Thomas Reid on the Plurality of Worlds: Scottish Contexts and Beyond

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This paper will examine the function of the plurality of worlds' idea in Thomas Reid's philosophical approach to human nature, giving several examples of the pluralism of other Scottish philosophers and showing what the modern pluralist ideas implied to the intellectual community of the century.

Reid advocated pluralist ideas modestly and in a reserved manner. Although not directly referred, pluralism is one of the bases of his moral philosophy. His neumatology was the study of universal mind, the mind of God and of other intelligent beings supposed to exist somewhere in the Newtonian infinite universe, through the empirical investigation of human mind as the only one example available to human intelligence. Reid seems to have employed the same approach in his study of human nature as Kant did in his critical period. Reid also seems to consider the possibility of the existence of higher space-time continuum in his tale of Idomenian philosophy in his *Inquiry*. With his cautious empiricist attitude, Reid accepted the pluralist idea of the age and used it to stimulate his imagination both in natural science and moral philosophy.

Ⅰ. Introduction

The idea of the plurality of worlds is well known to the students of the 18th century literature. There are many examples of the usage of the idea in the century, including *Micromégas*[1] of Voltaire, which followed the literary works of the of 17th century authors such as of Cyrano de Bergerac[2], Francis Godwin[3] and the very successful philosophical nursery story of Bernard Le Bovier de Fontenelle (1657 — 1757), *Entretiens sur la pluralité des mondes*, 1686. These texts seem to show that the new views of nature, outlined by Copernicus and established by 17th century scientific developments that culminated in Newtonian cosmology, stimulated 18th century writers. The newly demonstrated existence of vast universe allowed them to exercise their imaginations in the infinite space. The visual representations of intelligent beings on other planets and on other solar systems gave them new means to construct allegory in order to criticise the prejudices of their own societies and the religious dogmas of Christian church. Cartesian and Newtonian universe were imaginary fulcrums, from which every worldly order could safely be reversed, hence gave ways to express and develop, in the forms of scientific allegory, the critical spirit of the Enlightenment.

However, the readers of the following

text, a passage from the book, entitled *An Account of Sir Isaac Newton's Philosophical Discoveries*", would find something very different from the description above of 18th century pluralism. The author is Colin MacLaurin, a Scottish and the greatest British mathematician in the 18th century after Isaac Newton. The plurality of worlds is not an allegory in his scientific writings. The existence of extra terrestrial intelligent life form is the matter of scientific discussion for him. MacLaurin was a strict empirical Newtoninan and therefore it is natural for him to write that their existence could not be proved by the method of experimental philosophy, "experiments and observations", the central methodological credo of British Newtonians of the century. The reasoning of natural religion is also visible in his arguments. Observing the magnificence of the universe by telescope, human beings forced to admire the intelligence of its creator. But the reason of his creation of valleys, mountains and caves on the surfaces of other planets remains to be hidden from them.

> We cannot but take notice of one thing, that appears to have been designed by the author of nature: he has made it impossible for us to have any communication from this earth with the other great bodies of the universe, in our present state; and it is highly probable, that he has likewise cut off all communication betwixt the other planets, and betwixt the different systems. We are able, by telescopes, to discover plains, mountains, precipies, or for cavities in the moon: but who tread those precipies, or for what purposes those great cavities (many of which have a little elevation in the middle) serve, we know not; and at a loss to conceive how this planet, without any atmosphere, vapours, or seas, can serve for like purposes as our earth. We observe sudden and surprizing revolutions on the surface of the great planet Jupiter, which would be fatal to the inhabitants of the earth…It does not appear to be suitable that we should see so far, and have our curiosity so much raised concerning the works of God, only to be disappointed at the end.[4)]

His discourse then shows a strange twist. He has just acclaimed that we could not know the usage of the structures of planetary surfaces. Now he seems to accept the existence of extra terrestrial intelligent life forms in the universe as a matter of fact. The fact that human beings cannot understand the rational reason of the creation of the environments on other planetary bodies suddenly becomes the evidence for the imperfection of human intelligence in the

present stage. Furthermore, it demonstrates that human intelligent capacity can develop further to the point where it is able to solve the mysteries of the god's creation. His argument goes as follows; it is against the notion of the omnipotent intelligence of the god that the mysteries of the creation are destined not to be understood by all numerous intelligent minds in the universe. If it were true, both the mind and the body in the universe had been created with carelessness. This could be true if only the brains of human beings had to stay in disarray because their ancestor had committed original sin and brought the consequent corrupted existence of them in the world. But the idea of the universal despair of all scientists of all intelligent life forms in the universe is utterly unconceivable. Therefore, the mysteries of the creation must be understood by them, including human scientists in the future.

> As man is undoubtedly the chief being upon this globe, and this globe may be no less considerable, in the most valuable respects, than any other in the solar system, and this system, for ought we know, not inferior to any in the universal system so, if we should suppose man to perish, without ever arriving at a more complete knowledge of nature, than the very imperfect one he attains in his present state; by analogy, or parity of reason, we might conclude, that the like desires would be frustrated in the inhabitants of all the other planets and systems; and that the beautiful scheme of nature would never be infolded, but in an exceedingly imperfect manner, to any of them. This, therefore, naturally leads us to consider our present state as only the dawn or beginning of our existence, and as a state of preparation or probation for farther advancement.[5)]

As an 18th century scientist and philosopher, MacLaurin believed that humanity could attain to moral perfection. The presupposition of the existence of intelligent life forms in the outer space was given the major role in his demonstration.

The historians of science have demonstrated the thesis that in the 18th century the existence of extra terrestrial intelligent life form was widely taken for granted and the belief continued to exist by the late 19th century.[6)] Until the modern science as the cluster of specialized disciplines emerged in the 19th and 20th century, Copernican system could not be separated from "the plurality of the world,"[7)] especially after Galileo found mountains and valleys on the surface of the moon by newly invented telescope. Many of eminent astronomers and

natural scientists believed the existence of extra terrestrial intelligent life form, or at least felt no need to deny the probability to it[8]. The significance of the idea in the 18th century intellectual historiography is yet to be explored.

