Leibnizcorrespondence.www.class.uidaho.edu/.../texts/Leibniz%20-%20Correspondence.htm

18 Leibnizcorrespondence.www.class.uidaho.edu/...texts/Leibniz%20-%20Correspondence.htm



*Discourse on Metaphysics* should be interpreted in the context of other Leibnizian works which have a bearing on the subject matter of Discourse #19. Some of these works are *A Unitary Principle of Optics, Catoptics and Dioptrics* (1684), *Systema Theologicum* (1686), *Specimen Dynamicum* (1695), and *Tentamen Anagogicum* (1696). In order to interpret Leibniz's design argument properly in *Discourse on Metaphysics* as a whole, and in #19 in particular, one must understand Leibniz's theology. For Leibniz, all of reality is by design, and the end purpose for which reality exists is Jesus Christ.

*Systema Theologicum* explains this. In his doctrines of God, Creation, and Christology, Leibniz says first that God is an intelligent being of perfection who creates, preserves, and governs the order of intelligent beings for his glory.<sup>19</sup> Second, God is a loving person who only wants to be loved by intelligent beings in return.<sup>20</sup> Third, by God's perfect order of things, man has fallen,<sup>21</sup> but Christ has come to redeem man.<sup>22</sup> Fourth, according to Leibniz, man falls in sin because of 'concupiscence', animal nature.<sup>23</sup> Fifth, God has instituted revelations which declare his manner of governing intelligent beings as well as "the entire machine of the universe."<sup>24</sup> Sixth, Leibniz says that Christ is the logos of God, the rational principle of the universe made flesh.<sup>25</sup> Leibniz says that Christ is the one person in the trinity who took upon himself the nature of man.<sup>26</sup> He did

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19 Russell, William (Translator). *A System of Theology*, Burns and Lambert: London, England, 1850 p. 2, written by Gottfried Leibniz

20 Leibniz, *A System of Theology*, p. 3

21 Leibniz, *A System of Theology*, p. 6

22 Leibniz, *A System of Theology*, p. 7

23 Leibniz, *A System of Theology*, p. 7

24 Leibniz, *A System of Theology*, p. 10

25 Leibniz, *A System of Theology*, p. 16; One of the definitions of "logos" is "rational principle of the universe." See *Lidell and Scott's Greek-English Lexicon*. Clarindon Press: New York, N.Y., 1979, p. 416, λογος is "I. The word by which an inward thought is expressed...II The inward thought or reason itself." Christ is God's reason, or rationale, for creation; I.e, the rational principle of the universe.

26 Leibniz, *A System of Theology*, p. 16

so for the expiation of the human race.<sup>27</sup> The time for Christ's arrival on earth was pre-ordained.<sup>28</sup> Christ was sinless.<sup>29</sup> He was "the anointed of the Lord, or the King or messiah, the restorer of the human race foretold by the oracles of the prophets."<sup>30</sup> Christ's purpose in coming is to die for the sins of all mankind.<sup>31</sup> Seventh, the born again Christian loves God in return by keeping the law, which is all God wants in the first place. Leibniz says, "Nevertheless, it pleased God to ordain as the law man's redemption, that its benefits should extend to all who, having been born-again in Christ, by the grace of the Holy Ghost, should elicit a filial act of faith and love...."<sup>32</sup> For Leibniz, physics occurs for the purpose of man's knowing and loving God, through Jesus Christ.

That charity or love, which is a divine virtue, consists in our Loving God above all things; and seeking in him our sovereign good; and, therefore, we are to love him, not only for the benefits he bestows on us, but also for himself, and as our last end.<sup>33</sup>

Leibniz's *Systema Theologicum* sheds valuable interpretive light on *Discourse on Metaphysics*. God is a loving person of intellect and will who creates to love, and be loved by his creation. Christ is the end purpose for which the creation moves. This is what Leibniz means in the last article where he mentions Christ and machine in the same thought.

The ancient philosophers knew very little of these important truths; Jesus Christ alone has expressed them divinely well, and in a manner so clear and familiar that the coarsest of minds have grasped them. Thus his gospel has entirely changed the course of human affairs; he has brought us to know the kingdom of heaven or that perfect republic of minds which deserves the title of City of God., whose admirable laws he has disclosed to us; that, caring for sparrows, he will not neglect the rational beings which are intimately more dear to him., that all the hairs on our head are numbered; that heaven and earth will perish rather than the word of God and what pertains to the economy of our salvation; that God has more regard for the least of the intelligent souls than for the whole

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27 Leibniz, *A System of Theology*, p. 16

28 Leibniz, *A System of Theology*, p. 16

29 Leibniz, *A System of Theology*, p. 16

30 Leibniz, *A System of Theology*, p. 17

31 Leibniz, *A System of Theology*, p. 19

32 Leibniz, *A System of Theology*, p. 19

33 Leibniz, *A System Of Theology*, p. 30

machinery of the world; that we must not fear those who can destroy bodies but cannot harm souls., because God alone can make souls happy or unhappy; and that the souls of the just, in his hand, are safe from all the upheavals of the universe, God alone being able to act upon them; that none of our actions are forgotten, that everything is taken account of, even idle words or a spoonful of water well used; finally, that everything must result in the greatest welfare of those who are good; that the just will be like suns, that neither our senses nor our mind has ever tasted anything approaching the happiness that God prepares for those who love him<sup>34</sup>.

Article #19 is part of Leibniz's overall philosophy of the machine workings towards that end which is humanities confrontation with God in Christ by two sets of laws stemming from essential and final causation.

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34 Ariew and Garber, p. 68

## Chapter Two: Leibniz on Final Causation

In order to properly interpret Article #19, an understanding of Leibniz on final causation is essential, and there are four basic areas of Leibnizian thought that must be considered in this matter; one, the definition of final causation itself and its relationship with essential causation, two, the influence of Plato and Aristotle, three, Leibniz as a mechanist who never abandoned Aristotelianism completely and firmly believed in the operating of physical reality to be of a mechanical nature,<sup>35</sup> and four, the blending of theology, Plato and Aristotle, and mechanism together to form his Doctrine of “Interpenetration of Causation”. In this doctrine, essential causes and final causes are related without interfering with one another. The laws of motion in physics operate mechanically and with an end purpose. Article #19 should be understood within this dual functionality in causation.

Leibniz says that final cause has a “utility”, or useful role to play in physics. This is in regards to body on body causation. Final causation is the ends purpose for which a thing moves. For example if a rock falls, scientists and philosophers in Leibniz's day ask what caused it to fall. The primary question was one of essential causation. If another rock struck the rock in question, then that rock is the essential cause of the subject rock's

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35 In the introduction to *The Labyrinth and the Continuum* page xviii and xix, translator Richard Arthur says, “According to his later testimony Leibniz first began to doubt the scholastic philosophy he had learned in school as early as 1661 when, at the tender age of fifteen, he was in his first year at university of Leipzig. “...by the time Leibniz left university in the late 1660s he was firmly committed to finding a rapprochement between Aristotle and the moderns. Like his teachers Jacob Thomas and Erhard Weigel, he maintained that an Aristotelean account of substance was not only compatible with the new mechanistic physics of Descartes, Galileo, Hobbes, and Gassendi, but essential for its proper function.”

falling. One might ask what caused the first rock to strike the subject rock and cause it to move? In answering this, scientists and philosophers quickly become mired in the issue of infinite regress of causation. In this case they are either challenged with the problem of having no explanation for causation because they choose to adopt a position which denies a first cause, or they are challenged to define the first cause, which leads to problematic issues of metaphysics and theodicy. Leibniz says that the speed of the rock's fall can be calculated according to essential causes involving mechanical laws of motion. His point in article #19, however, is that there is a usefulness in this physics question to involve final causes in the calculation. This is because the velocity of the rocks fall is telic in nature. This forces Leibniz to confront the issues of metaphysics and theodicy in which he argues that God creates the best of all possible worlds in which such laws of force and motion exist.

Leibniz is a mechanist who says that the subject rock's fall can be totally explained in terms of physical laws of motion. At the same time, however, he thinks that the end purpose for which the rock moves plays a utility role. Direction of a bodies motion will convince Leibniz that a metaphysical explanation is the only explanation for this physics phenomenon. Bodies always move in accordance with the easiest path. By 1695 essential and final causes will play an equal role in explanations of the laws of nature, and this will be Leibniz's position until his death.

The influence of Plato on Leibniz is found in *Phaedo* and *Timaeus*. In *Phaedo* 95e-96b and 97b-c Plato says,

And Cebes said, 'There is nothing that I want to add or subtract at the moment. This is what I say.' Socrates paused for a long time, deep in thought. He then said, 'this is no unimportant problem that you raise Cebes, for it requires a thorough investigation of the cause of generation and destruction. I will, if you wish, give you an account of my experience I these matters.'

Then, if something I say seems useful to you, make use of it to persuade us of of your position. I surely do wish that, said Cebes. Listen then, and I will Cebes, he said. When I was a young man I was wonderfully keen on that wisdom which they call natural science, for I thought it splendid to know the causes of everything, why it comes to be, why it perishes and why it exists.

Nor can I any longer be persuaded that when one thing is divided, this division is the cause of its becoming two, for just now the cause of becoming two was the opposite. At that time it was their coming close together and one was added to the other, but now it is because one is taken and separated from the other. I do not any longer persuade myself that I know why a unit or anything else comes to be or perishes or exists by the old method of investigation, and I do not accept it, but I have a confused method of my own. One day I hear someone reading, as he said, from a book of Anaxagoras, and saying that it is mind that directs and is the cause of everything. I was delighted with this cause, and it seemed to me good, in a way, that Mind should be the cause of all. I thought that if this were so, the directing mind would direct everything and arrange each thing in the way that was best.<sup>36</sup>

In *Timaeus* 27d – 39c and 48e – 57d, Plato argues as a teleologist that mechanics is incapable of giving adequate explanation of physical reality.<sup>37</sup> Leibniz employed both of these Platonic positions in his philosophy; one, that not everything can be explained by mechanics, and two, that mind is a causal agent in physical reality coming to be.

The influence of Aristotle on Leibniz is found in *Metaphysica, Physica, and De Partibus Animalium*. In *Metaphysica* XII 6 Aristotle insists that movement requires a cause. He said, “Yet, if we follow the theologians who generate the world from night or the natural philosophers who say that 'all things were together', the same impossible result occurs. For how will there be movement is there is no actual existing cause?”<sup>38</sup>

Concerning God and theology, Aristotle discusses the existence of gods and the mythical tradition handed down to them by their forefathers in  $\Lambda 81074bI-10$ .<sup>39</sup> He teaches that all movement requires a mover and even multiple movers in  $\Lambda 71072a21-26$  and  $\Lambda 81074a15-$

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36 Cooper, John (Editor). *The Complete Works of Plato*. Hackett Publishing Company: Indianapolis, In., 1997, p. 84

37 Cooper, p. 1234 – 1260; This is Hankinson's assessment on p. 127 of *Cambridge Companion to Aristotle*.

38 McKeon, Richard (Editor). *The Basic Works of Aristotle*. Random House: New York, N.Y., 2001, p. 878

39 Barnes, Jonathon. (Editor). *Cambridge Companion to Aristotle*. Cambridge University Press: New York, N.Y., 1995, p. 104

16.<sup>40</sup> They are incorporeal, partless and indivisible substances. They cannot cause movement by striking something. They cause movement like an object of desire causes another object to move towards it in  $\Lambda 71072a26-32$ .<sup>41</sup> In  $\Lambda 9$  Aristotle's unmoved movers are good and they think. Here we see four influences on Leibniz. One, God is incorporeal and partless. Two, God does not cause anything to move by striking it. Three, God is good, and four, God thinks.

In *Physica* II 3 Aristotle says that reality contains four causes. The material cause is “that out of which a thing come to be and which persists.” The formal cause is “the form of the a archetype, i.e. “the statement of the essence”. The efficient is the primary source of the change or coming to rest.” The final cause is “the sense of end”, “that for the sake of which” a thing is done.”<sup>42</sup> In physics, Aristotle is not concerned with what causes what, but with the basic structural pattern of the world.<sup>43</sup> The focus is about what causes things to change. For Aristotle, physical reality has two parts, the heavenly bodies and the world below. In the heavens perfection reigns and nothing ever changes. Change occurs in our world below.<sup>44</sup> For Leibniz, individual finite substances do not cause movement, yet he observes the changing world. Aristotle's theology influences Leibniz in that God does play a role in the continuing unfolding of the world order, but God is neither the creator of that order nor its continuing cause. This concept is not the divine artificer of Plato where a supreme mind causes movement. It is a non-intentional teleology.<sup>45</sup> Objects move towards that which they love.

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40 Barnes, p. 104

41 Barnes, p. 104

42 McKeon, p. 240 – 241

43 Barnes, p. 107

44 Barnes, Jonathon (Editor). *Cambridge Companion to Aristotle*. “Philosophy of Science”, R.J. Hankinson, contributor, Cambridge University Press: New York, N.Y., 1995, p. 117 - 118

45 Hankinson, p. 127 – 128

Aristotle's teleology is not intentional or aimed at establishing a design argument. "Rather, it involves seeing particular physical processes (the maturation of a tree or infant, for instance) as being in a sense explanatorily basic (8 PA 4 10687a 19-23).<sup>46</sup> It can be argued that Leibniz gets his idea for the doctrine of Interpenetration of Causation from Aristotle's following comment in *De Partibus Animalium* I 639b11 – 642b4. Here Aristotle wed's efficient and final causation.

The causes concerned in the generation of the works of nature are, as we see, more than one. There is the final cause and there is the motor cause. Now we must decide which of these two causes comes first, which second. Plainly, however, that cause is the first which we call the final one. For this is the reason, and the reason forms the starting point, alike in the works of art and in the works of nature. For consider how the physician or how the builder sets about his work. He starts by forming for himself a definite picture, in the one case perceptible to mind, in the other to sense, of his end – the physician of health, the builder of a house – and this he holds forward as the reason and explanation of each subsequent step that he takes, and of his acting in this or that way as the case may be. Now in the works of nature the good end and the final cause is still more dominant than in works of art such as these, nor is necessity a factor with the same significance in them all; though almost all writers, while they try to refer their origin to this cause, do so without distinguishing the various senses in which the term necessity is used. For there is absolute necessity, manifested in everything that is generated by nature...<sup>47</sup>

Leibniz was a mechanist who wed Aristotelean causation with the new mechanistic philosophy. In the Aristotelean philosophy physics is explained in terms of accidental and substantial form. The new philosophy explained things in terms of size, shape and motion. Further, the new philosophy stressed that size, shape and motion were to be understood in terms of geometric equations as they are applied to tiny particles that make up large bodies.<sup>48</sup> Leibniz thinks that the Aristoteleanism of his day and the new physics are compatible.<sup>49</sup> In his letter to Jacob Thomasius in 1669, Leibniz says, "I cannot better show this possibility of reconciling the two than by asking any principle of

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46 Hankinson, p. 128

47 McKeon, Richard (Editor). *The Basic Works of Aristotle*. Random House: New York, N.Y., 2001, p. 644

48 Jolley, Nicolas (Editor). *The Cambridge Companion to Leibniz*. Cambridge University Press: New York, N.Y., 1995, p. 271 – 272

49 Ariew and Garber, p. 271



Aristotle which cannot be explained by magnitude, figure and motion.”<sup>50</sup> This wedding of efficient causation with final causation becomes for Leibniz the doctrine of

“Interpenetration of Causation” as he words it in *Specimen Dynamicum* (1695):

In general we must hold that everything in the world can be explained in two ways: through the kingdom of power, that is, through efficient causes, and through the kingdom of wisdom, that is, through final causes, through God, governing bodies for his glory, like an architect governing them as machines that follow the law of size or mathematics, governing them, indeed, for the use of souls, and through God, governing through his glory souls capable of wisdom, governing them like a prince, indeed like a father, through laws of goodness or moral laws. Those kingdoms everywhere interpenetrate each other without confusing or disturbing their laws to that greatness obtains in the kingdom of power at the same time as the best in the kingdom of wisdom.<sup>51</sup>

This law reaches its maturity in *The Monadology*, where Leibniz says,

“Since earlier we established a perfect harmony between two natural kingdoms, the one of efficient causes, the other of final causes, we ought to note here yet another harmony between the physical kingdom of nature and the moral kingdom of grace, that is, between God considered as the architect of the mechanism of the universe, considered as the monarch of the divine city of minds.”<sup>52</sup>

The development of the Doctrine of Interpenetration of Causation can be traced throughout Leibniz's career. He was both a mechanist and a teleologist. He believed that the world operated according to the design of God the designer. Reality, in his opinion, is an intelligently designed machine. In his position that reality is a product of an intelligent creator, he takes his place among those thinkers who have held, to various degrees, the same position: Socrates, Plato, Aristotle, Augustine, Aquinas, Kepler,, Newton, Paley, Descartes, and Einstein.<sup>53</sup>

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50 Loemker, Leroy (Translator and Editor). *Gottfried Wilhelm Leibniz, “Philosophical Papers and Letters”*, D. Reidel Publishing Company: Dordrecht, Holland, 1970, p. 95

51 Ariew and Garber, p. 126 – 127

52 Ariew and Garber, p. 224; Jeffrey McDonough, in his essay *Leibniz's Two Realms Revisited*” (Nous 42:4 2008, p. 674) says, “The peaceful coexistence of both realms, Leibniz maintains, reveals itself through various harmonies found throughout his metaphysical system. One such harmony holds between ‘the physical realm of nature, and the moral realm of grace; that is, between God considered as designer of the machine of the universe, and God considered as monarch of the divine city of minds (Mon 87/FW 280).”

53 The character Socrates argues for intelligent design in Philebus 28d – 29a. Plato argues for intelligent design in his work *Laws* Book X and *Timaeus* 28a – 29a. Aristotle's unmoved mover thinks in *Metaphysica A* 7 20 – 25. Aquinas argues for an intelligent designer in his fifth proof for God's existence where he says “Therefore some intelligent being exists by whom all natural things are directed

Of those philosophers and theologians who have argued in favor of the intelligent design argument, Leibniz is unique with his doctrine of interpenetration. The interpenetration of causation between essential and final causes is how God intelligently designed the world. He believed that God creates by force and he also believed that “force is the essence of matter”.<sup>54</sup> The combination of living force and minds in matter is the interpenetration of efficient and final causation. Things have the nature to move according to their own power and according to those end purposes established by God.

