Rediscovering French Science-Fiction in Literature, Film and Comics

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From Cyrano *to* Barbarella

Edited by

Philippe Mather and Sylvain Rheault

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To my wife Angeline.
—Philippe Mather

In Memory of my mother and my father.
—Sylvain Rheault

In Memory of George Slusser (1939-2014).

"The astronomers suddenly notice strange beings coming out from underneath the mushrooms, while making singular contortions. These are the Selenites, or inhabitants of the Moon. A fantastical being rushes on an astronomer, who defends himself, and with a stroke of his umbrella the Selenite bursts into a thousand pieces."
—From "Le Voyage dans la Lune" by Georges Méliès.

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PREFACE

French science fiction is as old as the French language. Cyrano de Bergerac wrote about a trip to the moon that was published in 1657. So did Jules Verne in 1865, this time using hard, scientific facts. The first movie showing a trip to the moon was made by Georges Méliès in 1902. In the comics format, Hergé had Tintin walk on the moon in 1954, 15 years before Neil Armstrong. Artist Jean-Claude Mézières' work was clearly the inspiration for many of the aliens and spaceships in George Lucas' Star Wars saga. These are just a few of many unique French contributions to science fiction (SF) that rightly deserve to be better known.

On the weekend of November 2nd, 2012, a multi-disciplinary conference was held at the University of Regina (Saskatchewan, Canada) that featured scholars and artists from France, Belgium, Canada, and the United States. Titled "POW! In the Eye of the Moon", a nod to Méliès' iconic film, the event aimed to recognize the contributions of French SF to world SF and also to engage in multi-disciplinary exchanges. Since SF is deeply rooted in popular culture, panelists discussed the role of science and fantasy in French SF, the influence of key authors in the genre's history, as well as the impact of films and graphic novels on the public perception of the genre's nature. The event was highlighted by a keynote lecture by the preeminent SF author from Québec, Élisabeth Vonarburg.

The present collection of essays is a record of this event, enhanced by a few additional contributions that were not included in the conference itself. One of our objectives was to introduce French SF to an English-speaking audience, which involved providing simultaneous translations for papers presented in French. For this monograph, it was therefore decided to publish English-language versions of the essays authored by Philipps, Stojanov, Guay, Rolland, and Rheault. We also chose to include titles and quotations in English in the body of the text, with the French originals available as endnotes.

Of particular note are the section introductions, kindly provided by the renowned literary scholar Dr. George Slusser, a specialist in French SF

who, sadly, passed away on November 4, 2014, while we were awaiting a reviewers evaluation of the manuscript. We look forward to a posthumous publication of Dr. Slusser's own completed monograph, titled *The Left Hand of Reason: The Science Fiction of Continental Rationalism*, which is likely to be a landmark theoretical study of French SF.

ACKNOWLEDGEMENTS

The editors wish to thank several organizations and individuals whose generous contributions made the publication of these conference proceedings possible. Our main sponsor has been the University of Regina's Institut Francais, with unfailing support provided by its Director, Dr. Sheila Petty, as well as staff members Frédéric Dupré and Véronique Gauthier. Funding was also obtained through the President's Conference Fund, the Humanities Research Institute's Visiting Scholar Fund, Campion College, the Faculty of Fine Arts, the Faculty of Arts, the Department of Film, and the Department of English. We are grateful for the help offered by conference committee members Gerald Saul and Dr. Christina Stojanova (Department of Film), Dr. Nick Ruddick (English), and Donna Bowman (Archer Library). Sincere thanks are extended to Belinda New (Regina Public Library Film Theatre), Dr. Arthur B. Evans (DePauw University), Dr. Alex MacDonald (Campion College), J. Michael Shires (Archer Library), Élise-Baudry Ferland (Department of Film), translator Anton Iorga, and last but not least, our publishers, Carol Koulikourdi, Sam Baker, Victoria Carruthers (Cambridge Scholars Publishing).