MacLaurin's text is a good example that the idea of the plurality of worlds was, beyond the usage of literally symbolism, an essential component of 18th century's knowledge system that encompassed natural science, natural religion and the Enlightenment philosophy. There are not many passages in the writings of Thomas Reid on the subject. But his references to the idea give us an insight into the scientific and philosophical backgrounds of the spread of the pluralist idea in the century, especially in Scotland. And conversely, seen in this context, the relationship between Reid's scientific views and his philosophical attempts could more clearly be analysed.

Considering the extent of the diffusion of the pluralism in the century, the paper will give only a brief outlook of its Scottish context. It will discuss, firstly, the pluralism of Baconian empiricist interpretation of Newtonian philosophy gives evidence to the seriousness of 18th century Newtonians' belief in plurality and highlights its role in their natural theology that was generally perceived as the synthesis of modern cosmology and Christian belief system: Secondly, the theological tract of Hugh Blair and the writings Adam Ferguson present how modern pluralism, which was thought to have been demonstrated by Newtonian philosophy, incorporated into the views of Scottish moral philosophers in the late 18th century. Thirdly, Scots also contributed to the popularization and defence of pluralism in the early 19th century in the form of the Evangelic pluralism of Thomas Chalmers and David Brewster.

Compared with these contributions of Scottish philosophers and scientists to the plurality debates and the straightforward supports of its existence, Reid advocated pluralist ideas more modestly and in a reserved manner. He mentioned the idea in his books and the lectures. Reid's attitude to the plurality is based on his rigorous empiricist methodology of his philosophy of science. He considered the existence of extraterrestrial worlds as the matter of analogy and probability. Although not directly referred, pluralism is one of the bases of his moral philosophy. His neumatology was the study of universal mind, the mind of God and of other intelligent beings supposed to exist somewhere in the Newtonian infinite universe, through the empirical investigation of human mind as the only one example available to human intelligence. Reid seems to have employed the same approach in his study of human nature as Kant did in his critical period.

Reid also seems to consider the

possibility of the existence of higher space-time continuum in his tale of Idomenian philosophy in his *Inquiry*. His caricature of "Idomenian Newton" could have been the modest expression of his inspiration that the supposition of high dimensionality could solve the Gordian knot of Newtonian science, the mystery of the cause of universal gravitation.

With his cautious empiricist attitude, Reid accepted the pluralist idea of the age and used it to stimulate his imagination both in natural science and moral philosophy.

Ⅱ. The plurality of worlds in Scottish contexts

In the 18th and early 19th century, Newtonianism accompanied by the idea of "plurality of worlds". Most of Newtonian scientists looked the idea as an inseparable part of Newtonian system of the universe. Laplace wrote in the concluding chapter of his *System of the World* published in 1796.

> Their existence is, at least, extremely probable.[9)]

Newtonians took the existence of extra terrestrial intelligent life forms for granted for the following reasons. Firstly, telescope was just invented in the 17th century and it was not yet a mature technology. The accuracy of astronomical observations heavily depended upon human skill. In addition, there was no exact theory both of the environments of planets and the conditions of life on them, because astrophysics and biochemistry were not there. Even in the 19th century, William Hershell could believe that the sun was inhabited. Secondly, astronomy had been until very recent years the science whose method of scientific investigation was observations only. This caused the methodological difficulty to the debate. It is logically impossible to give a counter example against the proposition that there is an intelligent life form somewhere in this boundless universe. The plurality debate only ends when an example, not a counter-example, has been given.

Thirdly, as Arthur Lovejoy pointed out,[10)] both the concept of plenity that inherited from ancient Greek and the idea of Christian God as the creator were crucial to the diffusion of the belief. Pascal's fear for the vast material universe gives a good example how difficult in early modern periods to imagine the mindless universe. This explains the eagerness of western scientists to believe in the pluralism that had no empirical evidence. Richard Bentley's tract "A Confutation of Atheism from the Origin and Frame of the World" shows the typical argument from natural theological grounds, which appeared in the publication[11)] of one of the most celebrated scientists of the

"scientific revolution", then endlessly repeated in pluralist literature of the late 17th and 18th century.[12] Philosophy, religion and science were in the state of cohabitation in the century. They composed an integrated knowledge system and reasoning occurs in one area flows into the other two without any disciplinary resistance. This characteristics of early modern science disappeared when the institutionalization of science completed.

Fourthly, and most importantly, as advocates of modern pluralism such as Thomas Paine acclaimed, the idea that there are other worlds beyond our reach was widely held by the many ancient philosophers.[13] Similar notions can be found in ancient Chinese and Indian philosophy.[14] The singularity of world and the plurality of worlds were competing ideas in the ancient.[15] Modern pluralism is the revival of these traditions that the success of Platonist and Aristotelian philosophy had once marginalised.

Among the advocates of pluralism in the 18th century, there were many Scottish. John Keill, who born in 1671 and died in 1721, was a prominent Scottish natural scientist and a professor of natural philosophy of Oxford. He published several text books on Newtonian natural philosophy and astronomy that were translated into many European languages. The Japanese translation of his book, *An Introduction to the True Astronomy* in 1718, presented Copernican system and Newtonian astronomy to early modern Japanese scholars in the late 18th and early 19th century.[16]

Keill was one of the leading advocates of the pluralism in Newtonian camp.