Leibniz's doctrine of Interpenetration of Causation begins in the early Leibniz, a period which extends from Leibniz's youth to the 1670s.<sup>55</sup> In this period he mentions his doctrine in various forms of intelligent design discussion involving God as intelligent, essential causes, final causes, and the Christian doctrine of creation. The first place is *Dissertation on the Art of Combinations* (1666).<sup>56</sup> It is also found in *Theological Writings*

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to their end; and this being we call God.” see Baird, Forrest and Walter Kaufmann (Editors). *From Plato to Derrida*. Fourth Edition. Prentice Hall Press: Upper Saddle River, N.J., 2003, p. 353 Augustine says, “...the world by itself, by the perfect order of its changes and motions, and by the great beauty of all things visible, proclaims...that it has been created and also that it could not have been made other than by god ineffable and invisible in greatness, and...in beauty”, see Ayala, Fransisco J. *Darwin and Intelligent Design*. Fortress Press: Minneapolis, Mn., 2006, p. 1. Ayala, p. 3, also says that Paley believed that the human body was evidence of God's creative design. Human physiology is the sole place where Descartes recognizes teleology. Newton argues for God's intelligent design in the scholium generale of his 1713 *Principia*. See Schonburg, Christoph. *First Things*. “Reasonable Science, Reasonable Faith,” No. 172, April 2007, p. 21 Einstein said to a young girl, “Everyone who is seriously involved in the pursuit of science becomes convinced that a spirit is manifest in the laws of the universe – a spirit vastly superior to that of man, and one in the face of which we with our modest powers must feel humble.” see Isaacson, Walter. *Einstein*. Simon and Schuster: New York, N.Y., 2007, p. 388

54 Loemker, p. 1

55 Christia Mercer puts *Discourse* in the middle period, see Jolley, Nicolas (Editor), *The Cambridge Companion to Leibniz*. Cambridge University Press: Cambridge, U.K., 1995; Mercer and R.C. Sleigh, Jr. (contributors) “Metaphysics: The Early Period to the Discourse on Metaphysics”, p. 67; Loemkr divides Leibniz's career into fourths, beginning with Mainz and Paris, 1666 – 1676, which puts *Discourse* into a later period. See Loemker, Leroy (Editor) *Gottfried Wilhelm Leibniz “Philosophical Papers and Letters*. 2<sup>nd</sup> Edition, D. Reidel: Dordrecht, Holland, 1970, p. ix

56 Loemker, p. 73 – 74; Here Leibniz begins with establishing for himself that God exists. Interpenetration of Causation is a phenomenon which exists by God and for his glory, so it is necessary to establish the existence of God.

*Related to the Catholic Demonstration* (1668 – 1670),<sup>57</sup> *Selections from the Paris Notes* (1676),<sup>58</sup> *On a Method of Arriving at a True Analysis of Bodies and Causes of Natural Things* (1677),<sup>59</sup> and *Letters to Christian Philip* (1679 and 1680).<sup>60</sup>

Leibniz's doctrine develops in his middle period, a period extending from the 1680s to the 1690s. In this period he mentions his doctrine in *A Unitary Principle of Optics, Catoptrics, and Dioptrics* in "Acta Eruditorum" (1682),<sup>61</sup> *On The elements of Natural Science* (1682 – 1684),<sup>62</sup> *Letters to Arnauld* (1687),<sup>63</sup> *Letters of Mr. Leibniz on a General Principle Useful in Explaining the Laws of Nature Through a Consideration of Divine Wisdom; To Serve as a Reply to the Father Malebranche* (1687),<sup>64</sup> *Critical Thought on the General Part of the Principles of Descartes* (1692),<sup>65</sup> *Specimen Dynamicum* (1694),<sup>66</sup> *Tentamen Anagoricum* (1696)<sup>67</sup> and *Second Explanation of the New System* (1696).<sup>68</sup>

In the development of his doctrine Leibniz begins with establishing the existence of God and moves toward the interpenetration of essential and final causation. In *Dissertation on the Art of Combinations* he provides a proof for God's existence in the

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57 Loemker, p. 109 – 112

58 Loemker, p. 158

59 Loemker, p. 173; Here Leibniz says that since not everything can be explained mechanically, that "What cannot be explained in this way will here be referred to the action of some perceiving being." These, for Leibniz, are the beginnings of minds which move according to end purposes.

60 Loemker, p. 272

61 In *A Unitary Principle of Optics, Catoptrics, and Dioptrics*, (1682) Leibniz says that rays of light move according to principles of final causes. See Jeffrey McDonough's translation in <http://philosophyfaculty.ucsd.edu/faculty/rutherford/Leibniz/unitary-principle.htm>, p. 3

62 Loemkr, p. 280

63 Ariew and Watkins, p. 269

64 Loemkr, p. 351

65 Loemkr, p. 387

66 Ariew and Garber, p. 126 – 127

67 Loemkr, p. 475; Leibniz opens this essay with "I have shown on several occasions that the final analysis of the laws of nature leads us to the most sublime principles of order and perfection, which indicate that the universe is the effect of a universal intelligent power."

68 Loemkr, p. 460

midst of a section of axioms demonstrating motion and on God being the mover of things that move.<sup>69</sup> In section three, article seven, he connects mathematics with metaphysics.<sup>70</sup>

Since number is therefore something of great universality, it rightly belongs to metaphysics, if you take metaphysics to be the science of those properties which are common to all classes of beings. For to speak accurately, mathematics (adopting this term now) is not one discipline but small parts taken out of different disciplines and dealing with the quantity of the objects belonging to each of them. These parts are rightly grown together because of their cognate nature. For as arithmetic and analysis deal with the quantity of beings, so geometry deals with the quantity of bodies, or of the space which is coexistent with bodies. Far be it from us, certainly, to destroy the social distributions of disciplines among the professions, which have followed convenience in teaching rather than the order of nature.<sup>71</sup>

Here we see the Platonic influence on Leibniz, because, for Plato, number disappeared into the forms.<sup>72</sup> Plato also believed in the demiurge as designer of reality and the producer of motion. This influenced Leibniz's thinking. In this particular passage he mentions geometry as well as mathematics. In the later stages of the doctrines development, Leibniz will employ his skill in geometry to establish final causes in optics. In the time between this passage and *Discourse on Metaphysics* the doctrine will develop in the following way: from the mind of God will emerge the mathematical and geometrical formula which will cause rays of light to function mechanically, and function according to the end purpose for which God has harmoniously established.

Leibniz begins his career with an embracing of mechanism and a shunning of final causes, and reverses himself on final causes, thereby embracing both. Two years after *Dissertation*, in *Catholic Demonstrations*, Leibniz writes that he started out to discover the workings of nature “without an incorporeal cause.”<sup>73</sup>

69 Loemkr, p. 73 – 74

70 It should be noted that Leibniz included logic with metaphysics; see Loemkr, p. 84

71 Loemker, p. 77

72 For Plato, there is the idea of a number and then there is the number itself in reality. For example, there is oneness and twoness, and then there are actual ones and twos; see Wedberg, Anders. *Plato's Philosophy of Mathematics*. Almquist and Wiksell: Stockholm, Sweden, 1955, p. 54 – 57

73 Loemker, p. 110

At the beginning I readily admit that we must agree with those contemporary philosophers who have revived Democritus and Epicurus and whom Robert Boyle aptly calls corpuscular philosophers, such as Galileo, Bacon, Gassendi, Descartes, Hobbes, and Digby, that in explaining corporeal phenomena, we must not unnecessarily resort to God or to any incorporeal thing, form or quantity (*Nec Deus intersit, nisi dignus vindice nodus inciderit*) but that so far as can be done, everything should be derived from the nature of body and its primary qualities – magnitude, figure, motion.<sup>74</sup>

Here is his early reference to the real issue, that of body on body in physics. Each of these men held that final causation had no part in the causation of movement between corporeal bodies. So, early on, as scholarship acknowledges, Leibniz is an advocate of mechanism. He falls in line with the thinking that reality functions solely according to mechanical principles, and that without the aid of God.

Then he runs into the problem of the question “why?”. Leibniz comes to the position that a full explanation of a body cannot be done without this question being asked, even in mechanics. He ponders the question of why a particular body is “two feet long instead of three, or square rather than round?”<sup>75</sup> Mechanics, he says, fails to answer this question. Sometime prior to 1666 – 1668, therefore, Leibniz lost faith in the new physics to fully and completely explain physical phenomenon. For him, bodies are explained fully when all the mechanical laws of motion are observed, along with other related scientific laws, and then teleologically. He comes to the conclusion that some bodies are two feet long instead of three because they are supposed to be. An intelligent agent decided so.

Leibniz comes to conclude that bodies do not define themselves within themselves.<sup>76</sup> What he becomes convinced of is the inadequacy of the atomists, and the early moderns who agree with them, to fully explain movement. He comes to believe in

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74 Loemker, p. 110

75 Loemker, p. 110 – 111

76 Loemker, p. 111

the superior explanation of movement being that of a mind controlling it all, namely God.

It is in *Catholic Demonstrations* that Leibniz mentions this movement being a harmonious one.<sup>77</sup> Harmonious movement emanates from the mind of God.

But since we have demonstrated that bodies cannot have a determinate figure, quantity, or motion, without assuming an incorporeal being, it readily becomes apparent that that incorporeal being is one for all because of the harmony of things among themselves, especially since bodies are moved not individually by this incorporeal being but by each other. But no reason can be given why this incorporeal being chooses one magnitude, figure, and motion, rather than another, unless he is intelligent and wise with regard to the beauty of things and powerful with regards to their obedience to his command. Therefore, such an incorporeal being will be a mind ruling the whole world, that is God.

In Paris, in 1676, Leibniz notes that one, God exists, that two, he has now established the principle of the “harmony of things”, and that three, all possible things that would exist do exist.<sup>78</sup> Further, he says that things exist as they are out of necessity, which is a precursor to the principle of sufficient reason. He then makes a statement about God that demonstrates where he will take “interpenetration”. Leibniz understands that God is a person of will. He says, “God is not a kind of metaphysical being, incapable of thought, will and action, as some make him. This would be the same as to say that God is nature, fate, fortune, necessity or the world. But God is a definite substance, a person, a mind.”<sup>79</sup> A full ten years before *Discourse on Metaphysics*, Leibniz thinks that a loving person of intellect and will is behind the laws of nature.

In the middle period when he develops his doctrine, Leibniz employs geometry in optics to make his point that final causation has a role to play in physics. This thinking has its roots in these notes in Paris. Before he pens the words about God as a person of will, he states that “Furthermore, since some things exist, and certain things do not exist, it follows that there must exist most perfect *Elements of a Secret Philosophy of*

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77 Loemker, p. 112

78 Loemker, p. 157

79 Loemker, p. 158

*the Whole of Things*, geometrically demonstrated....”<sup>80</sup> Before he leaves that section, Leibniz reiterates his thinking about God in the face of those who depersonalize God. He says, “It must be shown that God is a person, a substance, an intelligence.”<sup>81</sup>

The utility of final causation in physics is the end purpose for which a loving person of mind and will runs the machine. This machine runs according to mechanical laws, but it also runs according to moral laws. It runs, as Aristotle would have it, towards that which it loves. A loving mind runs the machine so that other loving minds can love Him in return. That is the usefulness, or the utility, of final causes in physics.

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80 Loemker, p. 158

81 Loemker, p. 158

### Chapter Three “Leibniz and the New Philosophers”

A proper interpretation of article #19 involves Leibniz on the opposition to final causation in physics. The text of # 19 begins with his reference to this opposition.

*Since I do not like to judge people wrongly, I do not accuse our new philosophers, who claim to banish final causes from physics. But I am nevertheless obliged to confess that the consequences of this opinion appear dangerous to me, especially if I combine it with the one I refuted at the beginning of this discourse, which seems to go so far as to eliminate final causes altogether, as if God proposed no end or good in acting or as if the good were not the object of his will. As for myself, I hold, on the contrary, that it is here we must seek the principle of all existences and laws of nature, because God always intends the best and most perfect<sup>82</sup>.*

From this passage two questions emerge. One, who are the “new philosophers”, and two, what is their new philosophy?<sup>83</sup> From *Discourse on Metaphysics* itself it can be discerned that at least two of the new philosophers Leibniz has in mind are Descartes and Spinoza.<sup>84</sup> In his other writings, however, Leibniz gives us two lists of names of philosophers with whom he disagrees. One such list is found in *Catholic Demonstrations*. These are the “corpuscular philosophers” who have, to Leibniz's dismay, “revived Democritus and Epicurus.” This list includes Galileo, Bacon,<sup>85</sup> Gassendi, Hobbes, Descartes and Digby<sup>86</sup>. The other list is found in his letter to

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82 Ariew and Garber, p. 52

83 Israel argues that the new philosophy is Cartesianism. See Israel, *Radical Enlightenment, Philosophy and the Making of Modernity*, p. 35

84 Ariew and Garber, p. 52; In footnote #84 Ariew and Garber say that “The 'new philosophers' Leibniz has in mind include Descartes and Spinoza, who explain everything mechanically and reject final causes.”

85 According to Garber, both Galileo and Bacon were adherents of atomism. See *Cambridge Companion to Descartes*, Garber, p. 287

86 Loemker, p. 210; Arthur is of the opinion that *Discourse on Metaphysics* is an attempt at reconciliation between “The new philosophy of Descartes, Mersenne and Gassendi” and Aristoteleanism. See Smith, Justin. *The Problem of Animal Generation in Early Modern Philosophy*. “Animal Generation and Substance in Sennert and Leibniz”, Richard Arthur, contributor, Cambridge University Press: New York, N.Y., 2006, p. 147



Thomasius. This list contains a group of philosophers who have “dismantled philosophy.” They are Baghemin, Patricius,<sup>87</sup> Telesius,<sup>88</sup> Campanella, Bodin, Nizolius, Fracastori, Cardan<sup>89</sup>, Galileo, Bacon, Gassendi, Hobbes, Descartes, Basso,<sup>90</sup> Digby Sennert, Sperling, Derodon, Deusing,...<sup>91</sup>

Article #19 is about the “utility” of final causes in physics. From these two lists, and from earlier material in *Discourse on Metaphysics*, the new philosophers Leibniz has in mind are those who deny final causes to various degrees. The new philosophy is either Cartesianism, corpuscular atomism, or both. In Leibniz's thinking the key issue for both of these philosophies is their relationship with final causes.

Corpuscular philosophy is the atomism of the early modern era in terms of the mechanics of matter and motion. “Boyle opens his account 'of the origins of qualities' with a statement of the fundamental principles of the corpuscular philosophy According to this theory (1) matter is an extended, impenetrable substance which is the same for all corporeal objects, and (2) motion is the primary accident of matter and the efficient cause of all other accidents of matter”<sup>92</sup> As Boyle sees things, the new philosophers are atomists who leave God out of the equation.

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87 According to Petkovic and Hengster-Movric, in the abstract of their essay “Patricius' Phenomenological Theory of Tides and It's Modern Relativistic Interpretation”, *Synthesis Philosophica*, Vol. 21, No. 2, December 2006, p. 255, Patricius had tried to explain the variety of phenomena of tides in various seas as part of his model of the universe (28<sup>th</sup> and 29<sup>th</sup> Books of Patricius' Pancosmia). He correctly recognized the moon and the sun as two general causes of tides (formulated by Kepler as the lunar theory of tides) but failed to see the role of gravity.”

88 Telesius was a materialist who believes that “the soul was simply matter in its finest and most mobile state.” see Baltz, Albert. *The Journal of Philosophy, Psychology and Scientific Methods*. “Dualism and Early Modern Philosophy II”, Vol. 15, No. 9, April 1918, p. 229

89 According to Serjeantson, Cardano held that concerning the language of animals, “Animal 'words' are formed not meaning in the soul,...but only by custom.” see Serjeantson R. *Journal of the History of Ideas*. “The Passions and Animal Language, 1540 – 1700”, Vol. 62, No. 3, July 2001, p. 432

90 According to Garber, Basso was an atomist, See *Cambridge Companion to Descartes*; Garber, p. 287  
91 Loemker, p. 93

92 O Toole, Frederick. *Journal of the History of Philosophy*, “Qualities and Powers in the Corpuscular Philosophy of Robert Boyle”, Vol. 12, No. 3, July 1974, p. 298

When I speak of the corpuscular, or mechanical philosophy, I am far from meaning with the Epicureans, that atoms, meeting together in an infinite vacuum, are able in themselves to produce the world, and all of its phenomena; nor with some modern philosophers, that supposing God to have put into the whole mass of matter such an invariable quantity of motion, he needed do no more to make the world, the material parts being able by their own unguided motions, to cast themselves into such a system (as we call by that name:) but I plead only for such a philosophy, as reaches but to things purely corporeal, and distinguishing between the first original of things, and the subsequent course of nature, teaches concerning the former not only that God gave motion to matter, but in the beginning he so guided the various motions of the parts of it, as to contrive them into the world he designed they should compose, (furnished with the seminal principles and structures, or models of living creatures) and established those rules of motion and that order amongst things corporeal, which we are wont to call the laws of nature. And having told this as to the former, it may be allowed as the latter to teach, that the universe being once framed by God, and the laws of motion being settled and upheld by his incessant concourse and general providence, the phenomena of the world thus constituted are physically produced by the mechanical affections of the parts of matter, and that they operate upon one another according to mechanical laws.<sup>93</sup>

Leibniz shares this position with Boyle. When he opposes those who reject final causation in physics, he opposes those who Boyle speaks about. Gassendi rejects final causation in physics. His position is that God can be inferred from final causes, but it has not place in scientific inquiry.<sup>94</sup> (Gassendi also holds the position that this mechanistic materialism can explain animal husbandry and light.<sup>95</sup> This will be a challenge to Leibniz when he works out the physics of light in optics.) Hobbes rejects final causation physics, as does Digby.<sup>96</sup>

Descartes' Cartesianism is a rejection of Aristotelean physics and a rejection of the ancient atomism of Democritus, Epicurus and Lucretius. It explains the behavior of bodies not in terms of substantial form, but in terms of size, shape and motion.<sup>97</sup>

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93 O Toole, p. 296 - 297

94 Clatterbaugh, Kenneth. *The Causation Debate in Modern Philosophy, 1637 – 1739*. Routledge: New York, N.Y., p. 84

95 Fisher, Saul. *Perspectives on Science*. “Gassendi's Atomist Account of Generation and Heredity in Plants and Animals”, Vol. 11, No. 4, Winter 2003, p. 485

96 Sarasohn quotes Burt as describing Hobbes' position as “Nothing without us but bodies in motion, nothing within us but organic motions”; see *Journal of the History of Ideas*. “Motion and Morality: Pierre Gassendi, Thomas Hobbes and the Mechanical World View”, Vol. 46, July – September 1985, p. 363

97 Cottingham, John (Editor). *Cambridge Companion to Descartes*. “Descartes's Physics”, Daniel Garber contributor, Cambridge University Press: New York, N.Y., 2006, p. 287

“Descartes rejected the indivisible atoms and empty spaces that characterized atomistic physics.”<sup>98</sup> Some Cartesians after Descartes abandoned the causation of Descartes.<sup>99</sup> LeGrand, for example, attributes the cause of motion to the will of God.<sup>100</sup> Leibniz in Discourse #19 is referring to Descartes himself and not to some later Cartesians like LeGrand.