PART I:

FRENCH PROTO SCIENCE FICTION IN LITERATURE

INTRODUCTION

FRENCH PROTO-SF IN ITS SCIENTIFIC AND LITERARY CONTEXT

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The above title gives reason to pause and reflect, especially in conjunction with France's contribution to the creation of an SF genre. That contribution, which spans the period, essentially, from the latter part of the 18th through to the 19th century, is immense. French fiction has developed major themes. We have, first of all, the quite revolutionary literary theme of the future, Paul Alkon's "futuristic fiction". If there were English examples of future speculation, such as Samuel Madden, his work was marginalized by that great arbiter of taste, Dr. Samuel Johnson. In late 18th century and post-revolutionary France, however, the literary landscape was more fluid. Sébastien Mercier's *Memoirs of the Year Two Thousand Five Hundred* (*L'An 2440*) appeared in 1771. It was followed by works like Rétif de la Bretonne's *The Posthumous Ones* (*Les Posthumes*), Félix Bodin's *A Novel of the Future* (*Le Roman de l'avenir,* 1834), and Émile Souvestre's *The World as it Shall Be* (*Le Monde tel qu'il sera*), and on through the 19th century with Verne's *Paris in the Twentieth Century* (*Paris au XXe siècle*, written 1862-63), Albert Robida's *Electric Life* (*Le vingtième siècle. La vie éléctrique*, 1890), to J-H. Rosny aîné's stunning evolutionary terminal future in *The Death of the Earth* (*La Mort de la Terre*, 1910). French literature of the late 18th century was first to develop the trope and narrative model of the imaginary voyage. Charles-Georges-Thomas Garnier's 25-volume collection, *Imaginary Voyages, Dreams, Visions, and Cabalistic Tales* (*Voyages imaginaires, songes, visions et romans cabalistiques*, 1787-1790) was possibly the first genre-establishing anthology in modern times. Its source was Defoe's *Robinson Crusoe*, but it displayed a vast collection of *robinsonades* and imaginary voyages derived from this work. The great majority of these works were French. They mark a long French tradition that leads to Jules Verne's *Voyages extraordinaires*

and a central current trend in modern SF. Finally, there was the French fascination, in the early 19th century, with Walter Scott's historical novel. This led to the creation of the SF sub-genre, known today as the "alternate history." An early example is L.-N. Geoffroy-Chateau's *Napoléon and the Conquest of the World* (*Napoléon et la conquête du monde*, 1836), where Napoleon won Waterloo. Charles Renouvier, in a sense, canonized this sub-genre with his *Uchronia (Utopia in History), an Aprocryphal Sketch of the Development of European Civilization, Not as It Was, But as It Might Have Been* (*Uchronie: Esquisse historique apocryphe du développement de la civilisation européenne tel qu'il n'a pas été, tel qu'il aurait pu être*, 1876).

France, then, offers a rich heritage of "proto" science fiction that continued into the early 20th century. If the process of canonization of literature and fiction – the distinction between "high" and "low," or "popular" and "literary" – was well underway in 19th century England, in France these boundaries were once again more fluid. An example is Honoré de Balzac's *The Centenarian, or the Two Beringhelds* (*Le Centenaire; ou les deux Beringheld*, 1822). Written under a pseudonym by the young Balzac, and later renounced by its author, *Le Centenaire* is a powerful example of "proto-SF" written by the writer who will do more than anyone else to establish the canon for 19th century fiction in France. Written four years after Mary Shelley's *Frankenstein* (1818), it bears close comparison with that "seminal" work. For it is perhaps the first fictional work that presents a scientist doing real science in the modern sense. Frankenstein's "science" is alchemy; the process that creates his living creature is simply "electricity", no further details. The Centenaire, however, answers to no moral authority; he answers to his science alone to extend his life, to his skill as a laboratory scientist. There is no pact with the devil; there is simply his laboriously detailed lab equipment, and his "method", which he describes as a thoroughly "modern" version of ancient alchemy, deemed unfit to get results in the new world of Restoration France. The Centenarian's laboratory is the prototype for the film laboratories of future Frankensteins, full of beakers and a huge bell-like device that looks forward to a similar contraption in Zamiatin's *We.* His method relies on the laws of the transfer of energy that the young Balzac shaped in the context of the early thermodynamic research of André Ampère and Sadi Carnot. It can be argued that, even if Balzac later repudiated this work, the fearful laws of energy transfer – thoroughly materialist and inexorable - that operate at the deepest level of his *Human Comedy* (*Comédie humaine*), were first worked out in this "popular"