> It is no ways probable, that God almighty, who always acts with infinite Wisdom, and does nothing in vain, should create so many Suns, and place them alone in indefinite Space, at such great Distances from each other, and not have made other Bodies, which he has placed near them, to be nourished, animated, and refreshed with the Heat and Light of these Suns: Those who affirm, that God created these great Bodies only to give us a small dim Light, must have a very mean Opinion of the Divine Wisdom. It is reasonable to suppose, that every Sun is surrounded with a Company of Planets peculiar to himself, which in different Periods, and at different Distances, perform their Circulations round their proper Sun; and who knows but that some of these Planets may have Moons, and other Bodies, to attend them in their Circulation?
>
> Hence we may frame to ourselves an admirable magnificent Idea or Notion of the Vastness or Amplitude of the World, by imaging an indefinitely great Space of the Universe, in

> which there are placed innumerable Suns, which, tho' they appear to us like so many small Stars, yet are Bodies which are not behind our Sun either in Bigness, Light, or Glory; and each of them constantly attended with a Number of Planets, which dance round him, and constitute so many particular Worlds or Systems: Every Sun doing the same Office to his proper Planets in illustrating, warming, and cherishing them, that our Sun performs in the System to which we belong.
>
> Hence we are to consider the whole Universe as a glorious Palace for an infinitely Great and every-where-present God; and that all the Worlds or Systems of Worlds, are as so many Theatres, in which he displays his Divine Power, Wisdom and Goodness.[17]

The fillowing tract of Hugh Blair is a good example how these Newtonian arguments were accepted in the Scottish Enlightenment. One of the most celebrated famous preachers and the literati of the century acclaimed that the "creation" of the world in Bible meant the creation of the earth as a planet by the god.

> But there was a period when this globe, with all that we see upon it, we have no reason to think, that the wisdom and power of the Almighty were then without exercise or employed, Boundless is the extent of his dominion. Other globes and worlds, enlightened by other suns, may then have occupied, as they still appear to occupy, the immense regions of space. Numberless orders of beings, to us unknown, people the wide extent of the universe; and afford an endless variety of objects to the ruling care of the great Father of all. At length, in the course and progress of his government, there arrived a period, when this earth was to be called into existence.[18]

Along with preachers who learned Newtoninan natural theology of Bentley and others to reconcile new science and Christian religion, the moral philosophers of the century tried to incorporate their ethical views in the "scientific" cosmology of pluralism, as Adam Ferguson expressed in his late writings. The last survivor of the Enlightenment literati, composed his speculations of omnipresent intelligence on the common cosmological knowledge which Keill and MacLaurin had displayed. He first asks himself the reason of the existence of vast material universe that modern astronomy has found. Then he calculates, as a political economist, the "population" of intelligent beings in the universe from human experience and estimates that it would be two

thousands millions of millions, enough to cover the whole of the universe. He concludes that the populousness of the universe is the basis for human moral advancement, because the idea of the existence and the number of the higher ranks of intelligence encourages men to improve themselves mentally and spiritually by the psychology of emulation that he sees the psychological engine of the improvement and progress of commercial society.

> From the magnitude etc. of planets they were guessed to be worlds like this earth, and from their motions this earth was guessed to be a planet like them. Of this there is now no doubt, but when we would go farther and guess they are inhabited, we must admit the probability of great variety as well as analogy in the forms of existence in comparison with that we experience...
>
> So great, so numerous are the forms of material existence. To what effect or for what purpose?... Is the universe of body then formed for the sake of mind alone? ...
>
> if every planet in the solar system has been equally productive, the sum will amount to seven hundred thousand millions; and if every fixed star supposed to be two thousand is but the sign post if a system similar to ours, let imagination try to accompany in thought two thousands millions of millions which figures may in vain be used to express and let the vanquished conception acknowledge that the material world, however great, is still subordinate, and even upon such data as the material world itself can supply must shrink in magnitude as well as in estimation before the world of living and conscious existence whose essence is power and distinction, felicity...
>
> When the aspiring mind recalls the millions of millions and hundred thousands of millions of millions with whom he may now have to contend for distinction, he may possibly shrink in despair. But if he judge aright, the object of a just ambition is not comparative but of an absolute value. That in which the value of existence itself consists is the capacity of happiness, and the happy mind is of the highest value whatever be the number that partakes in the same distinction.
>
> If you perform what in the present moment what you are called upon to do with benignity, diligence and resolution, you are happy.
>
> To this it may be subjoined that the multitude of competitors in the same pursuit will not impede but promote the success.[19)]

Astronomy, plurality, political economy and Stoic virtues are consciously mixed together in Ferguson's memoir in order to demonstrate the idea of human moral progress.

However, pluralism was not always a good friend of Christian faith. Deists like Thomas Paine used this "scientifically well-established fact" as the lethal weapon against Christian doctrines. Newtonian pluralism is the fundamental faith of Paine's natural theology. Following the arguments of the discourse of Fontenelle, the author of *Common Sense* dramatically described the impossibility of reconciling pluralism and Christianity in his philosophical masterpiece, *The Age of Reason; Being an Investigation of True and Fabulous Theology*, published in 1794, 1795 and 1807.

> By this easy progression of ideas, the immensity of space appear to us to be filled with the system of worlds; and that no part of space lies at waste, any more than any part of our globe of earth and water is occupied[20]

> From whence then could arise the solitary and strange conceit that the Almighty, who had millions of worlds equally depended on his protection, should quit the care of all the rest, and come to die in our world, because, they say, one man and one woman had eaten an apple![21]

> on the other hand, are we suppose that every world in the boundless creation had an Eve, an apple, a serpent, and a redeemer? In this case, the person who is irreverently called the Son of God, and sometimes God himself, would have nothing else to do than to travel from world to world, in an endless succession of death, with scarcely a momentary interval of life.[22]

Evangelicans, tormented by antagonism between their faith and the "scientific fact", finally found the effective counter attack to the deists' argument in the preaching of Thomas Chalmers in the early 19th century. He praised the wisdom of almighty God that had created numerous worlds.

> Each of these stars may be the token of the system as vast and as splendid as the one we inhabit. Worlds roll in these distinct regions; and these worlds must be the mansions of life and intelligence.[23]

Then he tried to persuade the Christian audience to accept the results of modern science by saying that the reason the god had sent his son to the earth, the meanest part of the glorious

universe, was to show the infinite mercy of the god almighty. Other intellectual beings on other planets and systems must have had the way, which was unknown to us, to observe the act of redemption and they must have known the enormous love of the god toward his creatures.

