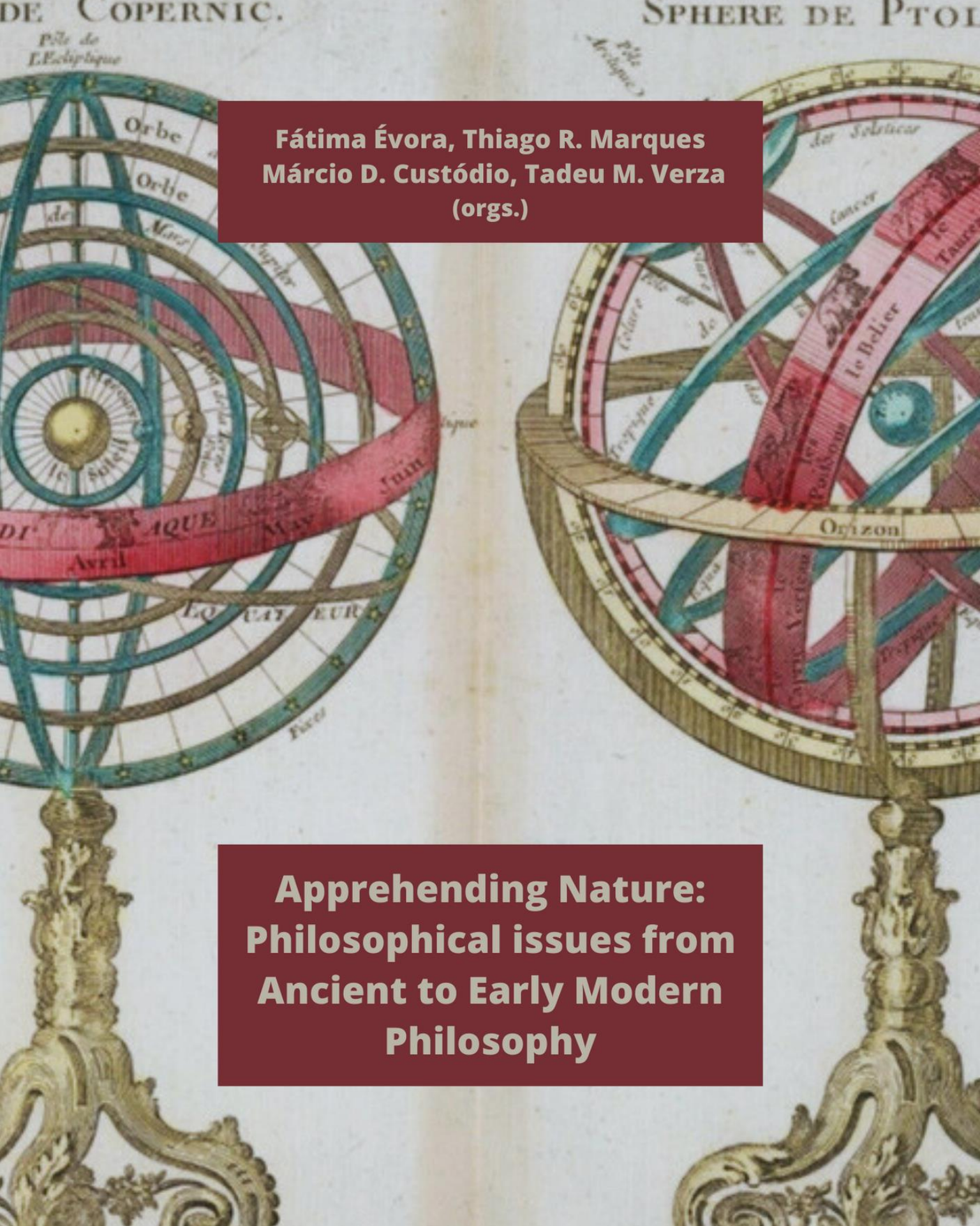

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(orgs.)

Apprehending Nature: Philosophical issues from Ancient to Early Modern Philosophy

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Apprehending Nature:
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Summary

Extended abstracts
XV Colloquium History of Philosophy of Nature

FÁTIMA ÉVORA (UNICAMP) THIAGO MARQUES (UNICAMP) E MÁRCIO CUSTÓDIO (UNICAMP)

Introduction

This volume is sponsored by the *Physis*: Research Center on the History of the Philosophy of Nature of the Department of Philosophy at the University of Campinas (UNICAMP). After its creation, *Physis* incorporated from 2017 the *Study Group on the History of the Philosophy of Nature* and the group Scientific *Revolution of the 16th and 17th Centuries: Origins, Influences and Bases*, both led by Fátima Évora, accredited by the National Council for Scientific and Technological Development (CNPq) and certified by UNICAMP, the *Metaphysics, and Politics* Group, led by Marcio Damin Custódio, also certified by UNICAMP and accredited by CNPq. It also incorporated *Philoponus Latinus Study Group*, coordinated by Fátima Évora and the *Espinosa Research Group* coordinated by Márcio Damin Custódio.

Under the direction of Fátima Évora, the Research Center *Physis* aims to strengthen the collaboration between national and international researchers, mainly in themes related to the History of the Philosophy of Nature. Thus, the *Physis* covers discussions from Ancient Philosophy, notably Aristotle, up to the 17th century, emphasizing the reception and transformation of

Aristotelian thought in the Latin and Arab traditions and its reception at the beginning of the modern period. The *Physis'* thematic lines are:

a) Analysis of Aristotle's Philosophy of Nature and Cosmology, with particular attention to works such as Physics, De Caelo, and Meteorology.

b) The question of causality in Aristotelian biological treaties and discussions on the intellect in De Anima III.

c) Ancient Greek medicine: Hippocratic School, Empirical School of Alexandria, founded by Philo of Cos, and Galen's medical doctrine.

d) Study of the reception of Aristotle's philosophy of nature in Late Antiquity, with particular attention to the Comments of Philoponus of Alexandria (490-570) and Simplicius (6th century).

e) Studies on the *Philoponus Latinus corpus*, aiming to both analyze and translate the Latin editions of Philoponus' Commentaries;

f) The Arab commentaries on Aristotle's philosophy of nature, with emphasis on Avicenna (Ibn-Sina, 980-1037), Avempace (Ibn-Badja, 1106-1138), and Averroes (Ibn-Roschd, 1126-1198);

g) Study and translation of the Arab Pseudo-Aristotle, specifically *Liber de causis*, *Liber de pomo*, and *Secretum secretorum.*

h) The Philosophy of Nature in the Middle Ages, especially the reception of the Aristotelian hylomorphism and the theories of the movement of Buridan, Oresme, and Bradwardine; i) The theory of abstraction and intellect in Thomas Aquinas and Durand of Saint Pourçain.

j) The reception of Aristotle's Politics on the middle ages;

k) The Philosophy of Nature in the Early modern period and the rupture with scholastics analysis of the movement. The criticism of the Cartesian authors to the teleological hylomorphism.

l) The astronomical revolution from Copernicus to Newton and the theory of motion from Galileo to Newton;

m) The impact and influence of the 16th and 17th centuries Scientific Revolution, especially in the Philosophical works of Galileo, Descartes, Kepler, Huygens, Berkeley, Gassendi, Leibniz, and Newton;

n) The Early Modern theory of moods, considering the immediate reception of Descartes' work Passions of the Soul, considering its bases and influences.

o) The Early Modern physiological theories, especially William Harvey's *De Motu Cordis*.

p) The 17th century English Experimental Philosophy, notably Bacon's and Boyle's works.

q) The role of the English Royal Academy of Science in the scientific debate during the 17th and 18th centuries.

r) Spinoza's metaphysics,

s) The Reception of ancient medicine, especially Hippocratic and Galen medicine, in the 16th and 17th centuries, with special attention to the Espinosa's works and Tschirnhaus'Medicina Mentis;

t) Study of the emergence of Modern Philosophy in scientific academies, among Parisian novices and Cambridge Platonists,

u) The question of scientific realism in Modern Science; and

v) The role of mathematics in the birth of modern science

Physis maintains an academic exchange with research and institutions in Brazil and abroad, in particular we would like to highlight three first members who started with the Study Group on the History of the Philosophy of Nature, incorporated by Physis:

The Physis keeps an academic exchange with researchers and institutions in Brazil and abroad. In particular, we highlight three main collaborations:

1) Princeton University: A fruitful academic collaboration with Prof. Daniel Garber, started in 2000, when he was still a professor at Chicago University, and remained when he transferred to

Princeton University. This collaboration was consolidated in 2008 with the participation of Prof. Garber in the Study Group on the History of the Philosophy of Nature, when we started a more regular academic collaboration, with work meetings, congresses, and seminars held at UNICAMP and `Princeton University (2008, 2009, 2011, 2014 and 2016). This international cooperation stands out for interchange between the Brazilian and American institutions involved. The collaboration also keeps work meetings held at UNICAMP and Princeton University, publications, and cooperative organization of congresses and seminars. Prof. Daniel Garber is also a member of the editorial board of the Philosophy of Nature History Studies Collection. We have organized, in a partnership with UNICAMP, Princeton University, and University of Porto, the XVth International Colloquium on the History of Natural Philosophy, dedicated to the theme "Theories of Matter". The meeting was devoted to debate the rejection of Aristotelian notions of matter and form by the Modern Philosophers understood as fundamentals capable of explaining the natural phenomenon.

2) Centre de Recherche sur la Pensée Antique "Bibliothèque Léon Robin" (Université de Paris IV et CNRS): academic cooperation, especially with Professor. Dr. Cristina Viano, started in 2004, and which was consolidated in the Project Coopération France / Brésil CNRS / FAPESP dedicated to the theme Aristote: causes and actions.

3) University of Porto: a fruitful academic graduation agreement between the research groups led by Fátima Évora and Professor José Francisco Preto Meirinhos was signed in 2007. Since then, Prof. Meirinhos has joined the Research Group on the History of the Philosophy of Nature. Also, he is a member of the Editorial Board of the Collection Studies on History of the Philosophy of Nature. In the scope of this collaboration, the International Colloquium Scire Naturam: philosophy and sciences, from antiquity to the beginning of modernity" was held between the 26th and 28th of February 2018 at the Faculty of Arts of the University of Porto. The Scire Naturam Colloquium was promoted in collaboration with the following research centers and projects: "Physis – Research Center on the History of the Philosophy of Nature" of UNICAMP, the project "Critical Edition and Study of the Assigned Works or Petrus Hispanus, 1" and the thematic line "Medieval and Modern Philosophy / Medieval Philosophy Office" of the Philosophy Institute of the

University of Port (http://ifilosofia.up.pt/activities/natureza-ciencia-2018). The Colloquium aimed to discuss the relationship between philosophy and science, from antiquity to the beginning of modernity. With participants from different backgrounds (sciences, philosophy, philology), the debates evolved several problems related to knowledge of nature, tracing the emergency, and transforming methodological, theoretical, or conceptual. With participants from different backgrounds (sciences, philosophy, philology), the debates evolved several problems related to knowledge of nature, tracing the emergency, and the methodological, theoretical, or conceptual transformations of philosophical subjects. The articles presented and discussed in the event were published in a special issue, edited by Fátima Évora and Márcio Damin Custódio, in the 'Mediaevalia journal. Texts and studies": Évora, F. and Custódio, M (org), "Scire Naturam: philosophy and sciences, from antiquity to the beginning of modernity," (Mediaevalia. Texts and studies, v. 37, 2018).

The Physis and the Graduate Program in Philosophy at Unicamp promote a series of International Colloquiums on the History of Philosophy of Nature. Such Colloquia encourage research and academic exchange between Brazilian and International researchers and graduate students on the History of Philosophy, History of the Philosophy of Nature, Epistemology, and History of Scientific Thought.

About the authours and organizers

Fátima Évora is an Associate Professor at the Department of Philosophy at IFCH-UNICAMP, where she has been researching since 1987 in the areas of the History of Philosophy and the History of Philosophy of Nature. She got a Bachelor's degree in Physics at the University of São Paulo in 1980. She defended, in 1987, at IFCH-UNICAMP, her Master's dissertation in Philosophy on the Copernican-Galilean Revolution: Origin, meaning, and insertion in the history of ancient and medieval scientific and philosophical thought. She obtained her Ph.D. in Philosophy in 1996 from the FFLCH-USP with a thesis on The evolution of the concept of inertia: from Philoponus to Galileo. She did research internships at Princeton University-USA (2011, 2014, 2016), University of Porto (2018 and 2020), University of Lisbon (2016, 2020), and at the Center de Recherche sur la Pensée Antique "Bibliothèque Léon Robin" (Université de Paris IV et CNRS) (2004, 2008, 2010). In 2016, she was a Visiting Scholar in the Department of Philosophy of Princeton

University-USA. She was editor, from 1993 to 2013, of Cadernos de História e Filosofia da Ciência, and, since 2006, she has been associated director of the book collection Philosophia / Analytica, published by Discurso Editorial.

Márcio Augusto Damin Custódio is an Associate Professor at the Department of Philosophy at IFCH-UNICAMP, his research is dedicated to the notion of mater in Thomas Aquinas and Latin Aristotle, as well as the opposition to the hylomorphism in texts by Early Modern authors, notably Descartes, and the Cartesianism.

Tadeu M. Verza is Professor of Medieval Philosophy at the Federal University of Minas Gerais (UFMG). His general research interest is in the history of philosophy done within the Aristotelian tradition, with a particular focus on the medieval Arabic and Jewish Philosophy. He is currently engaged in the translation of Pseudo-Aristotelian Arabic texts, *Liber de pomo*, *Liber de Causis*, and *Secretum secretorum* to the project The Complete Works of Aristotle developed by the Centre of Philosophy of the University of Lisbon (CFUL).

Thiago Rosales Marques holds a master's degree in Philosophy and a bachelor's degree in Physics from UNICAMP, having developed research internships at the Universities of Porto (Portugal) and Princeton (United States). He is dedicated to the reception of Aristotelianism especially in early modernity. He is currently developing with FAPESP scholarship at IFCH/UNICAMP the doctoral project *Tradition and Innovation in* Les Météores *de Renné Descartes: between the rupture with Aristotelianism and the continuity with Scholastic thought*, supervised by Prof. Dr. Fátima R. R. Évora. R. Évora.

Daisy Poltronieri is Ph.D. student in philosophy at the University of Campinas (UNICAMP). She studies the foundations of the concept of force in Gottfried Wilhelm Leibniz. She is linked to study

groups in philosophy at UNICAMP, such as the Descartes, Leibniz and Spinoza groups and the Research Group on Metaphysics and Politics (GPMP).

Evaniel Brás dos Santos is a Professor of Philosophy at the Federal University of Sergipe (UFS), where he coordinates the research group Medieval Philosophy and Neoplatonism. His research focus on topics related to metaphysics and scholastic cosmology, with special attention to Latin Aristotle, Bonaventure, Aquinas, and Christine de Pizan. Over the years, he has published papers on ancient cosmology, patristic natural theology, Augustine, Aquinas, and Christine de Pizan.

Luis Rusmando is a Professor at the State University of Santa Cruz (UESC), in the State of Bahia. He holds a doctorate (2017) and a master's degree (2010), both in Philosophy, from the Federal University of Bahia, and a degree in Philosophy (2006), from Faculdade Batista Brasileira (Bahia). Rusmando's research is devoted to the study of Philosophy, with an emphasis on Modern Philosophy, working on the themes: Spinoza; God; substance; attributes; monism.

Maria Clara Pereira e Silva is a Ph.D. student from Universidade Estadual de Campinas– UNICAMP with a CNPq scholarship. Has graduated in Philosophy from UNICAMP (2015) and has a master's degree in Medieval Philosophy from UNICAMP (2018). Current research concerns issues in the natural science and theory of cognition of Tomas Aquinas and the metaphysics and the cognitive theory of Durand of Saint Porçain.

Veronica Ferreira Bahr Calazans is a professor at Federal University of Technology - Parana (UTFPR), Brazil. She holds a doctorate in philosophy from the University of São Paulo (USP). Her studies were directed to Newtonian mathematics, especially regarding the transition to the synthetic method. Her main research interests are epistemological history of science, notably, Isaac Newton's physics and mathematics, and philosophy of technology.

Articles

EVANIEL BRÁS DOS SANTOS (UFS)

Christine de Pizan and scholastic natural philosophy: introductory considerations

The notion of natural philosophy is found throughout Christine of Pizan's works (1364/65–1430). The author, however, does not approach the notion of natural philosophy in a systematic way. As Christine wrote more than forty works,[1] one can find discussions on natural philosophy notably in five of her books: (I) *Le chemin de longue estude* (1402–1403, in verse); (II) *Le livre de la mutacion de fortune* (1403, in verse); (III) *Le livre du corps de policie* (1404–1407, in prose); (IV)

[1] See: WILLARD, C. C. *Christine de Pizan: Her Life and Works*, 1984; COOPER-DAVIS, C. *Christine de Pizan: Life, Work, Legacy*, 2021.

Le Livre des fais et bonnes meurs du sage Roy Charles V (1404, in prose); (V) *Le livre de l'advision Cristine* (1405, in prose). [2]

The expression "natural philosophy" may be taken in two ways in the aforementioned works. In a narrow way, it means "physics" in the sense of natural science, that is, the part of the theoretical philosophy that investigates the natural beings submitted to movement. In a broad way, it is synonym with natural reasoning or human reasoning in the following sense: the formulation of declarative sentences of the kind "S is P" with philosophical content and without any external constraint, like, for instance, the divine revelation. Taken as natural reasoning, the natural philosophy encompasses both the three theoretical philosophies (physics, mathematics, and metaphysics) and the notion of natural theology.

As should seem to be intuitive, it is not an easy task to find female figures who had written works of theoretical philosophy throughout the history of human thought. There is evidence that between the centuries IV–V A.D., there was a very learned woman in mathematics, Hypatia of Alexandria. Unfortunately, her works were destroyed. [3]

If we think about the theoretical philosophy from the perspective of the Aristotelian tradition, then it is plausible to suppose/propose that Christine was the first woman in the West.to have written works of theoretical philosophy from the perspective of the Aristotelian tradition. This is an aspect of her work that unfortunately has not received the attention it deserves in Brazil. Neither men nor women have carried out researches focused on it. As a matter of fact, it is possible

[2] See: CHRISTINE DE PIZAN. *Le chemin de longue étude*, 2000; *Le livre de l'advision Cristine*, 2001; *Le livre des fais et bonnes meurs du sage roy Charles V*, 1936–1940; *Le livre du corps de policie*, 1967; *Le livre de la mutacion de Fortune*, 1959–1966.

[3] See: DZIELSKA, Maria. *Hypatia of Alexandria*, 1995; *Hipatia de Alejandría*, 2004.

to say that the topic "medieval natural philosophy" has only recently become an object of interest by women.

This paper has two aims. On the one hand, we present the discussion about the notion of natural philosophy in the Middle Age context. On the other hand, we intend to disseminate the notion of natural philosophy in Christine, as well the biography of three women who dedicated part of their studies to the natural philosophy in the Middle Ages. The text is divided into five sections. The first presents the biography of three learned women on topics of natural philosophy in the Middle Ages. The second introduces the kind of relationship among metaphysics, cosmology, and astronomy in the Middle Ages from the perspective of one of the three aforementioned learned woman, besides some brief remarks on Christine. The third also introduces a brief discussion about astronomy, astrology, and metaphysics in the XIII-XIV centuries. The fourth portrays the medieval discussion on cosmology and cosmography by Dante Alighieri. The last shows the nexus between cosmology and astronomy in Christine of Pizan's work *The Vision of Christine de Pizan* II, 7, 5§.

I. Women and medieval natural philosophy: brief considerations

Although the following three women do not study the theoretical philosophy in Christine, they may well be counted among the pioneers in the scholarly interest in medieval natural philosophy: Anneliese Maier (1905-1971), Marie-Therese d'Alverny (1903-1991) and Edith Dudley Sylla (born in 1941). The first, Maier, dedicated her studies to the medieval natural philosophy of the XIII-XIV centuries. The second, d'Alverny, studied especially the medieval natural philosophy of the XII-XIII centuries, notably from the perspective of the Latin reception of Arabic works. The third, Sylla, also dedicated her studies to the medieval natural philosophy of the XIII-XIV centuries.

Maier wrote the most significant part of her texts in German.[4] She also published in French[5] and there are translations of her texts to the English[6], Spanish[7], and Italian[8]. In 1991, the book "*Studi Sul Xiv Secolo in Memoria di Anneliese Maier*" was published in her honor. In this book, one finds the "Bibliografia degli scritti di A. Maier" (pp. 15-23), which contains the complete list of her publications. In this book, it is also possible to find the text "Anneliese Maier and the History of Medieval Science", written by Sylla together with one of her colleagues.[9]

In the context of the history of the medieval science, it is important to stress the prestige of other scholars, such as Marshall Clagett, about the studies carried out by Maier:

> Miss Maier's work has been based on detailed manuscript investigations, and her principal studies are cited in the Bibliography. The result of Maier's magnificent studies has been to place the mechanical ideas uncovered by Duhem in their proper medieval setting and to show their essential divergences from the later concepts of modern mechanics. Thus, to give only one example, Miss Maier shows that Buridan's impetus is at best to be considered a rejected analogue to momentum rather than identical to it. Furthermore, Miss Maier's studies opened up areas of medieval natural philosophy not studied by Duhem. The succeeding

[4] See: MAIER, Anneliese. *Studien zur Naturphilosophie der Spatmittelalter*, 5 vols, 1952–1968.