novel. The process of canonization, that separates "literature" from "paraliteratures", like this proto-SF, can be seen taking shape in the later 19th century. Flaubert, for instance, refused all illustrations in his historical novel *Salammbô*, on the grounds that it was the word and its magic, not the visual image that carried the charge of "poetry". Verne's work, on the other hand, relies heavily on the interplay of text and image to convey its message. In a sense, it was in the wake of Verne, and the so-called "school of Verne", that the divide occurs. On the one hand, there is a tremendous "pulp" production of SF adventures that ends only with World War I, and does not resume until after World War II, with the series *Le Rayon fantastique* and *Fleuve noir anticipation*. On the other hand, there is Mallarmé, Valéry, and an increasingly hermetic sense of "literature," that continues throughout the 20th century, and offers no room for the "pulp" themes and excesses of SF.

The above remarks, hopefully, provide a context in which to place the authors dealt with in the three essays in this section. Two papers out of three in this section deal with Cyrano de Bergerac (1619-1655), who – in terms of the science fiction of travel, exploration, and speculation – is France's seminal author. Cyrano's two works – *The Other World, The States and Empires of the Moon* (*L'Autre Monde, ou les Etats et Empires de la Lune*), and *The States and Empires of the Sun* (*Les Etats et Empires du Soleil*) – are commonly seen as proto-examples of space travel. This latter is not achieved by dream, or on the wings of birds, but by means of a physical propellant, even though ludicrous (bottles of dew heated by the sun). Cyrano is a complex mind and writer. He is a man of the century of Descartes. Yet the issues he addresses in his fiction (e.g. Copernican Astronomy) are far more scientifically forward-looking than those addressed by Descartes or Pascal. Nor does he have his equal in the England of the time. The encyclopedic chattiness of a Robert Burton bears no comparison to the skeptical imagination of Cyrano, in which the true Baconian spirit thrives.

Arianne Margolin's essay "How Do I know Unless I Go There: Cyranian Thought Experiment as Scientific Method and Scientific Fiction," sees the author practicing a scientific method, in the modern sense, in his fiction. That method does not follow the deductive process of Descartes, but the empiricist view promoted at the time by Gassendi: "Cyrano's method is not based in pure deduction and elimination, but rather in the act of measuring, experimenting and collecting external physical data". She further argues that this method is not only a scientific

one, but a fictional one as well. In a sense, she asserts, we have a genuine work of proto-SF, whose method is akin to what later writers see as a defining element of the genre--extrapolation. As Margolin sees, Cyrano's fictions "offer hypothetical experiment: the instruments and observations he proposes in *The Other World* (*L'Autre Monde*) do not *yet exist*". What is more, it is Cyrano's use of the narrative voice, of his narrator's freethinking skepticism and unsystematic (un-Cartesian) presentation of Copernican science that shores up a very modern sense of how science is done, science not as a demonstration of order, but as a search *for* order. For example, after hearing arguments by proponents on both sides, he decides that the only way to test his hypothesis – that both the Earth and Moon are moving bodies – is to physically travel to the Moon in a spaceship. If the mode of propulsion is absurd, there remains the future possibility of a propellant. If his spaceship (by our standards) "won't fly", the idea of space flight is there, a blank to be filled by future generations of engineers and scientists. One of the problems with science fiction is that its technology is *too detailed*, too rooted in a given time and place, even if that time and place is – at the time of writing – on the "cutting edge." Cyrano, on the other hand, taught his reader to think in a different, perhaps more "science fictional", manner, which accepts speculation and experiment as so many avenues into a future that is unwritten, but will not remain unwritten. As Margolin puts it: "*Because his thought experiments existed within an imaginary, virtual world, his ideas were pseudo-experiments that could not be immediately replicated*". As SF sees it, there is no reason they will not be replicated some day.