Leibniz begins this passage with the phrase “*Since I do not like to judge people wrongly I do not accuse our new philosophers.*” There are two reasons for him opening with this statement. One reason is the kind of person Leibniz was himself, a gentleman and appreciator of persons. The second reason is because of the hostile environment in which Descartes, Spinoza, and others who disagree with him think and write. To be accused is dangerous business, not that Leibniz is going to have an actual effect on either Descartes or Spinoza personally. Both of these men have been deceased years before the writing of *Discourse on Metaphysics*. Leibniz was simply a gentleman philosopher. He was a diplomat and reconciler of warring factions who tried to find those parts which he could agree with in the other philosopher's opinion.<sup>101</sup>

The environment in which Descartes and Spinoza think and write is hostile. Toleration for opposing viewpoints in the realm of religion, science, and politics during the early modern period is in tenuous. When Descartes began his career, the papal trial and condemnation of Galileo was on his mind. It can be argued that such pressures,

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98 Garber, *Cambridge Companion to Descartes*, p. 288

99 Clatterbaugh, p. 9

100 Clatterbaugh, p. 106 – 107

101 Hobbes is an example of this. Although Leibniz had strong disagreements with Hobbes, he greatly respected the philosopher. In his 1670 letter Leibniz opens with “To my great delight I recently learned from the letters of a friend visiting in England that you are still alive and in full health at so great an age. Hence, I could not refrain from writing. If my doing so is inopportune, you can punish it by silence; for me it will suffice to have given witness of my feeling. I believe I have read almost all your works, in part separately, and in part in the collected edition, and I freely admit that I have profited from them as much as from few others in our century.” see Loemker, p. 105

whether real or imagined by Descartes, caused him to have those who knew him publish *The World* posthumously.<sup>102</sup> Descartes chafed under the weight of intolerance for thinkers such as himself. He writes in “The Passion of the Soul”,

...those who believe themselves devout, but are merely bigoted and superstitious. These people who – under the pretext of frequently going to church, reciting many prayers, and wearing their hair short, fasting, and giving alms, - think they are absolutely perfect, and they suppose that anything their passion dictates is a commendable zeal, even though it sometimes dictates the greatest crimes that men can commit, such as the betrayal of cities, the killing of sovereigns, and the extermination of whole nations for the sole reason that citizens do not accept their opinions.<sup>103</sup>

Spinoza associates with the Collegiants and Mennonites after his excommunication, and advocates theological toleration. He himself, however, was given little. In 1665 he writes to Henry Oldenburg “explaining his reasons for intervening in the theologico – political quarrels of his time”.

I am now writing a treatise about my interpretation of scripture: This I am driven to do for the following reasons:

1. The prejudice of the theologians; for I know that these are among the chief obstacles which prevent men from directing their minds to philosophy and to remove them from the minds of the more prudent (prudenciorum).
2. The opinion which the common people have of me, who do not cease to accuse me falsely of atheism; am also obliged to avert this accusation as far as it is possible to do so.
3. The freedom of philosophizing, and saying what we think; this I desire to vindicate in every way, for here it is always through the excessive authority and imprudence of the preachers.<sup>104</sup>

Spinoza never did find general public toleration. In the autumn of 1676, when Leibniz came to visit him, he had reason to think that he might be in danger. “One of his friends had recently been executed, and another had died in prison.”<sup>105</sup>

102 Cottingham, John (Editor). *Cambridge Companion to Descartes*. Cambridge Companion to Descartes. Cambridge University Press: New York, N.Y. 2006,, p. 12, “In 1633 he had ready for publication a treatise on cosmology and physics, *Le Monde* (“The World” or “The Universe”), but he cautiously withdrew the work on hearing of the condemnation of Galilee for advocating the heliocentric hypothesis (which he too supported).”

103 Levine, Alan. *Early Modern Skepticism and the Origins of Toleration*, “Descartes and the Question of Toleration” Michael Gillespie, contributor, Lexington Books: Lanhan, Md., 1999, p. 103

104 Levine, p. 127 “Toleration and Skepticism of Religion in Spinoza's *Tractatus Theologico-Politicus*”, Steven Smith, contributor

105 Stewart, Matthew. *The Courier and the Heretic*, “Leibniz, Spinoza, and the Fate of God in the Modern

Both Descartes and Spinoza call for the elimination of final causation from physics in their writings. Descartes, however, clings to a teleological understanding of human physiology while Spinoza rejects teleological implications in physics altogether.

In *Meditations on First Philosophy “Part IV”* (1641), Descartes says,

For since I know that my nature is very weak and limited, whereas the nature of God is immense, incomprehensible, and infinite, this is sufficient for me also to know that he can make innumerable things whose cause escapes me. For this reason alone the entire class of causes which people customarily derive from a thing's 'end', I judge to be utterly useless in physics. It is not without rashness that I think myself capable of inspiring into the ends of God.<sup>106</sup>

In *Principles of Philosophy “Part I”* (1644 – 1647) Descartes writes in #28, entitled “We Must Not Inquire Into The Final, but Only The Efficient Causes of Created Reality”,

Finally, we will not seek the reason of natural things from the end which God or nature has set before himself in their creation and we will entirely banish the search for final causes from our philosophy. For we should not take so much upon ourselves as to believe that God could take us into his counsels. But regarding him as the efficient cause of things, we shall merely try to discover the light of nature he has placed in us, applied to those attributes of which he has been willing we should have some. But we must keep in mind what has been said, that we must trust this natural light only so long as nothing contrary to it is revealed by God himself.<sup>107</sup>

In *Meditation VI* Descartes writes that human beings have sensations “in order to preserve the union of the mind and body.”<sup>108</sup> This is teleological. What Descartes objects to, therefore, is not finality per se, but certain applications of ends in natural philosophy.<sup>109</sup>

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*World*. W.W. Norton: New York, N.Y., 2006, p. 11

106 Ariew, Roger and Eric Watkins, *Readings in Modern Philosophy, Volume I “Descartes, Spinoza, Leibniz, and Associated Texts”* Hackett Publishing Co.: Indianapolis, In. 2000, p. 42; Martin and Brown in *G.W. Leibniz: Discourse on Metaphysics and Related Writings*, [p. 9, say, “When Descartes and other modernists insist that final causes should not be invoked in natural sciences and that all explanation in physics should be in terms of efficient causes, they raised the bogies of mechanism materialism and determinism. The Cartesians, followed Descartes himself, had claimed that animals were machines – physical systems whose workings were to be understood in non-purposive terms – and others seemed, explicitly or implicitly to extend the analogy in the obvious direction of human beings. A major aim of the *Discourse* was to provide a corrective to such tendencies, as is clear enough from a comparison of its contents with the unpublished piece we entitled “Two Sects of Naturalists”.

107 Ariew and Watkins, p. 86

108 Simmons, Allison, *Journal of the History of Philosophy*. “Sensible Ends: Latent Teleology in Descartes's Account of Sensation.” Vol. 39, No. 1, 2001, pp. 49 – 75

109 Simmons, p. 49 – 50

Descartes speaks of the teleological functioning of human physiology in *Treatise on Man, Principles of Philosophy IV, The Passions of the Soul, and Meditations VI*.<sup>110</sup> In *Meditations VI* Descartes speaks of sensations as being important to human physiology. It is his mind – body union, Sensations work toward the goal of survival. The 'ends' of sensation for the human being is survival.<sup>111</sup> He says, “...without a doubt sensations are, properly speaking, given to me by nature in order to signify to the mind what things would be beneficial to or harmful to the composite of which it is part.”<sup>112</sup> As mind – body unions, human beings have an interest in continued survival. This requires that the body be well maintained; “if any crucial parts of the body break down, the body is rendered defective, the soul departs from it and the human being dies.”<sup>113</sup>

The line between Descartes's objection to final causation in physics and his teleological use of sensation in human physiology is not clear. He blurs his metaphysics and his natural philosophy. In his letter to Mersenne he claims that his *Meditations* contains “all the foundation of my physics.”<sup>114</sup> In the *Principles of Philosophy*, Descartes connects God's immutability and the physical laws of motion.<sup>115</sup>

Spinoza says to banish final causes from philosophy and theology altogether. In the appendix of *Ethics* Part I he says,

I have thus sufficiently dealt with my first point. There is no need to spend time in going on to show that Nature has no fixed goal and that all final causes are but figments of the human imagination. For I think that this is now quite evident, both from the basic causes from which I have traced the origin of this misconception and from Proposition 16 and the corollaries to proposition 32, and in addition from the whole set of proofs I have adduced to show that all things in nature proceed from eternal necessity and with supreme perfection. But I will make this additional point, that this doctrine of final Causes turns Nature completely upside down, for it regards as an effect that which is

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110 Simmons, p. 59

111 Simmons, p. 53

112 Simmons, p. 53 – 55

113 Simmons, p. 56; (see “*Treatise on Man, ...Passions I 5-6 and 30...*)

114 Simmons, p. 63

115 Simmons, p. 63

fact a cause, and vice versa.<sup>116</sup>

In *Korte Verhandeling* (1660 – 1661) Spinoza states his doctrine that every substance is infinite, and therefore, there is only one substance. That substance is God. Extended and thinking nature are two attributes of the same thing. Causation is in, not external to, the one substance. “God's providence is redefined as 'nothing but the striving we find, both in nature as a whole and in particular things, tending to maintain and preserve their being.’”<sup>117</sup> In such a belief, Spinoza rejects divine providence, and, as a result, rejects all teleological implications in causation.

References made by Leibniz at the beginning of *Discourse on Metaphysics* shed light on his critique of Descartes and Spinoza as “new philosophers”. Leibniz says that he refutes an opinion that final causation should be eliminated from philosophy altogether. The opinion he is referring to is that of Descartes and Spinoza. In *Discourse #2* he says, “Thus I am far removed from the opinions of others who maintain that there are no rules of goodness and perfection in the nature of things or in the ideas God has of them and who say that the works of God are good solely for the formal reason that God has made them.”<sup>118</sup> Leibniz is reacting to a statement in the sixth reply in *Objections*

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116 Ariew, Roger and Eric Watkins, p. 175

117 Israel, Jonathon. *Radical Enlightenment: Philosophy and the Making of Modernity, 1650 – 1750*. Oxford University Press: New York, N.Y., 2001, p. 162

118 Ariew and Garber, p. 36; Martin and Brown, in *G.W. Leibniz: Discourse on Metaphysics and Related Writings*, p. 12, says of Leibniz's disagreement with Descartes, “The thought that God observes laws of grace make those into eternal truths independent of the will of God and is one point at which Leibniz and Descartes are radically opposed. Descartes was so anxious to assert God's sovereignty that he even allowed that the truths of mathematics were created by God's will. Leibniz – here again following Plato – believed not only that the truths of mathematics and logic were eternal truths, but also that there were eternal truths of goodness, beauty and justice (*Discourse #2*). If, Leibniz contended, the world was good because God made it, what basis would there be for praising him? Descartes' God was not the Christian God but an arbitrary despot. Leibniz, on the contrary, thought that a Christian philosophy would need to allow both that there are objective standards of perfection, independent of God's will, and that it is possible for us to know whether or not the world conforms to them. It must, in short, be possible to see nature as the handiwork of a perfect God.”

(1641). Descartes, a man admittedly unwilling to debate scriptural exegesis,<sup>119</sup> says,

For it is self-contradictory for the will of God not to have been indifferent from all eternity to everything that has happened or ever will happen, since it is impossible to imagine the ideas of anything good and true, anything to be believed or to be done or to be left undone being in the divine intellect prior to his will having determined itself to bring these things about such as they are.<sup>120</sup>

In Discourse #2 Leibniz says further that another opinion by the “recent innovators” is troublesome to him. This is an individual who says that “the beauty of the universe and the goodness we attribute to the works of God are but the chimeras of those who conceive of God in terms of themselves.”<sup>121</sup> This is a reference to Spinoza in the *Ethics*. In the *Ethics* Spinoza says,

When men become convinced that everything that is created is created on their behalf, they are bound to consider as the most important quality in every individual thing that which was most useful to them, and to regard as of the highest excellence all those things by which they were most benefited. Hence they came to form these abstract notions to explain the natures of things: Good, Bad, Order, Confusion, Hot, Cold, Beauty, Ugliness; and since they believed that they are free, the following abstract notions came into being: Praise, Blame, Right, Wrong.<sup>122</sup>

These two statements by Descartes and Spinoza indicate that it is these two “new philosophers” whom Leibniz primarily has in mind in Discourse #19 in particular, and *Discourse on Metaphysics* in general.

Leibniz argues that, in response to the challenge by these two men concerning God's intended purpose in laws of nature, “*we must seek the principle of all existences*

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119 Ariew, Roger (Editor). *Rene Descartes, Philosophical Essays and Correspondence*. Hackett Publishing Co.: Indianapolis, In., 2000, p. 198; In his sixth reply Descartes says, “However, as to the scriptures passages, I do not think it is my place to answer questions about them, except when they appear to be in opposition to some opinion that is unique to me. For when the scriptures are brought to bear against beliefs that are common among all Christians, such as are those which are here being attacked, namely, that something can be known and that human souls are not like those of animals, I should be fearful of the charge of arrogance if I did not prefer to be satisfied with the replies that have already been discovered by others, rather than think up new ones. For I have never involved myself in theological studies except insofar as they contributed to my private instruction, nor do I experience within me sufficient divine grace to believe myself called to their sacred studies.”

120 Ariew, *Rene Descartes, Philosophical Essays and Correspondence*, p. 199

121 Ariew and Garber, p. 36

122 Ariew and Watkins, p. 176



*and laws of nature...*” This admonition by Leibniz carries with it in his mind not only the laws of grace which constitute final causation, but also his current work in 1686 on the laws of motion and the issue of force. For Leibniz, the laws of motion and of force fall in the category of final causation, and relate to essential causation within his doctrine of “Interpenetration of Causation”. His work on these physics issues will lead to the “Vis Viva” controversy in the 1680s and 1690s. The two concepts at issue are momentum ( $mv$ ) and kinetic energy ( $\frac{1}{2}mv^2$ ). These are now being discussed by Leibniz and others as a single concept, and they both differ from Newton's force.<sup>123</sup> Leibniz's concept of force and laws of motion in physics will become part of his teleological explanation for the mechanical world.

This is different from his earlier position. Leibniz began working with physics in 1669.<sup>124</sup> In two presentations to the Royal Society of London in 1671, *Hypothesis Physica Nova* and *Theoria Motus Abstracti*, Leibniz submits laws of motion in physics.<sup>125</sup> These submissions are purely mechanistic. Starting in 1676 Leibniz takes force and motion in the direction of final causation. Leibniz's mature position begins with a critique and rejection of Descartes quantity of motion. Concerning this Descartes says in *Principles of Philosophy* #36, “It appears obvious to me that this is nothing other than God himself, who at the beginning created matter at the same time with motion and rest, and who now, solely through his ordinary concurrence, preserves that same amount of

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123 Iltis, Carolyn. *Isis*. “Leibniz and the Vis Viva Controversy”. Vol. 62., No. 1., Spring, 1971, p. 21; Slowik says on page one of his essay “The 'dynamics' of Leibnizian relationism: Reference frames and force in Leibniz's plenum”, *Studies in History and Philosophy of Modern Physics*, Vol. 37, 2006, “The details of Leibniz's physics would suggest to many later commentators the structures implicit in his preferred, if not consistently avowed relationalist alternative to Newton's absolute/substantial space: these include, most importantly, the restriction of the spacetime invariants to the relative distances, velocities, and accelerations manifest among the material occupants of the spacetime.”