[5] MAIER, Anneliese. Nouvelles Questions de Siger de Brabant sur la Physique d'Aristote, 1946; La doctrine de Nicolas D'Oresme sur les configurationes intensionum, 1948; Les commentaires sur la Physique d'Aristote attribués à Siger de Brabant, 1949.

[6] MAIER, Anneliese. *On the Threshold of Exact Science: Selected Writings of Anneliese Maier on Late Medieval Natural Philosophy*, 1982; The Structure of Material Substance: The Averroistic Route, 2005.

[7] MAIER, Anneliese. Un manuscrito de Tomàs Mieres, con notas autografas, en la Biblioteca Vaticana, 1952.

[8] MAIER, Anneliese. *Scienza e Filosofia nel medioevo: Saggi sui secoli XIII e XIV*, 1983.

[9] SYLLA, E. D.; MURDOCH, John E. Anneliese Maier and the History of Medieval Science, 1981.

> pages of this volume will demonstrate the great debt owed by me and all recent students of medieval mechanics to Miss Maier's work.[10]

When it comes to d'Alverny, her intellectual production was written in her mother tongue: French. There are two lists with the titles of d'Alverny's published works. One of them is found in the *Archives d'histoire doctrinale et littéraire du Moyen Age*;[11] the other in the "Bibliographie Supplémentaire",[12] organized by Charles Burnett. Moreover, Burnett has organized and edited four volumes with a huge number of texts written by d'Alverny.[13]

It is worth taking a look at some titles from d'Alvrny's texts. For instance, "Le cosmos symbolique du xii[e] siècle",[14] "Astrologues et théologiens au xii[e] siècle",[15] "Pseudo-Aristotle, De elementis",[16] "Note sur deux manuscrits du De aeternitate mundi",[17] "Pietro d'Abano et les naturalistes à l'époque de Dante",[18] "Comment les théologiens et les philosophes voient la femme",[19] "Les muses et les sphères celestes",[20] "Un Adversaire de Saint Thomas: Petrus Joannis

[10] CLAGETT, Marshall. *The Science of Mechanics in the Middle Ages*, 1959, p. xxi.

[11] Marie-Therese d'Alverny (1903-1991): Bibliographie, 1991.

[12] See: D'ALVERNY, Marie-Therese. *La Transmission des Textes Philosophiques et Scientifiques au Moyen Âge*, 1994, p. XI-XVI.

[13] Besides the text mentioned in the previous footnote, see also: D'ALVERNY, Marie-Therese. *Études sur le symbolisme de la Sagesse et sur l'iconographie*, 1993; *La connaissance de l'Islam dans l'Occident médiéval.*, 1994; *Pensée médiévale en Occident. Théologie, magie et autres textes des XIIe-XIIIe siècles*, 1995.

[14] D'ALVERNY, Marie-Therese. Le cosmos symbolique du XII[e] siècle, 1953.

[15] D'ALVERNY, Marie-Therese. Astrologues et théologiens au XII[e] siècle, 1994.

[16] D'ALVERNY, Marie-Therese. Pseudo-Aristotle, De elementis, 1994.

[17] D'ALVERNY, Marie-Therese. Note sur deux manuscrits du De aeternitate mundi, 1955.

[18] D'ALVERNY, Marie-Therese. Pietro d'Abano et les naturalistes à l'époque de Dante, 1966.

[19] D'ALVERNY, Marie-Therese. Comment les théologiens et les philosophes voient la femme, 1977.

[20] D'ALVERNY, Marie-Therese. Les muses et les sphères célestes, 1993, p. 7-19.

Olivi"[21] and "Al-Kindi. De radiis"[22]. In regard to the last text aforementioned, it is important to highlight that, besides being a erudite study (pp. 139-214), d'Alverny also established a critical version of the Latin text "De raddis" (pp. 215-259), a text that had major implication in the scholastic philosophy, included here Aquinas itself.

Par contre, il semble probable que saint Thomas d'Aquin ait en vue l'opuscule de Kindi lorsqu'il attaque la théorie de l'influence astrale sur les opérations magiques et refuse de l'admettre en tant qu'explication valable de leur efficacité, dans les chapitres 104 et 105 du livre III de la *Summa contra Gentiles*.[23]

Lastly, Sylla, the youngest women among the aforementioned, has written her research in English and, just as Maier, has always shown interest in the relationship between science and mathematics, notably approaching scholastic philosophers in the XIV century, since the beginning of her career. Her most recent text has the title "Leibniz and the Calculators" (2022)[24].

Besides the older texts,[25] it deserves to be mentioned some of her works published since the beginning of the XXI century: "Ideo quasi mendicare oportet intellectum humanum: The Role

[21] D'ALVERNY, Marie-Therese. Un Adversaire de Saint Thomas: Petrus Joannis Olivi, 1974.

[22] D'ALVERNY, Marie-Therese. Al-Kindi. De radiis, 1974.

[23] Idem, p. 140.

[24] SYLLA, Edith Dudley. Leibniz and the Calculators, 2022.

[25] SYLLA, Edith Dudley. God, Indivisibles, and Logic in the Later Middle Ages, 1998; Aristotelian commentaries and scientific change: The Parisian nominalists on the cause of the natural motion of inanimate bodies, 1993; *The Oxford Calculators and the Mathematics of Motion, 1320-1350: Physics and Measurement by Latitudes*, 1991; The Oxford Calculators in Context, 1987; Abstract of Comments: Were there Significant Differences between Medieval and Early Modern Scholastic Natural Philosophy? Content and Procedures, 1984; The a Posteriori Foundations of Natural

of Theology in John Buridan's Natural Philosophy";[26] "Walter Burley's Physics Commentaries and the Mathematics of Alteration";[27] "The Status of Astronomy between Experience and Demonstration in the Commentaries on Aristotle's Posterior Analytics of Robert Grosseteste and Walter Burley";[28] "The Oxford Calculators' Middle Degree Theorem in Context";[29] "Averroes and fourteenth-century theories of alteration: Minima naturalia and the Distinction between Mathematics and Physics";[30] "Concepts of space in the fourteenth century: works of Nicole Oresme and selected earlier work for comparison";[31] "Mathematics and Physics of First and Last Instants: Walter Burley and William of Ockham".[32]

Science: Some Medieval Commentaries on Aristotle's "Physics", Book I, Chapters 1 and 2, 1979; Medieval concepts of the latitude of forms. The Oxford calculators, 1973; Autonomous and Handmaiden Science: St. Thomas Aquinas and William of Ockham on the Physics of the Eucharist, 1973.

[26] In: THIJSSEN, J. M. M. H.; ZUPKO, Jack. (eds.). *The Metaphysics and Natural Philosophy of John Buridan*, 2001.

[27] In: *Early Science and Medicine*, v. 6, n. 3, p.149-184, 2001.

[28] In: FIDORA, Alexander; LUTZ-BACHMANN, Matthias. (eds.). *Erfahrung Und Beweis. Die Wissenschaften von der Natur Im 13. Und 14*, 2007.

[29] In: *Early Science and Medicine*, v. 15, n. 4-5, p. 338-370, 2010.

[30] In: BAKKER, Paul J. J. M. (ed.). *Averroes' Natural Philosophy and its Reception in the Latin West*, 2015, p. 89-126, p. 141-192.

[31] In: JANIAK, Andrew. (ed.). *Space. A History*, 2020.

[32] In: GOUBIER, Édéric; ROQUES, Magali. (eds.). *The Instant of Change in Medieval Philosophy and Beyond*, 2018.

II. Introduction to Metaphysics, Cosmology, and Medieval Astronomy: Sylla & Christine

We have chosen one of Sylla's texts to be quoted at this moment because it gives a joint approach to two topics held in high esteem by the scholastic theoretical philosophy, creation and nature: [33]

> [...] something should be said about a presupposition of essentially all of medieval natural philosophy, namely, that the world is God's creation [...]. The metaphysics of creation provided medieval thinkers with many topics for reflection [...].[34]

Among the topics discussed by the scholastic metaphysics, one finds the notion of nature incorporated in the scholastic metaphysics of creation insofar as the notion of nature supposes the idea of autonomy of operation to the natural entities, in the way it was formulated by the Greek philosophy, notably by Aristotle. The scholastic formulation differs from Aristotle's one because it defends that this autonomy of operation found in the natural entities is an effect of nature, we mean, the nature is the effect of a transcendental cause. Moreover, if the nature is effect, also the order that it imposes on the natural entities is the effect of the same transcendental cause.

The idea of order of the natural entities thought by the male and female philosophers in the scholastic era is necessarily associated with the *imago mundi*, that is, a cosmography that whoever thinks it has it in their thought. Together with the cosmography, there is, by its turn, the

[33] SYLLA, Edith Dudley. Creation and Nature, 2003. A similar title in the context of Aquinas' philosophy was established by Aertsen: AERTSEN, Jan. *Nature and Creature: Thomas Aquinas's Way of Thought*, 1988.
[34] SYLLA, Edith Dudley. *Creation and Nature*, p. 173.

cosmology, which we intend to offer an approach. Sylla provides an insightful image of how the medieval philosophers thought about the cosmography:

Diversity of day and night, the seasons, the weather, growth of plants and animals, and so forth are explained, first, by the obliquity of the ecliptic or apparent path of the sun, moon, and planets relative to the apparent rotation of the sphere of the fixed stars, and then by the individual motions of the sun, moon, and planets through the zodiac.[35]

The causal explanation of the cosmic diversity has at least two main sources in the scholastic era: (i) the reception of the Greek-Arabic astronomy and (ii) the relationship between the mathematical astronomy and the natural astronomy. Sylla remarks the following about the first topic:

Most medieval thinkers assumed that the motions of the heavenly bodies affect the course of nature in the sublunar realm. Until the twelfth century, Latin knowledge of the heavens came largely from the late Roman works mentioned earlier, all of which were not only non-mathematical but often inconsistent or at least highly fanciful. When, however, Arab astronomy began to be known in Europe, bringing with it a knowledge of Greek mathematical astronomy, the situation changed dramatically.[36]

Before the reception of the Greek-Arabic celestial science, therefore, according to Sylla, the male and female medieval thinkers based their reasoning on fanciful thought to some extent or exceedingly imaginary, that is, there were no solid criteria, so to speak, to the technical affirmations

[35] Idem, p. 177.

[36] Ibidem.

about the sky, especially because there was not a well-grounded celestial science in the Roman works used as sources.

It is due to the Arabic philosophy that, according to Sylla, the male and female scholastic philosophers begin the construction of a technical celestial science.

How was one to think of the science built on this view of the heavens? In Islam, Avicenna had initiated a tendency to categorize astrology as natural philosophy and astronomy as mathematics, a move that raised significant questions about the relations of the two disciplines to one another. Astrology became the discipline that addressed the physics of the heavens, as well as applying this physics of heavenly influences on earth. It was thus through the translation of Abu Mashar's *Introductorium maius in astronomiam*, an astrological work, that the Latin West was first introduced to Aristotelian physics. On the other hand, astronomy built mathematical models to track the positions of the planets (hence providing the forecasts of lunar, solar, planetary, and stellar positions needed for applied astrology), but it often built these models unconstrained by considerations of physical plausibility.[37]

It is not common the affirmation according to which it was due to a Arabic work on astronomy that "Latin West was first introduced to Aristotelian physics". Indeed, Aristotle's physics and the Arabic astronomy were determinant not only to the construction of a celestial science within the universities, but also within the royal courts, especially in regard to the French court ruled by Charles V in Paris, a place where Christine developed herself as a theoretical philosopher.

Sylla also indicates in the quoted passage that, since Avicenna, in the Arabic context, there is a significant difference between the mathematical celestial science (astronomy and mathematics)

[37] Idem, p. 177-178.

and the natural celestial science (natural astronomy and astrology). This distinction dates back to Plato and Aristotle:

> From the time of Plato, most natural philosophers were agreed that a spherical heaven (with concentric shells rather like an onion) surrounds a spherical earth, although they differed about the details. Aristotle had posited a set of such spheres, each with its own uniform motion but each also carried with the movement of the spheres surrounding it, meant to account for the observed positions of the planets through the year. From the time of Hipparchus and Apollonius, however, many mathematical astronomers lost hope of accurately "saving the phenomena" of planetary motions using models containing only concentric uniformly rotating spheres. They therefore proposed models in which spheres rotated around centers that were not the center of the cosmos (epicycles, eccentrics) or even changed their rates of rotation (equants). This led to a division of labor over the centuries between natural philosophers seeking physically realistic theories of the heavens and mathematical astronomers proposing theories that accurately predicted planetary positions.[38]

To reintegrate the celestial science is not a simple procedure because, for successfully achieving this aim, it would be necessary to unify physical and mathematical principles, what, ultimately, would be equivalent to unify Aristotle's natural cosmology with Ptolemeu's work, in the way that Christine shrewdly noticed:

[38] Idem, p. 178.

> "For", as Aristotle said, "this world that is below is governed by the action of heavenly bodies", and Ptolemy said that "the images and configurations of this world below are subject to the images and configurations of the world above".[39]

Some questions stem from the reading of this text. (1) What does it mean "to govern" and "to be subject" in the relationship between the supralunar and sublunar regions? (2) Is there any possibility of mathematizing these terms? (3) Does Aristotle represent the physics and the physical sort of reasoning while Ptolemeu, by his turn, represents the mathematics and the mathematical reasoning? Does the notions of astronomy, physical astronomy, and mathematical astronomy found in Christine's text similar to these concepts such as they are found in Aquinas' work? (5) What are the images and the figures in the mathematical sense? (6) Which is the nature of the images and figures according to mathematics, in Ptolomeu's view? (7) Are the images and figures of the sublunar region subjected to the images and figures of the supralunar region and, for that very reason, regardless of what they are, the images and figures of the supralunar region are ontologically superior to the images and figures in the sublunar one? (8) Does such a superiority, if there is any, makes the sky a ruler of the sublunar region, that is, taking into account Ptolomeu's views, Christine told us, the sublunar region is subjected to the celestial region? (9) Does what Aristotle calls "to govern" the same thing as Ptolomeu calls "to be subjected"?

[39] CHRISTINE DE PIZAN. *The Book of the Body Politic*, 1994: (I, 25). "Car selon ce que dit Aristote, ce monde cy dessoubz est gouverné par l'action des corps du ciel; et Ptholomee dit que les viares et les figuracions de ce siecle cy bas sont subgettés aux viaires et aux figuracions du siecle de dessus". (CHRISTINE DE PIZAN. *Le livre du corps de policie*, 1967).

When it comes to Ptolomeu, Christine also says: "And it is true, said Ptolemy, who was a great astrologer, may the wise determine the power of the stars".[40] This statement makes wonder the following: (10) is the determination of the capacities of the stars made through geometry and arithmetic, that is, the determination is the result of the mathematical calculus, which may well be also a possible forecast about future events?

Such questions aim to stress the seriousness of Christine's text. In a nutshell, it is possible to affirm that, for the author, the notions of "image" and "figure" may well be understood through the terms "entity", taken as a noun, and "operation", taken as a verb. In this way, the operation, immanent or transitive, is an action of the entity. It is through the figure taken as operation that one understands the image *qua* entity. The calculus identifies the operation towards the entity. Here the proper object of mathematics is the operation, while the entity belongs simultaneously to the object of physics and of metaphysics. Therefore, it is possible to postulate that, according to Ptolomeu, in Christine's interpretation, the figure *qua* operation may be quantified, being, then, the object of mathematics.

The mathematical notion of quantity (*quanta*) involves the idea of fixity, determination and invariability, corresponding to the causality of the sun in the nature, for instance. The same heat that comes from the sun melts the ice and harden the clay, that is, the heat *qua* operation that comes from the sun, in the sun, in the cause, is fixed, determinated and invariable; its effects, however, are received in different ways, as the examples from the clay and the ice have clearly shown.

The possible term from the natural language that names the operation is not easily grasped at first glance in Ptolomeu's works:

[40] CHRISTINE DE PIZAN. *The Book of the Body Politic* I, c. 24): "Et qu'il soit vray dit Tholomee, lequel fut grant astrologien que le saige determinera aux puissances des estoiles [...]".

> [...] a certain power emanating from the eternal ethereal substance is dispersed through and permeates the whole region of the earth, which throughout is subject to change, since, of the primary sublunar elements, fire and air are encompassed and changed by the motions in the ether, and in turn encompass and change all else, earth and water and the plants and animals therein.[41]

The idea of operation, without employing such a term, is found in this schematic passage from Ptolomeu's cosmology. It is interesting the possibility of understanding this passage through the terminology and discussion found in *The Book of the Body Politic* I, cc. 24–25, especially in regard to the terms "*force*", "*influence*", "*inclination*" and "*puissance*".

III. **Astronomy**, **astrology**, **and metaphysics in XIII–XIV centuries**

One of the most interesting discussion about the hypothesis of unification of the celestial science is about the scientific possibility of forecasting the future, an aspect that, apparently, emphasizes the role played by mathematics in the explanation of the relationship between the supralunar and sublunar regions. Here it is philosophy surprising the effort to articulate the notion of mathematical reasoning and the natural idea of influence, just as de Libera inspires us to do:

[41] PTOLEMY. *Tetrabiblos*, 1940, (I, c. 2).

> Il fault cependant reconnaître que nombre de médiévaux ont accordé le plus grand crédit sinon aux pratiques divinatoires de l'Antiquité tardive, du moins aux prétentions scientifiques de l'«astrologie libérale». C'est le cas, on l'a vu, de Roger Bacon, c'est évidemment aussi celui d'Albert le Grand, dont le nom a couvert et couvre encore de nos jours toute une série d'opuscules et de traités d'astrologie savante ou de magie populaire. Comment expliquer ce phénomène? La raison en est simple. Telle que la conçoivent les philosophes du XIIIe siècle, la partie «judiciaire» de l'astronomie a un sens philosophique parce qu'elle est solidaire du reste de l'astronomie et parce qu'elle vient, en outre, donner un contenu précis à la théorie philosophique de l'*influence* qui organize la perception médiévale des rapports entre le monde sublunaire et le monde supralunaire. En tant que branche des mathématiques, la science astrologique est compatible avec la vision du cosmos transmise par le péripatétisme gréco-arabe. Le monde de l'astrologue «liberal» est le même que elui du philosophe: il s'agit du système des sphères celestes, des intelligences et des âmes motrices des cieux, popularisé en Occident par Avicenne et les commentaires d'Averroès sur le traité aristotélicien *Du ciel*, c'est-à-dire une version péripatéticienne de la théologie cosmique esquissée dans le livre Λ de la *Métaphysique* d'Aristote.[42]

The notion of "influence" (*influentia*, in Latin) is philosophically transdisciplinary. It is found, therefore, in the physics, in the mathematics and in the metaphysics. It is not, then, a vulgar or extravagant notion, even though this notion may be employed in a popular way, in close connection with its daily use.

[42] DE LIBERA, Alain. *Penser au Moyen Age*, 1991, p. 254-255.

The metaphysical aspect of the notion of influence, according to the quoted text, is found in the Greek-Arabic idea that affirms that there are actions and intelligence in the celestial locomotion, that is, that there would be actions from immaterial things over material ones in the cosmos. It is in this context that the notion of natural theology linked to metaphysical notions comes up:

> Le thème fondamental de l'astrologie étant l'ideé d'une *influence des astres*, il faut lui donner une certaine représentation du monde pour qu'il trouve les conditions d'un fonctionnement théorique de plein exercise. C'est ce qu'ont fourni le *Livre des causes* et l'ensembledes écrits théologiques faussement attribués à Aristote. En s'emparant de la «théologie» d'Aristote, l'astrologie pouvait accaparer le reste d'un «système» qui n'avait, en réalité, jamais existé dans l'aristotélisme authentique et orchestrer ainsi un «aristotélisme total», mais fantôme, où la *Physique*, le traité *Du ciel* et les *Météorologiques* étaient absorbés dans un ensemble d'autant plus impressionant qu'il était aux trois quarts inauthentique.[43]

Despite de Libera's negative conception about part of the astrology by taking it as the result of a supposed pseudo-aristotelism, it is a historical fact, recognized by de Libera himself, that in the scholastic era the "*influence des astres*" is a phenomenon of the reality, which, then, is expected to have a philosophical and scientific explanation. The notion of "figuration" has a pride of place in the attempt to explain the "*influence des astres*":

[43] Idem, p. 257.

C'est cette *figuration*, expression visible et figurée déterminisme astral, qui autorize les pronostics et les prévisions. On connaît la chanson: «C'est écrit dans le ciel... », on n'a malheureusement là qu'une partie du refrain, la plus manifeste et la plus énigmatique, puisqu'il manque l'autre partie, celle qui – pour les médiévaux du moins – était inséparable de la première (articulation où, précisément, s'accomplissait la nouvelle interprétation d'Aristote): c'est *écrit* dans le ciel, parce que l'être de tout ce qui est est *décrit* dans les intelligences motrices des sphères, dans ces substances spirituelles séparées, réglant la vivante mécanique du ciel. On ne peut se réclamer de la tradition médiévale de l'astrologie sans assumer le coût de as structure cosmique ni revendiquer le mode principal de sa lisibilité. S'il y a, aux cieux, les multiplex figures des choses de ce monde, ces cieux *signifères* sont aussi des cieux *animés*.[44]

The "figuration" is a kind of "pre-existence" regarding the form of the effect in the cause, that is, the effect is somehow in the cause. In this way, "figure" is similar to "form", that is, the potential form of the effect is found in act in the cause. To know the form in the cause already amounts to knowing the future of the effect. The form, in the context of the quoted passage, imposes itself to the cause, is an idea or notion present in the celestial movers and that receive extramental reality when there is a passage from the capacity to the extramental act of the effect. The human reason, by its turn, putting aside the supernatural case of the divine revelation or divine illumination, may know the form in the cause from the knowledge of the form in the effect. This sort of knowledge may well be described as "tracking", whose consequence is the "description".