> from which we indistinctly guess at the fact that the redemption itself may stretch beyond the limits of the world we occupy.[24)]

> if the contemplation of God be their supreme enjoyment, then the very circumstance of out redemption being known to them, may invest it, even though it be but the redemption of one solitary world, with an importance as well as the universe itself. It may spread amongst the hosts of immensity a new illustration of the character of him who is all their praise, and in looking towards whom every energy within them is moved to the exercise of a deep and delighted admiration.[25)]

From the early 18th century to the middle of 19th century when astronomer David Brewster in Edinburgh bitterly criticised the anti-pluralism of William Whewell,[26)] Scotland was not an exception as the fertile territory of the plurality of worlds.

Thomas Reid and the plurality of worlds

Having enough skill and knowledge as a natural scientist, Thomas Reid was more cautious than Blair or Ferguson. However, he seems to have been following the argument of MacLaurin. As Michael J. Crowe referred,[27)] Reid wrote in his Inquiry that although the existence of other worlds had not yet proved, its probability was not little.

> Besides the pleasure we receive from analogies, they are of very considerable use, both in helping us to think about things that we can't easily get hold of without that handle, and in leading us to probable conjectures about the nature and qualities of things that we haven't the means to investigate more directly. When I consider that the planet Jupiter is like the earth in this: it rotates around it sown axis, revolves around the sun, and is lit up by several secondary planets as the earth is lit up by the moon, I am inclined to conjecture from analogy that, as these features of the earth fit it to be the habitation of various orders of animals, they also make the planet Jupiter fit to contain animals; and having no more direct and conclusive argument to settle the matter, I accept the conclusion of this analogical reasoning, with a degree

> of assent proportioned to its strength.[28]

As expected from his strict empirical Newtonianism,[29] Reid's position towards plurality is the same as French Newtonian scientist Laplace: that is, the existence of other worlds is not yet demonstrated or cannot be demonstrated, but very plausible. It is foreseeable from his Newtonian tendency that, as a scientist, Reid was a pluralist as his fellow Newtonian scientists with cautious empiricist reservations.

Moreover, Pluralism seems to contribute to his design of moral philosophy. Reid taught in the lectures on moral philosophy at Glasgow University that the human nature was the sole empirical subject available to us from which we understood how mind worked. In this context, "the mind" means universal intelligence whose owners include God, angels and the probable inhabitants of other planets and other systems. His Treatise expressed the notion in its introduction. Reid points out that although the existence of extra terrestrial intelligence is very probable, there is no means to know them. The knowledge of them remains in the domain of conjecture.

> What variety there may be of minds or thinking beings throughout this vast Universe, we cannot pretend to say. We dwell in a little corner of God's dominion, disjoined from the rest of it. The Globe which we inhabit is but one of seven planets that encircle our sun. What various orders of beings may inhabit the other six, their secondaries, and the comets belonging to our system, are things altogether hid from us. Although human reason and industry have discovered with great accuracy the order and distances of the planets, and the laws of their motion, we have no means to corresponding with them. That may be the habitation of animated beings is very probable; but of the nature, or powers of their inhabitants, we are perfectly ignorant.[30]

Therefore, according to the methodology of experimental philosophy, the subject of the study of mind is limited to human mind.

> Every man is conscious of a thinking principle or mind in himself, and we have sufficient evidence of a like principle in other men. The actions of brute animals show that they have some thinking principle, through of a nature far inferior to the human mind. And everything about us may convince us of the existence of a supreme mind, the Maker and Governor of the Universe. There are all the minds of which

reason can give us any certain knowledge.[31]

Reid divided the entire body of science of the universe into two branches; the science of body and the science of mind. Their subjects are respectively called material world and intellectual world. As the body presents in every part of the space in the universe, the mind is thought to prevail all over the universe, too.

> The whole system of bodies in the Universe, of which we know but a very small part, may be called the Material World; the whole system of minds, from the infinite Creator to the meanest creature endowed with thought, may be called the Intellectual World. These are the two great kingdoms of nature that fall within our notice.[32]

From this definition of the science of the universe and the position of the study of mind in it, it is obvious that the extension of the concept of his "philosophy of mind" theoretically includes other kinds of minds, such as the minds of other intelligent beings as well as of the god.

The same constellation of cosmology and moral philosophy was more explicitly described in the philosophy of Reid's counterpart in the continent. Immanuel Kant attempted once to build the "exact science" of extra terrestrial intelligence in his *General natural history and theory of the heaven* in 1755.[33] Even after giving up the attempt, he still remained to be certain in pluralism. In his masterpiece, *The Critic of Pure Reason*, Kant maintained that his theory of cognitive faculties of human mind could be applied to other intelligence in the universe.[34] In *The Critic of Practical Reason*, he stated that the principle of morality must have been the law of all reasonable beings (alle Vernünftige Wesen).[35] In his *The Concept of General History Viewed from the Standpoint of World Citizen* in 1784, he explained that the global government should be established in the future because human being, as a reasonable being, only could reach the degree of perfection not in the form of individual perfection but in the form of spieces (die Gattung), though individual perfection could be attained by other intelligent beings in the universe.[36] In this context, the famous passage in *The Critic of Practical Reason*[37] can be interpreted as follows; When looking at the stars in the night, men will be overwhelmed by the infinity and varieties of other worlds up there that are far beyond the reach of their cognition (unabsehnliche Grosse mit Welten über Welten und Systemen von Systemen[38], eine zahllose Weltmenge[39]). But when they turn their eyes into their own hearts, they will find them an

infinite inner world,[40] the moral world of reason, which must be shared by other numerous intelligence inhabiting there. Men will be encouraged by the fact that, although very mean and poor, they are the citizens of moral kingdom that was created by the intelligent god.

There is difference between the study of mind of Reid and Kant. Reid employed empiricist methodology. Kant in his critical period preferred strictly philosophical approach. But the entire concept of the study of mind of them is identical in the way that it designed to be the study of mind of universe examining human mind as the sole example. The belief in the universality of reason was their common ground. Both believed in the superiority of the mind over the matter. This was for them visually represented in the pluralists' idea of the mind that flourishes all over the cosmic space. Though humble and weak, human beings have the quality that can connect themselves, through their inner self, to innumerable other minds in the infinite space and to the basis of the worlds, the god himself. The ancient concept of universal reason that prevails in the world in some forms was still active behind their ways of philosophizing in the 18th century.