124 Garber, p. 273

125 Garber, p. 273

motion and rest in that matter as a whole as he placed in it then.”<sup>126</sup>

The *laws of nature* require an understanding of Leibniz's teleological usages of force and motion in direct opposition to Descartes. In 1644 Descartes published his position on motion in *Principia Philosophiae*.<sup>127</sup> The basic Cartesian view of physics is that the nature of body is extension. Bodies are the objects of geometry made real. In Cartesian mechanism, the properties of bodies are geometrical; size, shape and position.<sup>128</sup> According to Descartes, God is responsible for all motion, and “preserves the same quantity of motion and rest put into the world at the time of creation.”<sup>129</sup> In *Principia* he says, “we must reckon the quantity of motion in two pieces of matter as equal if one moves twice as fast as the other, and this in turn is twice as big as the first,” a statement the formula of which is  $mv$ .<sup>130</sup> For Descartes, this conservation by God of the same quantity of motion derives from God's perfection, the divine attribute that emits from God's unchanging nature. Because God is unchanging, or constant, the world's motion is constant.<sup>131</sup>

Descartes says that the universe contains an absolute quantity of motion which cannot be diminished or destroyed. The conserved quantity is the magnitude of the quantity of motion ignoring direction. It does not conserve its direction. For Descartes, “velocity is always treated as a positive quantity, ( $v$ ) rather than as a vector quantity whose direction is variable.”<sup>132</sup> In the same year as Leibniz writes *Discourse on*

*Metaphysics*, he publishes arguments against Descartes saying that “the quantity which

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126 Crowe, Michael. *Mechanics From Aristotle to Einstein*. Green Lion Press: Santa Fe, New Mexico, 2007 p. 95

127 Iltis, p. 21

128 Garber, p. 284

129 Iltis, p. 21

130 Iltis, p. 21

131 Iltis, p. 21

132 Iltis, p. 22

remains absolute and indestructible in nature is not quantity of motion  $m(v)$  but *vis viva*, or living force,  $mv^2$ . Beginning in 1686, Leibniz sets out to establish the law of conservation of  $mv^2$  over  $m(v)$ .<sup>133</sup>

Living force becomes an essential to Leibniz's whole philosophy. In 1686 he published "Brevis Demonstratio" in *Acta Eruditorum*. In this paper, he argues that "there was a difference between the concepts of motive force (*motricis potentiae*) and quantity of motion  $m(v)$  (*quantitas motus*) and that one can not be estimated by the other."<sup>134</sup> The arguments that he makes in this paper show up in Article #17, which contains the same diagram as he uses in *Acta*, and Discourse #18. In #18 he says, "This consideration, the distinction between force and quantity of motion, is rather important, not only in physics and mechanics, in order to find the true laws of nature and the rules of motion but also in metaphysics in order to understand the principles better."<sup>135</sup> In the *Acta* essay he is talking about motive force in terms of potential energy and its conversion to kinetic energy;  $F \cdot s = \frac{1}{2} mv^2$ .<sup>136</sup> Leibniz says,

Now since it is reasonable that the sum of motive force should be conserved in nature and not be diminished – since we never see force lost by one body without being transferred to another – or augmented; a perpetual motion machine can never be successful because no machine, not even the world as whole, can increase its force without a new impulse from without. This let Descartes, who held motive force and quantity of motion to be equivalent, to assert that God conserves the same quantity of motion in the world."<sup>137</sup>

Leibniz makes two points, and he thinks that the Cartesians can agree with both of them.<sup>138</sup> One, "a body falling from a certain height (*altitudine*) acquires the same force

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133 Iltis, p. 22

134 Iltis, p. 23

135 Ariew and Garber, p. 51

136 Iltis, p. 23; On page 23 Iltis says, "In modern terms his proof establishes the idea of the conversion of potential energy to kinetic energy, or more generally the basis for the work energy theorem:  $F \cdot s = \frac{1}{2} mv^2$ ." The F stands for force and the s stands for distance. It is the formula for work.

137 Loemker, p. 296

138 Iltis, p. 23

(*vis*) necessary to lift it back to its original height if its direction were to carry it back and if nothing external interfered with it.”<sup>139</sup> Two, “The same force is necessary to raise body *A* of 1 pound (*libra*) to a height of 4 yards (*ulnae*) as is necessary to raise body *B* of 4 pounds to a height of 1 yard.’ In modern terms, the work done on bodies *A* and *B* will be equal:  $Fs = mgs$ . From these two assumptions, Leibniz inferred that body *A* of 1 pound in falling a distance  $s = 4$  will acquire the same force as body *B* of 4 pounds falling  $s = 1$ ”.<sup>140</sup>

In 1686 Leibniz entered into a debate with the Cartesians over the nature of force. In Discourse #21 he comments for the first time concerning the difference between motive force, *vis viva*, and quantity of motion.

If there were nothing in bodies but extended mass, and nothing in motion but change of place, and if everything should and could be deduced solely from the definitions by geometric necessity, it would follow, as I have elsewhere shown that the smallest body in colliding with the greatest body at rest, would impart to it its own velocity, without losing any of this velocity itself; and it would be necessary to accept a number of other such rules which are entirely contrary to the formation of a system. But the decree of the divine wisdom to conserve always the same total force and the same total direction has provided for this.<sup>141</sup>

For Leibniz, the essence of individual substance is force and striving. He disagrees with Descartes who believes that motion and extension are the essences of nature.<sup>142</sup> Motion and extension in the Cartesian viewpoint, for Leibniz, are not real. In article #18 he states,

If we consider only that what motion contains precisely and formally, that is, change of place, motion is not something entirely real, and when several bodies change position among themselves, it is not possible to determine, merely from a consideration of these changes, to which body we should attribute motion or rest, as I could show geometrically....”<sup>143</sup>

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139 Iltis, p. 23

140 Iltis, p. 24

141 Ariew and Garber, p. 53

142 Iltis, p. 32

143 Ariew and Garber, p. 51

Leibniz's mature concept of that “law of nature”, force, is spelled out in the same publication in which he pronounces his doctrine of “Interpenetration of Causation”, *Specimen Dynamicum*. The physics he worked out before article #19. The connection of force with final causation is indicated in article #18 where he says, “Although all the particular phenomena of nature can be explained mathematically or mechanically, by those who understand them, nevertheless the general principles of corporeal nature and of mechanics itself are more metaphysical than geometrical, and belong to some indivisible forms or natures as the causes of appearances, rather than to corporeal mass or extension.”<sup>144</sup>

In *Specimen Dynamicum* Leibniz distinguishes between two kinds of force, primitive and derivative force and active and passive force.<sup>145</sup> Active force is two fold; dead force in which motion does not yet exist, and *living force* with actual motion. “In the context of the physics, *vis viva*, or “*living force*” represents for Leibniz a measure of a bodies ability to bring out effects in virtue of its motion.”<sup>146</sup> Daniel Garber sums up Leibniz's intended purpose and meaning:

The picture of the physical world that emerges out of the SD and related writings is quite interesting for the way in which it joins scholasticism and mechanism. At the metaphysical ground are corporeal substances, unities of form and matter, primitive active and passive forces. These, in turn ground derivative forces, the modes or accidents of these primitive forces, their momentary states, that can change as do shapes in an extended substance. The derivative forces, active and passive, in turn, are the immediate cause of motion, resistance, impenetrability, and even extension in bodies, giving rise to the mechanists world of extended bodies in motion, following certain laws. In this way, Leibniz can say, as we have seen, that everything in the world happens mechanically, but that the world of the mechanical philosophers is grounded in something quite different than extended matter in motion, an Aristotelean metaphysics of substantial form and primary matter, it is the dynamics, the science of force that links the underlying Aristotelean metaphysics with the physics of the mechanists. The final form of this doctrine, with its careful distinction between form and matter, primitive

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144 Ariew and Garber, p. 51 – 52

145 Garber, p. 290

146 Zalta, Edward n. (Principal Editor). *Stanford Encyclopedia of Philosophy*. “Leibniz's Philosophy of Physics”, Jeffrey McDonough, contributor, <http://plato.stanford.edu/archives/spr2009/entries/leibniz-physics/>, Sec. 3.2

and derivative forces, active and passive forces of different varieties may not appear until the 1690s; but the basic picture is integral to Leibniz's thought about the physical world from the 1680s on."<sup>147</sup>

The meaning behind Leibniz's words in Discourse #19, "...we must seek the principle of all existences and laws of nature..." should be interpreted in view of Leibniz's work in physics regarding force and laws of motion. "Living force" and motion are teleological. They exist as part of God's plan for his best of all possible worlds. They are part of Leibniz's interpenetration of causation. They are caused, and they move for an end purpose. After article #19, and the writing of *Discourse on Metaphysics*, these concepts show up in *Tentamen Anagoricum* (1696) and *Theodicy* (1710).

In *Tentamen Anagoricum* Leibniz says, "The true middle term for satisfying both truth and piety is this: all natural phenomena could be explained mechanically if we understood them well enough, but the principles of mechanics themselves cannot be explained geometrically, since they depend on more sublime principles which show the wisdom of the Author in the order and perfection of his work."<sup>148</sup> In *Theodicy* he writes,

I have discovered...that the laws of motion which are actually found in nature, and are verified in experience, are not in truth absolutely demonstrable, as a geometrical proposition would be. They do not derive entirely from the principle of necessity, but from the principle of perfection and order; they are an effect of the choice and wisdom of God. I can demonstrate these laws in many ways, but it is always necessary to assume something which is not absolutely geometrically necessary.<sup>149</sup>

The reason in article #19 that Leibniz says that "...we must seek the principle of all existences and laws of nature..." is "...because God always intends the best and most perfect." The principle and law of nature that he is referring to is final causality and its connection with the perfection and goodness of God. It is the idea of "best and most

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147 Garber, p. 293

148 Loemker, p. 478

149 Garber, p. 319

*perfect*” that creates the Leibnizian controversy regarding evil. What he means is that God has created the best of all possible worlds. His reasoning is as follows:

- (1) For any possible world, there is a better possible world, and so, there is no best possible world (assumption).
- (2) As omnipotent, God is able to create any possible world He chooses to create.
- (3) As omniscient, God knows how to create any possible world.
- (4) As omniscient, God is able to identify the level of perfection of every possible world.
- (5) As omnibenevolent, (impeccable, all perfect), God would only choose to create the best possible world that he could create.<sup>150</sup>

For a brief period of time in the 1670s Leibniz, Arnauld, and Malebranche were in Paris together at the same time. Of the various subject matter discussed among them in Paris, and the later by correspondence, was the problem of evil.<sup>151</sup> Leibniz and Malebranche believed that God acts like us, rationally and for the sake of that which is good. Arnauld is like Descartes. God is not a rational person, and the way God acts cannot be compared to the way we act.<sup>152</sup> Leibniz and Malebranche believed the universe to be from the wisdom of God, full of goodness and beauty. Descartes and Arnauld believed the universe to be arbitrary, and the product of an “all-powerful will”.

The event that triggered their discussion, and the discussion about evil in Europe in general at that time was the Thirty Years War. Europe was decimated by years of fighting between political rivals, land disputes, and religious differences between Catholics and Protestants. The effects of war, and the dispute between Catholics and Protestants, was ended by the Peace of Westphalia in 1648.<sup>153</sup> Despite this treaty only the military conflict between armies ceased. On the minds of many between the years of

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150 Steinberg, Jesse. *International Journal for Philosophy of Religion*. “Leibniz, Creation and the Best of All Possible Worlds”, Vol. 62, No. 3, December 2007, p. 123

151 Nadler, Steven. *The Best of All Possible Worlds*. Farrar, Straus and Giroux: New York, N.Y., p. x

152 Nadler, p. xi

153 Nadler, p. 4 – 5

1648 – 1686 is the question of the nature of God's interaction with the world. If he is good, then why doesn't God fix evil. Perhaps he cannot. Perhaps God does not know how. The “*best and most perfect*” that Leibniz is talking about is the perfection of reality.<sup>154</sup> He thinks that the world is both physically and morally superior.<sup>155</sup> In *Causa Dei* Leibniz says, “God wills what is good per se, at least antecedently. He wills in general the perfection of all things and particularly the happiness and virtue of all intelligent substances; and he wills each good according to its degree of goodness.”<sup>156</sup>

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154 Rutherford, Donald. *Leibniz and the Rational Order of Nature*. Cambridge University Press: New York, N.Y., 1995, p. 46

155 Rutherford, p. 46

156 Rutherford, p. 47



## Chapter Four: Leibniz Argues in Favor of God's Intelligent Design

After addressing his concerns about the new philosophers, Leibniz proceeds in Discourse #19 to confront an erroneous misconception about God's intelligent design of the machine. He writes

*I am quite willing to admit that we are subject to deception when we wish to determine God's ends of counsels. But this is only when we try to limit them to some particular design, believing that he had only one thing in view, when instead he regards everything at the same time. For instance, it is a great mistake to believe that God made the world only for us, although it is quite true that he made it in its entirety for us and there is nothing in the universe that does not effect us and does also accommodate itself in accordance with his regard for us, following the principles set forth above. Thus, when we see some good effect or perfection occurring or ensuing from God's works, we can say with certainty that God proposed it. For he does nothing by chance and is not like us, who sometimes fail to do the good. That is why, far from about to fall into error in this, as do extreme politicians who imagine too much subtlety in the designs of princes or as do commentators who look for too much erudition in their author, we cannot attribute too much reflection in this infinite wisdom, and there is no subject in which error is to be feared less, provided we limit ourselves to affirmations and avoid negative propositions that limit God's designs*

Here Leibniz mentions the first of two words which are as politically incorrect and out of favor in certain circles in his day as they are today. One is “design”, which he mentions in the above passage, and the other is “intelligent” which comes later in #19.<sup>157</sup> Leibniz's intelligent design position is that God, a loving person of intelligence, power, and will, caused physical reality to come into existence for the end purpose of making himself known to other self-aware, intelligent beings, in the personage of Jesus Christ.

This he makes clear in his *Systema* and in article #37. For Leibniz, God's self-

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<sup>157</sup> Niall Shanks, in the preface to his work *God, The Devil and Darwin, “A Critique of Intelligent Design Theory”*, Oxford University Press: New York, N.Y., 2006, says, “A culture war is currently being waged in the United States by religious extremists who hope to turn the clock of science back to medieval times. The current assault is targeted mainly at educational institutions and science education in particular. However, it is an important fragment of a much larger rejection of the secular, rational, democratic ideals of the Enlightenment upon which the United States was founded. The chief weapon in this war is a version of creation science known as *intelligent design theory*.”

revelation in Christ is why there is something instead of nothing. For Leibniz, the reason the planets revolve around the sun and the reason the natural world exists as it does, is for the purpose of such a divine self-revelation. A few of the Biblical references with which he forms his doctrine occur in the gospels where, for example, the angel tells Joseph to name the child Jesus, which means “the Lord saves”.<sup>158</sup> In his earthly ministry Jesus of Nazareth says in Matthew 20:28, “the son of man did not come to be served, but to serve and to give his life as a ransom for many.”<sup>159</sup> When confronted by religious leadership in the Jerusalem temple over the issue of who his father was, the Nazarene replies, “Before Abraham was, I am.”<sup>160</sup> In this particular response Jesus claims to be the burning bush of Moses. It is a claim to be God on earth. For this claim, the Bible says he was crucified.<sup>161</sup> The apostle Paul, writing to the church at Collosae, refers to Christ on the cross as the image of God: “He is the image of the invisible God, the firstborn over all creation. For by him all things were created; things in heaven and on earth, visible and invisible, whether thrones or powers or rulers or authorities; all things were created by him and for him. He is before all things, and in him all things hold together.”<sup>162</sup>

This is the theological understanding Leibniz embraces upon which all logic,

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158 *New International Version of the Holy Bible*, Matthew 1:21; Matthew goes on to note in verses 22 and 23 that “All this took place to fulfill what the Lord had said through the prophet: ‘The virgin will be with child and will give birth to a son, and they will call him Emmanuel’ – which means ‘God with us.’”

159 *New International Version of the Holy Bible*

160 *New International Version of the Holy Bible*, John 8:58

161 *New International Version of the Holy Bible*, John 5:17 – 18 “Jesus said to them, ‘My father is always at his work to this very day, and I too am working.’ For this reason the Jews tried all the harder to kill him; not only was he breaking the sabbath, but he was even calling God his own father, making himself equal with God.”

162 *New International Version of the Holy Bible*, Colossians 1:15 – 17 (A.D. 53 – 54, see Muddiman, John. *The Pauline Epistles*. p. 206; In his book *The Crucified God*. Fortress Press: Minneapolis, Mn., 1993, p. 27, Jurgen Moltmann says, “The epistemological principle of the theology of the cross can only be this dialectical principle; the deity of God is revealed in the paradox of the cross. This makes it easier to understand what Jesus did; it was not the devout, but the sinners, and not the righteous but the unrighteous who recognized him, because in them he revealed the divine righteousness of grace, and the kingdom.” Jesus of Nazareth was God crucified.

necessary truths, and scientific formulas are based. The Father, through the Son, thinks, or, rationally expresses himself. From the mind of the divine craftsman to the physical and moral laws of reality, God expresses himself according to that world which is best and most perfect. For Leibniz, conservation of  $mv^2$ , the calculus, and other mathematical and scientific formulas, emerge from the Father through the Son, and they are used as tools upon which the designs of the machine are actualized in terms of necessity and contingency. They are all the working parts of the machine which operates for God's glory in the best of all possible worlds.

The arguments written in this passage are in response to Spinoza's *Ethics*. Leibniz's first premiss agrees with opponents of final causes and teleological explanations. He says that, indeed, God's designs are subject to deception: "...we are subject to deception when we wish to determine God's ends or counsels." The debate over final causation and God's "ends" rages before, during, and after Leibniz's lifetime. In the area of meteorology, for example, mechanist philosophers and theologians argue over the end purpose for violent weather. Doubts on all sides were intensified by the fact that Aristotle did not mention "ends" in his *Meteorology*. Catholics and Protestants were divided over the end purpose for storms. Even the camp which thought that meteorology has a divine end disagree over whether the weather is God's providence or wrath.<sup>163</sup>

Some thinkers suffer from various deceptive notions like "the ocean was made salty so that ships could float in it", "noses have bridges so as to hold spectacles", "legs are breeched in order to wear breeches", and "stones were made to be quarried so that the Lord could live in a castle".<sup>164</sup> A few years after Leibniz's death, Voltaire expresses the

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163 Martin, Craig. *Journal of the History of Philosophy*. "The Ends of Weather: Teleology in Renaissance Meteorology", Vol. 48, No. 3, July 2010, p. 260 – 261

164 Gordon, Daniel (Editor and Translator). *Candide by Voltaire*. (The Bedford Series in History and

outrage over Leibniz's position with this quote from *Candide*, chapter twenty-eight.

“Well my dear Pangloss”, Candide said, “when you were being hanged, dissected, beaten black and blue, and when you were rowing in the galleys, did you still think that everything was for the best in this world?” “I still hold to my original opinion,” replied Pangloss. “For after all, I am a philosopher, and it is not appropriate for me to take back my word. Leibniz is never mistaken. Moreover, pre-established harmony is the finest aspect of the universe, along with the plenum and subtle matter.”<sup>165</sup>

David Hume picks up the complaint against intelligent design in the eighteenth century in *Dialogues on Natural Religion* in which Hume criticizes the Newtonian mechanical analogy, an argument by proponents in design.<sup>166</sup> Bertrand Russell continues the argument against design in the twentieth century. In the “Argument From Design” section of his book *Why I Am Not A Christian*, Russell says to his audience, “You all know the argument from design: everything in the world is made just so that we can manage to live in the world, and if the world were ever so different, we could not manage to live in it. This is the argument from design. It sometimes takes on a rather curious form; for instance, it is argued that rabbits have white tails in order to be easy to shoot.”<sup>167</sup> Leibniz is not referring to retorts against God's ends such as these. Such thinkers as Hume and Russell, Leibniz would argue, suffer from deception of the true nature of the designs of God.