The second essay on Cyrano, Lionel Philipps' "The Filiation from Cyrano to Verne, an exacting poetics that birthed French science fiction", focuses not on the scientific side of the author, but on his "poetical" technique and *its* influence on French SF that appeared later, notably via the work of Jules Verne who cites Cyrano, being obviously familiar with his fiction. Philipps emphasizes an interesting, and little discussed, aspect of Verne's writing, which he calls his "diverted references". These comprise "*a method of writing as rigorous as it is poetic, which could very well be one of the major characteristics of a French 'pre-science fiction'*" ("*un procédé d'écriture aussi rigoureux que poétique […] qui pourrait bien apparaître comme l'une des caractéristiques majeures d'une pré-SF française*" – translated from the French by Anton Iorga). One thinks offhand of Axel's famous misquote of Virgil as he encounters the "quaternary man" in *Journey to the Center of the Earth* (*Voyage au centre de la terre*). I have perhaps a more telling, and seminal, example. My

colleague and I have just finished the first English translation of Verne's first novel *A Priest in 1835* (*Un prêtre en 1835*). The novel is full of quotes from various writers. Some are pure boyish pedantry (Verne was 19 when he wrote the latter), but many (quoted correctly or misquoted) occupy an ironic space, a realm that points outside the narrative that could be seen as the beginning of what Philipps calls a "procédé d'écriture".

Philipps' essay has two sections. The first is a long and interesting analysis of Cyrano's technique of composition. The second affirms the connection Cyrano-Verne: "*This exacting poetics which is the source of a first French science fiction masterpiece did not escape Jules Verne*" ("*Cette exigence poétique à la source d'un premier chef-d'oeuvre de la SF française n'a pas échappé à Jules Verne*" – translated from the French by Anton Iorga) What is truly significant is that Philipps' choice of a piece of Verne's work, indeed one of his most complex and controversial, *The Adventures of Captain Hatteras* (*Les Aventures du Capitaine Hatteras*, 1866). His claim is that, in this novel, "*[Verne adopts] the process of polysemous proliferation as a foundation for the Romanesque invention*" ("[*Verne adopte] le procédé de prolifération polysémique comme fondement de l'invention romanesque*" – translated from the French by Anton Iorga). His argument turns on the very different accounts of Captain Hatteras' maniacal voyage to the North Pole – notably those of Dr. Clawbonny, who in counterpoint to Hatteras' "folie polaire", consistently offers scientific evidence that casts doubt of ever identifying an exact location for the North Pole. Clawbonny's attraction to the polar landscape could be called "poetical", insofar as his scientific skepticism ("*Here our ears hear wrong, and our eyes deceive us!*") ("*les oreilles entendent de travers et les yeux voient faux*", Project Gutenberg EBook #29413) presents, at each step, a relativizing vision to what other more fanatical observers claim to see and hear. Philipps bases his argument on the "polysemic" nature of the word "ours", seeing here in Verne – as in Cyrano – "*the same poetic exploration of language*" ("*une même exploration poétique de la langue*" – translated from the French by Anton Iorga). There are certainly parallels between Cyrano's mode of narration and that of Verne in terms of cultivating the multiple possible meanings of words and citations. What is really important however, in Philipps' analysis, is his calling attention to this dimension of Verne's fiction. Verne after all began his career as a writer producing poetry and plays. There is no reason, once he fell under the tutelage of Hetzel and gained popularity with his *voyages extraordinaires*, that he would abandon all literary concerns. Much more research needs to be done on Verne and this

"exigence poétique". Philipps' other claim, that this becomes a distinct property of French SF in the wake of Verne, needs to be proven. Indeed, what *is* an SF that can be called distinctly "French"? It is something assumed, in this and other essays – almost taken for granted. It remains to be defined, in order to know that it exists.