Ⅲ. Plurality and high dimensionality in "The Geometry of Visible"

Besides the similarity to Kant as a continental philosopher who considered the results of Newtonian methodology and cosmology very seriously, Reid as a British empiricist philosopher had another ground to contemplate on the plurality of worlds. Empiricist philosophy taught him that human reason was restricted by the power of human perception. The god has mercy to give human being his own faculty, the reason. But this is not enough to uncover the mysteries of nature by human scientists. Reason and empiricist methodology are not the panacea. They are, as Francis Bacon and Galileo Galilei had described, more likely to be a torch or a compass that advise travelers on their ways in a deep forest.

John Keill employs the familiar metaphor that even Bacon and Galileo used in their methodological statements[41].

> In most of the other Arts there are several inextricable Labyrinths[42].

This old metaphor of the "Labyrinth" is given new methodological meaning in Keill's arguments. Keill was very aware that Newtonian science depended upon the linearity of subject-matter. He would not deny the existence of the complexity of nature; therefore it could not possible

to solve the mystery of nature completely by the hands of human being.[43] Keill is conscious that in other domains of scientific researches, the way to uncover the hidden truth of nature will not be easy.[44]

Henry Pemberton's account of Newtonian physics contrasted two kinds of ways in which scientific investigations had been carried out. One was the method of continental thinkers like Descartes and Leibnitz, who easily jumped at uncertain general axioms from hard empirical data. The other was the cautious empirical approach of Newtonians who were very careful in generalising the results of "observations and experiments".

> the other is to proceed cautiously, to advance step by step, reserving the most general principles for the last result of our inquiries.

The concept behind this methodological viewpoint became clearer when he began to paraphrase Francis Bacon. He discussed four points that Bacon had made on the causes of fallacies in sciences. The first was "the weakness of our senses, and of the faculties of the mind". This weakness of human cognitive faculties tended to create the artificial assumptions of the laws of nature and resulted in "forming to ourselves a fanciful simplicity and regularity in natural things". On this assumption of the inability of human cognitive power, he restated the methodology of Newton and Locke.

> the philosopher's first care must be to distinguish, what he sees to be within his power, from what is beyond his reach.

Pemberton's methodology digested the points made by skeptical philosophy. As a scientist, he did not give up the unveiling of the general laws of nature. But he did not think that human nature had enough power to bring the deepest causes of beings to light. The fundamental assumption lying behind his method was the belief that the world including final cause was too mysterious to be perceived by human race.

> the subtlety of nature far exceeds the greatest subtlety of our senses or acutest reasoning.

The world was so built that the individual chains of cause and effect can be observed and understood by humans through the careful step by step approach of Newtoninans. However, the whole of these chains would never be grasped by human being, for the very mystery of being had been designed to be hidden from them.

> many things are concealed from us, which have the greatest effect in producing natural appearances.

Therefore, scientists have "to advance by slow and cautious steps", look not for the final cause but for "intermediate causes" of phenomena.

Following these line of arguments, MacLaurin wrote that the concept of gravitation was treated as an occult quality and condemned by Newton's enemies, because it demonstrated the inability of human intelligence to understand the whole of nature.

> The truth is, he had, with great evidence, overthrown the boasted schemes by which they pretended to unravel all the mysteries of nature; and the philosophy he introduced, in place of them, carrying with it a sincere confession of our being far from a complete and perfect knowledge of it.[45]

The following passage of MacLaurin shows the symbolism of the quest for the universal truth, which 18th century British Newtonians had in common with their predecessors in the 16th and 17th century.

> The great mysterious being, who made and governs the whole system, has set a part of the chain of causes in our view; but we find that, as he himself is too high for our comprehension, so his immediate instruments in the universe, are also involved in an obscurity that philosophy is not able to dissipate;...but still we find ourselves at a distance from Him, the great force of all motion, power and efficacy; who, after all our enquiries, continues removed from us and veiled in darkness.[46]

The Newtonian system is logically not perfect, because human cognition is imperfect in its nature.

Reid was aware of the metaphor that Keill, Pemberton and MacLaurin used. He employed the same word to the study of human mind.

> "Success in an inquiry of this kind, it is not in human power to command; but perhaps it is possible, by caution and humility, to avoid error and delusion. The labyrinth may be too intricate, and the thread too fine, to be traced through all its windings; but if we stop where we can trace it no farther, and secure the ground we have gained, there is no harm done.[47]

He repeated the same phrase in his late tract of utopian system.

> The Heart of Man is a Labyrinth,

too intricate to be fully traced by his Understanding.[48)]

Once placed in these contexts of early modern science and empiricist Newtonianism, the episode of Idomenian Newton in *Inquiry's* "The Geometry of Visible" could be interpreted as Reid's expression of physical pluralism.

Reid not only stated the scientific plausibility of the plurality of worlds several times, He put pluralist allegory in the centre of his masterpiece. He tried to give a good example of his new geometry by describing an image of intellectual beings on the moon which had only two dimensional perceptions.

> the being we have supposed, having no conception of more than two dimensions, of which the length of a line is one, cannot possibly conceive it either straight or curve in more than one dimension.[49)]

Then a mysterious figure of Rosicrucian philosopher and a traveller to the moon suddenly made an appearance in the middle of the very complicated arguments of non Euclidean geometry. Reid introduced him in the way of legitimate Rosicrusian mythology, as a keeper of the ancient wisdom and an extraordinary traveller who could transport himself everywhere in a second.[50)] His respectful attitude toward the man seems incompatible with his expression of contempt for Paracelsian tradition that constituted the intellectual context of Rosicrusian affairs in the 17th century.[51)]

> As it is more difficult to attend to a detail of possibilities, than of facts even of slender authority, I shall beg leave to give an extract from the travels of Johannes Rudolphus Anepigraphus[52)], a Rosicrusian philosopher. Who having, by deep study of the occult sciences, acquired the art of transporting himself to various sublunary regions, and of converting with various orders of intelligences, in the course of his adventures, became acquainted with and order of beings exactly such as I have supposed.[53)]

As well as the usage of the metaphor of the world as labyrinth in Renaissance and early modern science, these sentences may suggest that the founder's adoration toward prisca theologia, ancient theology, which had been a driving force of the early modern quests for the hidden knowledge of humanity and nature, still preserved in the forms of rhetoric in Newtoninan tradition in the century. On the other hand, Reid's historiography of Idomenian science that culminated in the entrance of "Idomenian Newton", looks more a caricature of Newton rather than being homage to him.