It is taken for granted that there was no consensus in the scholastic era about the "descriptive knowledge" in the terms we have just presented. However, for those who accepted it, among others, there was a technical support from Avicenna:

[44] Idem, p. 257.

> Il n'y a pas mille manières de lire dans le ciel, il faut que, d'une façon ou d'une autre, le lecteur entre en *contact* avec ses príncipes recteurs. Ce contact est littéralement une conjonction – à la conjoction des astres répond la conjonction de l'âme humaine avec les intelligences qui instrumentent l'ordre universel. C'est une théorie philosophique de la conjonction qui rend possible la réalité sémiologique du cosmos. Or il n'y a pas de conjonction sans émanation: l'âme humaine doit se rendre apte à recevoir le flux du sens et ele ne le peut recevoir que des intelligences. Cette doctrine n'est aucunement aristotélicienne, c'est celle d'Avicenne [...].[45]

The notion of "figuration" is linked, then, to another very important notion: conjunction. The idea is very emphatic and deserves attention: "à la conjoction des astres répond la conjonction de l'âme humaine avec les intelligences qui instrumentent l'ordre universel". This passage explains that conjunction is said in two ways, intellectual and natural, both in the cosmic context because the idea of emanation is implied. The first is related to the contact between the human soul and the celestial soul that receives the flux of the separate intelligence. The second is related to the natural locomotion, earthly and celestial.

Although the text refers and quotes the work "*De pronosticatione sompniorum libellus*" written by William of Aragon, the general context of de Libera's reflection help us understand the two ways in which conjunction is said:

[45] Idem, p. 263.

> On nage ici en plein concordat. Aristote, Ptolémée, son commentateur «Haly», bref tout ela philosophie, qu'lle soit ou non «aristotélicienne», disent la même chose. Le rapport des quatre éléments aux corps qui en sont composés est le même que le rapport des «étoiles» aux âmes. Certes, si les éléments entrent effectivement dans la composition des corps, les étoiles n'entrent pas dans la composition de l'âme; toutefois, de même que «le corps participe de diverses manierès aux vertus des éléments – selon que tel ou tel élément prédomine en lui – , de même, l'âme acquiert diverses propriétés en fonction des étoiles qui prédominent au moment où leur pouvoir est infusé en elle».[46]

The relationship between what is intelligible and natural is very complex. It is a kind of relationship that may be said in four contexts: God and the cosmos; the intelligences and the celestial spheres; the spheres' souls and the celestial bodies; the celestial bodies and the sublunar region. Furthermore, the attempt to associate these topics with Aristotle's and Ptolomeu's works makes even harder the complexity of the relationship, notably because they are two thinkers that have their own cosmological principles, that is, the first focuses on the vision and the movement; the second is especially concerned with the calculus.

[46] Idem, p. 294-295.

IV. Cosmology and cosmography in the Middle Ages: the case of Dante Alighieri

In the Medieval context of the cosmology and cosmography, two questions are very important: (1) is the first efficient cause (or originating one) of the celestial cosmology the nature or the entity separated from the nature? (2) Which is the quantity of skies that constitutes the superior region of the cosmos? In an exemplary way, Dante Alighieri synthesizes the medieval concern about these two questions, especially in his work "*Convivio*".

Dante approaches the first question in *Convivio* II, 4. In his reply, he says that the first efficient cause of the celestial locomotion is the intelligence separated from the nature. The second question is approached in *Convivio* II, 3 [(3), (4), (5), (6), (7)]. As the second reply is of special interest for our purposes in this paper, we dedicate more attention to it. The passage is divided into two parts for the sake of a more detailed discussion.

The first part refers to Aristotle:

> I say then that concerning the number of the heavens and their position divers opinions have been held by many, although the truth hath at last been found. Aristotle, following only the ancient grossness of the astrologers, believed that there were no more than eight heavens, the extremest of which, containing all the sum of things, was that whereon the stars are fixed, to wit the eighth sphere; and that outside of that there was no other. Moreover, he believed that the heaven of the sun came next after that of the moon, that is that it was the second from us. And this so erroneous opinion of his, whoso wills may see in the second *Of Heaven and the World*, which is in the second of the *Books of Nature*. But truly he shows his excuse for this in the twelfth of the *Metaphysics*, where he lets us

> clearly see that he was just following the opinion of others where he had to speak of Astrology.[47]

Dante's first remark is to say that the quantity of skies is object of philosophical discussion and that there is no consensus about it. Another important remark is that Aristotle committed a mistake when he postulated the existence of only eight skies. Dante argues, however, that Aristotle's mistake is somehow forgivable because he was only following what was said by his predecessors. Finally, it is not less baffling this remark made by Dante: "although the truth hath at last been found". Does Dante have in mind simultaneously the philosophy and the biblical revelation or just the biblical revelation?

This kind of question should be brought into discussion because Dante affirms the following in *Convivio* II, 3 (8–12).

> But beyond all these the Catholics assert the empyrean heaven, which is as much as to say the heaven of flame, or the luminous heaven; and they assert it to be immovable, because it hath in itself with respect to every part that which its matter demandeth. [...].This is the place of the blessed spirits, according as holy Church, which may not lie, will have it [...].This is the sovran edifice of the world, wherein all the world is included, and outside of which there is nought; and it is not itself in space, but was formed onlyin the primal mind, which the Greeks call *protonoe*. This is that magnificence whereof the Psalmist spoke when he saith to God: "Thy

[47] DANTE ALIGHIERI. *The Convivio of Dante Alighieri*, 1908, (II, 3 (3)).

> magnificence is exalted above the heavens". And thus, gathering up what hath been discoursed, it appears that there are ten heavens [...].

The tenth sky, therefore, is a claim from the Catholics based on the Bible. The nature of this sky is intellectual and cosmological, being its "place" in the divine mind. If the tenth sky is a revealed truth, then the natural reason will hardly find this truth by its own efforts. In contrast to this, it is possible that Ptolomeu's cosmological conclusions represent the furthest point that natural reason may reach by itself over the quantity of skies when it postulates simultaneously the cosmological and mathematical necessity of there being a ninetieth sky:

> Thereafter Ptolemy, perceiving that the eighth sphere had more than one movement, since he saw that its circle departed from the direct circle which turns the whole from east to west, constrained by the principles of philosophy (which of necessity will have a *primum mobile* of perfect simplicity) laid down the existence of another heaven, outside that of the stars, which should make that revolution from the east to the west. And I say that it is completed in about four-and-twenty hours, that is in twenty hours and three hours and fourteen out of fifteen parts of another, roughly reckoning. So that according to him and according to the tenets of astrology and philosophy (after the observation of these motions) the moving heavens are nine; and their relative position is manifested and determined according as, by the arts of perspective arithmetic and geometry, it is perceived by sense and reason; and by further observation of the senses, as in the eclipse of the sun, it appears sensibly that the moon is beneath the sun; and by the testimony of Aristotle, who saw with his own eyes (as he tells us in the second

> *Of Heaven and the World*) the moon, being at the half, pass below Mars with herdarkened side, and Mars remain hidden till here appeared from the other shining side of the moon which was facing the west.[48]

Dante affirms that, according to Ptolomeu, the moving skies are nine and that the eightieth, counting from the Moon, is the *primum mobile*. It is the *primum mobile* that makes a complete circle around the earth in almost twenty-four hours, because it is moving, necessarily it is the first moving mover, which is moved by the first unmoved mover. This last is not natural, but supernatural.

When it comes to the position of the stars in the Medieval cosmography, Dante makes a precise remark:

> And the order of their position is this: The first in the enumeration is that wherein is the moon; the second is that wherein is Mercury; the third is that wherein is Venus; the fourth is that wherein is the sun; the fifth is that wherein is Mars; the sixth is that wherein is Jupiter; the seventh is that wherein is Saturn; the eighth is that of the fixed stars; the ninth is that which is not perceived by the senses save by that movement which was spoicen of above; and it is called by many the crystalline heaven, that is the diaphanous, or all transparente.[49]

[48] Idem, II, 3 (5-6).

[49] Idem, II, 3 (7).

The ninetieth sky, the *primum mobile*, is also called "crystalline", "diaphanous" and "transparent" because the human eyes are not able to see it. There are two skies that are not perceptible: the tenth and the ninetieth. In the case of the ninetieth, perhaps due to the resemblance in the transparency, the Medieval philosophers fuse Ptolomeu's ninetieth sky with the biblical claim that there is a sky made out of water.

V. Astronomy and cosmology in Christine de Pizan

In the work *The Vision of Christine de Pizan* II, 7, 5§, Christine of Pizan also discusses about the quantity of skies, the position of the stars and the sky made from water in a passage displaying erudition, which constitutes evidence for the fact that the author was a full-fledged intellectual and knew very well the philosophical literature:

> These three said poets, speaking of the things of nature after the manner of fiction and metaphors, said that the Ocean, or the sea or the abyss wherein exists a great flood of waters, and Thetis, whom they called the goddess of liquids, were the parents of generation. By this, he said, as by a particular metaphor, they made it understood that water was the principle of generation for things. Moreover, this meaning they hid by another fabulous story, saying that the gods' sacrament or oath was by the water that they called the Styx, which is a river of hell. And because of this they said the gods made their oaths and sacraments on water; since a sacrament is always made with what is most worthy because the perfect comes before the imperfect in nature and in time-they gave themselves to understand that water was the most honorable and worthy of the gods. And so, as it appears

that they must have believed water the first and most ancient of the gods, which gods they perhaps understood to be heavenly bodies or other palpable bodies, for they did not yet know about separated substances – he says there was no known opinion about natural bodies more ancient than this. Yet this notion was even recently renewed by some, not that they said that water was more noble nor as noble as God as these first ones said but they did say and affirm without any fiction that it was the first and also the last of the things of this world. They even propose it is older than the sky. For the first sphere – that is to say the one they imagine comprises the ninth – they consider water, as Brother Roger Bacon more clearly relates in his *Book On the Heavens* in the twelfth chapter. And perhaps they were moved to this believing that the ancient poets agreed with them or perhaps because the books of the philosophers mention in several places that the waters are above the heavens. Yet these philosophers as much as these poets, inasmuch as they might have been led by good sense to at least most of these things, spoke covertly and obscurely: not the new ones but these ancient ones, inasmuch as they opened the gates of knowledge for you, you must excuse, love and support.[50]

[50] CHRISTINE DE PIZAN. *The Vision of Christine de Pizan*, 2005. "Ces .iii. poetes dis par maniere de ficcions et de paroles transsumptives parlans des choses de nature/ disoient que occean cest a dire le mer ou labysme ou a tres grant inondacion dyaues Et thetis quilz disoient la deesse dumeur sont parens de generacion Et par ce dist il comme par singuliere similitude ilz donnoient entendre que yaue fust le principe de la generacion* des choses. Encore ceste sentence par autre fabuleuse narracion ilz couvroient disant que le sacrement et le serement des dieux estoit par leaue quilz appellent stix/ laquelle est un fleuve denfer Et par ce quilz disoient les dieux faire leurs seremens et leurs sacremens de lyaue/ Pour ce que sacrement se fait tousiours par ce qui est plus digne. Car le parfect precede limparfect de nature et de temps ilz se donnoient a entendre que lyaue fust plus honnourable et plus digne des dieux. Et donc comme il appere quilz Guidassent liaue premiere et plus anciene des dieux/ lesquelx dieux puet estre ilz entendoient estre les corps du ciel ou autres corps sensibles/. Car encore des choses separees navoient cognoiscence. Il dist que nulle plus anciene opinion de ceste na este es choses de nature la quelle soit cogneue. Meismement encore ceste opinion a este nagaires daucuns renouvellee non pas quilz deissent leaue plus noble ne si noble que dieu comme yceulx premiers firent mais

According to Christine, for the ancient Greek poets, the water would be a originating principle of the universe or cosmos. Moreover, they assigned to water a divine and noble aspect, since they take it as the "most ancient of the gods". Such a conception, according to Christine, was also renewed by some philosophers that conceived the first and last water of the world, besides being "older than the sky".

This last statement, that is, that the water is older than the sky, brings into discussion an interesting discussion and Christine justifies this postulate in the following way: "For the first sphere – that is to say the one they imagine comprises the ninth – they consider water, as Brother Roger Bacon more clearly relates in his *Book On the Heavens* in the twelfth chapter".

This very brief passage is baffling for two reasons. First, Christine discusses celestial spheres, approaching then astronomical issues. She makes us wonder: which is the nature of the ninetieth sphere? Second, it seems that the water is not related only to the sublunar element, whose position is above the earth and below the air: there would also be a sky made from water. In this context, Christine says: "And perhaps they were moved to this believing that the ancient poets agreed with them or perhaps because the books of the philosophers mention in several places that the waters are above the heavens". Here other questions arise: which are "the books of the philosophers" that

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sanz ficcion aucune ilz la disoient et affermoient estre premiere/ et aussi la desreniere des choses de ce monde. Car meismes il la mettent premiere que le ciel. Car la premiere espere cest assavoir une que ilz ymaginent comprendre la .ix e. ils la mettent estre yaue. sicomme plus piaillement frere rogier bacon le recite en son livre du ciel on oxii e. chapitre/ Et puet estre ad ce ilz se mouvoient cuidans les vieux pouetes accorder avecques eulx/ ou puet estre pour les ditz des philosophes nommans en pluseurs lieux les yaues sur le ciel/ Toutefois tant yceulx philosophes que aussi les pouetes/ en tant que a bon sens se puissent ramener au moins le plus *des choses en envolopement et soubz ombre parlerent non les nouveaulx mais yceulx anciens en tant que des sciences les portes vous ouvrent les devez excuser amer et supporter".

affirm that there must be water above the skies, according to Christine? Would there be, according to Christine, an identification between Ptolomeu's notion of crystalline sky and the notion of a sky made from water? Would some text from the Arabic astronomy received in the scholastic era be among "the books of the philosophers"?

The possibility of the water belonging also to the celestial region seems to have some relationship with the perspective from the ancient poets and the Greek naturalist philosophers of grounding on the elements of nature the origin and constitution of the cosmos. This is made clearer in another passage, but instead of saying that water is the constitutive element of everything, included here the ninetieth sky, fire is presented as the constitutive element:

> Two other philosophers – that is, Hippasus and Heraclitus – proposed fire as the principle and matter of things. And possibly they were moved to this because of its subtlety and nobility, for, because they saw this very thing shining and ascending, they believed that the heavens were made of fire.[51]

There are much more cosmological and metaphysical discussions of utmost important in the work *The Vision of Christine de Pizan* II, 7, 5§, previously quoted. As examples, we may bring the following discussions: (i) the relationship between philosophy and literature or the relationship between the philosophers and the poets; (ii) the use of Aquinas' claim "the perfect comes before the

[51] (Idem, c. 8). "Deux autres philosophes cest assavoir ypasus et eraclitus mirent le feu estre principe et matere des choses et puet estre furent meus ad ce pour la soubtillete et noblece quil a. Car meismes pour ce quilz le veoyent luisant et monter contre mont ilz cudoient le ciel estre de feu".

imperfect in nature and in time" ("le parfect precede limparfect de nature et de temps");[52] (iii) the reference to divinity in a pagan (god) and cristian (god) way and its interaction with the celestial body and the cosmos; (iv) the reference to the separate substances (*choses separees*) and to the history of philosophical discovery); (v) the use of the indeterminate pronoun "some" (*aucuns*) and of the verb "renewed" (*renouvellee*) present in the sentence "yet this notion was even recently renewed by some"; (vi) a mention to Roger Bacon's work "*Book On the Heavens*" (*du ciel*), in Latin "*De caelestibus*".

Each topic mentioned is philosophically demanding and certainly deserves more attention and an in-depth treatment, something which we have not done in this paper due to the lack of space. Given our purposes, it is sufficient to stress that there are several topics of theoretical philosophy in Christine's works, especially in the *The Vision of Christine de Pizan*. Particularly, in her cosmological and metaphysical discussion with Aquinas and Aristotle, which is found in *The Vision of Christine de Pizan* II, cc. 6-14.

Conclusion

Furthermore, to make clearer Christine's erudition and philosophical maturity, we would like to briefly present an introductory discussion about the mention to Roger Bacon "frere rogier bacon le recite en son livre du ciel on oxii e. chapitre", found in the previous section.

[52] "Perfectum enim praecedit imperfectum natura et tempore simpliciter"/"the perfect is prior absolutely to the imperfect, both in nature and in time". (THOMAS AQUINAS. *Commentary on Aristotle's Metaphysics*, 1961, I, 4, n. 84. This becomes clearer when one reads *The Vision of Christine de Pizan* II, 12, especially the parts in which the author translates Aquinas' Latin text.

Even the composition of the work *De caelestibus* is open to debate among the editors of the text, as Robert Steele, himself one editor of this text, shows:

> Professor Little's promised publication of the missing portion of the *Opus Tertium* and the fact that his MS. does not contain the 'de celestibus' (pp. 419–41) relieves me of the necessity of examining in detail Professor Duhem's conjectural reconstruction of that work. I am, personally, convinced that there must have been at least two forms of the work prepared, if existing manuscripts are to be trusted. Parts I and II of this book were at one time included in the *Compendiuin Philosophie* (see pp. 316, 342): several chapters of Part V coincide to some extent with the *Opus Tertium* MS. of M. Duhem (see pp. 419–41), chapter 18 being found in the *Compendium Philosophie* diff. 4 (cited as S).[53]

There are, therefore, two editions of the work *De caelestibus*, one made by Stelle, the other by Pierre Duhem. [54] Moreover, it is important to pay attention to Steele's following remark: "I am, personally, convinced that there must have been at least two forms of the work prepared, if existing manuscripts are to be trusted". Indeed, Christine's mention to Roger Bacon ("frere rogier bacon le recite en son livre du ciel on oxii e. chapitre") does not have any correspondence with the two editions regarding chapter 12. Taking into account Christine's discussion right before the mention to Bacon, where she discusses the quantity of the skies and, particularly, the nature of the ninetieth one, which is made out of water, a sentence in which the term "*aucuns*" is employed, it is possible

[53] Note. In: ROGERI BACONI. *Opera hactenus inedita. Fasc. IV. Liber Secundus. Communium Naturalium. De Celestibus*, 1913.

[54] For Duhem's edition, see: *Roger Bacon: Opus tertium: Fragment*, 1909.

to propose a link between Christine's mention to Bacon and the work *De celestibus* IV, 3 ("*Capitulum tercium: an sit decimum celum*"), in Steele's edition (pp. 388–393, especially pp. 391–392), when Bacon discusses the notion of the sky made out of water (*celum aqueum*).

Those who proposed the claim of a sky made from water were the christian theologians (*theologi*). If there is any plausible correspondence between Christine's text and Steele's edition of the work *De celestibus*, then it is possible at least to suppose that with the term "*aucuns*" Christine had in mind, among other possibilities, the christian *theologi*. But, even if this interpretive proposal is accepted, it remains the task of investigating whether the term "*theologi*" makes reference only to the masters in the university or whether it also includes other references, for instance, the professors in cathedral schools and even authors who lived centuries before:

> Quoniam autem solum novem celi sunt de natura quinta preter naturas elementorum quatuor, et decem in numero et non in ordine est quia nonum in ordine est de natura alia ab hac quinta, sicut sequencia docent. Et ideo potest Aristotelem intelligere ad litteram, quod sunt solum novem celi unice. Nam ut verum fateamur, oportet nos concedere celum aqueum esse inter corpora celestia et supra octavam speram, quod theologi docente sine contradiccione, nec debent philosophantes hoc abhorrere, nec abhorrerent qui perfectephilosophati sunt, et philosophi fideles ducunt nos ad hoc, sicut probabitur inferius, licet vulgus philosophancium hoc non consideret, sicut nec multa alia consideracione dignissima, quapropter decimum celum non erit celum nisi equivoce cumaliis, quia non est quinta natura preter elementa, immo est in specie aque verissima et purius quam aqua inferior, ut ostendetur in | sequentibus, et ideo posset Aristoteles destruere substanciam posicionis Pictagore, qui posuit celos esse decem ejusdem nature communis, scilicet, que est quinta essentia ab elementis. Sic enim

> concedendum est quod sunt tantum novem celi qui sunt de natura quinte essencie, quamvis decem sint corpora a spera lune usque ad convexitatem ultimam celi, et quia inter speras celestes collocatur hoc corpus aque maximum, ideo vocatur celum sicut alia, set hoc est equivoce.[55]

Among so many interesting topics discussed by Bacon in this excellent text, the expression "*philosophi fideles*", which means beyond any doubt "christian philosopher", calls the reader's attention. There is an explicit attempt carried out by Bacon to harmonize the *philosophi fideles* with the basic principles of Aristotle's cosmology, a pagan philosopher. The context provided by Bacon makes *The Vision of Christine de Pizan* II, 7, 5§ even more complex and philosophically fruitful because it is possible that, besides the *theologi*, also the *philosophi fideles* are included in the French pronoun "*aucuns*" employed by Christine.

[55] ROGER BACON. *De Celestibus* IV, 3.