The third paper is Scott Sanders' "Flying the Colonial Skies during the French Enlightenment: Rétif de la Bretonne's *Découverte australe*". Rétif's title translates as *The Southern-Hemisphere Discovery*. Sanders argues that Victorin's flying machine – the means by which he is able to reach the southern realms and establish his utopian colony – is in fact a clever illusion, one designed to cover technology in the garb of nature. Comparing the famous frontispiece showing Victorin in flight with the preface, he finds that the latter explains the technology behind the machine, while the former clothes it in mythical garb. In a long disquisition on the nature and uses of the *machine*, and on those whose art was to manipulate machines – *the machinist* – in order to create spectacles of mythic grandeur and power, in 17th and 18th century France, he argues that "Victorin's flying machine appropriates *ancien régime* representations of the divine sovereign into a late Enlightenment image of the colonial despot".

This argument is compelling, but it touches on one single work of Rétif, who remains a mysterious figure because of the diversity of his output. As a writer evolving at a time of catastrophic change, he is a polyvalent figure, about whom generalizations are difficult. If he is a late Enlightenment apostle of colonialism, the place he chose to colonize – the *terres australes* – were at that time, in a real sense, a forbidding place to colonize, simply more *arpents de neige.* In fact, his *Nocturnal Spectator* (*Les Nuits de Paris*) presents a very different "colonizer", one who explores a strange land at the heart of French civilization. Far from a despot, his night owl remains a simple observer. The world he discovers is not one of power and fabulous riches; it is one of a thriving underground economy, in the nooks and crannies of the great city – for instance, the observer raises rabbits from grass growing in cracks in the streets. His preoccupations, never those of the *ancien régime*, are things like sanitation and real social reform. His speculation on future worlds, for better or worse, were his *Posthumous Ones* (*Posthumes*). The best description of a figure like Rétif is that of Peter Tosh's Mystic Man: a man of the past living in the present, but walking in the future. This is precisely his situation in Ettore Scola's brilliant film, *That Night in Varennes* (*La Nuit*

de Varennes). In the film, Rétif is the narrator and actor that ensures the confused continuity of events that surround the pivotal "nuit de Varennes". Riding in the coach, he sits between Casanova and Thomas Paine – the libertine past and the new democratic future. He arrives at Varennes too late to find Louis XVI. What he does find are the royal robes, a symbol of privilege and power that suddenly is no more. Neither he, nor anyone else, – like Victorin – can pretend to use these empty robes to mount a spectacle of power. The future is anyone's guess, and all he does is move with the times. In a final scene, in one long single traveling shot, Rétif mounts the stairs from the quai of the Seine where a soirée is taking place. He enters the streets of modern Paris where he walks unnoticed and unnoticing among an otherwise alien world of cars, noise and congestion, but which, because of his act of walking, is made a place where possible new futures can be encountered. Science fiction is the literature of this single, unbroken shot.