> In the mean time, natural philosophy began to rise from its ashes. Under the direction of a person of great genius, who is looked upon as having had something in him above Idomenian nature. He observed, that the Idomeninan faculties were certainly intended for contemplation, and that the work of nature were nobler subject to exercise them upon, that the follies of systems, or the errors of the learned; and being sensible of the difficulty of finding out causes of natural things, he proposed, by accurate observation of a phaenomena of nature, to find out the rules according to which they happen, without inquiring into the causes of those rules. In this he made considerable progress, who call themselves inductive philosophers.[55]

Against the 18th century heroic image of Newton as the discoverer of the truth of the entire universe, Idomenian Newton seems powerless in explaining the nature of physical bodies and their movements. Idomenian Scientists cannot grasp the simple overlapping movement of two bodies. They only can give it meaningless name "the overcoming qualities of bodies". Idomenian physics however, perfectly fitted into the format of Newtoninan methodology that Keill and MacLsaurin acclaimed; We accept the testimony of senses and must not step over it into the domain of rationalist contemplation.

> It is to be observed, that every Idomeninan firmly believes, that two or more bodies may exist in the same place. For this they have the testimony of sense, and they can no more doubt of it, than they can doubt whether they have any perception at all.[56]

Therefore, viewed from empiricist Newtoninan methodology, Idomenian physics is the only legitimate physics in the moon. How is it possible for a sincere worshipper of Newtoninan Revolution in science and natural religion to present the physics on the moon, which is likely to exemplify the powerlessness of empirical science to uncover the true face of nature?

Supposing the idea of imperfection of human perceptions and thus the inability of human intelligence to attain the knowledge of physical universe as a creation of almighty god, Reid's allegory of Idomenians could imply that the difficulty of human Newtonianism on the earth originated in the defects of human senses, as those of Idomenian Newtonianism came from the lack of three dimensional perception on the moon. If so, intellectual being who can perceive more than three dimensional continuum may instantaneously

understand the cause of universal gravitation that Newtoninans thought to be beyond the hand of human intellectual ability. In other words, the real shape of nature could be not within the reach of human senses that only perceived three dimensional existence. If it is the case, Reid was still loyal to Newtonian astronomical pluralism that presupposed the one and only space-time continuum. But for him, its appearance to human beings and its reality was completely different. This could be interpreted as a form of physico-epistemological pluralism.

Conclusion

There is a philosophical reason for the fact that many scientists, philosophers and literati believed in or supposed the existence of extra terrestrial life form in the 18th century. Most of the early modern philosophers still held the ancient view of the reason: the universal organ that connects human being to the universe or the God. The difference between the continental and British or Scottish idea of the reason is, that, the former presupposes that the reason itself can reach the basis of the beings in positive way, affirmative theology, the latter assumes that the limit of the ability of the reason alone, negative theology, can prove the true nature of the being. Either affirmative or negative, they all theoretically demand the superiority of mind over material body. As the words of Bentley or Ferguson shows, the vast material universe that had been found by modern astronomy was not well-fitted to this mindset. The view of the universe full of intelligence could solve this difficulty.

Pluralism could have been a part of Reid's intellectual framework, within which science, philosophy and religion were interconnected with each other. On the one hand, the pluralism of Thomas Reid enabled him to locate his moral philosophy in the grand design of Newtonian cosmology. It is, as well as Kant's philosophy of mind, the study of universal mind examining human mind as the example available to humanity. Both of two representative philosophers in the century had the assumption of universal reason that prevailed over unknown plural worlds in the universe. Their studies are meant to supply telescopic insight into the minds beyond humanity, Kant in the way of positive theology and Reid in the way of negative theology.

Furthermore, strict empirical tradition of British Newtonianism was likely to preserve the early notion of nature as a labyrinth held by their predecessors such as Bacon and Galileo. Perception for the former and mathematics for the latter were faint flashlights that alone could guide human intelligence through the deep forest of nature. The cause of

the inability of human intelligence to unveil the true nature of universal gravitation should be reduced to the imperfection of human perception. Reid's allegory of two dimensional beings and their Newtoninan revolution could be the expression of his reservations towards the current form of Newtonian physics. Universal gravitation and other unsolved mysteries of nature could be self evident facts for intelligent beings somewhere in the universe that have much accurate perceptions that human beings cannot imagine to have. The real shape and the constitutions of the world may differ from those we see and only beings that have four (or eleven, if current super string theory is right) dimensional perception can perceive it. All these arguments are only about possibility and possible worlds. But possible worlds cannot distinguish from real world if there is methodologically no way to reach it. All we can do is to remain to be satisfied with the guide of the faint flashlight of reason that in some ways paves the way to the depth of beings including the god himself. Both cases of Reid's pluralism testify that the intellectual minds of the century still embraced pluralism in the broader sense in several forms, that is, the notion that there exist different worlds that we cannot see forever.

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1) Voltaire, *Micromégas*, 1752.

2) Cyrano de Bergerac, *Les Etats et Empires de la Lune*, 1657.

3) Francis Godwin, *The Man in the Moone; or, A Discourse of a Voyage Thither by Domininго Gonsales, The Speedy Messenger*, 1638.

4) Colin MacLaurin, *An Account of Sir Isaac Newton's Philosophical Discoveries*, London, 1748, pp. 390-2.

5) *Ibid*., pp. 390-2.