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MARIA CLARA PEREIRA E SILVA[56]

The theoretical assumptions of Durand of St-Pourçain's cognitive theory

In his *Commentary on the Sentences* II, dist. 3, q. 5, Durand aims to define what understanding is and if it is possible for humans to understand[57]. Moreover, he must elucidate the case of human beings that involve the relation between an immaterial soul endowed with intellectual capacity and a material body that possesses sensitive organs. For that matter, it is imperative to comprehend the non-negotiable principles that orientate his constitution of a new theory of cognition: 1) that intellectual cognition is an utterly active capacity and, in this respect, it

[56] Doctorate candidate in Philosophy at the University of Campinas and CNPq scholarship holder.

[57] *In* II *Sent* [A], dist. 3, q. 5, n. 21: "*Primo inquirendo quid sit intelligere, uniuersalius loquendo, quid sit cognoscere, utrum sit aliquid additum super potentiam cognitiuam faciens cum ea realem compositionem. Secundo a quo sit intelligere et cognoscere in nobis*".

is crucial to comprehend the notion of vital act; and 2) that there is an ontological hierarchy which can be elucidated through the examination of the cognitive process of separated intellects. Once Durand does not admit the possibility that the object may elicit an intellectual act, the investigation of the concept of *sine qua non* causality enlightens the purpose of the sensible object.

1– Theoretical assumptions

Observing a general agreement in his period, Durand concedes that human beings are a compound of the soul capable of intellectual knowledge and the body capable of sensation. For that reason, the human being knows what is, in the first place, received by the sense organs. Soul and body are united, and both of their operations happen concurrently. However, the soul can move the body, and the contrary does not follow because the soul is ontologically superior to the body. Thus, it is necessary to investigate the relation between soul and body through the inquiry of the non-negotiable principles and the appeal to the *sine qua non* causality, which is based on a theoretical framework that extrapolates the tradition of the Aristotelian causality and is rarely used through history[58].

Primarily, it is pivotal to examine Durand's affirmation that we can competently use our sensitive and intellectual faculties and that everything we know about the material world must come from the senses. *In II Sent.* [C], d. 3, q. 6, n. 8 he writes:

[58] SOLÈRE, 2014, pp. 220. "In any event, taking up the concept of *causa sine qua non* and applying it to cognitive issues, Durand was placing himself in a very specific and marginal trend, which was met with a lot of opposition."

> Since the object that is primarily proportioned to our intellect is that which is primarily proportioned to the senses, inasmuch as our intellect is with the senses (cum sensu), as it acknowledges what is present to it.[59]

For him, we should understand the intellect and the senses as two different components whose operations are both needed for the individual to constitute knowledge of the world. Although the intellect possesses the capacity for understanding, it cannot access any content from the material world without the senses. Through perception, a possible object of intellection is presented to the intellective power. Thereby, we can only know a material object as long as it is present to the senses, and there is no possibility of knowledge of absent objects. Even if we possess a sensible faculty capable of producing sensible cognition, it will not happen without the affection of an object to our sensible organ. Likewise, despite possessing an intellect able to know, we also need the presence of an object capable of being known by our intellect.

Although it seems that the relation of material and immaterial is on equal terms, Durand also affirms that the soul is capable of moving the body, but the opposite would be impossible: "the immaterial soul united to the body moves the body and it is not moved by the body nor receives anything from it[60]". The principle at stake is that there is a hierarchy of beings and only what is

[59] *In II Sent.* [C], d. 3, q. 6, n. 8. "*quia obiectum primo proportionatum nostro intellectui est aliquid prius sensatum, quia intellectus noster est cum sensu, propter quod intellectus noster (licet sit sibi presens) non tamen in ratione primi intelligibilis ab eo, quia non est aliquid quod cadere possit sub sensu*".

[60] *Additiones In* I *Sent* [A]: "(…) *anima immaterialis unita corpori movet corpus et a corpore non movetur nec aliquid recipit a corpore*."

ontologically superior can act upon what is ontologically inferior, never the opposite[61]. According to Durand "the perfection of a thing is measured in accordance with the perfection of its form[62]". The soul possesses an incorruptible form, notably nobler than the corruptible form of the body. For that matter, the body cannot act upon the soul in any way. Nevertheless, the soul can and acts actualizing the potentialities of the body.

It seems that Durand contradicts himself when he affirms that the senses have an important purpose in the cognitive process and also that the senses cannot provide anything with cognitive value to the cognitive faculties. On the one hand, if the senses do not perform any function in the cognitive process, we must ask if it is possible to affirm the existence of a relation in which one of the *relata* is considered unnecessary. On the other hand, if the senses are indeed part of the process, we must clarify their function. Hence, to determine the role of the object of cognition and the body regarding sensible cognition, it is indispensable to inspect Durand's non-negotiable principles: 1) the intellect is an utterly active capacity, and 2) what is ontologically more perfect can act upon what is ontologically inferior, but the contrary cannot happen.

[61] SOLÈRE, 2013. p. 192: "Now, given that bodies are inferior to the soul we can make this principle more specific and call it "the Asymmetrical Soul-Body Relation Principal" or the "Asymmetry Principle" for short. According to the Asymmetry Principle, then, our body cannot act on our soul, whereas our soul can act upon our body; nor can external bodies act on the soul, either directly, or through their impact on our body, or through any kind of intermediary. Thus, Durand stresses, our cognitive faculties cannot undergo any impact whatsoever from material things."

[62] *In II Sent.*[C], d. 3, q. 1, n. 10: "*Quia perfectio rerum mensuratur secundum perfectionem formarum.*"

1.1– The intellect is an active capacity

The first principle to point out as pivotal to Durand is that the intellect is an active capacity. To explain this capacity, Durand presents the notion of vital act, when debating a theory according to which species inform the act of the intellect:

> The first opinion says that to know is an act of the intellect informed by species of real intelligible things from which it differs. Therefore, the intellect is informed by species, as well as the water turns the foot or the hand hot through heat.[63]

Durand does not name his opponent, yet, his description of this theory is very similar to the theory of intellective species of Thomas Aquinas[64]. According to Durand, his opponent states that perception is the effect of the act of the sensible object upon the external sense organs. Similarly, the intellection would result from the action of the agent intellect that abstracts the universal content

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[63] *In II Sent* [A], dist. 3, q. 5. n. 5: "*Prima dicid quod intelligere est actio intellectus informati specie rei intelligibilis realiter ab utroque differens, ad quam se habet intellectus specie informantus, sicut aqua facta calida ad calefactionem pedum uel manum".*

[64]Bérenger de Landore, archbishop of Compostela, called a commission of friars to examine Durand's In Sent [A]. They produced two lists of censured propositions. The first list, from 1314, comprises 93 theses categorized as heretical, false, dangerous, or imprudent. The second list, from 1317, is composed of 235 articles in which the friers affirm that Durand departs from Aquinas' teachings. For example, there is article 8 from the latter list: Durand claims that the agent intellect should not be considered part of the soul. The commission points this thesis as against the common doctrine, against Augustine, Aristotle, and Thomas Aquinas: "[8] In I Sent. [A], d. 3 a. 4 dicit, quod "*non est certum quod intellectus agens inter ceteras partes anime teneat supremum locum nec aliquem locum; nec Augustinus unquam de eo fecit mencionem, nec forte oportet aliquem intellectum agentem ponere, ut infra patebit*" (cf. I 2). *Contra communem doctrinam et philosophi 3 de anima et Thome ubique* p. I q. 79 a. 3". In: KOCH, 1973, p. 73. (*Articuli in quibus magister Durandus deviat a doctrina venerabilis doctoris fratris Thome*).

of the phantasms, combined with the act of the intelligible species that inform the intellect. In turn, the species would be the perfect likeness of the sensible object and would not retain any trace of materiality[65]. As a result, he claims that precisely why the species would be a perfect likeness of the sensible object, the intelligible species could inform the intellect without itself being known. Thereby, intellection would be, to some extent, a some sort of reception. Consequently, even though it is, to some extent, active, it is also a passive capacity, as something external must inform it. That is why Aquinas would designate the intellect as a passive potency[66].

Durand, in contrast, cannot accept that intellective species could inform the intellect. That would presuppose that an extrinsic principle, not an intrinsic one, would initiate the proper act of the intellect.

First, because it is ridiculous to say that the vital act itself it's primarily or totally from the non-living, but that it would come from the extrinsic. For the intellective act and to know completely is a vital act. However, the species is not proper to living beings, but comes from the extrinsic. Thus, it would be inconvenient to affirm that the intellective act would be totally or primarily due to a species received in the intellect.[67]

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[65] *ST*, I, q. 76 a 2 resp: "*Sed ipsum phantasma non est forma intellectus possibilis: sed species intelligibilis quae a phantasmatibus abstrahitur. In uno autem intellectu a phantasmatibus diversis eiusdem speciei non abstrahitur nisi una species intelligibilis*".

[66] *ST*, I, q. 79. a. 2 resp: *Sic igitur patet quod intelligere nostrum est quoddam pati, secundum tertium moddum passionis. Et per consequens intellectus est potentia passiva.*

[67] *In II Sent* [A], dist. 3, q. 5. n. 7: "*Primo quia ridiculum est dicere quod actus uite inquantum huiusmodi sit principaliter uel totaliter ab eo quod nichil est uiuentis, set aduenit ab extrinseco; set intelligere et totaliter cognoscere est actus uite, species autem nichil est ipsius uiuentis, set aduenit ab extrinseco; ergo inconueniens est quod intelligere sit totaliter uel principalius a specie quam ab intellectu*".

Nutrition, augmentation, sensing, and knowing are vital acts performed only by living beings.[68] Through these acts, it is possible to distinguish living from nonliving, because the first ones possess intrinsic principles of motion and sense, and the latter only possess the principle of motion.[69]

The local movement of a living being may occur through their intrinsic principle or an intermediary, an efficient external cause. The vital acts, in contrast, can only occur by intrinsic principles. Therefore, nonliving do not perform nutrition and augmentation, as they do not possess the intrinsic principles capable of actualizing such potentialities. Moreover, if only intrinsic principles may elicit nutrition and augmentation, vital acts admittedly less noble than sensing and knowing, it would be even less conceivable that an extrinsic principle could elicit sensing and knowing, vital acts certainly nobler than the first ones[70]. For this reason, Durand cannot admit the existence of species that would inform the sensitive and intellective faculties with the content of sensation and intellection, as they would be considered the extrinsic principle eliciting these internal acts. Assuming the hypothesis that the species could actualize human potentialities, it would be necessary to affirm that the principle of sensation and intellection is not intrinsic to living beings but to nonliving things humans aim to know. Thus, it is impossible to affirm that the object of cognition

[68] See SOLÈRE, 2013. p. 195, for Jacobus of Viterbo and Durand of St. Pourçain on vital act.

[69] *In II Sent* [A], dist. 3, q. 5. n. 19: "Since the living is distinguished from the non-living due to the senses and the movement, and more because of the senses than because of the movement, because the living is moved according to place by themselves unless they are effectively moved by something extrinsic. Therefore, for a stronger reason, the sense is not an extrinsic principle in us." "*tibus sensu et motu et magis sensu quam motu, quia uiuentia mouentur secundum locus a se ipsis nisi mota effectiue ab aliquo extrinseco; ergo fortiori rations sentire non est in nobis a principio actiuo extrinseco*". 201

[70] *In II Sent* [A], dist. 3, q. 5. n. 19: "Since it would be inconvenient that the vital act, as to sense and to know, would be in us as an effect of a non-living for two reasons. First, because the less noble vital acts, such as the nutrition and the augmentation, are in us due to an intrinsic principle and by any means extrinsically effectuated.". "*Inconueniens ualde uidetur quod actus uitalis, ut est sentire et intelligere, sit in nobis effectiue a non uiuente propter duo. Primo, quia actus uitales minus nobiles, ut nutriri et augeri, sunt in nobis a principio intrinseco et nullo modo ab extrinseco effecttiue*".

is the principle or cause of any sensible or intellectual knowledge because it would be mandatory to admit that an extrinsic principle is responsible for an intrinsic act. Durand claims that the object of cognition cannot be the cause of cognition, not as an immediate cause, nor as a remote cause, not directly and not even throughout species[71].

According to Durand, the soul is capable of actualizing bodily potencies, and it also operates completely independent from the bodily organs. Such operation, called intellectual cognition, is the proper operation of the rational soul. In fact, through this operation, human beings are distinguished from all the other animals[72]. Hence, Durand affirms that the intellectual act is the vital act of human beings and denies any possibility that an extrinsic principle could cause the proper act of the soul. Durand stands critically against theories according to which accidental forms, initially presented in external sensitive objects, could inform the intellect.[73]The function of the sensitive object, though, must be elucidated. The sensible object is necessary so that the act of the intellect

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[71] *In II Sent* [A], dist. 3, q. 5. n. 10: "Since, when it produces a connatural and proportionated act, no natural potency needs something extrinsic as a causal principle of its activity because it would be an act connaturally initiated. And the intellect is to the intellective action such as a proportionated and connatural act.". "*Quia nulla potentia naturalis ad eliciendum actum sibi connaturalem et proportionatum indiget aliquo extraneo tamquam principio causatiuo actus; esset enim illud conaturalis actu elicito; set intellectus se habet ad intelligere tamquam ad actum sibi proportionatum et connaturalem; quare etc*".

[72] The human body is precisely that which humans share as similar to the animal genus. Therefore, the body could not be responsible for triggering the act that differentiates humans from other animals.

[73] SOLÈRE, 2013. pp. 194 -195: "Durand flatly rejects this standart, Thomistic argument. The basis for his rejection is that the formal principle of an action is more truly a principle than the material one. Now, according to the theory under discussion, the species has the status of a formal principle of our cognitive act, while the faculty, being informed by the species, has the status of a material principle. Admittedly, the cognitive act is supposed to be produced by the compound faculty-species, not just by the species (in other words, for Aquinas the passivity of the faculty is not complete). But in that process, and by no means the faculty itself, is ascribed the role of the principle "by which (quo)" (...). As a consequence, Durand claims that on Aquinas' view the species would have to be more truly a principle of the cognitive act".

may take place in the present state of life, even though Durand does not designate it as the principle of cognition. If there were no sensible object capable of being known, no act of intellection about the external world would occur in the present state of life. Thus, Durand maintains that the sensible object is a condition without which the act of understanding could not take place, even if he does not conceive the object of cognition as the efficient cause of the intellectual act[74].

1.2– There is an ontological hierarchy

The second principle that constitutes the core of Durand's cognitive theory is that according to which what is ontologically more perfect can act upon what is ontologically inferior, but what is ontologically inferior cannot act upon what is superior to it. Although it is beyond the scope of the present research, it is only possible to comprehend the principle at stake by inspecting Durandu's cosmology. For this reason, this section presents a summary of the author's statements on this topic in three parts: (I) First, Durand explains the organization of the cosmos through the principle of ontological hierarchy; (II) Second, this principle also explains how separated intellects know; (III) Third, it is finally possible to step forward towards the cognition process of intellects united to material bodies. The following extract is central to this task:

No object effectively moves, neither the sensitive potency nor the intellective potency to its cognition, but only as a sine qua non–cause.

Whence, such as the sky acts upon the inferior sphere, by whom it is not affected since it does not share the matter with it, even though it touches the latter due to the metaphysical act.

[74] Section two will provide further analysis of this topic.

Accordingly, the immaterial soul united to the body moves the body, and it is not moved by the body nor receives anything from it[75].

(I) The principle of ontological hierarchy rules not only the discussion regarding cognition but also the comprehension of Durand's cosmology. Durand drives this principle to its ultimate consequences, and he does not admit exceptions, not even in the case of human knowledge about the material world. Indeed, this principle implicates Durand's organization of the whole world. The celestial bodies can act upon the bodies found in the sublunar sphere, but the latter cannot act upon the former because they possess different degrees of perfection. Celestial bodies, composed of ether and incorruptible form, possess a higher degree of perfection than the bodies found under the sphere of the moon, which are composed of matter and corruptible form, and that is why the former can act upon the latter. In a sense, the celestial bodies are the cause of the sublunar sphere bodies, and, being a cause, they contain part of their effect.

(II) The separated intellect is the paradigmatic case when examining cognitive processes. Durandus states that it does not know throughout species, nor through its proper essence[76], it possesses the intrinsic active principle of intellection, and it does not need to receive species to initiate the intellectual act. As soon as the object of cognition is presented to the cognitive power, it is intuitively known. Thereby, the separated intellect first knows that which is ontologically closer to it, and in a second moment, it knows what is further. The separated intellect can intuitively know according to the subsequent order: other separated intellects, celestial bodies, and, then, the sublunar entities. First, it knows other separated intellects because they are immediately present to

[75] *Additiones In* I *Sent* [A]: "*Nullum obiectum movet effective potentiam quamcumque sentitivam vel intellectivam ad cognicionem sui, sed solum est causa sine qua non. Unde sicut celum agit in hec inferiora, et ab eis non patitur, quia non communicat cum eis in materia, tangit tamen ea in actu metaphysico, sic anima immaterialis unita corpori movet corpus et a corpore non movetur nec aliquid recipit a corpore*".

[76] *In II Sent* [A], dist. 3, q. 5. n. 41.

it once they possess the same degree of perfection. Secondly, it knows the celestial bodies because, as they are less material and more formal, they are ontologically closer than the material bodies, though not as close as the completely immaterial intellects. Third, the celestial bodies know the sublunar bodies insofar as they are effects of them.

(III) The relation between the human soul and body is considered analogously to the case of separated intellects. The human body and the soul are united but do not mutually act upon each other. Durand explicitly affirms that "the immaterial soul united with the body moves the body, and it is not moved by it nor receives anything from it.[77]" On that account, the body is said to be animated because it is united to the soul as its vital principle. Hence, the soul acts upon the body as its principle of movement and life, actualizing its bodily potencies, but the body cannot actualize any potency of the soul[78]. Additionally, due to its perfection, the human intellect can intuitively know what is immediately present to it without the necessity of any intelligible species, which is similar to the separated intellect, though with a lower degree. In fact, it would be impossible for the object of cognition to act, by itself or through species, causing a cognitive act because it is material and inanimate, henceforth ontologically inferior to the immaterial soul and the vital principle. To summarize, even though human beings are composed of soul and body, these parts are not ontologically equivalent and cannot mutually operate upon each other.

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[77] *Additiones In* I *Sent* [A]: "*Nullum obiectum movet effective potentiam quamcumque sentitivam vel intellectivam ad cognicionem sui, sed solum est causa sine qua non. Unde sicut celum agit in hec inferiora, et ab eis non patitur, quia non communicat cum eis in materia, tangit tamen ea in actu metaphysico, sic anima immaterialis unita corpori movet corpus et a corpore non movetur nec aliquid recipit a corpore*".

[78] SOLÈRE, 2013. p. 192: "According to the Asymmetrical Soul-Body Relation Principle, then, our body cannot act on our soul, whereas our soul can act on our body; nor can external bodies act on our soul, either directly, or through their impact on our body, or through any kind of intermediary. Thus, Durand stresses, our cognitive faculties cannot undergo any impact whatsoever from material things".

2– The sine qua non cause

To completely dismiss the affirmation that the body could move the soul, Durand inspects an apparent exception to the rule. *In* II *Sent* [A], dist. 3, q. 5. n. 13, he examines how fire can heat the human being, i.e., how a less noble thing can affect a more noble being:

> Even though the agent is not always better than the patient in connection with what it is a *suppositum* – for instance, fire is not better than a human being upon whom it acts – nevertheless it is without exception necessary that in connection with the principle in virtue of which the agent acts it be better and more noble than the patient in connection with the principle in virtue of which the patient is affected. For instance, the heat of the fire in virtue of which it acts is more noble than the dryness or wetness of a human being in virtue of which he is affected by the fire. However, a sensible quality in virtue of which a sense object acts upon a sense (as they say) is not more noble or more perfect than the sensitive power. And the same goes for the intellect's object and the intellective power. Hence, the sense object or the object of intellect cannot cause in sense or intellect a sensing or thinking.[79]

[79] *In II Sent* [A], dist. 3, q. 5. n. 13: "*Primo, quia, quamuis agens non semper sit prestantius patiente quantum ad illud quod est secundum suppositum, puta ignis non est prestantior homine in quem agit, tamen oportet uniuersaliter agens quantum ad principium quo agit esse prestantius et nobilior est caliditas ignis per quam agit quam sit siccitas uel humiditas hominis per quam ab igne patitur; set qualitas sensibilis per quam sensibile agit in sensum, ut isti dicunt, non est aliquid nobilius et perfectius potentia sensitiua et idem intelligitur de obiecto intellectus et potentia intellectiua; ergo obiectum sensus et intellectus non potest causare in sensu et intellectu sentire et intelligere*". *Hartman's translation, found in: HARTMAN, 2014, p. 234.*

According to the beginning of the passage, it seems that it is possible to find an example of an agent that is ontologically inferior to the patient upon which it acts, as the fire that heats the human being. However, this is not the case, as the heat of the fire acts strictly upon the dryness or humidity of the human body, causing the calefaction but not the sensation of heat since sensation is a proper human act. Fire is only capable of acting upon another material thing. In this case, it acts upon the human body assumed as a strictly material *substratum*. The fire, actually hot, is in this particular sense more noble than the humidity or dryness present in the human body. That is why it can act upon the body, informing it with the form of heat it did not possess in actuality. However, the object cannot bring about perceptive human acts, as humans are living beings and, therefore, more noble, and the cause of our acts cannot be less noble than its effects[80].