When Leibniz mentions the deception nature of determining God's “ends”, he has Descartes and Spinoza in mind. In Meditation IV Descartes says concerning knowing the “ends” of God:

As I mull over these things more carefully, it occurs to me first that there is no reason to marvel at the fact that God should bring about certain things the reasons for which I do not understand. Nor is his existence therefore to be doubted because I happen to experience other things of which I fail to grasp why and how he made them. For since

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Culture). Bedford: New York, N.Y., p. 42

165 Gordon, p. 115

166 For a historical perspective on Hume and intelligent design see Preus, Samuel J. *Explaining Religion*. Scholars Press: Atlanta, Ga., 1996, p. 85, 89 – 92

167 Russell, Bertrand. *Why I Am Not A Christian*. George Allen and Unwin Ltd. 1957, p. 9 – 10

I know now that my nature is very weak and limited, whereas the nature of God is immense, incomprehensible, and infinite, this is sufficient for me also to know that he can make innumerable things whose causes escape them. For this reason alone the entire class of causes which people customarily derive from a things 'end' I judge to be utterly useless in physics. It is not without rashness that I think myself capable of inquiring into the ends of God. <sup>168</sup>

Descartes does not deny “ends” in terms of God's creative purpose. He says that he simply does not know what the “ends” are. Does he, however, think that God is intelligent in Leibniz's manner? In the dedication section of *Meditations on First Philosophy* (1641), Descartes gives indication that he finds contemporary theological arguments for the existence of God from the insistence of scripture to be a circular argument:

“...it is altogether true that we must believe in God's existence because it is taught in the Holy Scriptures, and conversely, that we must believe the holy scriptures because they have come from God. This is because, of course, since faith is a gift from God, the very same one who gives the grace that is necessary for believing the rest can also give the grace to believe that he exists. Nonetheless, this reasoning cannot be proposed to unbelievers because they would judge it to be circular.”<sup>169</sup>

As to the argument from the design of God in nature being knowable to man, he refers to in chapter 13 and *Romans* chapter one, two documents both of which claim that human knowledge of God in nature is knowable. Nowhere, however, does Descartes ever link the words 'God', intelligent', and 'design' in any point or argument.

The second premiss for Leibniz in this passage is that God's designs involve his omniscience. “*But this is only when we try to limit them to some particular design, believing that he had only one thing in view, when instead he regards everything at the same time.*” Leibniz believes God is all knowing. God regards everything at the same time while at the same time allowing for freedom in the movement of individual substances. Freedom combined with God's “omniscience” should be understood in terms

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168 Ariew, Roger. *Rene Descartes, Philosophical Essays and Correspondence*. Hackett Publishing Co.: Indianapolis, In. 2000, p. 123 – 124

169 Ariew and Watkins, p. 22

of “possibility” and “freedom”. God knows all the possibilities that free substances may exercise, and in his wisdom, the choices made are what is always best and most perfect.

The most famous Leibnizian example of God's omniscience in terms of his intelligent design and his wisdom is Discourse #30 concerning Judas Iscariot. The Bible says three things about the messiah as “Lamb of God”. One, he had to be betrayed.<sup>170</sup> This is prophesied centuries before the event.<sup>171</sup> Two, the betrayer, in this case Judas Iscariot, was condemned to hell.<sup>172</sup> Three, betrayal was the will of God in advance. Therefore, for doing the will of God, Judas Iscariot was condemned to hell. This is all part of the wisdom in the intelligent design of the machine. The law of efficient cause was in play with the motion of Judas in the act, and the law of final cause was in play in the wisdom of God working out the “end” of creation. The question is did Judas have a choice? Leibniz says yes, because God's omniscience is a knowledge of all the possibilities, and not only a knowledge of the future. He writes,

“But someone will say, why is it that this man will assuredly commit this sin? The reply is easy: otherwise he would not be this man. For God sees from all time that there will be a certain Judas whose notion or idea (which God has) contains this free and future action. Therefore, only this question remains, why does such a Judas, the traitor, who is merely possible in God's idea actually exist? But no reply to this question is to be expected on earth, except that, in general, one must say that, since God found it good that he should exist, despite the sin that God foresaw, it must be that this sin is paid back with interest in the universe, that God will derive a greater good from it, and that it will be found that, in sum, the sequence of things in which the existence of that sinner is included is the most perfect among all the possible sequences. But we cannot always explain the admirable economy of this choice while we are travelers in this world; it is enough to know it without understanding it. And here is the occasion to recognize the *altitudinem divitarum*, the depth and abyss of diviner wisdom, without seeking a detail that involves infinite considerations.”<sup>173</sup>

Leibniz can be further understood in a short essay he wrote sometime in the summer of

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170 *New International Version of the Holy Bible*, Psalm 41:9

171 The forty-first Psalm, “A Psalm of David”, is dated between 1000 – 960 B.C.

172 Acts 1:24-25 After the passion of Christ, the eleven disciples decided to choose a successor to Judas Iscariot, the betrayer of Christ. The interpretation of these two verses is interpreted that Judas went to hell for his deed. “Then they prayed, 'Lord, you know everyone's heart. Show us which of these two you have chosen to take over this apostolic ministry, which Judas left to go where he belongs.'”

173 Ariew and Garber, p. 61

1684 - 1688 entitled *The Origin of Contingent Truths*": "If everything that exists is necessary, it would follow that only those things which exist at some time or other are possible (as Hobbes and Spinoza wish), and that matter would take on all possible forms (as Descartes wishes). So no story could be fashioned which did not exist at some time or place which is absurd."<sup>174</sup>

Spinoza believes that all truths are necessary. God alone is free and determines the movements of modes within his being., At the beginning of the appendix to *Ethics* he says,

"I have now explained the nature and properties of God: that he necessarily exists, that he is one alone, that he is and acts solely from the necessity of his own nature, that he is the free cause of all things and how so that all things are in God and are so dependent on him that they can neither be nor be conceived without him, and lastly, that all things have been predetermined by God, not from his free will or absolute pleasure, but from the absolute nature of God, his infinite power."<sup>175</sup>

Spinoza's theology is a significantly different understanding of God's nature from that of Leibniz. For him, God is not a person with a will to love. For Spinoza, God is omniscient but does not exercise his freedom toward any end purpose.

Leibniz's third premiss in this passage is that the mistake that leads to deception is the limiting of God's design. He says, "*it is a great mistake to believe that God made the world only for us, although it is quite true that he made it in its entirety for us and there is nothing in the universe that does not effect us and does also accommodate itself in accordance with his regard for us...*" The idea in Christian theology that reality exists for man's end use purposes, that God created the world for us, is found in Genesis 1:26-30.

The Bible says,

"...let them rule over the fish of the sea and the birds of the air and over every living creature that moves on the ground.' Then God said, 'I give you every seed bearing

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174 Copyright Lloyd Strickland, 2003 – 2011, Leibniz-translations.com  
175 Ariew and Watkins, p. 174

plant on the face of the whole earth and every tree that has fruit with seed in it. They will be yours for food. And to all the beasts of the earth and all the birds of the air and all the creatures that move on the ground – everything that has the breath of life in it I give every green plant for food.”<sup>176</sup>

So, when Leibniz agrees with his critics that God did not make the world “only for us”, he neglects to consider that the Bible does not mention creation happening for any other beings but mankind. If he thinks that the world is made for non-human animals, this opinion is strictly from natural theology. It can be argued in the entirety of Leibniz's writings that he is a natural philosopher and not a Biblical theologian. This argument has great merit, and this is one of the locations where he demonstrates thus. Another interpretation is that Leibniz is “whipping out a letter” to Arnauld; he simply goes too fast and falls into double speak. The only other way to view the word “entirety” is in relation to God's infinite possibilities for the best and most perfect. That is one way to explain “...*accommodate itself in accordance with his regard for us....*”

The words are a reaction to Spinoza in *Ethics*. In the appendix to part I, Spinoza continues his anti final cause position.

“Now all the prejudices which I intend to mention here turn on this point, the widespread belief among men that all things in nature are like themselves in acting with an end in view. Indeed, they hold it as certain that God himself directs everything to a fixed end; for they say that God has made everything for man's sake and has made man so that he should worship God. So this is the first point I shall consider, seeking the reason why most people victims of this prejudice and why all are so naturally disposed to accept it. Secondly, I shall demonstrate its falsity; and lastly I shall show how it has been the source of misconceptions about good and bad, right and wrong, praise and blame, order and confusion, beauty and ugliness, and the like. However, it is not appropriate here to demonstrate the origin of these misconceptions from the nature of the human mind. It will suffice at this point if I take as my basis what must be universally admitted, that all men are born ignorant of the causes of things, that they all have a desire to seek their own advantage, a desire of which they are conscious. From this it follows, firstly, that men believe that they are free, precisely because they are conscious of their volitions and desires; yet concerning the causes that have determined them to desire and will they do not think, not even dream about, because they are ignorant of them. Secondly, men act always with an end in view, to wit, the advantage that they seek. Hence it happens that they are always looking only for the final causes of things done, and are satisfied when they find them, having, of course, no reason for further doubt. But if they fail to discover them from some external source, they have no recourse but to turn to themselves, and to reflect on what ends would normally determine them to

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176 *New International Version of the Holy Bible*. Zondervan: Grand Rapids, Mi., 1984



similar actions, and so they necessarily judge other minds by their own. Further, since they find within themselves and outside themselves a considerable number of means very convenient for the pursuit of their own advantage – as, for instance, eyes for seeing, teeth for chewing, cereals and living creatures for food, the sun for giving light, the sea for breeding fish – the result is that they look on all the things of Nature as means to their own advantage. And realizing that these were found, not produced by them, they come to believe that there is someone else who produced means for their use.”<sup>177</sup>

Spinoza's objection here is the Biblical position expressed in Genesis. Spinoza rejects the Biblical record as divinely authoritative.<sup>178</sup> His objection to intelligent design does not stem from his belief that the existence of God can be questioned. In fact, in *Korte Verhandeling* he says, “From all this then, it follows clearly that we can prove both a priori and a posteriori that God exists.”<sup>179</sup> Thus, we see that not only is Spinoza not an atheist, but that he is of the opinion that God's existence is provable. His objection does not stem from a belief that God is not the first cause of nature. Proceeding in the last paragraph in chapter one, “That God Exists”, he says, “...things which are proved in the latter way (a posteriori), must be proved through their external causes, which is a manifest imperfection in them, inasmuch as they cannot make themselves known through themselves, but only through external causes. God, however, who is the first cause of all things, and also the cause of himself (*causa sui*), makes himself known through himself.”<sup>180</sup> Spinoza thinks that God exists and is the first cause of things, putting him in agreement with Leibniz regarding essential causes. Does God think, however, is the question. Does Spinoza think that God is intelligent, and therefore, the essential cause of an intelligent design in nature?

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177 Ariew and Watkins, p. 174

178 Israel records a comment made by Borch that “at Rijnsburg there is a Christian who is an apostate Jew, in fact, practically an atheist, who does not respect the Old Testament and considers the New Testament to be of no more weight than the Koran and Aesops Fables and that, for the rest, this man lives in an exemplary and irreproachable fashion, his only occupation being the manufacture of telescopes and microscopes.” See Israel, *Radical Enlightenment: Philosophy and the Making of Modernity*, p. 163

179Morgan, Michael (Editor) Shirley, Samuel . *Spinoza Complete Works With Translations by Samuel Shirley*. Hackett Publishing Company: Indianapolis, In., 2002, p. 40

180Morgan, p. 40

Spinoza has two sections in *Ethics*, Propositions #17 and #19, where he confronts the design argument in terms of God's intellect and will. In Proposition #17 Spinoza addresses the intellect of God as it is understood by his opponents. He does so, however, combined with the will of God. Spinoza says, "God acts solely from the laws of his own nature and is constrained by none."<sup>181</sup> He follows this up with two corollaries. First, "there is no cause, except the perfection of his nature, which either extrinsically or intrinsically moves God to act." Second, "God alone is a free cause. For God alone exists solely from the necessity of his own nature (Pr. 11 and Cor. 1 Pr 14) and acts solely from the necessity of his own nature (Pr. 17). So he alone is a free cause (Def. 7)."<sup>182</sup> Nowhere does Spinoza say that God is a thinking person who creates because he is a loving person. Neither does he consider God to be a person of will in the fashion that Leibniz does. He says that "neither intellect nor will pertain to the nature of God."<sup>183</sup> He admits that it is the case that his opponents believe that intellect and will belong to the nature of God. He says they believe this because intellect and will are part of the highest perfection of themselves.

The latter part of Proposition #17 is a comparison of divine intellect and will with human intellect and will in an attempt to illustrate the faulty reasoning by some that the perfection of God exists because of what we see in ourselves. Spinoza argues that we think that God has because we have plans. It is a human projection in that we give God the attribute of thinking because we see that in ourselves and we consider it to be good. Therefore, God thinks. Spinoza writes, "If intellect and will do indeed pertain to the eternal essence of God, one must understand in the case of both these attributes

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<sup>181</sup>Ariew and Watkins, p. 167

<sup>182</sup>Ariew and Watkins, p. 166

<sup>183</sup>Ariew and Watkins, p. 166

something very different from the meaning widely entertained.”<sup>184</sup> First, he says that the intellect and will of God is “vastly different” from human intellect and will.<sup>185</sup> It has to do with order. He argues, “If intellect does pertain to the divine nature, it cannot, like man's intellect, be posterior to (as most thinkers hold) or simultaneous with the objects of understanding, since God is prior in causality to all things (Cor. 1 Pr. 16).” God's intellect, insofar as it is conceived as constituting God's essence, is in actual fact the cause of things, in respect both to their essence and their existence.”<sup>186</sup>

Spinoza's unique position is spelled out next in Proposition #17 in that he thinks that “God's intellect, will, and power are one and the same.”<sup>187</sup> It differs from Leibniz in that, for Leibniz, God is a person of intellect, will, and power. For Spinoza the essence and existence of God are the same, so God is intellect, will and power. However, he argues that the essence and existence of God is different from what the intellect of God causes. Spinoza concludes *Ethics* I, #17 with the assertion that, hypothetically speaking, God's intellect, “insofar as it is conceived as constituting the divine essence, differs from man's intellect both in respect of essence and existence, and cannot agree with it in any respect other than in name....”<sup>188</sup>

In Proposition #19 Spinoza argues that “Things could not have been produced by God in any other way or in any other order than is the case.”<sup>189</sup> Everything exists from necessity. He says that if things could have existed in any other way than what it does, it would mean that God would have to have another nature, or even multiple natures. Thus,

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184Ariew and Watkins, p. 167

185Ariew and Watkins, p. 167

186Ariew and Watkins, p. 167

187Ariew and Watkins, p. 167

188Ariew and Watkins, p. 167

189Ariew and Watkins, p. 172

there would exist multiple God's, which Spinoza thinks is absurd.<sup>190</sup> There is nothing, he says that exists as 'contingent', but he says he must explain what he means by contingent through an explanation of what is 'necessary' and 'impossible'. “A thing is termed necessary either by reason of its essence or by reason of its cause.”<sup>191</sup> A thing is impossible “either because its essence or definition involves a contradiction or because there is no external cause determined to bring it into existence.”<sup>192</sup> A thing is contingent because our knowledge is deficient.<sup>193</sup> Contingencies occur when we cannot determine if there is a contradiction, or, even if we do determine that no contradiction exists, what is the cause. We therefore term it contingent.

Spinoza next turns to the issue of 'will'. He says that will is not a part of the essence of God. Some, he says, do believe that will is part of an intelligent God creating. His argument is the same. If God had a different will, then his nature would have to be different.<sup>194</sup> Further, if God had a “different intellect in act” and a “different will”, God's essence would have been different. Therefore, Spinoza argues “since things could not have been brought into being by God in any other way or order – and it follows from God's supreme perfection that this is true – surely we can have no sound reason for believing that God did not wish to create all the things that are in his intellect through that very same perfection whereby he understands them.”<sup>195</sup>

Spinoza's opponents argue that the perfection or imperfection, the goodness or badness of things that exist, depend on the will of God. Spinoza argues that this is “but

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190Ariew and Watkins, p. 172

191Ariew and Watkins, p. 172

192Ariew and Watkins, p. 172

193Ariew and Watkins, p. 172

194Ariew and Watkins, p. 173

195Ariew and Watkins, p. 173

an open assertion that God, who necessarily understands that which he wills, can by his will bring it about that he should understand things in a way different from the way he understands them - and this, as I have just shown, is absurd.”<sup>196</sup> He turns their argument against them. “For things to be able to be otherwise than they are, God's will, too, would necessarily have to be different. But God's will cannot have to be different (as we have just shown most clearly from the considerations of God's perfection). Therefore, neither can things be different.”<sup>197</sup>

Finally, Spinoza turns to the real reason for his rejection of God as a loving person of will who intelligently designs the world. It is the issue of theodicy. He says, “I admit that this view which subjects everything to some kind of indifferent will of God and asserts that everything depends on his pleasure diverges less from the truth than from the view of those who hold that God does everything with the good in mind.”<sup>198</sup> Spinoza cannot abide having a perfect God who causes such a world as this to come into being with the good in mind. A God who creates with the good in mind is subject to fate, and this cannot be because, as he has already shown, God is “the first and only free cause of both the essence and the existence of things.”<sup>199</sup> He eliminates the theodicy problem because God is neither good nor the producer, of anything good. He argues that this reasoning is the imagination of individuals who think that eyes were made for seeing, teeth were made for chewing, cereals and living creatures were made for food, the sun was made for giving light, and the sea was made for breeding fish. A God whose nature is without intellect and will cannot be responsible for these things existing for anyone's

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196Ariew and Watkins, p. 173

197Ariew and Watkins, p. 173

198Ariew and Watkins, p. 173

199Ariew and Watkins, p. 174

benefit. Leibniz would ask Spinoza, why, then, do they exist. To the question of why, Spinoza has no answer.