CHAPTER ONE

HOW DO I KNOW UNLESS I GO THERE? CYRANIAN THOUGHT EXPERIMENT AS SCIENTIFIC METHOD AND SCIENTIFIC FICTION

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However the early-modern French thought experiment has been frequently associated with the utopian criticism of Plato and Thomas More, the early-modern prototype – for what James Robert Brown calls the "mind laboratory"[1] – first appeared in René Descartes' *Discourse on the Method* (*Discours de la method,* 1637). Intended as an introduction to his rationalist triad, the *Dioptrique, Meteors* (*Météores*) and *Geometry* (*Géométrie*), the *Discourse* presented Cartesian theoretical method by combining mathematics and accepted, albeit speculative, explanations on first causes. As we may note in the fourth and fifth parts of the *Meditations on First Philosophy,* Descartes' quasi-Aristotelian process of elimination through doubt, partly resembled the modern thought experiment structure: clear statement of the problem; visualization of the natural phenomenon's mechanism; exploration of the problem *ad reductio*; and conclusion. Not surprisingly, this method subsequently proved popular for conducting research, as scientists could investigate ideas within private or public missives. Yet the rationalist Cartesian methodology of *ad reductio* was widely criticized by the *libertins* and empiricists, notably Cyrano de Bergerac. In two of his major works, *The Other World* (*L'Autre Monde*, 1657) and the *Fragment of Physics* (*Fragments de physique,* 1662), Cyrano urged natural philosophers to observe and explain phenomena through experiments that could be replicated easily,[2] noting that "Physics could only be a conjectural science", a glimmer of *vraisemblance*

expressing the most probable of possible explanations.[3] According to this empiricist view, stemming from Gassendi's *Paradoxical Exercises against the Aristotelians* (*Exercitationes paradoxicae contra Aristoteleos*, 1624), Galileo's *The Assayer* (1623), and Jacques Rohault's Wednesday lectures, Cyrano's *méthode* was not based on pure deduction and elimination, but rather on the act of measuring, experimenting, and collecting external physical data. Cyrano recognized that while the Cartesian-Rohaultian method proved useful for a philosophical or mathematical *ad reductio* argument involving figures and axioms, the deductive process failed to explain adequately physical phenomena – in a tangible manner – to the public, as these phenomena exist externally to the faculty of the mind. As he noted in the *Fragments*, the understanding that philosophers gain from reason, through convincing visual experiences from sound, light, and color, are also as valid as the understanding gained by the sensory sensations of pain, odor, and taste, both of which are exterior to the mind.[4] For Cyrano, natural philosophy, as the study of physical phenomena, should be articulated either through discussion of a previously conducted experiment or by imagining a familiar situation where a potential experiment could be conducted. In this paper, I explore how Cyrano's thought experiments were symptomatic of early-modern scientific investigation, a perplexed literary attempt to address Galilean scientific method's inherent conflicts between theory and experiment.

In his *conte philosophique, The Other World*, Cyrano created a fictional, yet realistic, Galilean "world" to test realistic "physical reflections" that highlighted several inaccuracies of Aristotelian physics. According to the *Fragments*, "physical reflection" was the method of examining hypotheses of relative motion, the observable effects first noted by Kepler and Galileo that were unrecognizable and indeed unacceptable to the Aristotelian eye:

> *Appearances of the Sun and Fixed Stars.*
> *Specific hypothesis in order to explain these appearances [apparences], given that all motion [mouvement] is attributed to the Heavens.*
> *Daylight and nightfall, and their [observable] differences in many places throughout the world.*
> *Physical reflection.*
> *Hypothesis that explains appearances of the Sun, once [we have] determined its fundamental mass while in motion.*
> *Another physical reflection.*[5]

"Physical reflection" followed each suspiciously Galilean-Copernican

hypothesis ("day and night around the world;" "Explanation of the appearances of the Moon, given its fundamental mass at rest") and opposed both the scientific terms "observation" and "supposition:"[6] The factual observable science that resulted from the senses and the conclusions that it supposed based on induction. For Cyrano, reflection was a physically, and sensibly, possible *méditation* that resembled Galileo's famous ship thought experiment in the *Dialogue Concerning the Two Chief World Systems* (1632):

> *SALVIATI. Shut yourself up with some friend in the main cabin below decks on some large ship, and have with you there some flies, butterflies, and other small flying animals. Have a large bowl of water with some fish in it; hang up a bottle that empties drop by drop into a wide vessel beneath it. With the ship standing still, observe carefully how the little animals fly with equal speed to all sides of the cabin. The fish swim indifferently in all directions; the drops fall into the vessel beneath; and, in throwing something to your friend, you need to throw it no more strongly in one direction than another, the distances being equal; jumping with your feet together, you pass equal spaces in every direction. When you have observed all of these things carefully (though there is no doubt that when the ship is standing still everything must happen this way), have the ship proceed with any speed you like, so long as the motion is uniform and not fluctuating this way and that. You will discover not the least change in all the effects named, nor could you tell from any of them whether the ship was moving or standing still.* [7]