In addition, when the fire acts upon the human being, causing the heat, it does not act upon the whole being, it does not heat the soul, yet the sensitive quality of fire modifies only the sensitive qualities of the human body. It is possible to conceive, then, that the fire is superior to the dryness or humidity as accidents of the human body without affirming that the fire is nobler than the human being or that despite being ontologically inferior, it is capable of acting upon the human being, which is ontologically superior.

This distinction is essential to comprehend that the object of cognition does not act upon the sensitive potency, obviously superior. The sensitive qualities of the sensitive object can affect

[80] HARTMAN, 2014, pp. 233-234. " (...) what is less noble cannot affect what is more noble. Durand considers two ways of understanding this principle. On the one hand, it might mean that a less noble power cannot act upon a more noble power. According to most medieval philosophers, in any causal transaction, there is an active power in an agent in virtue of which it acts and a passive power in the patient in virtue of which it is acted upon, and the former must be more noble than the latter. (...) On the other hand, the nobility principle might mean that in virtue of which a thing brings about an effect must be at least as noble as (if not more noble than) the effect, at least in cases where that thing causes the effect on its own".

the sensitive qualities of the external sense organs through sensible species, but they do not go further than that. According to Durand, to affirm that the object actualizes the sensitive potency would be an improper extrapolation. It also does not consider the definition of the potency that is assumed as part of the soul. The sensitive potency is defined as the soul's capacity to know the present object. Thus, the principle of this act of cognition must be intrinsic to the soul.

The previous analysis concerns Durand's first argument against Godfrey of Fontaine's cognitive theory. However, when Durand debates what probably is the Thomistic[81] theory of intelligible species[82], he frames his objections according to the same principles, as is verified in the following passage[83]:

> The first opinion affirms that to know is an act of the intellect informed by species of intelligible real things from whom it differs, from what we have that the

[81] I stand alongside literature on this topic. See: HARTMAN, 2013, pp.19-29; SOLERE, 2013, pp.194-196.

[82] *ST*, I, q. 76, a. 2, resp: "But the phantasm itself cannot be the form of the possible intellect, yet the intelligible species that is abstracted from the phantasms. And a single intellect does not abstract except a single intelligible specie from diverse phantasms of the same specie". "*Sed ipsum phantasma non est forma intellectus possibilis: sed species intelligibilis quae a phantasmatibus abstrahitur. In uno autem intellectu a phantasmatibus diversis eiusdem speciei non abstrahitur nisi una species intelligibilis*".

[83]Even though the passage presented in note 23 is an argument against Godfrey of Fontaines, and the passage presented in note 29 is an argument against the Thomistic standpoint found in a preliminary section of *In* II *Sent* [A], dist. 3, q. 5; It is pertinent not to limit the examination by only following the structure in the author's text. In contrast, this research benefits itself by selecting the passages to examine not the arguments against different thinkers but the criticism he develops against the concept of intelligible species. For this reason, the disposition of the passages is in this order and not according to the order in which the author presents them in his work.

> intellect is informed by species, such as the water heats the hand and the foot through heat[84].

Without naming his opponent, Durand presents this theory according to which intelligible species inform the intellect, pointing out that it contradicts the ontological principle. The opponent claims that just like water can turn the hand hot through heat, the sensible object can also inform the sensitive faculty through intelligible species. Therefore, the intellect would be understood as the passive principle of the cognitive process. Furthermore, it would also be possible to affirm an active capacity of the soul, namely, to abstract the accidental forms in the phantasms. However, the intellect would still need to be informed by species of the sensible object and would be, to some extent, passive. As Durand does not admit that the intellect would be the passive principle of its proper act, even if it would be partially passive, he takes his opponent's theory to its limits to analyze its implications:

> If, in fact, the intelligible is caused by a species in the intellect, the divine power that can make us comprehend without species, just like in the beatific vision, much more could make us comprehend without the intellect, which is absurd. And I say that it does not, since God can create an effect without the medium efficient cause, but not without the material or subjective cause, as it cannot make a figure without quantity. If the species is the active principle that initiates the

[84] *In* II *Sent* [A], dist. 3, q. 5. n. 5: "*Prima dicid quod intelligere est actio intellectus informati specie rei intelligibilis realiter ab utroque differens, ad quam se habet intellectus specie informantus, sicut aqua facta calida ad calefactionem pedum uel manum*".

> intellective act, the intellect is the passive principle in which the former is subjectively received[85].

Durand adverts that, according to the presented theory, the species must be identified as the active principle of the cognitive act. That would be because the opponent determines that the intellect must receive the intelligible species as a form to actualize it. The example of divine action elucidates the absurdity of such a theory: the intellect would be the passive principle of the act by which its proper function and existence had been established in the first place. If one considers the species as the formal or efficient cause of intellection, it will also be necessary to identify the intellect as the material cause of such an act. Suppose the divine power is such that it can cause an act of vision without a corresponding species in the world. In that case, if it can cause an effect without a corresponding formal cause, it would be much easier to cause an effect without its material cause. That way, the conclusion would be that divine power could cause an intellective act without an intellect, which is impossible. Evidently, there is no intellective act without an intellect, like there is no figure without quantity. Durand would not support that the object of cognition could cause a cognitive act. Nevertheless, he still must explain how the cognitive act takes place and the function of the cognitive object.

[85] *In II Sent* [A], dist. 3, q. 5. n. 8: "*Si intelligere uerius causetur a specie quam ab intellectu, cum uirtute diuna possit fieri quod intelligamus sine specie, ut in uisione beata, multo magis posset fieri quod intelligeremus sine intellectu, quod est absurdum. Set dices quod non, quia Deus potest facere quemcumque effectus sine causa efficiente media, set non sine causa materiali uel subiectiua. Non enim potest facere figuram sine quantitate. Species autem est principium actiuum quo elicitur actus intelligendi; set intellectus est principium passiuum in quo recipitur subiectiue*".

With that in mind, Durand recovers Cicero's notion of *sine qua non* causality[86]. The approach of the cognitive object as a *sine qua non cause* of the cognitive act extrapolates the tradition of the four Aristotelian causes. Based on a different theoretical framework, Durand affirms that the object is a necessary condition for the cognitive relation to occur. This would explain why we do not know everything all the time, even though we possess an intellect capable of knowing and responsible for actualizing its own act.[87]

Sometimes first and second act perfect a thing without reference to something else... In these cases, a thing is made to be under first and second act all at once from the same item... However, sometimes first and second act perfect a thing not without reference to something else but in relation (*in habitudine*) to something else and, thus, are signified as, e.g., able-to- make-hot (*calefactivum*) or able-to-break (*disgregativum*) and makes-hot (*calefacere*) or breaks (*disgregare*). Here first act implies a potential relationship (*respectus*) whereas second act implies an actual one. In these cases, something is not always at once under first act and second, but it might happen sometimes that it has first act without second act. The reason for this is because such first acts only require the potential presence of that with respect to which they are said whereas such operations or second acts require its actual presence. For instance, in order for something to be able-to-make-hot it is sufficient that it can have a heatable item present to it; but in order for it to make-hot it requires an actually present heatable item. And since it sometimes happens that something is

[86] SOLÈRE, 2014, p. 198: "In fact, the notion he draws on comes from an alternative division of causes: that provided by Cicero in his topics and transmitted by Boethius in his commentary on that work".

[87] *In II Sent.* [A], d. 3, q. 5, n. 28: "*scilicet quod sint ab obiecto sicut a causa sine qua non, et in hoc apparebit tertium principale, scilicet qualiter intelligere et sentire fiant in nobis et quare non semper intelligimus aut sentimus, cum semper habeamus sensum et intellectum*".

potentially present which is not actually present, it will sometimes be the case that something is under first act without second act.[88]

Durand points out that it is necessary to distinguish between two kinds of processes. (1) The first kind concerns the ones that occur to absolute items, that is, the process of actualization of non-relational dispositions. (2) And the second kind of process occurs to items as they are in relation to another item or items, that is, the process of actualization of relational dispositions.

In (1), the form and its operation cannot be actualized separately; they always come about simultaneously. Just as the example illustrates: the form of color and the operation of being colored, or the form of heat and being something hot, cannot be separated. So, when the generator gives the form of such items, it simultaneously gives them their operation. In other words, when an item with a non-relational disposition is actualized, it will be found in first and second actuality.

In (2), otherwise, the form and operation of an item may occur separately. That is because the item is not actualized by itself but insofar as it is in relation to another item. Therefore, to a certain extent, it depends on another item. So, when an item is actualized to be something hot

[88] *In II Sent.* [A], d. 3, q. 5, n. 28: "A*d cuius euidentiam sciendum est quod actus primus et secundus quandoque perficiunt rem secundum se et absolute et sic significantur ut calor et calere, albedo et abscere. Et in talibus simul et inseparabiliter res ab eodem efficitur sub primo actu et secundo; simul enim et ab eodem aliquid est calidum et calet, album et albescit. Quandoque autem actus primus et secundus perficiunt rem non absolute, set in habitudine ad alterum et sic significantur, ut calefactiuum et disgregatiuum, calefacere et disgregare; et respectu talem importat actus primus secundum potentiam, actus autem secundus secundum actum, et in talibus non semper simul est aliquid sub actu primo et secundo, set contingit quandoque habere actum primum sine secundo. Cuius ratio est quia actus primus requirit praesentiam eius ad quod dicitur solum secundum potentiam, sed operatio vel actus secundus requirit praesentiam eius secundum actum. Ad hoc enim quod aliquid sit calefactiuum, sufficit quod possit habere calefactibile, sed ad calefacere requiritur actualiter praesens calefactibile. Et quia contingit aliquid esse praesens secundum potentiam, quod tamen non est actu presens, ideo contingit aliquid esse sub actu primo absque actu secundo*". *Hartman's translation, found in: HARTMAN, 2014, p. 249-250.*

(which is its first act), it does not always follows that it would be actualized to be a heater (its second act), because for that to happen, it would also need the actual presence of a heatable item upon which it could act heating. As long as there is a possible item to be heated in the world, the heatable item can be considered to be a possible heater. Nevertheless, to be reduced to its second actuality, to actually heat something, the actual presence of a heatable item is necessary.

In addition to the distinction between the first and the second act, Durand also presents a distinction between accidental potentiality and essential potentiality[89] derived from his interpretation of Aristotle's *Physics VIII*:

> He expressly affirms there that the *generator* gives *form* and also gives the operation and the movement appropriate to the form, just as it gives heat to fire and it is able to heat when a heateble item is presented and it gives lightness [to an item] and it moves upwards by itself. Because it haves the form it is only in accidental potency to the operation and it moves in accordance to the form; and similarly to it, as it is reduced to act, it does not require an agent that would give a new form, because it is not solely in accidental potency, but in essencial potency. Hereof, that which has the form also has the operation, whereas it is by itself reduced to second actuality. And what it is possible to conclude from this article is that: what is in mere accidental potency is not in potency to a new form nor does it need, in order to be reduced into act, an agent giving to it a new form. But

[89] SOLÈRE, 2014, pp.190-191: "When commenting on that chapter, Averroes introduces the terms that Durand uses, namely, "essential potentiality" and "accidental potentiality"" That which is in essential potentiality to a form, Averroes explains, has to be actualized by an external agent. On the contrary, that which is already in first actuality is in accidental potentiality towards second actuality, that is to say, can pass by itself to second actuality".

> what is solely in first actuality is in accidental potentiality to the second actuality, which is the operation. Thus, etc. [90]

In this extract, Durand aims to differentiate first and second actuality through the potentialities that they derived. He points out that an item must receive a new form to achieve its first actuality, despite being an absolute or non-absolute item. That is because this item is in essential potentiality to its first act. The essential potentiality to be something hot or light can be actualized as soon as the creator gives the fire the form of heat or lightness. The fire possesses non-relational and relational dispositions: as far as it concerns the first option, the fire possesses an accidental potentiality to move upwards. Whenever the fire receives the form of lightness, its operation to move upwards will simultaneously occur. Those acts do not occur separately, except if there was an impediment able to prevent the natural movement of the fire. Anyhow, as soon as the impediment is removed, the second act of the fire would follow.

The same reasoning is valid when we consider the relational disposition of the fire: to be a heater. Once the essential potentiality to possess the form of heat is actualized, and the fire is actually hot, it does not need to receive any other form to also be in its second actuality and be able to heat

[90] *In II Sent.* [A], d. 3, q. 5, n. 27: "*Auctoritas etiam ARISTOTILIS VIII PHISICORUM est ad hoc. Dicit enim ibi expresse quod generans dans formam dat etiam operationem et motum conuenientem forme, sicut dans calorem igni dat ei ut calefaciat combustibile presens et dans ei leuitatem dat ei per se motum sursum; habens enim formam solum est in potentia accidentali ad operationem et motum conuenientem forme; et ideo ad hoc, ut reducatur in actum, non indiget agente dante nouam formam, quia iam non esset in potentia accidentali solum, set essentiali. Ab eodem ergo a quo habet formam habet etiam, quantum est de se, quod sit sub actu secundo. Et potest ex hoc formari ratio concludens utrumque articulum sic: Illud quod est solum in potentia accidentali non est in potentia ad nouam formam nec indiget ad hoc ut reducatur in actum agente dante nouam formam; set habens actum primum solum est in potential accidentali ad actum secundum, qui est operatio; ergo etc.*"

another item. However, as this is a relational disposition, it requires both *relata* of this relation. That is why the actual presence of a heatable item is necessary for the second actuality to occur: the absence of another item capable of being heated is an impediment that prevents the natural operation suitable to the form of the fire. However, as soon as the heatable item is actually present to the possible heater, its accidental potentiality is naturally reduced to act, as there is no other impediment to it. Also, that is what it means to be a *sine qua non* cause: a cause that is responsible solely for removing an impediment to the actualization of an accidental potentiality of a relational disposition[91]. An item does not require to receive a new form to have its accidental potentiality reduced to act when it concerns its non-relational dispositions. Likewise, the same is valid for relational dispositions. There is no need to define the object as an efficient cause that provides a new form, but only as a necessary condition to the occurrence of the process, as a cause that removes impediments but does not act upon the item itself.[92] Additionally, it is imperative to point out that the notion of sine qua non cause is not used only in rare cases, but in natural processes just like the one illustrated with the case of fire and also in the case of human intellection, as demonstrated above:

> Numbered among such acts are the intellect (or the intellective principle) and thinking (*intelligere*), for both of these are spoken of not without any reference whatsoever to something else but in relation to an intelligible item, and the

[91] As Solère puts it in SOLÈRE, 2014, p. 195: What he calls a sine qua non cause is not just a necessary cause, as in ordinary parlance, but more specifically a cause that removes an obstacle to the (self) actualization of an accidental potentiality".

[92] HARTMAN, 2012. p. 118: "On Durand's view, the cause of an accidental reduction can't reduce to one of the four kinds of causes, for, were it an efficient cause, then it would have caused an essential reduction and not an accidental reduction. Whenever a natural operation or motion is impeded, then whatever removes that impediment should be treated as a sine qua non cause of the natural operation or motion".

> intellect implies this relationship as potential whereas the act of thinking implies it as actual. Hence, something that has an intellect does not always think since it does not always have an intelligible item actually present to it... The object's presence or the presentation of the object is the *sine qua non* cause since an act of thinking is not a perfection that makes no reference to something else but rather it is a perfection in relation to something else... And the same is the case with sensitive cognition.[93]

The creator actualizes the human being's essential potentiality of possessing an intellect fully capable of operating. The accidental potentiality to operate and know something does not depend on the reception of a second form. However, as it is a relational disposition, it depends on the actual presence of a cognitive item capable of being cognized by the intellect. The cognitive object does not act upon the intellective faculty, even though it is a necessary condition for the act of the intellective faculty upon its object.[94] The absence of a possible cognitive object is an obstacle to the actualization of the human potentiality to know. For this reason, the presence of such an object is the cause that removes any impediment, and the intellect is then capable of performing its proper

[93] *In II Sent.* [A], d. 3, q. 5, n. 28 and 29: "*De numero autem talium actuum sunt intellectus uel principium intellectiuum et intelligere. Dicitur enim utrumque non omnino absolute, set in habitudine ad intelligibile, quam habitudinem importat intellectus secundum potentiam, intelligere autem secundum actum. Propter quod habens intellectum non semper intelligit, quia non semper habet intelligibile actu presens. Per quid ergo reducitur de potentia intelligendi ad actum? Dicendum, ut tactum est, quod per illud quod dat intellectum per se, quia dans intellectum, quantum est de se, dat intelligibile, quia habere intellectum est intelligere presens obiectum. Obiectum autem prasentatum vel presentans obiectum est causa sine qua non pro eo quod intelligere non est perfectio mere absoluta, sed in comparatione ad alterum. Et idem est de actu sentiendi* (...)"

[94] See HARTMAN, 2014, pp. 244-254.

act and proceeds to actualize itself.[95] Thus, cognition is not an absolute perfection, but a relation between an obje't capable of being cognized and a cognitive power capable of knowing its objects. The intellect establishes this relation, and the object's function is not to be the efficient cause of the cognitive act. However, it is solely one of the *relata* without whom the relation would not occur.

[95] SOLÈRE, 2014, p. 203: "While the presence of an object conditions the production of a cognitive act, the object does not have an efficient power regarding this specific effect, and thus its contribution does not infringe on the Downwards Only Causation principle. More precisely, an object is strictly nothing else than a sine qua non cause 1 [the one that have no action on their own at all] regarding cognition (as much can be said of the bodily affections that result from its action on the sense organs), as it does not act at all on the soul, even by the intermediary of the body".

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LUIS MARCELO RUSMANDO (UESC)

El problema del monismo en el *Tratado breve* de Spinoza

Contrariamente a lo que hará en la *Ética*, en el *Tratado breve*, Spinoza antepone la demostración de la existencia de Dios a su definición y explicación. En efecto, el filósofo dedica el primer capítulo de esta obra a demostrar *que Dios existe*, y el segundo a explicar *qué es Dios*, a partir de su definición, según la cual: "[Dios] es un ser del cual es afirmado todo, a saber, *infinitos atributos*, cada uno de los cuales es infinitamente perfecto en su género." (KV I, 2 [1]). Spinoza no escatima esfuerzos para asumir esta explicación: después de exponer la definición de Dios, para aclararla, el filósofo observa la necesidad de formular cuatro puntos, que pasa a demostrar detalladamente; al exponer el primer punto, ofrece una nota a pie de página, en la que también desarrolla la demostración de los puntos, con moderadas diferencias en relación al abordaje que realiza en el cuerpo del texto; en el primer apéndice de la obra, a su vez, Spinoza desarrolla la misma explicación del segundo capítulo, pero de forma geométrica.

De este modo, investigar al Dios del *Tratado breve*, y, por ende, el monismo que Spinoza establece en esta obra (es decir, la existencia de un ser que abarca la totalidad de la realidad), según la secuencia de su abordaje, exigiría detenernos en el primer capítulo, y luego en el segundo y en el apéndice geométrico. Sin embargo, como veremos más adelante, las pruebas de la existencia de Dios no cumplen su propósito, sin su ulterior definición y explicación, pues se mueven enteramente en el ámbito de lo infinitamente perfecto en su género, lo que, en concreto, sólo permite concluir la existencia necesaria de todo lo que sea sustancia o atributo.

Esta conclusión, por tanto, si bien responde a los intereses argumentativos de Spinoza, de demostrar que las sustancias que existen en acto comprenden las únicas plausibles de existencia, exige la tarea de superar su evidente autonomía ontológica, con miras a la unicidad divina: si toda sustancia existe necesariamente, dado que es infinitamente perfecta en su género, ¿hasta qué punto es posible sostener que las sustancias que existen en la naturaleza, lejos de constituir seres autónomos, comprenden afirmaciones del mismo ser, o, dicho de otro modo, atributos divinos?

Spinoza muestra que es consciente de que la autonomía ontológica de los atributos constituye un obstáculo a ser superado en el *Tratado breve*; no por casualidad, después de formular y demostrar los cuatro puntos, en lo que resta del segundo capítulo, y en el primero de los diálogos que ofrece a continuación, el filósofo asume la difícil tarea de explicar en qué medida "todos estos atributos, que existen en la naturaleza, no son más que un ser único, y de ningún modo seres distintos". (KV I, 2 [17])

De esta forma, contrariamente a la cronología que Spinoza establece en el *Tratado breve*, centraremos nuestra investigación en las razones que el filósofo presenta en el segundo capítulo de la obra para justificar la unicidad divina, y, en la medida en que sus argumentos lo requieran, ampliaremos nuestro enfoque hacia las partes anteriores.

Primera razón

Después de formular y demostrar los cuatro puntos antes referidos, también en el segundo capítulo del *Tratado breve*, Spinoza justifica la unicidad divina a través de tres razones. El primero hace referencia directa a la demostración de la existencia de Dios, que el filósofo explicara en el primer capítulo de la obra, y a su definición, que, como también indicamos, abre el segundo capítulo. Spinoza nos dice:

> Las razones, pues, por las cuales hemos dicho que todos estos atributos, que existen en la naturaleza, no son más que un ser *único*, y de ningún modo seres distintos, por cuanto podemos entender clara y distintamente el uno sin el otro, y éste sin aquél, son éstas:
>
> Porque ya hemos hallado anteriormente que debe existir un ser infinito y perfecto, por el cual no se puede entender otra cosa que un ser tal que de él se debe afirmar absolutamente todo. En efecto, así como a un ser que tiene alguna esencia se le debe atribuir (algunos) atributos, y tantos más atributos cuanta más esencia se le atribuye, así también, en consecuencia, un ser que es infinito debe tener infinitos atributos. Y esto es justamente lo que llamamos un ser perfecto. (KV I, 2 [17])

Para justificar la unicidad divina, así, en primera instancia, Spinoza nos dice que los *atributos, que existen en la naturaleza, no son más que un ser único, y de ningún modo seres distintos*, puesto que, como él ya descubriera, existe un ser infinito y perfecto, definido como siendo aquél del cual es afirmado todo. De esta forma, nos vemos abocados a analizar las pruebas a través de las cuales Spinoza demuestra la existencia de este ser, en la apertura del *Tratado breve*.