Leibniz concludes this portion of Discourse #19 with his statement, *Thus, when we see some good effect or perfection occurring or ensuing from God's works, we can say with certainty that God had proposed it.*" Here he has divine revelation in mind. "For since the creation of the world God's invisible qualities, his eternal power and divine nature have been clearly seen, being understood from what has been made, so that men are without excuse."<sup>200</sup> This is opposite of Spinoza's position. For Leibniz, God brings about creation from his nature which causes God to create only what He thinks is good. The greatest good, for Spinoza, is to know God."<sup>201</sup>

The "*good effect or perfection occurring or ensuing from God's works*" refers to the actualizing of creation stemming from the "beginning" of creation when God's pre-established harmony was initially set into motion. God, who is perfect, chooses what is best, and lets the machine play itself out in freedom, and this by design in "the best of all possible worlds. Leibniz's "best of all possible worlds" allows him to employ his "principle of sufficient reason". Everything that occurs in the world is necessary, but at the same time nothing has to be the way it is."<sup>202</sup> According to Leibniz's way of thinking, the best of all possible worlds solves the problem of God's goodness. God does not choose particular things. Neither does he choose things that are evil. He does, however, choose a best of all <sup>203</sup> This is a moral necessity for God, not a metaphysical necessity.

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200 *New International Version of the Holy Bible*, Romans 1:20

201 Ethics IV prop. 28

202 Stewart, Matthew. *The Courtier and the Heretic, Leibniz, Spinoza and the Fate of God in the Modern World*. W.W. Norton and Company: New York, N.Y., 2006, p. 238

203 Stewart, p. 238 - 239

God could create a less than best of all possible worlds, or no world at all.<sup>204</sup>

Leibniz is reacting to Spinoza's concept of the nature of God and his essence, existence, and goodness. These concepts are radically different between Leibniz and Spinoza. Instead of many worlds to choose the best from, Spinoza believes that God creates the only world he can possibly create. It is the one world that follows from its own nature.<sup>205</sup> For Spinoza, God is immanent, whereas for Leibniz, God is transcendent.<sup>206</sup> As the immanent cause of things, Spinoza's God creates it's world "in the same way that the nature of a circle makes it round."<sup>207</sup> Spinoza's God creates it's world in the same way that the nature of coffee causes it to be black.<sup>208</sup> The circle is in the world, and the world is in the circle. As he is to have said to Blijenburg, "If a triangle could speak...it would say that God is immanently triangular."<sup>209</sup> Reality cannot be any other way.<sup>210</sup> For Leibniz, God creates the world similar to the way a watchmaker makes a watch.<sup>211</sup>

Since Spinoza's God is not a person, it has no personality, therefore God cannot be "good". In his *Treatise*, Spinoza says, "Things are good only insofar as they assist a man to enjoy the life of the mind."<sup>212</sup> The source of all good is pleasure, which, for him, is the maximization of the conatus.<sup>213</sup> God is perfect, but morally neutral. Everything in the world follows from God's essence by necessity. In Spinoza's world, there is as much evil as there is good. This is not in an absolute sense, however. They are relative notions

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204Stewart, p. 239

205Stewart, p. 239

206Stewart, p. 239

207Stewart, p. 239

208Stewart, p. 236

209Stewart, p. 162

210Stewart, p. 239

211 Stewart, p. 248

212Stewart, p. 63

213Stewart, p. 175

according to how we use the things we are interested in.<sup>214</sup> This is born out in his words quoted above, that man sees the world as good or evil depending on the results of the end uses of things in the world.

In his second argument in this passage, Leibniz starts by saying, “*For God does nothing by chance, and is not like us, who sometimes fail to do the good.*” Here is another place where Leibniz demonstrates that he is not a Biblical theologian. In scripture, chance is part of God's design. The wisdom writer says, “The race is not to the swift or the battle to the strong, nor does food come to the wise or wealth to the brilliant or favor to the learned, for time and chance happen to them all.”<sup>215</sup> Leibniz's belief is that the interpenetration of causation stemming from the pre-established harmony of actualized events is not by chance. Contingent truths exist, but God chooses the best of all possible contingencies.

Sin is *failing to do the good*. Leibniz's position is seen in *Confessio Philosophi* (1672 – 73) and *Theodicy* (1710) where his words mirror Ovid's Medea: “*Vide meliora proboque, deteriora sequor*” - “I see the better way and approve it, but I follow the worse way.”<sup>216</sup> Here he is leaning towards the thinking of Paul in Romans where the apostle says “For what I want to do I do not do, but what I hate to do I do”.<sup>217</sup> This is because in Ovid, Medea is a sinner who knows what is wrong and does it anyway.<sup>218</sup> Man the sinner fails to do the good whereas God never fails.

Leibniz finishes this section with an observation of those who fall into error with

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214 This is Spinoza's point in the appendix to the *Ethics*. Individuals see things as good and bad, right and wrong, according to their usefulness in their lives.

215 *The New International Version of the Bible*, Ecclesiastes 9:11

216 Rutherford, Donald, and J.A. Cover (Editors). *Leibniz, “Nature and Freedom”*. “*Vide Meliorate Proboque, Deteriorate Sequora*”, Jack Davidson, contributor. Oxford University Press: New York, N.Y., 2005 p. 234

217 *New International Version of the Holy Bible*, Romans 7:15

218 Davidson, p. 234



the intelligent design argument. He mentions two groups of people, *extreme politicians* who “*imagine too much subtlety in the design of princes*”, and commentators who “*look for too much erudition in their author.*” Who are the politicians and who are the commentators? As of today, there is simply no extra-Leibnizian material to indicate who he might specifically be referring to. Unless Leibnizian material currently being translated turns up any new information, scholars will continue to be in the dark as to who such people might have been.

## Chapter Five: Leibniz Illustrates His Argument

After responding to the new philosophers on the misunderstanding of the designs of God, Leibniz turns his efforts to illustrating his argument that physical reality is an intelligent design. He does so three ways. First, he says that the design of physical reality can be seen in animal structure. Second, it can be seen in the human eye, and third it can be seen by the operation of the cannon by the prince. These three illustrations finish the content of Discourse #19, and they all have a common theme, machinery.

He opens the passage by saying, “*Anyone who sees the admirable structure of animals will find himself forced to recognize the wisdom of the author of things.*” This “admirable structure of animals”, as an illustration of intelligent design, is challenging to interpreters of Leibniz's idealist ontology.<sup>219</sup> Animals are machines. Machines are designs. The concept of machine is found throughout Leibniz's career. In a letter to Herman Conring (1678), Leibniz links animals with the concept of machines saying, “Yet, if I am not mistaken, God could certainly have created a kind of machine similar to an animal which carries out, without sensibility, all the functions, or at least most of them, which we see in beasts. Conversely, we cannot assert with certainty that there is a sentient soul in beasts unless we observe phenomena which cannot be explained mechanically.”<sup>220</sup> In his letter to Walter von Tschirnhaus (1684), he writes,

“In Holland they are now disputing, loudly and soundly, whether beasts are machines.

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219 Smith, Justin and Chad Nachtomy (Editors). *Machines of Nature and Corporeal Substances in Leibniz*. Springer: New York, N.Y. 2011, p. 1  
220 Loemker, p. 190

People are even amusing themselves by ridiculing the Cartesians for imagining that a dog that is clubbed cries in the same way as a bagpipe which is pressed. As for me, though I grant the Cartesians that all external actions of beasts can be explained mechanically, I nevertheless believe that beasts have some knowledge and that there is something in them, not itself extended, which can be called a soul, or if prefer, a substantial form....<sup>221</sup>

After *Discourse on Metaphysics*, Leibniz mentions the concept of machine in *A New System of the Nature and Communication of Substances, and of the Union of the Soul and Body* (1695):

I am the most readily disposed person to do justice to the moderns, yet I find that they have carried reform too far, among other things, by confusing natural things with artificial things, because they have lacked sufficiently grand ideas of the majesty of nature. They think that the difference between natural machines and ours is only the difference between great and small. Recently this led a very able man, the author of the *Conversations on the Plurality of Worlds*, to assert that when we examine nature more closely we find it is less admirable than previously thought and more like the workshop of a craftsman. I believe that this conception does not give us a sufficiently just or worthy idea of nature, and that my system alone allows us to understand the true and immense distance between the least productions and mechanisms of divine wisdom, and the greatest masterpieces that derive from the craft of a limited mind; this difference is not simply a difference of degree, but a difference of kind.<sup>222</sup>

For the purposes of a “complete” interpretation of Leibniz in article #19, as well as his whole philosophical career, it is important to note that this passage links the machinery of nature with the wisdom of God. The wisdom of God is the law of final cause participating in Leibniz's doctrine of “Interpenetration of Causation”. Machines of nature operate for an end purpose.

Three years later in *On Nature Itself*, Leibniz linked the concept of machine with the intelligence of the divine craftsman. “I also agree that those wonders which present themselves daily, and about which we customarily say (quite rightly) that the work of nature is the work of intelligence, should not be ascribed to certain created intelligences endowed with wisdom and power (virtus) only in proportion to the task at hand, but rather

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221Loemker, p. 275

222Ariew and Garber, p. 141

that the whole of nature is, so to speak, the workmanship of God,...”<sup>223</sup> The structure of animals, for Leibniz, fits in with his interpenetration of causation between essential and final causation. That is why he mentions animals in #19. The workings of the animal kingdom are according to mechanistic principles. They also, however, move according to the end purpose of creation. Aristotle argues as much in *Parts of Animals* 639b5 – 640a20. Specifically, in 639b10 he says “The causes concerned in the generation of the works of nature are, as we see, more than one. There is the final cause and there is the motor cause.”<sup>224</sup> It can be argued that Aristotle in this section, and in parts of *Generation of Animals*, is influential in Leibniz's thinking.

After illustrating design from animal structure, Leibniz turns to the human eye and optics. He says,

*And I advise those who have any feelings of piety and even feelings of true philosophy to keep away from the phrases of certain freethinkers<sup>225</sup> who say that we see because it happens we have eyes and not that eyes were made for seeing. When one seriously holds these opinions ascribing everything to the necessity of matter or to some chance (even though both must appear ridiculous to those who understand what we have explained above), it is difficult to recognize an intelligent<sup>226</sup> author of nature. For the effect must correspond to its cause; indeed, the effect is best recognized through a knowledge of the cause.”*

The *freethinkers* are those who, like Spinoza, ascribe everything to necessity or chance.

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223 Ariew and Garber, p. 156

224 McKeon, p. 644

225 Martin and Brown, *G.W. Leibniz: Discourse on Metaphysics and Related Writings*, p. 4, say that Leibniz was eager to avoid the “free thinker” stereotype. “For Scholastics the authority of Aristotle had a place which was traditionally parallel and subordinate to that of the church. The Church had insisted that its interpretation of scripture could be doubted only by those who could prove a contrary interpretation. A heavy burden of proof therefore lay with anyone who wished to question ecclesiastical authority. The same was widely taken to apply to intellectual authority generally, and Leibniz made use of the notion of paradox that conceded to the Scholastics a good share, of not a monopoly, of authority in philosophy. Someone who ignored the obligation to give well authorized opinion its due is known as a 'free thinker', and someone who put forward new opinions regardless was called an innovator, a charge that Leibniz (in common with a great many of his contemporaries) was anxious to avoid.”

226 In his Paris notes, written February 11, 1676, Leibniz writes “All possibilities cannot be understood distinctly by anyone, for they imply a contradiction. The most perfect being is that which contains the most. Such a being is capable of ideas and thoughts, for this multiplies the variety of things like a mirror. Hence God is necessarily a thinking being, and if he is not a thinking being, the whole will be more perfect than he.” see Loemker, p. 159

As Spinoza points out in *Ethics*, individuals who think that God gave mankind eyes for the purpose of seeing are guilty of the same kind of reasoning that attributes noses for holding spectacles. Leibniz would ask, then why do we have eyes? The answer given to him is the same as today. No one knows why apart from a metaphysical explanation. Mechanistic explanations yield answers directed at the operations of eyesight, but none of those explanations offer a compelling reason for the existence of the eye. For Leibniz, it is the like the distance of the earth from the sun. To the question of why it is nine-three million miles away, instead of, say, ninety-two, or ninety-four, answers all concern the effects on life's ability to survive. That, however, does not answer the question of why the distance is specifically, and consistently, nine-three million. It is in response to the challenge to final causes in early modern discussions that drives Leibniz to a study of optics, and consequently, to one of his most compelling personal discoveries, the teleological functions of rays of light and his "Most Determined Path Principle".

In 1637 Descartes publishes two laws of optics based on geometrical principles, the laws of reflection and refraction.<sup>227</sup> Descartes' law of refraction says that "the ratio between the sine of the angle at which a ray of light strikes a refractive surface and the sine of the angle at which it is refracted is a constant determined by the mediums involved."<sup>228</sup> Descartes position is that both laws can be derived in an essentially uniform manner using purely mechanical principles.<sup>229</sup> In 1665 Newton attempts to derive the laws from mechanical means, as did Huygens.<sup>230</sup> Despite their best efforts, essential causation methods to satisfactorily derive the laws of optics seemed to fall short.

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227McDonough, Jeffrey. *Philosophy and Phenomenological Research*. "Leibniz on Natural Teleology and the Law of Optics", Vol. 78 No. 3, p. 507

228McDonough, "Leibniz on Natural Teleology and the Law of Optics", p. 507

229McDonough, "Leibniz on Natural Teleology and the Law of Optics", p. 507

230McDonough "Leibniz on Natural Teleology and the Law of Optics", p. 508

Fermat takes up the cause from the angle of final, instead of essential causes. This leads him to establish the position that the key to understanding the paths taken by rays of light is not length but direction. Rays of light always take “the quickest route between two given points”.<sup>231</sup> With this new principle, Fermat quickly derived convincing laws of optics. To his surprise he discovered that Descartes had discovered the laws of optics using a completely different system.<sup>232</sup>

True to his nature as a professional diplomat, Leibniz tried to reconcile the two systems. In the inaugural edition of the *Acta Eruditorum* (1682), “Leibniz addresses the technical difficulties separating the Cartesian and Fermatian approaches as applied to cases of refraction.”<sup>233</sup> His opening point is that “Light radiating from a point reaches an illuminated point by the easiest path, which is to be determined first with respect to planar surfaces, but is accommodated to concave and convex surfaces by considering their tangent planes.”<sup>234</sup> Then Leibniz makes a statement about the nature of a ray of light that he argues is of the nature of final causes and illustrates it with a drawing. “Hence in simple optics, the direct ray of light from the radiating point C to the illuminated point E arrives by the shortest direct path – in the same medium of course – that is by the straight line CE.”<sup>235</sup>

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231McDonough, “Leibniz on Natural Teleology and the Law of Optics, p. 509

232McDonough, “Leibniz on Natural Teleology and the Law of Optics, p. 510

233McDonough, Jeffrey. *Nous*. “Leibniz’s Two Realms Revisited”, Vol. 42, No. 4, 2008, p. 678

234McDonough, Jeffrey K. (Translator) *A Unitary Principle of Optics, Catoptrics, and Dioptrics*. <http://philosophyfaculty.ucsd.edu/faculty/rutherford/Leibniz/unitary-principle.htm>, p. 1

235McDonough, *A Unitary Principle of Optics, Catoptrics, and Dioptrics*, p. 1

Fig. 1

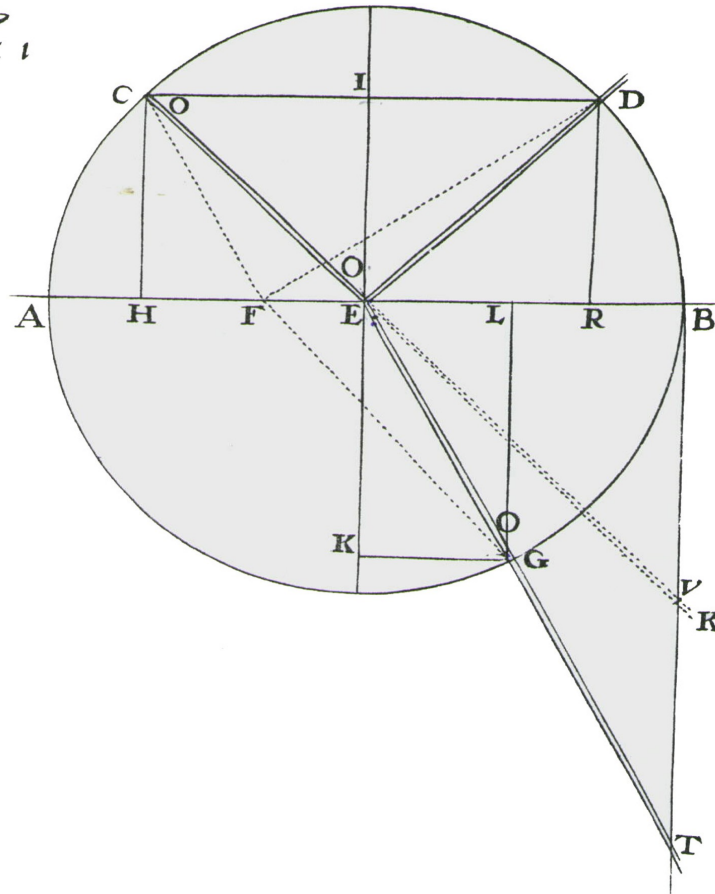


Figure 1: A figure of Leibniz's drawing depicting final causes in a ray of light <sup>236</sup>

Line segment CE operates with an end purpose. It is of the nature of final causes. Leibniz argues that “If the lines m and n represent resistance with respect to light – the former of air, the latter of water – the difficulty of the path from C to E will be as the rectangle formed by CE and m; from E to G as the rectangle formed by EG and n. Therefore so that the difficulty of the path CEG is the least of all, the sum of the rectangles CE by m and EG by n should be the least possible, or less than CF by m and FG by n – where F is taken to be any point whatsoever except E. E is sought.”<sup>237</sup> He then affirms the adequacy of his calculations which have final cause as their base.