6) Pierre Duhem, *Le systeme du monde*, Paris, 1958. Roger Ariew (ed. And trans.), *Medieval Cosmology*, The University of Chicago Press, Chicago and London, 1985. Steven J. Dick, *Plurality of worlds : the origins of the extraterrestrial life debate from Democritus to Kant*, Cambridge University Press, Cambridge, 1982. Michael.J.Crowe, *The Extraterrestrial Life Debate, 1750-1900*, Dover Publications, Meneola, New York., 1999.

7) One of the early example is Nicolaus Cusanus, *De docta ignorantia*, 1440.

8) Johannes Kepler, Somnium, 1634. John Wilkins, *The Discovery of a World in the Moon. Or, a Discourse tending to prove, that this probable there may be another habitable world in that planet*, London, printed by E.G. for Michael Sparl and Edward Forrest, 1638. Christianus Huygens, *Kosmotheoros; sive, De terris coelestibus earumque ornatu conjecturae*, 1698.

9) Pierre Simon Laplace, *Exposition du système du monde*, Paris, 1796.

10) Arthur O. Lovejoy, *The Great Chain of Being: a Study of the History of an Idea*, Harvard University Press, Boston, 1936.

11) See Christianus Huygens, *Kosmotheoros*.

12) Richard Bentley, *Sermons Preached at Boyle's Lecture; Remarks upon a Discourse of*

Free-Thinking; Proposalls for an Edition of the Greek Testment; etc. etc. By Richard Bentley, D.D. Edited, with Notes, By the Rev. Alexander Dyce. London: Francis MacPherson, Middle Row, Holborn,1838, p.175.

13) "The belief of a plurality of worlds was familiar to the ancient," (Thomas Paine, *The Writings of Thomas Paine Vol. IV*, AMS Press, New York, 1967, p.66). According to Diogenes Laertius, who himself was an anti-pluralist, nearly the half of Greek philosophers had acclaimed the plurality of worlds. (See Diogenes Laertius, *The Lives and Opinions of Eminent Philosopher*.)

14) Ancient Indian philosophy has the innumerable examples of pluralist ideas in the texts of Hinduism, Buddhism and others. The Taoist tradition in China, especially those of Chuang-tzu, shows pluralist ideas.

15) If we define pluralism as the notion that there exist different worlds that we cannot see forever, we will get the following taxonomy of pluralism; firstly, there are pluralism as a form of literary allegory and scientific and philosophical pluralism or plural worlds in imagination and in reality; secondly, in the latter criterion, there are metaphysical or logical pluralism (of scholastic philosophy and of David Lewes, for example) and physical pluralism; thirdly, in the latter criterion, there are geographical pluralism (of unknown continents or of underworld, for example), micro world, pluralism in time (of Origenes Adamantius, of Stoicism and of Hinduism) and astronomical pluralism. All these categories exited in early modern literature and the pluralism of Nicolaus Cusanus, Giordano Bruno, Cartesian and Newtonian scientists can be characterised as a form of physical and astronomical pluralism that presupposes plural worlds in one and only space-time continuum. If thus broadly defined, pluralism can be seen as a universal phenomenon in the history of ideas. They are literally everywhere.

16) Japanese early modern Newtoninans' writings who were neo- Confucianists as well are good examples that neo-Confucian doctrines can cohabite with Newtonian pluralism; Shizuki Tadao wrote in his *The New Book of Astronomy* (1798-1802 in Japanese), "The space is so vast and boundless. There is no reason that only our sun has planets round itself. Other stars must have other planets as our five ones. Why our earth is the only place of the inhabitancy of people and things, among all these innumerable planets? In other worlds of our planets, and in other worlds of the planets of other suns, there is no reason that no inhabitants live, even if their shapes and figures are different from us."; Yoshio Josan said in his *Illustrative Introduction to far Western Astronomy by Physic*s (1823 in Japanese), "The earth is one of the planets in the heaven. Be aware that all the planets and the moons are immense inhabited worlds. This is the point why western philosophers teach Copernican system...So-called Galaxy is the cluster of fourteen thousands small stars making the shape of a river...The light reach millions of miles, called planetary world. And there are several planets in it, moving round a star as their sun. Each planet is a world, men and animals inhabited and grass and plants grow there, just like our earth."

17) John Keill, *Introductio ad veram Astronomiam, seu lectiones Astronomicae*, 1718. John Keill, *An Introduction to the True Astronomy*, London, MDCCXLVIII, pp.40-41.

18) Hugh Blair, *Sermons, by Hugh Blair, D.D., A New Edition, corrected*, Vol. II, Dublin, 1792, p.246.

19) Yasuo Amoh, *The Papers of Adam Ferguson,* Rinsen Shoin, 1996.

20) Thomas Paine, *The Writings of Thomas Paine Vol. IV*, AMS Press, New York, 1967, p.71.

21) *Ibid*., p.73.

22) *Ibid*., p.74.

23) Thomas Chalmers, *A series of Discourses on the Christian Revelation, viewed in connection with the Modern Astronomy*, 1817.The quotation is from Thomas Chalmers, *A Series of Discourses on the Christian revelation viewed in Connection with the Modern Astronomy, Glasgow*, 1822, p.41. This is the similar argument that James Beattie constructed against deists' critic of Christianity in *Evidences of Christian Religion* in 1786. See Crowe, p.102.

24) *Ibid*., p.135.

25) *Ibid*., pp.144-5.

26) David Brewster, *More Worlds Than One, The Creed of the Philosopher and the Hope of the Christian, By Sir David Brewster, K,H., D.C.L., P.R.S., V.R.P.S. EDIN., and Associate of the Institute of France. Principal of the University of Edinburgh*, London, John Murry, Albemarle Street, 1854.

27) Crowe, p.575.

28) Derek Brooks (ed.), Thomas Reid, *Essays on the Intellectual Powers of Man*, Edinburgh University Press, 2002, p.55.

29) See the different interpretations of *Principia* of Reid and Priestley. Paul Wood (ed.), Thomas Reid, *Thomas Reid on the Animate Creation*, Edinburgh University Press, Edinburgh, 1995.