Spinoza demuestra la existencia de Dios mediante tres pruebas, dos *a priori* y una *a posteriori*. Según la primera:

> En cuanto a lo primero, pues, a saber, si existe un Dios, decimos que esto puede ser demostrado, ante todo, *a priori*, como sigue:
>
> Todo lo que nosotros entendemos clara y distintamente que pertenece a la naturaleza de una cosa, lo podemos afirmar también con verdad de esa cosa.
>
> Ahora bien, que la existencia pertenece a la naturaleza de Dios, lo podemos entender clara y distintamente. Luego… (KV I, 1 [1])
>
> Y también de otro modo, como sigue:
>
> Las esencias de las cosas son desde toda la eternidad y permanecerán inmutables por toda la eternidad.
>
> La existencia de Dios es esencia. Luego… (KV I, 1 [2])

Al formular la premisa mayor de la primera prueba, después del término *naturaleza*, Spinoza ofrece una nota a pie de página, según la cual:

> Entiéndase la naturaleza determinada, por la cual la cosa es lo que es, y que no puede, en modo alguno, ser separada de ella, sin aniquilar, *ipso facto* la cosa. Y así, a la esencia de una montaña pertenece que tenga un valle o, en otros términos, la esencia de la montaña es que tenga un valle; lo cual es verdaderamente eterno e inmutable y debe hallarse siempre en el concepto de una montaña, aun cuando ésta no haya existido ni exista jamás. (KV I, 1, nota 48)

Esta nota contiene ciertas ambigüedades que nos parece importante aclarar, pues ella nos ayuda a comprender mejor las demostraciones *a priori*; veamos: al escribir la primera prueba, a través de la nota en cuestión, Spinoza nos dice que se refiere a la *naturaleza determinada* de una cosa, y, a continuación, que se refiere a algo por lo cual *la cosa es lo que es, y que no puede, en modo alguno, ser* [separado] *de ella, sin aniquilar, ipso facto la cosa*. En esta instancia, el filósofo nos hace dudar: ¿qué es eso por lo que *la cosa es lo que es*: (i) la naturaleza determinada (como nos lleva a pensar si sólo consideramos la nota) o (ii) *todo lo que nosotros entendemos clara y distintamente que pertenece a la naturaleza de una cosa* (conforme venía diciendo al exponer la prueba)? En síntesis, ¿aquello por lo que la cosa es lo que es, es su naturaleza o aquello que entendemos clara y distintamente que pertenece a su naturaleza?

A su vez, Spinoza pone un ejemplo: *a la* esencia de una montaña pertenece *que tenga un valle*; y luego, a través de la conjunción *o*, lo explica de otra manera: *la esencia de la montaña es que tenga un valle*. Considerando el comienzo del ejemplo, como expuesto por primera vez (*a la esencia de una montaña pertenece*…), somos llevados a suponer que el filósofo considera los términos *naturaleza* y *esencia* como sinónimos, teniendo en cuenta que, en la prueba de la existencia de Dios, se venía refiriendo *a lo que entendemos clara y distintamente que pertenece a la naturaleza de una cosa*. En efecto, el verbo *pertenecer* y su regencia preposicional (*pertenecer a*), en cuanto se refiere, en la formulación de la prueba, a la *naturaleza*, y, en la formulación del ejemplo, a la *esencia*, dan a entender que hay equivalencia entre tales términos, y que Spinoza los usa indistintamente. Sin embargo, en la segunda formulación del ejemplo, el filósofo nos dice que *tener un valle* es la esencia de la montaña, lo que nos hace entender que es la esencia la que pertenece otra cosa (tener un valle, a la montaña), y no que hay algo que pertenece a la esencia.

En suma, considerando el ejemplo de la nota, inicialmente somos llevados a suponer que *naturaleza* y *esencia* son sinónimos, en cuanto hay algo que les pertenece; sin embargo, a

continuación, somos llevados a suponer que es la esencia la que pertenece a una cosa, y no una cosa la que pertenece a ella, lo que nos da a entender que *naturaleza* y *esencia* son cosas diferentes.

En los ulteriores pasajes de *Tratado breve*, Spinoza mantiene estas ambigüedades. Así, con vistas a adquirir una mejor comprensión de las pruebas *a priori* de la existencia de Dios, nos conviene dilucidar las ambigüedades en cuestión, remitiéndonos al prefacio de la segunda parte del *Tratado breve*, en el que Spinoza expone la regla a través de la cual es posible establecer lo que pertenece a la naturaleza de una cosa. El filósofo nos dice:

> Pertenece a la naturaleza de una cosa aquello sin lo cual la cosa no puede existir ni ser entendida. Pero no sólo esto, sino de tal suerte que la proposición sea siempre convertible, a saber, que el predicado no puede existir ni ser concebido sin la cosa. (KV II, pref. [5])

Según la regla, lo que pertenece a la naturaleza de una cosa es algo sin lo cual la cosa no puede existir ni ser entendida, y, recíprocamente, algo que, sin la cosa, tampoco puede ser ni ser entendido. De esta manera, una cosa no puede existir ni ser entendida sin lo que pertenece a su naturaleza, y, a su vez, lo que pertenece a la naturaleza de una cosa, sin ésta, no puede existir ni ser entendido. Así, entre lo que pertenece a la naturaleza de una cosa y ésta hay una relación de reciprocidad ontológica y epistemológica, en cuanto que una no puede existir ni ser comprendida sin la otra, y viceversa.

A partir de la regla, pues, podemos resolver la primera ambigüedad de la nota que nos ocupa. En efecto, observamos que la regla coincide con lo que nos dice Spinoza, en la nota, luego de aclarar que, al escribir la primera prueba, se refiere a la *naturaleza determinada* de una cosa; vale recordar: aquello por lo cual *la cosa es lo que es, y que no puede, en modo alguno, ser* [separado] *de ella, sin*

aniquilar, ipso facto la cosa. Así, es posible suponer que, con esta sentencia, Spinoza no nos explica exactamente qué es la *naturaleza determinada* de una cosa, sino que aquello que, como dice en la prueba, entendemos, con clareza y distinción, que pertenece a la naturaleza determinada.

De esta manera, así interpretamos la nota: inicialmente, con los términos *naturaleza determinada*, Spinoza aclara a qué tipo de naturaleza se refiere al escribir la prueba, y, a continuación, aclara propiamente lo que pone en la primera sentencia de la prueba, o sea, aclara qué es *todo lo que nosotros entendemos clara y distintamente que pertenece a la naturaleza de una cosa*, diciéndonos que es aquello por lo cual *la cosa es lo que es, y que no puede, en modo alguno, ser* [separado] *de ella, sin aniquilar, ipso facto la cosa*.

De lo que establece la regla, a su vez, también podemos aclarar la segunda ambigüedad de la nota. Recordemos: al exponer el ejemplo, Spinoza nos dice inicialmente que *a la esencia de una montaña pertenece que tenga un valle*, y luego, al exponerlo en otros términos, que *la esencia de la montaña es que tenga un valle*, lo cual, en vista de lo que venía exponiendo en la prueba, nos había hecho dudar si *esencia* y *naturaleza* son o no equivalentes. Sin embargo, si consideramos lo que el filósofo nos dice sobre el ejemplo, después de su segunda formulación, y lo asociamos con lo que establece la regla, podemos inferir que la *esencia* no es equivalente a la *naturaleza*, sino que es precisamente lo que entendemos clara y distintamente pertenecer a ésta. En efecto, por un lado, en la segunda formulación del ejemplo de la nota, después de afirmar que *la esencia de una montaña es que tenga un valle*, Spinoza agrega: *lo cual es verdaderamente eterno e inmutable y debe hallarse siempre en el concepto de una montaña*; por otro lado, al formular la regla, el filósofo nos dice que lo que *pertenece a la naturaleza de una cosa aquello sin lo cual la cosa no puede existir ni ser entendida*. Así, es posible suponer que la *esencia* de una cosa es lo que pertenece a su *naturaleza* (en el caso del ejemplo, tener un valle pertenece a la naturaleza de la montaña), de tal manera que, según la nota, la esencia debe estar siempre contenida en el concepto de la cosa (tener un valle, en el concepto de una

montaña), y así, según la regla, sin la esencia no se puede entender la cosa (sin el hecho de tener un valle, entender la montaña).

En suma, a la vista de lo que Spinoza establece en la regla para determinar lo que pertenece a la naturaleza de una cosa, resolvemos las ambigüedades que identificamos en la nota, así: (i) aquello por lo cual una cosa es lo que es no comprende su naturaleza, sino lo que entendemos clara y distintamente que pertenece a su naturaleza; y (ii) *naturaleza* y *esencia* no son equivalentes; *esencia* es lo que pertenece a la *naturaleza* de una cosa, de modo que la esencia debe estar siempre contenida en el concepto de la cosa, y, por tanto, que la cosa no puede ser entendida sin la *esencia*[96].

Un último aspecto debemos considerar de la nota, con el fin de recoger todos los elementos necesarios para el análisis de las dos pruebas *a priori* que arriba citamos. Como ya hemos observado, al formular el ejemplo por segunda vez, Spinoza nos dice que la esencia de la montaña (es decir, tener un valle) es una verdad eterna e inmutable, de tal manera que debe estar siempre contenida en el concepto de montaña; y agrega: *aun cuando ésta no haya existido ni exista jamás*. Espinosa nos muestra así que la esencia de una montaña es una verdad eterna e inmutable, pero no su existencia, ya que, como observa Falgueras Salinas, "las esencias *son,* pues, con independencia de la existencia.

[96] Observamos que, en el pensamiento de Spinoza, y, específicamente, en el contenido de la obra que nos ocupa, el concepto de naturaleza requiere un análisis detallado, dado que o filósofo no llega a desarrollarlo o a esclarecerlo puntualmente. Sin embargo, de los pasajes que ahora nos ocupan, y de su contexto, siguiendo el razonamiento de nuestra interpretación, podemos delinearle un significado al concepto de *naturaleza*; para eso, haciéndola nuestra, tomamos prestada la interpretación de Marilena Chauí, quien observa: "[...] la introducción de la noción de la *naturaleza de la cosa* y de una percepción clara y distinta de la *naturaleza de la cosa* indica que Spinoza no sólo ya le dio a la clareza y distinción cartesianas el sentido espinoseano de *idea vera*, sino también que ya considera inseparables la esencia de la cosa y la existencia de la cosa (esta inseparabilidad es precisamente la *naturaleza de la cosa*) […]." CHAUÍ, Marilena de Souza. *A nervura do real*: inmanência e liberdade em Espinosa, vol. 1, pág. 372.

Hay un *esse essentiae,* radical y fontal respecto del *esse existentiae,* dado que las esencias son inalterables y eternas, no así las existencias".[97]

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Una vez aclaradas las ambigüedades de la nota, y recogidos los elementos que en ella nos interesan, pasemos al análisis de las pruebas *a priori*. Asumiendo el entendimiento claro y distinto como fundamento de la verdad, en la primera prueba, Spinoza establece que, en la medida en que entendemos clara y distintamente que la existencia pertenece a la naturaleza de Dios, podemos entender que su existencia es una verdad, o, en otras palabras, que Dios existe.

Mediante la nota que analizamos anteriormente, y la regla a la que recurrimos para dilucidar sus ambigüedades, podemos ampliar el análisis de esta prueba. En efecto, como hemos visto, lo que entendemos clara y distintamente que pertenece a la naturaleza de una cosa es su esencia, y, a su vez, la esencia es aquello sin lo cual la cosa no puede existir ni ser entendida, y también aquello que no puede existir ni ser entendido sin la cosa. De esta manera, con base en lo que establece la primera prueba, podemos afirmar que la esencia de Dios es la existencia, de tal manera que debemos suponer una reciprocidad entre ésta y aquél: la existencia es aquello sin lo cual Dios no puede existir ni ser entendido, y, a la inversa, es aquello que no puede existir ni ser entendido sin Dios. La relación de reciprocidad ontológica y epistemológica entre la existencia y Dios, por tanto, no sólo garantiza que

[97] Falgueras Salinas amplía su apreciación, recordando lo que afirma Spinoza en los *Pensamientos metafísicos*, (que, si bien creemos corresponder a lo expuesto en esta parte del *Tratado breve*, no nos parece conveniente incluirlo en el cuerpo del texto, para ceñirnos sólo a la exégesis de esta obra): "En los *CM* ESPINOSA explica qué entiende por *esse essentiae* y *esse existentiae:* el 'ser de la esencia' no es más que el modo como están contenidas las cosas en su causa, los atributos divinos; mientras que el 'ser de la existencia' es la misma esencia de las cosas fuera de su causa, Dios, y en sí considerada. (CM, c. II, CG, I p. 238, 8-16). La existencia se atribuye a las cosas después que han sido creadas, mientras que las esencias no son creadas, sino eternas. (CM, c. II, CG, I, p.239, 1-4). De donde se ve nítidamente que la existencia no es otra cosa que un efecto, modo o consideración distinta de la misma esencia. SALINAS, Ignacio Falgueras. *El Establecimiento de la Existencia de Dios en el Tractatus Brevis de Espinosa*, pp. 102-103.

éste existe, sino que existe necesariamente, ya que, de no ser así, habría que poder negar la propia existencia.

La segunda prueba corrobora nuestro análisis anterior: después de afirmar la eternidad e inmutabilidad de las esencias (como adelantara en la nota), Spinoza afirma que la existencia es la esencia de Dios, y, así, concluye no sólo su existencia, sino también su existencia necesaria: si las esencias son eternas e inmutables, y la existencia es la esencia de Dios, entonces Dios ha existido desde toda la eternidad y permanecerá inalterable por toda la eternidad.

En síntesis, a través de las dos pruebas *a priori*, Spinoza nos muestra que, al contrario de lo que sucede con los modos (como es el caso de la montaña, expuesta como ejemplo en la nota), en Dios hay una reciprocidad entre su esencia y su existencia, de tal manera que se comprenda clara y distintamente que Dios existe, o, en otras palabras, que se pueda afirmar que su existencia es una verdad. Así, teniendo siempre presente que las esencias son eternas e inmutables (como adelanta Spinoza en la nota que ofrece al escribir la primera prueba, y establece en la premisa mayor de la segunda), es necesario suponer, a su vez, que la existencia de Dios es necesaria.

Después de demostrar la existencia de Dios *a priori*, Spinoza presenta una prueba *a posteriori*, según la cual:

> Si el hombre tiene una idea de Dios, Dios debe existir *formalmente*.
> Ahora bien, el hombre tiene una idea de Dios. Luego… (KV I, 1 [3])

Seguidamente, Espinosa explica y demuestra las dos premisas del argumento, a través de otros argumentos que se desdoblan. Para evitar citarlos y profundizar su análisis, por considerarlos no directamente relacionados a nuestro tema, proponemos resumirlos, entretejiendo algunos fragmentos textuales de esta parte de la obra, de la siguiente manera:

Spinoza demuestra la premisa mayor de la prueba, a saber, *si el hombre tiene una idea de Dios, Dios debe existir formalmente*, argumentando que "la causa de esta idea debe existir formalmente, y contener en ella todo cuanto la idea tiene objetivamente". (KV I, 1 [4])

Para explicarnos este razonamiento, el filósofo se apoya en tres principios fundamentales, a saber: "1) que las cosas cognoscibles son infinitas; 2) Que un entendimiento finito no puede comprender lo infinito; 3) Que un entendimiento finito no puede entender nada por sí mismo, a menos que sea determinado por algo exterior" (KV I, 1 [5]). Spinoza articula estos principios, planteando el siguiente argumento general: si las cosas cognoscibles existen en un número infinito (según el primer principio), y si un intelecto finito no puede comprender lo infinito, es decir, "no tiene poder de entenderlo todo a la vez, tanto menos tiene la capacidad de poder, por ejemplo, comenzar a entender esto antes que aquello o aquello antes que esto" (KV I, 1 [5]) (según el segundo principio), el entendimiento humano, que es finito, "al no estar determinado por ninguna cosa externa [le] será imposible […] entender nada." (KV I, 1 [7]) (según el tercer principio).

Así, Spinoza concluye que la causa de las ideas que tiene el entendimiento humano es "[…] una causa exterior, que lo constriñe a entender una cosa antes que otra. Dicha causa no consiste sino en que las cosas existen formalmente y en que (unas) están más próximas a él que otras, cuya esencia objetiva está en su entendimiento" (KV I, 1 [8]). En otras palabras, el filósofo concluye que el hombre conoce, a medida que las causas de las ideas que tiene su entendimiento no son más que las cosas mismas, formalmente existentes fuera de él, unas más cercanas que otras, lo que justifica que las encuentre en momentos diferentes.

Bajo este razonamiento, Spinoza sustrae del ámbito hipotético la premisa mayor de la prueba *a posteriori*, y así concluye la existencia de Dios: "así, pues, si el hombre tiene la idea de Dios[98], está claro que Dios debe existir formalmente y no eminentemente, puesto que por encima o fuera de él no hay nada más real o más excelente." (KV I, 1 [8])

A su vez, Spinoza demuestra la premisa menor de la prueba, es decir, que *el hombre tiene una idea de Dios*, argumentando que el hombre comprende las propiedades divinas, las cuales no puede producir, por ser imperfecto. Asimismo, Spinoza nos dice que es evidente que el hombre comprende las propiedades divinas, ya que:

> […] sabe, por ejemplo, que el infinito no puede estar compuesto de distintas partes finitas; que no pueden existir dos infinitos, sino uno solo; que éste es perfecto e *inmutable*, pues es bien sabido que ninguna cosa busca, por sí misma, su propia aniquilación; y que tampoco puede transformarse en algo mejor, dado que es perfecto, cosa que en este caso no sería; o que tampoco puede estar sometido a algo que proceda del exterior, ya que es omnipotente, etc. (KV I, 1 [9])

Spinoza nos dice que, al comprender estas nociones, el hombre comprende las propiedades divinas, a saber: infinidad, unicidad, perfección, inmutabilidad, omnipotencia, lo que prueba que tiene la idea de Dios.

[98] Espinosa descarta la posibilidad de que esta idea sea una ficción, apoyándose en la posibilidad de que el hombre conozca; según este argumento: "si la ficción del hombre fuera la única causa de su idea, sería imposible que él pudiera comprender algo. Ahora bien, él puede comprender alguna cosa. Luego" KV I, 1 [6]. Spinoza amplía este argumento en una nota a pie de página, en: KV I, 1 [3] nota 49.

Después de exponer los argumentos de Spinoza respecto a la explicación y demostración de la prueba *a posteriori*, podemos esbozarla, brevemente, así: considerando que el entendimiento humano, siendo finito, no puede conocer nada por sí mismo, debemos suponer que está determinado a conocer por algo exterior, o dicho de otro modo, que las ideas que están en su entendimiento son causadas por algo que existe fuera de él, que no es otra cosa que las mismas cosas que son objeto de su conocimiento, teniendo existencia formal, tales y cuales las conoce. Así, el hecho de que el hombre comprenda las propiedades divinas evidencia que tiene la idea de Dios, lo que, en vista de las consideraciones anteriores, demuestra que Dios existe, formalmente, conforme el hombre lo conoce.

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Una vez analizadas las pruebas de la existencia de Dios, ofrecidas por Spinoza en el primer capítulo del *Tratado breve*, es necesario verificar si ellas, en efecto, justifican la unicidad divina, en el sentido de corroborar si demuestran la existencia de *un ser del cual es afirmado todo*, de tal manera que sea posible suponer que los atributos o sustancias que existen en la naturaleza, lejos de constituir seres autónomos, comprenden afirmaciones divinas.

En cuanto a las pruebas *a priori*, independientemente de sus diferencias, cabe señalar que Spinoza es recurrente en afirmar la reciprocidad entre la esencia y la existencia de Dios, de tal manera que es posible comprender clara y distintamente que él existe; a su vez, como el filósofo también afirma la eternidad e inmutabilidad de las esencias, es posible suponer que Dios existe necesariamente. Sin embargo, cabe preguntarse: a partir de estas pruebas, ¿es posible saber cuál es el ser que corresponde a tal existencia? ¿Qué es, en concreto, aquello que, con claridad y distinción, entendemos existir de manera necesaria?

Para responder a estas preguntas, bien podríamos recurrir al argumento de la prueba *a posteriori*: porque el hombre comprende las propiedades divinas, es evidente que tiene la idea de Dios, y por tanto es cierto que Dios existe formalmente, habiendo en él tanto como hay objetivamente em tal idea. Por lo tanto, podríamos suponer que Dios comprende todo lo que es pasible de infinidad, unidad, perfección, inmutabilidad y omnipotencia. Una vez más, sin embargo, esto nos lleva a preguntarnos: ¿qué es lo que, ciertamente, comporta tales propiedades?