<sup>236</sup>McDonough, *A Unitary Principle of Optics, Catoptrics, and Dioptrics*, p. 2

<sup>237</sup>McDonough, *A Unitary Principle of Optics, Catoptrics, and Dioptrics*, p. 3

We have therefore reduced all the laws of rays confirmed by experience to pure geometry and calculation by applying one principle, taken from final causes if you consider the matter correctly: Indeed a ray setting out from C neither considers how it could most easily reach point E or D or G, nor is it directed through itself to these, but the Creator of things created light so that from its nature that most beautiful event might arise. And so those who reject final causes in physics with Descartes err greatly – not to speak more harshly – since even besides the admiration of divine wisdom, they would also supply to us the most beautiful principle for discovering some properties of those things whose interior nature is still not so clearly known to us that we would be able to use proximate efficient causes and explain the machines which the Creator employed in order to produce those effects and in order to obtain his ends.<sup>238</sup>

His point about the eye in article #19 comes partially from these calculations. Due to the ends with which rays of light move, the eye itself must be the result of the Creator, and itself participate in the creator's ends. In 1695 he announced to the world his fundamental belief which he sought to prove.

In fact (as I have shown by a quite remarkable example of a principle in optics which the famous Molybdenum greatly approved of in his *Dioptrics*), final causes can sometimes also be introduced to great effect in particular problems in physics – not only so that we can better admire the most beautiful works of the supreme Creator, but also sometimes in order to find out things which by consideration only of efficient causes would be less obvious, or only hypothetical.<sup>239</sup>

In *Tentamen Anagogicum* Leibniz combines his “Most Determined Path Principle” with his calculus to produce a more refined argument. First, Leibniz uses his calculus to find “local maxima and minima”. He asks his readers to consider “a curve AB, concave or convex, and an axis ST to which the ordinates of the curve are referred.”<sup>240</sup> Put in contemporary terms, C is therefore the only point on AB where the derivative of the line with respect to ST equals zero. As an immediate consequence, given the equation of the line AB, one can therefore find the point C by taking the derivative of the equation and setting it equal to zero.<sup>241</sup> With this new technique

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238McDonough, *A Unitary Principle of Optics, Catoptrics, and Dioptrics*, p. 3

239McDonough, “Leibniz on Natural Teleology and the Law of Optics”, p. 516

240McDonough, “Leibniz on Natural Teleology and the Law of Optics”, p. 512

241McDonough, “Leibniz on Natural Teleology and the Law of Optics”, p. 512



Leibniz says that derivation of the laws of refraction and reflection is simpler.<sup>242</sup>

Next in the article he demonstrates deriving the law of reflection using the Most Determined Path Principle and the assistance of calculus.” “He asks his readers to consider a ray of light traveling between the fixed points F and G via a mirror ACB which could be plane, concave, or convex:

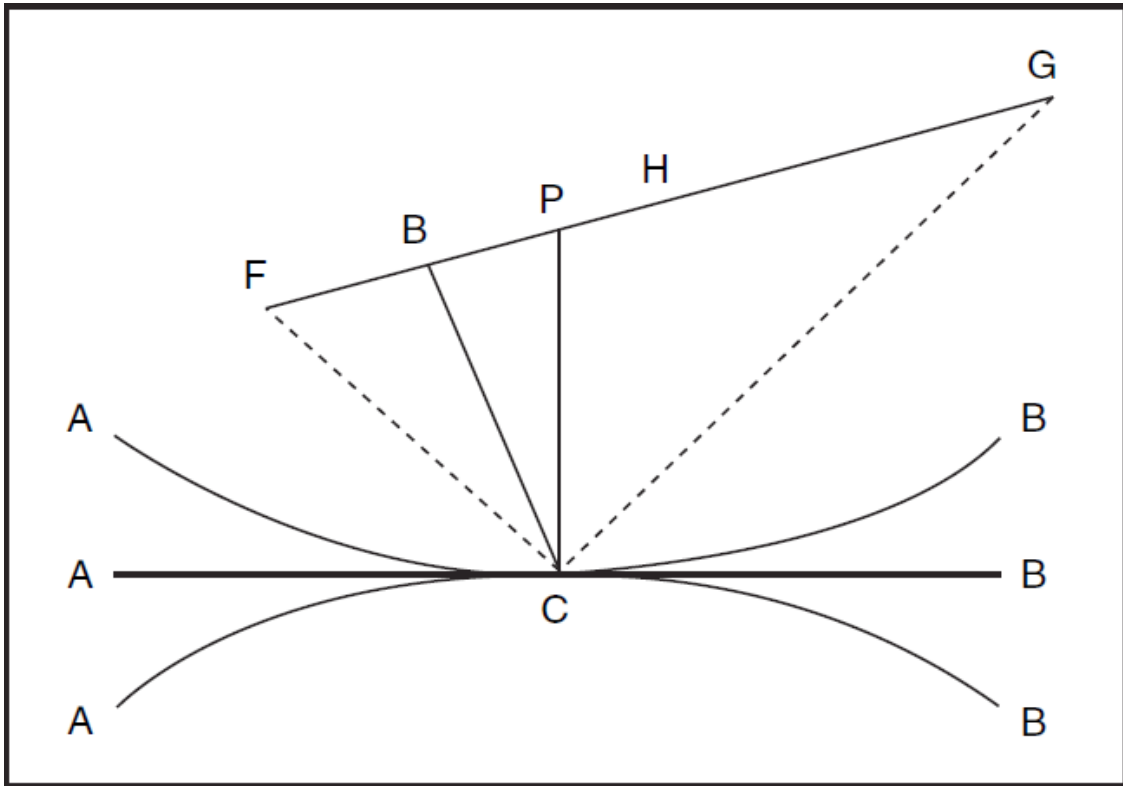


Figure 2: A figure of Leibniz's drawing depicting reflection.<sup>243</sup>

<sup>242</sup>McDonough, “Leibniz on Natural Teleology and the Law of Optics,” p. 512 – 513

<sup>243</sup>McDonough, “Leibniz on Natural Teleology and the Law of Optics,” p.512; McDonough, p. 514, gives the specific Leibnizian calculations which give a clearer geometrical understanding of what he is doing in reflection.

“HF = HG = a, HB = x, CB = y,  $CB \perp FG$ ,  $CP \perp ACB$ . Since CBP is a right triangle,  $dy = PB/CB$ .

Substituting y for CB,  $dy = PB/y$ . Multiplying through by y and taking the distance from B to P to be negative,  $-ydy = BP$ . Now since CBF is also a right triangle,  $CF = \sqrt{(CB)^2 + (BF)^2}$ . Substituting y for CB yields  $CF = \sqrt{(y^2 + (BF)^2)}$ . But  $BF = a - x$ , so by substitution,  $CF = \sqrt{(y^2 + (a - x)^2)} = \sqrt{(y^2 - 2ax + a^2 + x^2)}$ . Similar considerations show that  $CG = \sqrt{(y^2 + (a + x)^2)} = \sqrt{(y^2 + 2ax + a^2 + x^2)}$ . In order to find the path  $FCG = CF + CG$  which is unique with respect to length, Leibniz differentiates and sets the resulting equation equal to zero:  $d \cdot CF + d \cdot CG = d \cdot \sqrt{(y^2 - 2ax + a^2 + x^2)} + d \cdot \sqrt{(y^2 + 2ax + a^2 + x^2)} = (ydy + xdx - adx)/CF + (ydy + xdx + adx)/CG = 0$ . Rearranging terms yields:  $CF/CG = (a - x - ydy)/(a + x + ydy)$ . Substituting  $a - x$  for BF, and  $a + x$  for GB in turn yields:  $CF/CG = BF + BP/GB - BP = PF/PG$ . Trigonometry is now sufficient to show that if  $CF/CG = PF/PG$ , then CP bisects FCG, and that the angle

He assumes mediums which are homogenous and isotropic. According to McDonough,

Leibniz reduces the problem of finding the unique path with respect to distance times resistance to the problem of finding the point C such that the path FCG is unique with respect to its length. He then (i) constructs an equation for the length of the path from F to G via some point C on ACB, (ii) uses the technique previously illustrated to find the value of the equation of the path such that the value is unique or 'stationary', and then (iii) uses elementary trigonometry to show that for such a path the angle of incidence FCA must be equal to the angle of reflection GCB.<sup>244</sup>

McDonough says that Leibniz uses the same technique to demonstrate refraction.<sup>245</sup>

Consider, he says, a planar, concave, convex surface ACB. F and G are the source and sink points for the ray of light, and the refracted ray is GCF.

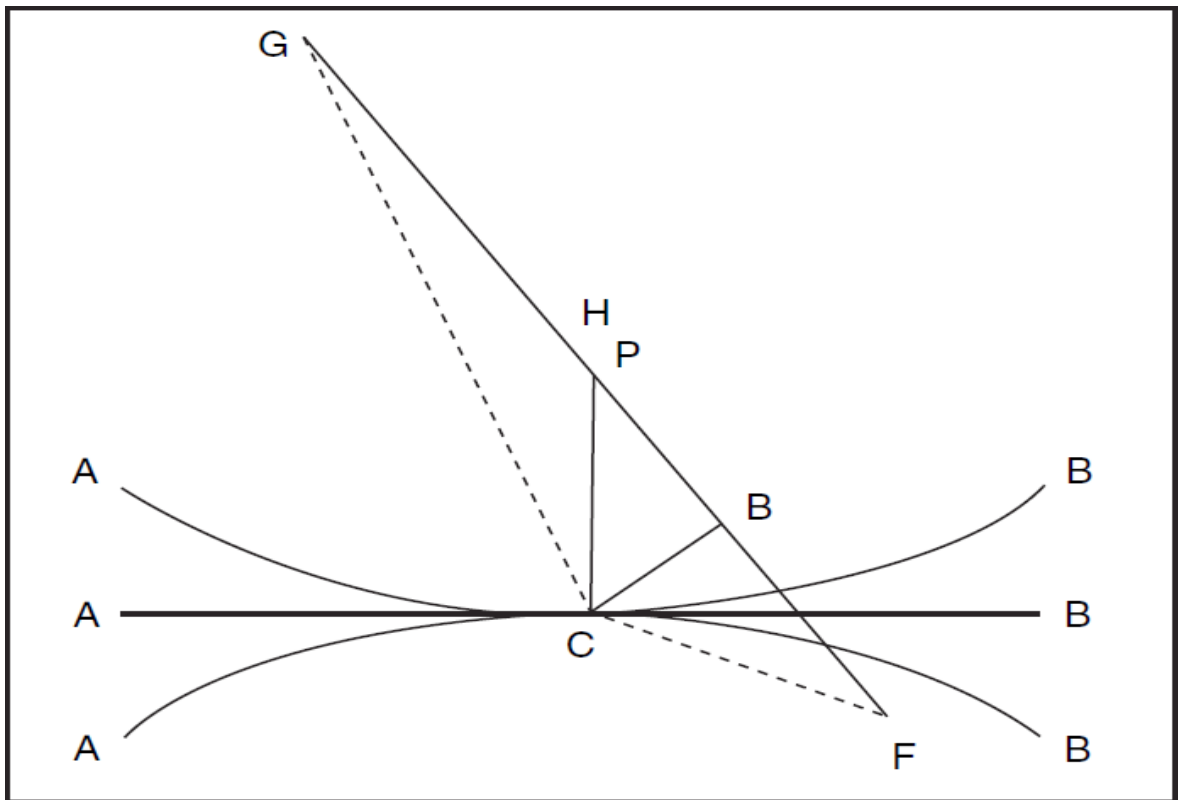


Figure 3: A figure of Leibniz's drawing depicting refraction

According to McDonough,

Here Leibniz once again (i) constructs an equation for the path of the ray of light – this time taking into account the different resistances of the two mediums, (ii) applies his calculus to find the path that is unique with respect to ease (i.e.

of incidence is therefore equal to the angle of reflection.”

<sup>244</sup>McDonough, “Leibniz on Natural Teleology and the Law of Optics,” p. 513 – 514

<sup>245</sup>McDonough, “Leibniz on Natural Teleology and the Law of Optics,” p. 514

length times resistance), and (iii) uses trigonometry to show (a) that the ratio of the sine of incidence to the sine of refraction is inversely proportional to the ratio of incident velocity to the refractive velocity, and (b) that the ratio between the sine of the angle at which a ray of light strikes a refractive surface and the sine of the angle at which the ray is refracted is a constant determined by the mediums involved.”<sup>246</sup>

Leibniz thinks that there are many different paths a ray of light can take, and with his calculus he is able to select the one path that the ray will take. With this information he strikes as balance between the Cartesians and Fermat. He is able to solve “non-standard cases of reflection”, Fermat's problem, and his standard of “ease” enables him to address the Cartesian objection of different speeds of light for different mediums.<sup>247</sup> Leibniz's claim will be that “from among all the possible paths between a source and a sink, a ray of light will travel along the path which is unique with respect to ease; where “ease is understood as the quantity obtained by multiplying the distance of the path by the resistance of the medium(s).”<sup>248</sup> Now that the obstacles and objections have been removed. Leibniz is able to argue that the laws of optics are not just mechanical, but they are also teleological. There is a utility of final cause in the physics of optics!

Leibniz finishes this illustration with the words “*For the effect must correspond to its cause; indeed, the effect is best recognized through a knowledge of the cause.*” These words come in response to Spinoza's position on cause and effect. Their foundation lies in Leibniz's knowledge of Aristotle and his cosmological argument. Aristotle argues that

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246McDonough, “Leibniz on Natural Teleology and the Law of Optics” p. 514 – 515; McDonough, p. 515 gives the specific Leibnizian calculations which give a clearer geometrical understanding of what he is doing in refraction. “HF = HG = a, HB = x, CB = y, CB ⊥ FG, CP ⊥ ACB. As before, FCG = CF + CG =  $\sqrt{(y^2 + (a - x)^2)} + \sqrt{(y^2 + (a+x)^2)} = \sqrt{(y^2 - 2ax + a^2 + x^2)} + \sqrt{(y^2 + 2ax + a^2 + x^2)}$ . Taking the resistance of the upper medium to the lower medium to be as f to g, then the measure of the ease of the path FCG = f • CF + g • CG = f •  $\sqrt{(y^2 - 2ax + a^2 + x^2)} + g • \sqrt{(y^2 + 2ax + a^2 + x^2)}$ . In order to find the path FCG = CF + CG which is unique with respect to its ease (i.e. distance times length), Leibniz once again differentiates and sets the resulting equation equal to zero:  $f(d • CF) + g(d • CG) = f(d • \sqrt{(y^2 - 2ax + a^2 + x^2)}) + g(d • \sqrt{(y^2 + 2ax + a^2 + x^2)}) = f • (ydy + xdx - adx)/CF + g • (ydy + xdx + adx)/CG = 0$ . Calculating as above, yields: CF/CG = (f • PF) / (g • PG). Trigonometry is now sufficient to complete the proof.”

247McDonough, “Leibniz on Natural Teleology and the law of Optics”, p. 516

248McDonough, p. 512

for the existence of an “unmoved mover” which causes it all initially, and also that for every effect there must be a cause.<sup>249</sup> The passage regarding the relation between cause and effect which most likely has an influence on Leibniz is found in *Posterior Analytics* I 2 10-20 where Aristotle says,

“We suppose ourselves to possess unqualified scientific knowledge of a thing, as opposed to knowing it in the accidental way in which the sophist knows, when we think that we know the cause on which the fact depends, as the cause of that fact and of no other, and, further, that the fact could not be other than it is....What I now assert is that at all events we do know by demonstrations. By demonstration I mean a syllogism productive of scientific knowledge, a syllogism, that is, the grasp of which is eo ipso such knowledge. Assuming then that my thesis as to the nature of scientific knowledge is correct, the premisses of demonstrated knowledge must be true, primary, immediate, better known than and prior to the conclusion which is further related to them as effect to cause.”<sup>250</sup>

Aristotle's other comment which influences Leibniz is *Metaphysics* II 2 994a 16-19: “But of series which are infinite in this way, and of the infinite in general, all the parts down to that now present are alike intermediates; so that if there is no first there is no cause at all.”<sup>251</sup>

In 1676 Leibniz annotates Spinoza's *Letter 12*. This Spinozan work is a comment on Chasdai Crescas's cosmological argument for the existence of God in *Or Adonai*. Crescas argues that “if the cosmological proof is to have any validity, it cannot appeal to an alleged absurdity of an infinite regress, but must take a different form. In *Letter 12*, Spinoza summarizes Crescas's argument and the current debate with this statement:

But in passing I should like to note that the more recent Peripatetics have, as I think, misunderstood the demonstration by which the ancients tried to prove God's existence. For as I find it in a certain Jew, called Rab Chasdai, it runs as follows: if there is an infinite regress of causes, then all things that are will also have been caused; but it does not pertain to anything which has been caused to exist necessarily by its own nature; therefore, there is nothing in nature to whose essence it pertains to exist necessarily; but the latter is absurd; therefore, the former also. Hence, the form of this argument does not lie in the impossibility of there being an actual infinite, or an infinite regress

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249 McKeon, p. 878

250 McKeon, p. 111 – 112; see also Mancosu, Paolo. *Philosophy of Mathematics and Mathematical Practice in the Seventeenth Century*. Oxford University Press: New York, N.Y., 1996, p. 10-11

251 McKeon, p. 713; see Mogens p. 60

of causes, but only in the supposition that things which do not exist necessarily by their own nature are not determined to exist by a thing that does necessarily exist by its own nature (NS: and which is a cause, not something caused)".<sup>252</sup>

Spinoza does not believe in a first cause. He says, "God cannot properly be called the remote cause of singular things...For by a remote cause we understand one which is not conjoined in any way with its effect. But all things that are, are in God, and so depend on God that they can neither be nor be conceived without him."<sup>253</sup> Crescas thinks that necessary existence can only come from an uncaused being.<sup>254</sup> This is not Spinoza's position. He says in his *Short Treatise*, "God, the first cause of all things, and also the cause of himself, makes himself known through himself. So what Thomas Aquinas says, that God could not be proved a priori because he properly speaking has no cause- is not of much importance."<sup>255</sup> Spinoza thinks that God is an uncaused thing, as does Crescas, and God is the first cause of all things in the sense that "divine self-causation constitutes the common ontological ground of all finite things or causes."<sup>256</sup>

Leibniz agrees with Spinoza on the infinite. In his letter to Foucher (1693) he says, "I am so much in favor of the actual infinite, that instead of admitting that nature rejects it, as is commonly said, I maintain that it effects it everywhere, for better indicating the perfection of its author."<sup>257</sup> Leibniz sees his own principle of sufficient reason in Spinoza's analysis of Crescas's argument:

"This is is rightly observed, and agrees with what I am accustomed to saying, that nothing exists but that for whose existence a sufficient reason can be provided...From these considerations a truly memorable thing also follows, that what is earlier in the series of causes is not nearer to the Reason for the universe,i.e. to the first being , than what is later, nor is the First being the reason for the later ones as a result of

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252 Laerke, Mogens. *Archiv fur Geschichte Der Philosophie*. "Leibniz's Cosmological Argument for the Existence of God.' Vol. 93, No. 1, March 2011, p. 60

253 Laerke, , p. 60

254 Laerke, p. 61

255 Laerke, p. 61

256 Laerke, p. 61

257 Laerke, p. 63

the mediation of the earlier ones; rather, it is the reason for all of them equally immediatley.”<sup>258</sup>

When Leibniz talks about cause and effect in article #19, he is by no means talking about a first cause and later causes and effect in terms of priority. For Leibniz, there is no priority in cause and effect. Further, for Leibniz there is no cause and effect between finite substances at all. His thinking along these lines can be established from the 1670s. In *Demonstratio propositionum primarum, Confessio philosophi*, for example, Leibniz speaks of the principle of sufficient reason in terms of 'requisites'. The principle of sufficient reason of any one particular thing is the sum of its requisites. “If we correlate this view with the comments in *Letter 12*, it suggests that, in Leibniz's view, instead of seeing Leibniz as the 'first term' in the series of things, we must see him as the being that contains the requisites for the existence of all things.”<sup>259</sup> In his letter to Tschirnhaus concerning *Ethics*, Leibniz says, “God is the one all (*unus omnia*); for in him are contained the requisites for existing of all the others.”<sup>260</sup>

What does Leibniz mean by 'requisites'? The ingredients for Leibnizian causation are “order and consequence”.<sup>261</sup> He specifies between “conditions that are absolute and those that are relative to 'a certain mode of producing or existing'.”<sup>262</sup> Absolute conditions are inferences from the conditioned to the condition. This is “immediate and without the need of additional premises.”<sup>263</sup> An example would be a circle and the plane it is drawn on. The plane is a condition of a circle.<sup>264</sup> Sufficient conditions, for Leibniz are

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258 Laerke, p. 63 – 64

259 Laerke, p. 63 – 64

260 Laerke, p. 64

261 Futch, Michael. *British Journal of Philosophy of Science*. “Leibnizian Causation”, Vol. 56 (2005), p. 452

262 Futch, p. 453

263 Futch, p. 453

264 Futch, p. 453

principles. Causes are 'producers', principles or conditions prior by nature. These are called requisites.<sup>265</sup> In Leibniz literature, this information is used to produce four possibilities for what a cause is.

1. A cause is an immediate requisite, and thus a condition that is absolutely necessary for the existence of its effect.
2. A cause is a mediate requisite, and thus a condition that is necessary for its effect relative to a specified mode of existing.
3. A cause is an immediate producer, and thus a condition that is sufficient for the existence of its effect.
4. A cause is a mediate producer, and thus a condition that is sufficient for its effect relative to a specified mode of existing.<sup>266</sup>

In the middle period, causes, for Leibniz are only “mediateley related to their effects.”<sup>267</sup>

He says, “requisites of things are mediate, which through reason must be investigated,

such as causes.”<sup>268</sup> For Leibniz, “causes do not relate to their effects as parts of

wholes.”<sup>269</sup> He identifies causes with requisites.<sup>270</sup> A cause is a “necessary condition that

is related to its effect through the mediation of some law, rule or 'mode of producing'.”<sup>271</sup>

It is “a factor that contributes significantly to an actual effect by being a sufficient

condition for something that is, under a certain hypothesis, a necessary condition for the

occurrence of the effect.”<sup>272</sup>

The third illustration Leibniz uses is the prince and the cannon. At the end of

Discourse #19 he says,

*Moreover, it is unreasonable to introduce a supreme intelligence as orderer of things and then, instead of using his wisdom, use only the properties of matter to explain the phenomena. This is as if, in order to account for the conquest of an important place by a*

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265Futch, p. 455

266Futch, p. 456

267Futch, p. 458

268Futch, p. 458

269Futch, p. 458

270Futch, p. 458

271Futch, p. 458

272Rutherford, Donald. *Leibniz and The Rational Order of Nature*. Cambridge University Press: New York, N.Y. 1995 p. 115

*young prince a historian were to claim that it occurred because the small particles of gunpowder, set off by the contact of a spark, escaped with sufficient speed to push a hard and heavy ball against the walls of the place, while the little particles that make up the brass of the cannon were so firmly interlaced that this speed did not separate them, instead of showing how the foresight of the conqueror enabled him to choose the suitable means and times and how his power overcame all obstacles.*

Order in causation is important for Leibniz. An intelligent design is an ordered design. Leibniz says, “Order is the relation of several things, through which any one of them can be distinguished from any other.”<sup>273</sup> It is a “species of relation” in which things are related to each other.<sup>274</sup> Order is of two types, *situs*, which is the order of arranged parts or constituents, and the order which occurs “in a series or progression of things.”<sup>275</sup> Disposition and arrangement are essential components of complex beings. He says in *Cum Deo*, “Since everything which exists or which can be thought must be compounded of parts, either real or conceptual, there are two ways in which differences of kind can arise: either through a difference of parts or through a different arrangement of parts.”<sup>276</sup> Priority and posteriority determine order of succession.<sup>277</sup>

In 1687, Leibniz pens eight definitions concerning order.

(D1) If *A* is, then *B* is = *A* is an *inferens*, *B* is an *illatum*.

(D2) If *A* is not, then *B* is not = *A* is a *conditio*, *B* is a *conditionatum*,

(D3) *A* is *prior by nature* if its notion is simpler.

(D4) If *A* is not, then *B* is not, and if *A* is prior by nature to *B* = *A* is a *requisitum*, *B* is a *requirens*.

(D5) A *producens* is an *inferens* that is prior by nature, or at least what is in itself an *inferens* (i.e., if nothing impedes it) prior by nature.

(D6) A *relevans* is what renders a *relevatum* easier, or that which is a requisite on a certain hypothesis or according to certain circumstances and a certain mode of existing or producing.”

(D7) A *conferens* is a *producens* of a *relevans*

(D8) A *cause* is a *conferens* with outcome (*cum successu*), i.e. the *producens* of a requisite, on the hypothesis or according to the mode of existing by which a

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273Rutherford, p. 111

274Rutherford, p. 111

275Rutherford, p. 111

276Rutherford, p. 111, L, p. 80

277Rutherford, p. 111



thing in fact exists.”<sup>278</sup>

In (D1) *A* is “a sufficient condition for the existence of *B*”. In (D2) the existence of *A* is a necessary condition for the existence of *B*. In (D3) one thing can be prior to another. Leibniz says that that which is former is simpler. (D4) concerns the difference in requisites, which is important for all of Leibnizian metaphysics. In 1685 he says, “Some *requisita* of things are mediate which must be investigated through reasoning like causes; others are immediate like parts, limits and generally those things which are in (*insunt*) a thing”.<sup>279</sup> An immediate requisite is presupposed by another being and cannot exist without it.<sup>280</sup> (D5) stands in relation to (D1) as (D4) stands to (D2), “a *producens*, according to Leibniz, is an *inferens* that is also prior by nature.”<sup>281</sup> “(D6) next defines an example of a *requisitum mediatum*: a *relevans*, which is a *requisitum* 'on a certain hypothesis or according to certain circumstances and a certain mode of existing or producing.’”<sup>282</sup> In this state of contingency things existing in one state are not “a necessary condition per se for the existence of another thing, but only a necessary condition 'on a certain hypothesis’.”<sup>283</sup>

According to Rutherford, (D7) and (D8) are substituted for by Leibniz with the following:

(D7') A *conferens* is a *requisitum* according to some mode by which a thing could be produced. (D8') A *cause* is a *requisitum* according to that mode by which a thing has been produced. I prefer to call it an *efficiens*”.<sup>284</sup> Content wise, (D7') is the same as (D6), “Leibniz's definition of a *relevans*. This redefines a *conferens* as “a necessary

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278Rutherford, p. 112

279Rutherford, p. 113

280Rutherford, p. 113

281Rutherford, p. 113

282Rutherford, p. 113

283Rutherford, p. 113

284Rutherford, p. 114

condition for the existence of a thing according to some mode by which it could be produced.”<sup>285</sup> *Cause* is redefined by (D8'). It is now “a special case of a *conferens*, namely a necessary condition according to the mode by which a thing has in fact come into existence.”<sup>286</sup>

Leibniz gives an example of his meaning in *Vorausedition zur Reihe VI*,

where he says, “We say that a teacher contributes to the fact that human beings are happy, since he produces something that is necessary, namely knowledge from one experienced in some of the things necessary for happiness. However, the contributing (*conferens*) itself is not immediately *requisitum*. For to stay with the same example, we can learn the same things even without a teacher.”<sup>287</sup> According to Rutherford, Leibniz does not think that (D7') and (D8') “articulate an adequate definition of 'cause' since in limiting a cause to a necessary condition, they rule out those things, such as the teacher's instructions, which may in fact be effective in bringing about a certain outcome but are not necessary for it.”<sup>288</sup> “For this reason, he prefers to define a *conferens*, or contributing factor, more broadly as that which is sufficient for a requisite (or necessary condition) under a certain set of circumstances, and a *causal* as a conferees, which contributes to an effect that in fact occurs.”<sup>289</sup>

Leibniz says that there is wisdom in the order of things. That is why he chides those who introduce an intelligent author as creator of things, then turn around and attribute everything in causation to matter. His reaction to Spinoza's determinism drives him to begin including the wisdom of God and what is best in the mechanics of nature.<sup>290</sup>

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285Rutherford, p. 114

286Rutherford, p. 114

287Rutherford, p. 114 see V on p. xiii “G.W. Leibniz, *Vorausedition zur Reihe VI (Philosophische Schriften) in der Ausgabe der Akademie der Wissenschaften der DDR*. Ed. Leibniz-Forschungsstelle der Universität Munster. 10 Vols., with successive pagination. Munster, 1982 – 91.

288Rutherford, p. 114

289Rutherford, p. 114

290Garber, Daniel. *Leibniz: Body, Substance, Monad*. Oxford University Press: New York: N.Y., 2009 p. 233

In his *Conversation du Marquis de Pianist..., et dew Pete Emery Eremite* (1679-1681)

Leibniz says,

There are two extremes to avoid when dealing with the laws of the universe. Some believe that everything happens with a mechanistic necessity, as in a watch; others are persuaded that the sovereignty of God consists in a freedom without rule. The proper middle position is consider God not only as the first principle, and not only as a free agent, but to recognize in addition that his freedom is determined by his wisdom....When one has this idea of God, one can love him and honor him.<sup>291</sup>

So Leibniz ends Discourse #19 with a final example from machinery, the prince and the cannon, which appropriately illustrates the doctrine of interpenetration of causation. In order to consider seriously Spinoza's determinism, one has to think that the cannon loads itself, aims itself, and fires by itself. The Leibniz says is not real. There is no mind behind the action.

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291 Garber, *Leibniz: Body, Substance, Monad*, p. 233

## Conclusion

My purpose in writing this essay was to comment on article #19 of Gottfried Wilhelm Leibniz's *Discourse On Metaphysics*. In doing so, I have operated under the thesis that a proper interpretation of article #19 involves the context in which it is written, opposing philosophical viewpoints to Leibniz, and three Leibniz themes; final cause, intelligent design, and machinery. A study of this article leads one to an investigation of those philosophical questions and issues which represent the core of Leibniz's philosophy as a whole. They mirror his thinking in their words.

Leibniz believes that reality is a machine that operates according to two sets of laws, mechanical laws of motion represented in essential causation and teleological laws of grace represented by final causation. The machine is created by a loving person of intelligence, will, and power. The machine is preserved in its operation by this same person. This person is the God of Judeo/Christian belief and heritage. Leibniz believes that God created the machine according to mathematical, scientific, and logical truths, and that it functions on its own according to those principles. Equally as well, he believes that this same physical machine operates for an "end purpose". The substances which make up the physical machine, like rays of light, move for a reason. Nothing, Leibniz says, moves by accident or chance.

Leibniz believes that every physical entity has mind. Souls with mind possess earthly bodies and move freely towards an end in this best of all possible worlds. This

end is a meeting with God in the personage of Jesus Christ. The reason that there is something instead of nothing, ie. the reason for creation, is so that God can establish eternal relationships with individual souls who love him in return.

Article #19 is about the utility of final causes in physics. Leibniz makes this argument because of the “new philosophy” which sought to eliminate final causes from the sciences in the early modern period.. Most likely, the new philosophy was Cartesianism and those in its belief system who sought to eliminate final causes from the sciences and physics. Descartes and Spinoza, the two main philosophers of Leibniz's objection in #19, represented such opinions. They, along with those atomists who also sought to eliminate final causes, are the new philosophers who serve as those he is thinking about in #19. Leibniz's understanding of final causation is a combination of Aristotelian and Christian theology which produces in Leibniz's thought a method for understanding reality that surpasses what mere essential causation and its mechanism could produce. After abandoning substantial forms for mechanism early on, he comes to realize that not everything can be explained through essential causes. With only mechanism at his disposal, Leibniz finds that he cannot answer the “why” of anything. Therefore, Leibniz embraces final causation. A study of Leibniz's career from beginning to end is a study in a philosopher who sought to explain “why”, and not just “how”, physical reality operates through the employment of both essential and final causation.

The challenge of Descartes is that his banishing of the search for final causes in physics leaves him with no explanation as to why anything moves or exists as it does. By wanting to banish the *search* for final causes, Descartes is saying that final causes do exist, i.e. physical reality does move with a purpose, but he simply does not know what

the purpose is. Descartes wants to banish the *search* for final causes, and he finds final causes in physics to be utterly *useless*, but never he never states that there are no final causes at all. Descartes believes that the attributes of God make God incomprehensible and his ways beyond understanding. He therefore does philosophy apart from the understanding of the ends of God in both the Bible and Catholic theology, a theology which is built upon the Bible and the church fathers. As a result, his philosophy does not undergird Christian theology, either Biblical or Catholic. Rather, it leads to the single substance atheism of which Spinoza is accused.

Spinoza takes Descartes' single substance idea seriously and adopts it as the cornerstone of his philosophy. There is, and there can only be, one substance. This make him a pantheist and an atheist by the definition of seventeenth century atheism, which is denial in the Christian God. Spinoza shares Descartes' problem of not being able to explain the why of anything. He is the opposite of Leibniz. God is not a person. God does not think, has no will, and does not care. It is fallacious reasoning, Spinoza believes, to think otherwise about God. God is in all of nature, and all of nature are just attributes and modes of the one substance. He believes that physical reality occurs necessarily out of God's nature. There is no end purpose for which the world moves. This sets him at odds with the Christian public who find him to be near the devil incarnate.

Article #19 is part of Leibniz's attempt at reconciliation between Catholics and Protestants. It's contents are very appropriate for this cause, but it is a lost cause. Leibniz has severely overestimated his capabilities. One thing that these two parties can agree on, however, is that the world moves for an end purpose. Further, Catholics and Protestants alike think that it is rational to think so. For these reasons Leibniz's design

argument is highly appealing to both groups. Leibniz's problem is that he sends an outstanding piece of philosophical literature to a person who is probably the wrong Catholic to send it to. Though Arnauld is a tremendous thinker in his own right, his Jansenism puts him in too partisan a position within Catholicism. Leibniz should have sent a complete copy of *Discourse on Metaphysics*, along with its partner work *Systema Theologicum*, to a Catholic official more acceptable to the Roman Church at large.

To study article #19, one must confront Leibniz's intelligent design argument which involves Leibniz's protestant theology as well. If one is not willing to do this, one ultimately cannot comprehend Leibniz. The interpreter is left with half an understanding, which is exactly what Leibniz was trying to avoid. An intellectually honest approach to Leibniz, which, in this day and time is admittedly politically incorrect, requires a grasp of how everything for this thinker comes down to the two laws of essential and final causation working together in harmony. To understand Leibniz is to understand The Doctrine of Interpenetration of Causation. The math, logic, physics, science, and theology of Leibniz are all involved in this doctrine. His monads even work according to both sets of laws.

A popular concept in the early modern period is “machine”. Descartes used the term in reference to animals. If Leibniz would have known about the combustion engine, he would have said that reality is a machine with a two cylinder engine. It is designed by God and operates according to two sets of laws. He illustrates his design concept in #19 with three examples of the machine; animal structure, optics, and the prince and the cannon. Animals are structured as they are because they are supposed to be. The cheetah

runs fast and the tortoise runs slow because they are supposed to. Otherwise, the cheetah would run slow and the tortoise would run fast. It is the way the great architect designed them to be. This is #19, an example of rationality from the principle of sufficient reason.

The most convincing design argument proof in #19 is his mentioning of the human eye. One could argue that his line of thinking is too similar to the fallacious argument that oceans were made salty so that ships would float in them. Spinoza must be right. It just happens that we see because it happens that we have eyes. Leibniz's attack in #19 is on the issue of random chance. Eyes do not exist by random chance, and the most determined path taken by rays of light proves this. Of the infinite possible paths light rays can travel, they always take the easiest path. This, Leibniz concludes, is no accident or chance occurrence. To him, this is evidence that an intelligence is guiding the machine. Therefore, Spinoza is wrong, eyes were made for seeing.

In his last illustration, he seeks to link the loving person God with the operation of the machine in the story of the prince and the cannon. Simply put, cannons do not construct, load, or fire themselves. They must be constructed, loaded, and fired by an outside agent. The prince is the outside agent, a person of intelligence and will, who by his power successfully conquers the castle. In Leibniz's thinking, this same principle is true of all reality, from the human eye to the structure of animals to the actions of souls who might love God in return. Leibniz says that this is all God wants. He has designed a best of all possible worlds, pre-established from the beginning, to run on two sets of laws, one mechanical and one teleological, so that intelligent souls might recognize him when they see him and thereby love him. Discourse on Metaphysics #19 is part this Leibnizian rationale.



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