30) *Ibid*., p.12.

31) *Ibid*., p.12.

32) *Ibid*., p.11.

33) Immanuel Kant, *Sämtliche Werke*, 7, Felix Meiner, Leibzig, 1922.

34) "Es ist auch nicht nötig, dass wir die Anschauungsart in Raum und Zeit auf die Sinnlichkeit des Menschen einshränken; es mag sein, dass alles endliche Wesen hierin mit dem Menschen notwendig übereinkommen müsse, (wie wohl wir dieses nicht entscheiden können,) so hört sie um dieser Allgemeingülltigkeit willen doch nicht auf Sinnlichkeit zu sein, eben darum, weil sie abgeleitet (intuitus derivativus), nicht ursprünglich (intuitus originarius), mithin nicht intellectuelle Anchauung ist, als welche aus dem eben angeführten Grunde allein dem Urwesen, niemals aber einem, seinem Dasein sowohl als seiner Anschauung nach (die sein Dasein in Beziehung auf gegebene Objecte bestimmt), abhängigen Wesen zuzukommen scheint". Immanuel Kant, *Kritik der reinen Vernunft*, Felix Meiner Verlag, Humburg, 1976, SS.92-3.

35) "Es shränkt sich also nicht bloss auf Menschen ein, sondern geht auf alle endlichen Wesen, die Vernunft und Willen haben, ja schliesst sogar das unendliche Wesen, als oberste Intelligenz, mit ein." Immanuel Kant, *Kritik der praktischen Vernunft*, Felix Meiner Verlag, Hamburg, 1985, SS.37-8.

36) "Wie es mit den Einwohnern anderer Planeten und ihrer Natur beschaffen sei, wissen wir nicht; wenn wir aber diesen Auftrag der Natur gut ausrichte, so konnen wir uns wohl schmeicheln, dass wir unter unseren Nachbaren im Weltgebäude einen nicht geringen Rang behaupten dürften. Vielleicht mag bei diesen ein jede Individuum seine Bestimmiung in seinem Leben völlig erreichen. Bei uns ist es anders; nur die Gattung kann dieses hoffen." Immanuel Kant, Ausgewählte kleine Schriften, Felix Meiner Verlag, Humburg, 1969, S.35.

37) "Zwei Dinge erfüllen das Gemut mit immer neuer und zunehmender Bewunderung und Ehrfurcht, je öfter und anhaltender sich das

Nachdenken damit beschäftigt: der bestirnte Himmel über mir und das moralische Gesetz in mir." *Ibid*., S.186.

38）*Ibid*., S.186.

39）*Ibid*., S.186.

40）"Das Zweite...stellt mich in einer Welt dar, die wahre Unendlichlkeit hat...mit welcher ich mich nicht wie dort in bloss zufalliger, sondern allgemeiner und notwendiger Verknüpfung erkenne." *Ibid*., S.186.

41）Francis Bacon, *Novum Organum*, 1620. Galileo Galilei, *Il Saggiatore*, 1623.

42）*Op.cit*, p.iii.

43）*Ibid*., p.iv.

44）*Ibid*., p.v.

45）Colin MacLaurin, *An Account of Sir Isaac Newton's Philosophical Discoveries*, Johnson Reprint Corporation, New York and London, 1968, p.11.

46）*Ibid*., p.22.

47）Derek Brooks (ed.), Thomas Reid, *An Inquiry into the Human Mind on the Principles of Common Sense*, Edinburgh University Press, Edinburgh, 2000, p.1

48）Knud Haakonssen (ed.), Thomas Reid, *Practical Ethics*, Princeton University Press, Princeton, 1990, P.297.

49）Derek Brooks (ed.), Thomas Reid, *An Inquiry into the Human Mind on the Principles of Common Sense*, Edinburgh University Press, Edinburgh, 2000, p.107.

50）Francis Yates, *The Rosicrucian Enlightenment*, Routledge & Kegan Paul, London, 1972. Recent scholarship on the subject after Yates: Carlos Gilly, *Adam Haslmayr: Der erste Verkünder der Manifeste der Rosenkreuzer*, Pelikaan, Amsterdam, 1994. In the closing paragraph of the section, he referred to two alchemists' names, Olaus Borrichius (Ole Borch, 1626-1690) and Johannes Fabricius (1587-1616). There is an early classic of alchemy entitled Anepigraphos (Brian P. Copenhaver, Hermetica, Cambridge University Press, Cambridge, 1992, p. Xxiv).

51）"All our curious theories of the formation of the earth, of the generation of animals, of the origin of natural and moral evil, so far as they go beyond a just induction from the fact, are vanity and folly, no less than the vortices of Des Cartes, or the Archaeus of Palacelsus."Derek Brooks (ed.), *Thomas Reid, An Inquiry into the Human Mind on the Principles of Common Sense*, Edinburgh University Press, Edinburgh, 2000, p.12.
First appeared as Apodemus (apodemos, foreign traveller) in his paper read at Aberdeen Philosophical Society on 14th June 1758 (Brooks, *Inquiry*, p.273).

53）*Ibid*., p.108.

54）Brian P. Copenhaver and the estate of Charles B. Schmitt, *Renaissance Philosophy*, Oxford University Press, Oxford, 1992.
Niccolo Guicciardini, *Reading the Principia: The Debate on Newton's Mathematical Methods for Natural Philosophy from 1687 to 1736*, Cambridge University Press, Cambridge, 1999.

55）*Ibid*., p.110.

56）*Ibid*.,, pp.110-1.

57）This might be the reason that Reid as an empiricist political theorist was able to write a utopian tract in the end of his life. Rationally constructed utopia exists in a probable world. If probable worlds and the worlds real but never to be reached, therefore never to be corroborated, are not ontologically but epistemologically the same, it is not illogical to imagine that a utopia actually exist somewhere in the universe. This was one of the beliefs of many 18th century pluralist writers and Reid could have the same

notion in more reserved way. This also suggests that fantasy and reality in pluralist literature were not strictly demarcated.

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