En esta instancia de nuestro análisis, nos vemos obligados a cuestionar la utilidad de las pruebas de la existencia de Dios, tal como están situadas en el *Tratado breve*: ¿qué es lo que ellas demuestran exactamente? Con vistas a esta indagación, creemos pertinente escuchar a Deleuze, quien observa:

> [El *Tratado breve*] comienza por Dios, se instala en la existencia de Dios. Spinoza, en aquel momento, creía aún que era posible partir de una idea de Dios. El argumento *a priori*[99] recibe, pues, una primera formulación conforme el enunciado de Descartes. Pero, así, el argumento se mueve enteramente en lo infinitamente perfecto, y no nos da medio alguno para conocer la naturaleza del ser correspondiente. Tal como está situada, a la cabeza del *Tratado breve*, la prueba ontológica no sirve estrictamente de nada.[100]

Deleuze llama la atención sobre un aspecto importante, en relación al tema que nos ocupa: a través de las pruebas *a priori* (y, para nosotros, como señalamos a través de las preguntas anteriores,

[99] Deleuze se refiere a una prueba *a priori* y una *a posteriori*, como las que Spinoza expone en el *Tratado breve*, y divide la primera en dos enunciados o formulaciones. Nosotros, como Falgueras Salinas, preferimos referirnos a tres pruebas, dos *a priori* y una *a posteriori*.

[100] DELEUZE, Gilles. *Spinoza y el problema de la expresión*, p. 69.

también a través de la prueba *a posteriori*) Spinoza se mueve enteramente en el ámbito de lo infinitamente perfecto, o, en otras palabras, demuestra la existencia de lo que es infinito y perfecto, lo cual se aplica estrictamente a toda sustancia, pero no a un ser del que deben afirmarse infinitas, de tal modo que se pueda decir que éstas son sus atributos.

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En esta instancia de nuestro análisis, es necesario observar las explicaciones que Spinoza ofrece en el segundo capítulo y en el apéndice geométrico del *Tratado breve*, a fin de verificar si nos ayudan a comprender en qué medida las pruebas de la existencia de Dios serían una justificación de la unicidad divina.

Como ya hemos indicado, después de presentar la definición de Dios, al comienzo del segundo capítulo, Spinoza nos dice que, "para expresar, pues, claramente nuestra opinión sobre ello, debemos formular previamente los cuatro puntos siguientes" (KV II, 2 [2]), los que procede a demostrar, tanto en el cuerpo del texto[101] y en una nota a pie de página que allí ofrece, como en el primer apéndice de la obra[102], por medio de una serie de intrincados argumentos. No asumiremos

[101] Conforme expuestos en el cuerpo del texto, los cuatro puntos son: "1. Que no existe ninguna *sustancia limitada*, sino que toda sustancia debe ser, en su propio género, infinita, es decir, que en el entendimiento infinito de Dios no puede haber una sustancia más perfecta que la que ya existe en la naturaleza; 2. Que tampoco existen dos sustancias iguales; 3. Que una sustancia no puede producir otra; 4. Que en el entendimiento infinito de Dios no hay ninguna sustancia, fuera de aquélla que existe formalmente en la naturaleza" (KV I, 2 [2])

[102] En el apéndice geométrico del *Tratado breve*, estos puntos se presentan en forma de proposiciones, y en un orden diferente al del segundo capítulo, a saber: "*A ninguna sustancia, que existe realmente, puede serle referido uno y el mismo atributo que es referido a otra sustancia. O, lo que es lo mismo, en la naturaleza no pueden existir dos sustancias, a menos que sean realmente distintas*" (KV, Ap. 1, P 1); "*Una sustancia no puede ser la causa de la existencia de otra sustancia*" (KV, Ap. 1, P 2); "*Todo atributo o sustancia es,* por *su naturaleza, infinito y sumamente perfecto en su género*" (KV, Ap. 1, P 3); "*A la naturaleza de toda sustancia pertenece, por naturaleza, la existencia, de tal suerte que*

un análisis detallado de estas partes de la obra, ya que exigiría un enfoque excesivamente exhaustivo; así, sólo presentaremos nuestra conclusión sobre lo que allí Spinoza establece.

En las tres partes de la obra, Spinoza demuestra la existencia necesaria de los atributos o sustancias, demostrando la infinitud, la perfección en género y la incausalidad sustancial. Para tal demostración, en el segundo capítulo, el filósofo recurre a la acción o producción divina (es Dios quien produce las sustancias de esta manera), y, en el apéndice, recurre a la autosuficiencia sustancial (las sustancias existen por sí mismas).

Si bien en el segundo capítulo Spinoza se inclina por afirmar que Dios es la causa de las sustancias, el filósofo también llega a afirmar que éstas existen por sí mismas, lo que demuestra que los argumentos allí expuestos bien pueden articularse a través del sesgo de la autosuficiencia sustancial. Así, es posible verificar que, si Spinoza incluye a Dios en tales argumentos, no es porque éste sea un elemento necesario para la articulación de ellos, sino porque los ajusta a su contexto, a saber: (i) a la definición de Dios que Spinoza expone justo al comienzo del segundo capítulo de la obra, y (ii) a la justificación de la unicidad divina, que expone poco después de demostrar los cuatro puntos.

El apéndice comprende un enfoque adicional, sólo relativo a la demostración de los cuatro puntos que Spinoza asume en el segundo capítulo, para explicar claramente la definición de Dios. Por lo tanto, el enfoque del apéndice siempre debe ser leído teniendo en cuenta el contexto de ese capítulo, sin que, sin embargo, deba ser considerado incompleto o dependiente de él. Por el contrario, el apéndice se articula, enteramente, a partir y por medio de sus propios elementos, llegando a sus propias conclusiones.

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es imposible poner en un entendimiento infinito la idea de la esencia de una sustancia que no existe realmente en la naturaleza" (KV, Ap. 1, P 4).

Es posible afirmar, por tanto, que tanto el desarrollo del segundo capítulo como el del apéndice, considerados en sí mismos, es decir, en relación a los elementos que utilizan para articular sus argumentos, tienen como consecuencia la autonomía ontológica de los atributos o sustancias, lo que nos lleva a seguir verificando bajo qué argumentos Spinoza justifica la unicidad divina, es decir, afirma que todos los atributos o sustancias existentes en acto, lejos de constituir seres autónomos, constituyen un mismo ser.

Segunda razón

Para justificar la unicidad divina, en segunda instancia, Spinoza nos dice que *todos estos atributos, que existen en la naturaleza, no son más que un ser único, y de ningún modo seres distintos*:

> Por la unidad que vemos por doquier en la naturaleza, en la cual, si fueran seres *distintos*, no podrían en modo alguno unirse el uno con el otro. (KV I, 2 [17])

Luego de formular esa razón, para aclararla, Spinoza ofrece una nota a pie de página, según la cual:

> Es decir, si fueran sustancias distintas, que no estuvieran complicadas en un solo ser, entonces la unión sería imposible, ya que vemos claramente que ellas no tienen absolutamente nada en común, como el pensamiento y la extensión, de los cuales, no obstante, constamos. (KV I, 2 [17] nota 17)

Es importante para nosotros resaltar dos aspectos de estos pasajes; el primero se refiere a la verificación empírica, asumida por la visión, de que, en la naturaleza, hay dos atributos que se unen por todas partes (*por la unidad que vemos por doquier*); y el segundo se refiere precisamente al hecho de que estos atributos están unidos.

A la vista de estos elementos, una lectura menos atenta y descontextualizada de los pasajes citados podría llevarnos a interpretarlos bajo una perspectiva explícitamente dualista: hay dos atributos, a saber, *pensamiento* y *extensión*, que, si bien son realmente distintos, es decir, no tienen nada en común entre sí, están unidos uno con el otro, como comprobamos empíricamente, es decir, vemos en la naturaleza, de tal manera que el ser humano *consta* de ellos.

Sabemos, sin embargo, que tales apreciaciones objetivan la unicidad divina, que Spinoza insiste en afirmar en todo momento, lo que nos obliga a descartar la idea de que *pensamiento* y *extensión* puedan ser sustancias autónomas. En efecto, los pasajes y aspectos en cuestión, si debidamente contextualizados en relación a las partes que los preceden y los siguen, lejos de promover una lectura dualista, nos parecen fundamentales para investigar el monismo que el joven Spinoza comienza a delinear en la *Tratado breve*.

Para iniciar tal empeño, pues, levantemos algunos elementos de las partes que constituyen el contexto de lo que ahora nos ocupa.

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Sabemos que, antes de comenzar la demostración de los cuatro puntos antes referidos, Spinoza asume que existen múltiples sustancias, en tanto define a Dios como un ser del cual se deben afirmar infinitos atributos, lo cual, según los argumentos por los que demuestra estos puntos, son sustancias, en relación a Dios. Como analizamos en el apartado anterior, sin embargo, las pruebas

de la existencia de Dios que inauguran el *Tratado breve* no demuestran la existencia de un ser del cual deban ser afirmados infinitos atributos. Las pruebas se limitan a demostrar la existencia necesaria de: (i) todo aquello a cuya esencia pertenece la existencia (de tal manera que entendamos, con clareza y distinción, que existe) o (ii) todo lo que es susceptible de infinito, perfección, inmutabilidad, etc.; sin embargo, no demuestran, propiamente, cuál o cuáles seres corresponden a tal existencia y modo de existir.

A su vez, la noción de *género* no se desprende de ninguna de las demostraciones que el filósofo asume en la obra. Al tratar el primer punto, Spinoza demuestra que toda sustancia es ilimitada, y por tanto infinitamente perfecta en su *género*, sin explicarnos qué es el *género* de una sustancia. Al tratar el segundo punto, a su vez, Spinoza demuestra que dos sustancias no pueden ser iguales, y, solo en esta instancia, verificamos que la noción de *género* aparece, no porque se infiera de las articulaciones demostrativas de tales argumentos, sino bajo el presupuesto o la especulación de que hay múltiples sustancias: si toda sustancia debe ser ilimitada e infinitamente perfecta (como establece el primer punto), toda sustancia es singular, de tal manera que, suponiendo que haya o pueda haber múltiples sustancias, éstas no podrían ser iguales (como establece el segundo punto), y, en tal caso, habría que decir que son realmente distintas, o, en otras palabras, que cada una es infinitamente perfecta en su *género*.

Si Spinoza define a Dios como un ser del cual se deben afirmar infinitos atributos, antes de iniciar la demostración de los cuatro puntos o proposiciones, en el segundo capítulo y en el apéndice geométrico, y, así, puede desarrollarlos suponiendo la existencia de múltiples sustancias, de tal modo hablar de infinitud y perfección en *género*, es porque recurre a un argumento adicional, el cual interpone entre las pruebas de la existencia de Dios y los referidos abordajes. En efecto, al formular la definición de Dios, después de afirmar que Dios *es un ser del cual es afirmado todo, a saber, infinitos atributos*, Spinoza ofrece una nota a pie de página, en la que argumenta:

> La razón es que, como la nada no puede tener ningún atributo, el todo debe tener todos los atributos. Y así como la nada no tiene ningún atributo, porque nada es, así el algo tiene atributos, porque es algo. Por tanto, cuanto más algo es, más atributos debe tener. Y, por consiguiente, Dios, por ser (omni)perfecto, infinito, todos los algo, también debe tener infinitos, perfectos y todos los atributos. (KV I, 2 [1] nota 1)

La fórmula general de este argumento es: cuanto más es *algo*, más atributos tiene, de lo que se sigue que Dios, siendo el ser más perfecto e infinito, es decir, siendo todo el *algo*, debe tener infinitos atributos. En otras palabras, Spinoza basa el argumento en el carácter absoluto de Dios o en su grado de perfección: porque Dios es el todo o el ser más perfecto, debe tener infinitos atributos.

Cabe señalar que, en la instancia de la obra en que se sitúa, el argumento se torna tautológico, dado que parte del principio que pretende justificar. De hecho, el argumento presupone que Dios comprende el todo y el ser más perfecto, de tal manera que, en base a estos aspectos, se justifica que a él se le deben atribuir infinitos atributos. Sin embargo, como acabamos de observar, las pruebas de la existencia de Dios (únicos argumentos que preceden al argumento que nos ocupa) sólo demuestran la existencia necesaria de todo aquello a cuya esencia pertenece la existencia, y por tanto no demuestran la necesidad de que existan, de esa forma, múltiples cosas, mucho menos un ser capaz de contenerlas.

De esta forma, el argumento en cuestión no añade nada en relación a lo que establece la definición de Dios (que, vale señalar, es donde Spinoza lo ofrece). Veamos: la definición de Dios establece que éste es un ser del cual es afirmado *todo*, y, mediante la expresión *a saber*, explica que

todo significa *infinitos atributos*. A su vez, la definición establece que cada uno de los atributos es infinitamente perfecto en su género, de lo que se sigue que Dios (a quien es afirmado *todo*) es infinito y perfecto en una infinidad de géneros, y por tanto es el ser más perfecto. El argumento en cuestión, a su vez, nos dice que Dios tiene infinitos atributos porque es el *todo*, y porque es el ser más perfecto, nada más allá de lo que establece la definición, sólo que en forma de justificación. Así, podríamos delinear ese argumento de la siguiente manera: los atributos infinitos pertenecen a Dios, en cuanto es un ser al que pertenece *todo*, y que es el ser más perfecto, o, en otras palabras, en cuanto es un ser al que pertenecen *infinitos atributos*, cada uno de los cuales es infinitamente perfecto en su género. En resumen, el argumento nos dice que Dios tiene *infinitos atributos*, en tanto que es un ser al que pertenecen *infinitos atributos*.

Como señalamos más arriba, la tautología del argumento reside en que, en la instancia en que se lo formula, todavía hay carencia de una demostración concreta de la existencia de múltiples sustancias o atributos, de manera que seamos capaces de concebir el todo como siendo la totalidad de éstos. De este modo, el argumento sólo podría interpretarse especulativamente: las pruebas de la existencia de Dios demuestran la existencia necesaria de todo aquello a cuya esencia pertenece la existencia, de tal modo que, si hay múltiples cosas a cuya esencia pertenece la existencia, todas ellas deben constituir un todo, o ser afirmadas de él. Por tanto, según el principio de la argumentación que nos ocupa, el todo no podría agotarse en unas pocas de estas cosas, y, por tanto, tendría que estar constituido de infinitas.

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De cara a esta carencia demostrativa, adquiere relevancia el primero de los aspectos señalados anteriormente (a partir de la segunda razón expuesta por Spinoza para justificar la unicidad divina): si de ninguno de los argumentos o demostraciones del *Tratado breve* se sigue que debe haber

múltiples atributos o sustancias, la razón por la que podemos decir que hay más de uno (y, a partir de ahí, una infinidad), es una mera observación empírica, a saber, el hecho de que vemos que hay dos de ellos (*pensamiento* y *extensión*) unidos por doquier en la naturaleza.

En efecto, en la medida en que comprobamos empíricamente que hay más de un atributo, surge la necesidad de afirmar una infinidad de ellos. Por eso Spinoza, en el *Tratado breve*, como acabamos de citar, al exponer el argumento que justifica la atribución de infinitos atributos a Dios, establece un intermediario, que representa la instancia en la que el hombre verifica la existencia de *pensamiento* y *extensión*, como siendo lo que se atribuye a algo, pero no al todo: (i) *la nada no tiene atributo, porque nada es*; (ii) *el algo tiene atributos, porque es algo*; (iii) *Dios, siendo* […] *todo el algo*, […] *debe tener infinitos* [atributos].

Spinoza nos explica este razonamiento, en parte de una larga nota a pie de página que ofrece al desarrollar la demostración a *posteriori*, que analizamos en el apartado anterior. Tras ofrecer argumentos sobre la imposibilidad de que la idea de Dios sea una ficción, el filósofo nos dice:

> Aparte de que por lo hasta ahora dicho resulta claro que la idea de infinitos atributos en el ser perfecto no es una ficción, aún añadiremos a ello lo que sigue.
>
> Tras las anteriores investigaciones acerca de la naturaleza, no hemos podido hasta ahora hallar en ella más que dos atributos que pertenecen a este ser absolutamente perfecto. Pero éstos están lejos de poder dejarnos satisfechos, como si ellos fueran todo aquello de los que consta el ser perfecto, sino que, por el contrario, hallamos en nosotros *un algo* que no sólo apunta claramente a todavía más, sino incluso a infinitos atributos perfectos, que pertenecen realmente a este ser perfecto, antes de poder ser calificado de tal. ¿Y de dónde proviene esa idea de perfección? Ese *algo* no puede proceder de aquellos dos atributos, porque dos no da más que dos, y no una infinitud. ¿De dónde, pues? De mí nunca jamás, a menos que deba dar lo que

> nunca podría dar. ¿De dónde, entonces, sino de los mismos atributos infinitos, que nos dicen que existen, sin decirnos, en cambio, al menos hasta ahora, qué son? Pues sólo de dos sabemos lo que son. (KV I, 2 [1] nota 8)

Según la fórmula general de la prueba *a posteriori*, en esta nota Spinoza destaca que la idea de perfección es la que exige la existencia de infinitos atributos, y que esta idea, precisamente por ser idea de algo perfecto, no puede provenir de la imperfección humana. Sin embargo, Spinoza admite que la idea de perfección que tiene el hombre tiene como principio el hallazgo empírico de que hay dos atributos: porque el hombre encuentra que hay dos atributos, entiende que la perfección no puede agotarse en ellos.

En este sentido, vale la pena especular que, si hubiera un solo atributo, o si el hombre solo percibiera uno, no vería la necesidad de pensar en una infinidad de atributos, ni podría especular sobre la posibilidad de una perfección mayor, sino que, por el contrario, lo absoluto se agotaría en la infinidad y perfección de un solo género. Así, podemos aceptar el argumento de la prueba *a posteriori* de que, por comprender las propiedades divinas (perfección, infinitud, etc.), tenemos la idea de un ser perfecto, y que, dada nuestra imperfección, esta idea no puede provenir de nosotros, lo que demostraría que este ser tiene existencia formal, teniendo en sí tanto como objetivamente tiene esta idea. Como hemos visto, sin embargo, la prueba *a posteriori* se limita a demostrar la existencia necesaria de todo lo es infinitamente perfecto, y no la existencia de un ser del que hay que afirmar una infinidad de cosas infinitamente perfectas, de lo que se sigue que, sin la verificación empírica de que hay dos atributos, el hombre no podría llegar a tener la idea de un ser del cual se deben afirmar infinitos.

De esta manera, a partir de nuestro análisis, podemos empezar a vislumbrar, como hemos señalado anteriormente, cuál es el monismo que pretende el joven Spinoza en el *Tratado breve*. En efecto, la constatación empírica de que hay más de un atributo muestra que el filósofo, además de concebir la distinción real entre sustancias o atributos (a la que sí demuestra claramente en los abordajes referidos del segundo capítulo y del apéndice geométrico, al demostrar la perfección y la infinitud sustancial, y por tanto la singularidad de *toda* sustancia), concibe también que, entre ellos, hay una distinción numérica: el hombre percibe *dos* atributos (*pensamiento* y *extensión*), y, de ellos, o más bien, del hecho de que existen en ese número, el filósofo infiere que debe haber una infinidad de atributos, teniendo siempre presente la infinita perfección de Dios.

El segundo aspecto que destacamos más arriba, de la segunda razón por la que Spinoza justifica la unicidad divina, corrobora nuestra interpretación anterior: percibimos dos atributos, y, aunque no tienen absolutamente nada en común entre sí, es decir, que son realmente distintos, si no fuera por la unidad que vemos en todas partes en la naturaleza, no podrían unirse uno con el otro. De este modo, es necesario observar que, en el marco de la unicidad divina que Spinoza se propone demostrar, no sólo existe una distinción real entre *pensamiento* y *extensión*, sino también una distinción numérica, de tal manera que estos atributos, si no se distinguieran así, es decir, si no fueran *dos* atributos, no podrían unirse entre sí.

Es verdad que, por cierto, es necesario detallar el análisis acerca de lo que quiere decir Spinoza cuando afirma una unión entre los atributos, principalmente para el estudio de la segunda parte del *Tratado breve*, en cuanto a la relación entre la mente y el cuerpo, y las cuestiones epistemológicas que de ella derivan[103]. Sin embargo, en lo que nos concierne, a saber, la justificación

[103] En cuanto al abordaje de este tema, recomendamos el análisis detallado contenido en: FERREIRA, Giorgio G. *De sensatio a affèctus:* a genealogia do pensamento de Espinosa sob a ótica da relação corpo-mente. Capítulo II: a relação corpo-mente no KV.

de la unicidad divina o el monismo de Spinoza, cabe señalar que la unión afirmada por el filósofo entre los atributos corrobora la distinción numérica que, además de la real, existe entre ellos: hay atributos real y numéricamente distintos, de tal manera que no tienen absolutamente nada en común entre sí, y, sin embargo, están unidos uno con el otro, como evidencia la unidad que vemos por todas partes en la naturaleza.

De esta manera, es posible suponer que el hallazgo empírico de que hay dos atributos en la naturaleza, al mismo tiempo que muestra que ellos están involucrados con el mismo ser, según Spinoza argumenta a favor de la unicidad divina, muestra que ésta se constituye bajo una noción de conjunto y espacialidad: hay atributos que se distinguen numéricamente, de tal manera que se unen entre sí; así, la unicidad divina se configura como una totalidad, como unión de todos los atributos existentes, no sólo en un sentido objetivo o epistemológico (es decir, en relación a su distinción real), sino también, en un sentido estrictamente ontológico, el cual nos obliga a concebirlo como un todo, que no es más que la naturaleza o Dios.