The notable difference between Galileo and Cyrano is one of method. Galileo's celebrated thought experiment, as narrated by the Copernican Salviati, displays a real scenario – observers below deck on a moving ship – that has been tested, and could be re-tested. Within the ample detail of the thought experiment, the reader is convinced of its veracity. Cyrano's "list," however, offers no such detail or observational precision. It is in *The Other World* that we find the early-modern French literary equivalent to Galileo's ship experiment.

Though a well-known empiricist, as we may note from his intrinsically Montaignian "How can I know unless I go there?" of *The Other World*, Cyrano tentatively embraced Descartes' dualistic metaphysics in the form of physical reflection – thought experiment – to publicly display the "new science"[8] of Galileo. However, contrary to the Cartesian *cogito*, which encompassed absolute and fundamental knowledge, Cyrano added the external world of the senses as admissible fundamental knowledge to scientific experience. In his view, the thought experiment should be

expressed to the public, either by the narration of a previously conducted experiment or by imagining a hypothetical experiment within a familiar world or environment using the given laws of physics. From this modification of scientific discourse, Cyrano devised *The Other World* – one of the first forms of French "science fiction" – where the reader could verify Galilean scientific theory and contest the results, or inherent fallacies, of the thought experiment. Cyrano's general assertion of method replicates that of the Cartesian-Galilean scientific method: General theory from mathematics, or a phenomenon as appearance – statement of hypothesis – and experiment to resolve the validity of the theory. Nevertheless, Cyrano's method offers a purely hypothetical experiment: The instruments and observations that he proposes in *The Other World* do not yet exist.

Though French Classical critics, notably the grammarian and polemicist Gilles Ménage, lambasted Cyrano's unorganized tableau and blatant violations of conventional *vraisemblance* in *The Other World*, the scientists among them grudgingly admitted his thought experiments' attractiveness, from which both Fontenelle and Voltaire would later borrow extensively. On the one hand, these thought experiments proved effective for two reasons: First, Cyrano's readers could "replicate" the experiments suggested in the story in real life; second, Cyrano's thought experiments contained both Cartesian deduction and Galileo's artistic talents for pictorial demonstration and irony. On the other hand, Cyrano's thought experiments were problematic not only because of their unsystematic presentation of Copernican science, but also because of their tenuous epistemological union between the faculties of the mind and the senses. While this truce permitted these modern insights into the future, it precluded their acceptance as *vraisemblable* by the public.

Inherent to Cyrano's scientific method is the free-thinking skepticism of the reader, who, as a scientist, can present evidence for a theory or completely discount it by experiment. In the introduction of *The Other World*, the scientist-narrator recounts a debate with his colleagues regarding relative motion and narrates the impetus for his voyage to the Moon:

> *"And I," I replied, "[...]* I think the Moon is a world like this one, and the Earth is its moon*." My friends greeted this with a burst of laughter. "And maybe," I told them, "someone on the Moon is even now making fun of someone else who says that our globe is a world." I told them that Pythagoras, Epicurus, Democritus and, in our time, Copernicus and*

> *Kepler had been of the same opinion, but it was no use; they just hooted all the more. My mood was strengthened by contradiction, and my thought engrossed me so much that all the rest of the way home I was bursting with ideas about the Moon but could not quite give birth to them. I supported my comical belief with such serious arguments that I almost convinced myself of it.*[9]

Here we find the first and second steps of Cyrano's general methodology, as well as the preamble for Cyrano's thought experiments throughout the story. Although it is indirectly referenced from the first sentence of the quote, the orthodox theory of planetary motion – in seventeenth century France – is that of Ptolemy's geocentrism, which asserts that celestial bodies revolve around the Earth and are uninhabited. Using his second step, Cyrano's narrator-scientist suggests an opposing hypothesis – that the Moon is another "world" and the Earth is its satellite – which his Aristotelian contemporaries dismiss as ludicrous. Though the Moon is actually a natural satellite of Earth (which Cyrano knows), his argument is a rhetorical and satirical one: From the point of view of an observer on the Moon, the Earth would appear as a stationary object. The narrator seeks to contradict his contemporaries' Ptolemaic stance on physics and the moon by generating counterarguments in his favor.

However, the hypothesis suggested by the narrator is only one of *appearance* and not sense. At this particular juncture of his argument, he cannot conclusively prove relative motion, as it is equally probable using human observation that the Moon revolves around the Earth (or, according to Cyrano's *satyre* that the Earth revolves around the Moon). The narrator solves the problem in one statement: "How would I rid myself of any doubt if I didn't go there?"[10] Cyrano proceeds to his third step: Testing his hypothesis through a thought or virtual experiment. Cyranian thought experiment embraces the empiricist philosophy of knowledge through the senses, but poses an experiment that anyone can do, feasible or not, within the virtual reality of the mind. In order to test his hypothesis, that both the Earth and the Moon are moving bodies, he proposes a voyage from the Earth to the Moon using a spaceship. He describes his apparatus as follows:

> *[In order to] accomplish [this voyage], I established myself in a fairly remote country house and entertained my imagination with various means of transport. Here is how I betook myself to heaven. I attached to myself a number of bottles of dew, and the heat of the sun, which attracted it, drew me so high that I finally emerged above the highest clouds.*[11]

Like many subsequent science fiction novels, Cyrano proposes a unique, albeit questionable, method of propulsion, juxtaposing the ridiculous concept of dew (water) bottles heated by the sun and the realistic suggestion of propellant as a technological possibility. However, Cyrano's apparatus presents both an experimental and philosophical conundrum: The dew bottles have elements of fiction – dew being chemically insufficient to generate the force needed to truly send the narrator to space – and reasoned, "reflection"; a glimpse into the future of space travel that – while it may be mentally possible – proposes substances that do not yet exist in the early-modern world. For the seventeenth century empiricist, Cyrano's science is inherently occult.

Near the end of his flight in space to the Moon, Cyrano has the narrator describe the following phenomenon:

> *When I had gone – as I have calculated since then – much more than three-fourths of the way from the earth to the Moon, I suddenly realized I was falling head downwards without having turned around in any way. [...] I realized that I was actually not falling back to our world. I was between two moons and saw very clearly that I was moving away from one and approaching the other. I was very sure that the larger was the Earth: after a day or two of traveling, the receding refractions of sunlight blurred the diversity of shapes and weather, and the Earth appeared to me as only a large golden plate, much like the other moon. That made me think that I was coming down towards the Moon, but I happened to remember that I had begun to fall only after going three-fourths of the distance. "Since," I said to myself, "the Moon's mass is less than the Earth's, its sphere of activity must be less extensive, which has caused me to feel the force exerted by its center when I am nearer to it than to the Earth."*[12]

Cyrano expects the reader to start with the known laws of physics (*mouvement*) and apply them to a new, hypothetical situation. Even without Newton's law of gravitation, the seventeenth century scientific community and learned public could in a sense appreciate that the major forces on the spaceship depended on the masses of the Earth and the Moon, and their distances with respect to the ship. Though it is important to note that Cyrano's guesstimate of the distance (three-fourths to the Moon) is skewed due to seventeenth century measurements and estimates, his thought experiment – the impossible act of traveling to the Moon in the seventeenth century – is uncannily perceptive for its time. At the same time when Cyrano composed *The Other World*, natural philosophers began to postulate an early theory of attraction. Cyrano's "sphere of activity" refers to the Keplerian-Galilean explanation of planetary movement by