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Si bien Spinoza argumenta a favor de la unicidad divina, y nos ofrece elementos a partir de los cuales poder comprender lo que tiene en mente, es necesario recordar que, por la primera razón, es decir, por las pruebas de la existencia de Dios, el filósofo sólo demuestra la existencia necesaria de lo que es infinitamente perfecto en su género, sin que se siga que haya algo absolutamente infinito, es decir, infinito en una infinidad de géneros. La noción de absoluto surge de los argumentos de la segunda razón, pero siempre asociada a un argumento adicional: comprobamos empíricamente que hay *dos* atributos *unidos* en la naturaleza (como lo establece la referida razón), y, de esta comprobación, inferimos que debe haber infinitos atributos, ya que el absoluto no puede agotarse sólo en estos *dos* (según la fórmula del argumento adicional).

Dejando de lado la cuestión de que si existen o no infinitos atributos, o, más aún, de que si es válido el argumento que ofrece Spinoza para justificar la existencia de una infinidad de atributos, es necesario señalar que cada uno de los que sabemos que existe, es decir, *pensamiento* o *extensión*, siendo una sustancia, según los abordajes del segundo capítulo y del apéndice geométrico, debe existir necesariamente, o ser una cosa que existe por sí misma, a cuya esencia pertenece la existencia. De este modo, cabe preguntarse: ¿el hecho de que veamos los atributos unidos por todas partes en la naturaleza es evidencia suficiente para justificar la unicidad divina, es decir, para afirmar que están involucrados con un mismo ser?

Por lo que Spinoza nos ofrece en las dos primeras razones, pensamos que esta pregunta sólo puede encontrar una respuesta negativa. En efecto, como acabamos de observar, mediante estos argumentos, en rigor, el filósofo sólo demuestra la necesidad de la existencia sustancial, y observa que, como vemos, hay dos atributos o sustancias unidos en la naturaleza, sin ofrecernos una explicación acerca de lo qué es propiamente tal *unión*. Así, a la vista de los rigurosos argumentos que Spinoza desarrolla en el segundo capítulo y en el apéndice geométrico, las razones en cuestión no parecen comprender justificación suficiente para afirmar que los atributos, lejos de comprender seres autónomos, son afirmaciones de un mismo ser: si toda sustancia debe ser ilimitada, es decir, infinitamente perfecta, de lo que se sigue que toda sustancia es singular, y, por tanto, que una no puede ser causa de otra, toda sustancia que existe debe existir necesariamente o por sí misma (como lo muestran los abordajes antes mencionados).

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Tercera razón

Veamos, pues, en qué medida la tercera razón nos ayuda a comprender bajo qué principio Spinoza puede justificar la unicidad divina. En tercer lugar, el filósofo nos dice que *todos estos*

atributos, que existen en la naturaleza, no son más que un ser único, y de ningún modo seres distintos:

> Porque, así como acabamos de ver que una sustancia no puede producir otra, así también es imposible que una *sustancia que no existe* comience a existir. Vemos, por otra parte, que en ninguna sustancia (que sin duda sabemos que existe en la naturaleza) captada aisladamente, hay necesidad alguna de existir, dado que a su esencia particular no pertenece ninguna existencia. De donde se sigue necesariamente que la naturaleza, que no procede de ninguna causa y, sin embargo, sabemos muy bien que existe, debe ser necesariamente un ser perfecto, al que pertenece la existencia. (KV I, 2 [17])

Al iniciar este argumento, Espinosa ofrece una nota a pie de página, en la que desarrolla, de diferentes maneras, el mismo razonamiento; el filósofo explica:

> Es decir, si no puede haber sustancia alguna que no exista y, por otra parte, de su esencia, considerada aisladamente, no se sigue ninguna existencia, se concluye que ella no debe ser algo particular, sino algo que es un atributo de otro, a saber, del uno, único y omnisciente. O, en otros términos, toda sustancia es existente y ninguna existencia de una sustancia concebida por sí misma se sigue de su esencia; luego, ninguna sustancia existente puede ser concebida por sí misma, sino que debe pertenecer a algo distinto.
>
> Esto es, al captar con nuestro entendimiento el pensamiento y la extensión sustanciales, no los entendemos en su esencia ni en su existencia, a saber, que su existencia pertenece necesariamente a su esencia. Pero, como nosotros probamos

> que ella es un atributo de Dios, de ahí probamos *a priori* que existe; e *a posteriori* (sólo en relación a la extensión) a partir de los modos, que la deben tener necesariamente como sujeto. (KV I, 2 [17] nota 58)

Tanto en el cuerpo del texto como en la nota, inicialmente, Spinoza corrobora lo que había argumentado y concluido en los abordajes del segundo capítulo y del apéndice geométrico, acerca del estatuto ontológico sustancial; a continuación, sin embargo, parece ir en contra de tales argumentos y conclusiones.

Veamos: en un primer momento, en el cuerpo del texto, Spinoza reproduce el argumento de la incausalidad sustancial: si las sustancias no pueden relacionarse causalmente, no es posible que pase a existir una sustancia que no existe; en la nota, a su vez, el filósofo presenta lo que se sigue de tal argumento, a saber, toda sustancia existente tiene existencia necesaria, o, lo que es lo mismo, ninguna sustancia puede ser sino existente. Posteriormente, sin embargo, en el cuerpo del texto y en la nota, Spinoza niega tal necesidad, afirmando explícitamente que en ninguna sustancia concebida separadamente hay necesidad alguna de existir, dado que ninguna existencia pertenece a su esencia particular. Con base en tales afirmaciones, así, en el cuerpo del texto, Spinoza presenta una conclusión algo inconexa, en relación a las premisas, afirmando que de eso se sigue que la naturaleza debe ser necesariamente un ser perfecto, al que pertenece la existencia, lo cual explica mejor en la nota: si toda sustancia es existente, y ninguna existencia se sigue de la esencia de cierta sustancia concebida por sí misma, tal sustancia no puede ser concebida por sí misma, sino que debe pertenecer a otra cosa, que, más adelante, el filósofo nos dice ser Dios.

Para constatar en qué sentido la segunda parte del argumento, tanto en el cuerpo del texto como en la nota, parece contradecir los argumentos anteriores, en primer lugar, conviene recordar,

una vez más, que los abordajes del segundo capítulo y el apéndice geométrico no se refieren a un cierto número de sustancias, sino que sólo demuestran que toda sustancia es ilimitada, infinitamente perfecta y singular (resaltamos: independientemente del número de sustancias existentes). En segundo lugar, por tanto, conviene recordar que, de esta secuencia de demostraciones, se sigue que una sustancia no puede producir otra (según la primera parte del argumento expuesto en el cuerpo del texto), y, por tanto, que, si una sustancia existe, existe necesariamente, o, según el lenguaje específico del apéndice, que a la esencia de esa sustancia pertenece por naturaleza la existencia, de lo que se sigue que es una cosa que existe por sí misma.

De esta manera, nos preguntamos: si los abordajes del segundo capítulo y del apéndice geométrico demuestran que toda sustancia existe necesariamente, o, lo que es lo mismo, que a la esencia de toda sustancia pertenece la existencia, de tal modo que toda sustancia es una cosa que existe por sí misma, independientemente del número en que existan, ¿cómo puede decirse (como lo hace Spinoza en la segunda parte del argumento que nos ocupa) que en ninguna sustancia concebida separadamente hay alguna necesidad de realmente existir, dado que a su esencia particular no pertenece a ninguna existencia?

En la segunda parte de la nota, Espinosa responde a esta pregunta, y lo hace haciéndola aún más evidente. Según el filósofo, entendemos las sustancias sólo en su esencia, pero no en su existencia, o, en otras palabras, aunque las concebimos en su esencia, no podemos concluir de esto que existen con necesidad, lo que, de hecho, parece contradecir lo que establecen los abordajes del segundo capítulo y del apéndice; conviene recordar: toda sustancia existe necesariamente, o, lo que es lo mismo, a la esencia de toda sustancia pertenece por naturaleza la existencia. A continuación, Spinoza justifica la existencia necesaria de las sustancias, aunque no se siga de su esencia, con vistas a ser atributos de Dios. En otras palabras, el filósofo nos dice que las sustancias existen

necesariamente, aunque no podamos concluir esa existencia de su esencia, porque son (como había demostrado *a priori*, y, en relación con la extensión, *a posteriori*) atributos de Dios.

Nos parece claro que, cuando nos dice que ha demostrado que las sustancias son atributos de Dios, Spinoza se refiere tanto a las pruebas de su existencia (que ofrece al comienzo del *Tratado breve*) como a los abordajes del segundo capítulo (cuerpo del texto y nota a pie de página) y al apéndice geométrico. Sin embargo, como creemos haber demostrado, al analizar estas partes, Spinoza no puede salir del ámbito de lo infinitamente perfecto en su género, de lo que se sigue que las demostraciones allí asumidas conciernen a todas las sustancias, y no a un número determinado de ellas, y mucho menos a un ser del cual deban ser afirmadas infinitas, de tal manera que podamos decir que son sus atributos. En síntesis, cabe señalar que, a través de estos abordajes, sólo es posible suponer que toda sustancia existe necesariamente, o que la existencia pertenece a la esencia de toda sustancia, de tal manera que es una cosa que existe por sí misma.

De esta manera, cabe preguntarse: ¿podemos concebir la existencia necesaria de *pensamiento* o *extensión*, a partir de su esencia? Si consideramos los abordajes del segundo capítulo y del apéndice, no dudamos en responder positivamente a esta pregunta y, por tanto, en seguir señalando una aparente contradicción en los argumentos con los que Spinoza, en tercera instancia, pretende justificar la unicidad divina.

Ahora bien, pensamos que en esta aparente contradicción reside precisamente la justificación de la unicidad divina que Spinoza defiende en el *Tratado breve*, pero en la medida que consideremos, una vez más, un elemento extrínseco a los argumentos que el filósofo minuciosamente desarrolla, en relación a toda sustancia, en los abordajes antes mencionados, a saber, la verificación empírica de la existencia de múltiples sustancias.

Por un lado, cabe señalar que Spinoza efectivamente niega la necesidad de que exista una sustancia, pero, observa, si se la concibe por separado, lo que demuestra que considera la existencia de más de una sustancia. En efecto, en este punto de su argumentación (independientemente de aquél mediante el cual justifica la existencia de infinitos atributos, con miras a la suprema perfección de Dios), Spinoza ya había declarado que había constatado empíricamente la existencia de dos atributos, *pensamiento* y *extensión*; por eso, entre paréntesis, en el argumento expuesto en el cuerpo del texto, al referirse a la no necesidad de que exista una sustancia, si se la concibe separadamente, el filósofo nos advierte: que sin duda sabemos que existe en la naturaleza. Así, es posible verificar que, además de los argumentos especulativos sobre la necesidad de múltiples atributos, Spinoza tiene la certeza, en base a lo que percibe en la naturaleza, de que hay más de un atributo.

Por otro lado, observamos que Spinoza justifica la no necesidad de que una sustancia exista, afirmando que ninguna existencia pertenece a su esencia *particular*, lo que demuestra, una vez más, que considera dada la existencia de múltiples sustancias, de tal manera a referirse a la esencia *particular* de éstas, o, dicho de otro modo, a la esencia de cada una de las que, como vemos, existen en la naturaleza.

En síntesis, Spinoza niega la necesidad de que exista una sustancia, concebida separadamente, porque sabe que, lejos de ser una sola sustancia, al menos hay dos: *pensamiento* y *extensión*. De esta manera, habiendo demostrado, a través de los abordajes detallados del segundo capítulo y del apéndice geométrico, que toda sustancia debe existir necesariamente, es decir, que a la esencia de toda sustancia pertenece por naturaleza la existencia, en cuanto que conoce, por la vía de la verificación empírica, que hay múltiples sustancias, Spinoza no puede afirmar la necesidad de la existencia de una, sin al mismo tiempo afirmar la necesidad de la existencia de la otra.

Es decir, habiendo demostrado que toda sustancia existe necesariamente y, a su vez, habiendo constatado empíricamente que existen múltiples sustancias, aunque difieran realmente, es decir, que una no tenga absolutamente nada en común con la otra, y, por tanto, que una no dependa de la otra para existir, afirmar la existencia de una implica afirmar la existencia de la otra, de tal manera que, si no fuera así, debería admitirse que algunas de las sustancias (que se sabe existe en la naturaleza) no existe con necesidad, lo cual, según los abordajes del segundo capítulo y del apéndice, es imposible.

De esta manera, podemos comprobar que, en la tercera razón que Spinoza ofrece para justificar la unicidad divina, al negar la necesidad de que una sustancia exista, si se concibe *aisladamente*, o al negar que a la esencia *particular* de una sustancia pertenezca a alguna existencia, no entra en contradicción con los abordajes del segundo capítulo y del apéndice, ya que, lejos de negar la necesidad intrínseca de que toda sustancia exista, niega la necesidad extrínseca, es decir, que exista sin considerar la existencia de las demás sustancias: toda sustancia existe necesariamente, y a su esencia pertenece por naturaleza la existencia, de modo que es una cosa que existe por sí misma; de esta manera, al haber más de una sustancia, no es posible afirmar que una de ellas existe necesariamente, sin tener que hacerlo de cada una de las otras.

El estatuto ontológico de Dios

Como observamos al analizar la segunda razón, la unicidad divina se configura como totalidad, en el sentido de entender la unión de todos los atributos existentes, los cuales, al distinguirse numéricamente, nos obligan a concebir tal totalidad como conjunto. Al iniciar el análisis de la tercera razón, a su vez, a modo de introducción, vimos que esta noción de totalidad (que se deduce del mero hallazgo empírico de que hay dos atributos unidos en la naturaleza) por sí sola no

justifica la unicidad divina, ante la autonomía ontológica sustancial, demostrada en los abordajes del segundo capítulo y del apéndice geométrico.

Sin embargo, del análisis que asumimos arriba, respecto de la tercera razón, es posible agregar un nuevo elemento a la referida noción de totalidad, a saber, la necesidad de la existencia sustancial, en el ámbito de lo múltiple, que garantice la cohesión del conjunto conformado por los atributos existentes: como vemos en la naturaleza, existen múltiples atributos, cada uno de los cuales, siendo sustancias, debe existir necesariamente, de tal manera que, aunque uno no necesite del otro para existir y ser explicado, no puede concebirse separadamente, con existencia necesaria, sin que cada uno de los otros deba también ser así concebido.

Así, a pesar de lo que cuestionamos sobre la unicidad divina, al considerar la autonomía sustancial, es posible afirmar que es precisamente ésta la que le sirve de principio o fundamento. En efecto, si un atributo no fuera autónomo, es decir, si dependiera de otro para existir y ser explicado, no podría ser ilimitado, y por tanto infinitamente perfecto, de lo que se sigue que su existencia no sería necesaria, ni que sería eterno e inmutable; por tanto, un conjunto formado por atributos carecería también de la necesidad de existir, de la eternidad y de la inmutabilidad. Con base en el carácter autónomo de los atributos, entonces, podemos afirmar que la totalidad de los que existen en la naturaleza, lejos de constituir un mero agregado de cosas contingentes, mutables y finitas, comprende un conjunto necesario, inmutable e infinito en diversos géneros, uno por cada atributo que lo componen.

Por eso Spinoza, al concluir la tercera razón por la que justifica la unicidad divina, en el cuerpo del texto traslada a la naturaleza lo que, en los abordajes del segundo capítulo y del apéndice, había demostrado respecto a toda sustancia. En efecto, después de negar que haya necesidad alguna de existir en una sustancia, si se la concibe *separadamente*, y de negar que la existencia pertenezca a

su esencia *particular*; el filósofo afirma que de ello se sigue necesariamente que la naturaleza, que no procede de ninguna causa y, sin embargo, sabemos muy bien que existe, necesariamente debe ser un ser perfecto, al que pertenece la existencia.

Cabe preguntarse, sin embargo, si es de esa manera que, en efecto, Spinoza puede consolidar propiamente un estatus ontológico para Dios, o, en otras palabras, si puede instituir la existencia real de algo infinitamente perfecto en una infinidad de géneros, o, lo que es lo mismo, absolutamente infinito. En efecto, Spinoza sabe que esta cuestión constituye un problema de la filosofía que expone en el *Tratado breve*; no es casual que dedique el primer diálogo de la obra (que ofrece justo después del segundo capítulo de su primera parte) a combatir la concepción de Dios como noción de conjunto. La pregunta general que orienta este problema es: si lo que realmente existe en la naturaleza son atributos, es decir, sustancias infinitamente perfectas en su género, aunque la necesidad de su existencia, lejos de afirmarse de una sola, debe afirmarse de todas, ¿es posible admitir que la totalidad que ellas conforman corresponde, en efecto, a algo realmente existente, es decir, ontológicamente real? ¿O la totalidad de las sustancias sólo existe como un todo, es decir, como un mero ente de razón?

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DAISY POLTRONIERI (UNICAMP)

The complementarity between motion and force from the theses of dynamic Science

Introduction

As a proposed solution to the problem of the quantity of motion grounded by Descartes and the Cartesians of the 17th, Leibniz re-establishes the object of study with regard to objects in motion. For him, motion could not be quantified under the guarantee that it is something of the body that does not change, in fact, Leibniz says that motion is relative as well as the extension of bodies, there is, therefore, something more essential than motion and extension in the theses of dynamics that prove such criticism during the historical period of this philosopher.

Throughout this article I propose to present the main reason for Leibniz's critique of Descartes as a pretext for inserting a discussion of the concept of the nature of motion and force,

the main object of dynamic science. By this way, I present counterpoints to the Leibnizian thesis that could be interpreted as idealistic if force were not an absolute nature and that completes the meaning of the relativity of motion, the latter vehemently defended by Leibniz. Thus, the provocation of the complementarity of force with motion may suggest a satisfactory argument about the critique of the quantity of motion, as well as a philosophical project of epistemology with an emphasis on the development of purely metaphysical natures, namely natures of force.

Motion in dynamic science

It is emblematic how the nature of motion and force are presented in the texts of Leibnizian dynamic science (1686-1704)[104]. First, Leibniz starts from a differentiation between these two natures in order to expose the Cartesian error of calculating the quantity of motion. This argument shows that Descartes, in estimating that the quantity of motion of a body is unchangeable, establishes equality between motive force and quantity of motion. For Leibniz, such argument can be brought into question for two main reasons: i) because the quantity of movement being equivalent to the quantity of force generates disproportionality between matter and its displacement, that is, the effects can be greater than the cause itself and ii) because of the conserving agent of the quantity of movement in bodies.

(i) The pendulum situation exemplifies very well why the first reason for questioning the Cartesian thesis was taken to its utmost consequences in the Leibnizian thesis. Imagine a pendulum

[104] I consider the period when Leibniz begins to write his own philosophy thesis on epistemic knowledge, with the abandonment of Cartesian influence, until the writing of the Monadology which is a milestone of a new nomenclature of the dynamic's theses. Therefore, dynamical science can be considered a middle or transitional period.

in initial motion, it travels the distance from end A1 as its starting point to end B1 as its ending point. When the pendulum returns to its starting point, but with a quantity of movement already used in the journey, we say that this starting point in a second moment is A2. For Leibniz, according to the Cartesian thesis, if it were correct, the pendulum should arrive at A2 with the same amount of motion as it left at A1, since if the amount of motion is proportional to matter and it doesn't dissipate, then it should always remain the same or even greater – since it can acquire more velocity along the route from B1 to A2. For these reasons the law of conservation of the quantity of movement (mv) must be corrected, that is, the quantity of force (mv^2) is what must be conserved, because by its own material properties the object loses and acquires motive force, which triggers motion, while its natural conservation comes from another type of force, natural and specific to each body.

They settle the matter in that way so as to conserve the same quantity of motion, which they confuse with power. I do so in order to conserve the same quantity of power, that is, to preserve the equality of cause and effect, to prevent perpetual motion from arising by the one exceeding the other.[105]

In the Leibnizian conception, the quantity of motion can generate a kind of perpetual motion, that is, something that has no verification in the physical world. The windmill that operates with the effect of a machinery for grinding, consumes the force generated with the wind and cannot operate ad infinitum because it has once been set in motion. When the force is consumed, the machinery operates. The mechanical force distributes the motive force through its internal system to perform its activity. For Leibniz, the quantity of motion being conserved from matter generates

[105] GM VI 287-92; AG p. 107.

such redundancy. From this point of view, the quantity of motion being conserved only applies to the five simple machines, since the matter of these instruments equally distributes motion across matter in the working procedure.

Many mathematicians, seeing that velocity and mass offset each other in the five simple machines, have in general deduced motive force from quantity of motion (...) in the case of Descartes, who considered motive force and quantity of motion equivalent, has held that God conserves the same quantity of motion in the world.[106]

The quantity of movement in the case of the five simple machines is a misunderstanding of generalization and, as for Descartes, in order for things to remain with the same quantity of movement, in the sense that they have the ability to repeat the effect generated, he considers that God preserves in matter the quantity of movement necessary to perform his work. From this point of view, Leibniz questions that the cause of this quantity of motion is not necessarily matter since the Cartesian argument can be contradicted by the conjecture of perpetual mechanical motion. In this case, one must admit that the potentiality of action – proper to each body – is closer to the item to be conserved, and God, in order not to have to intervene in the nature of bodies and substances all the time, has the power to make the substances themselves and their respective bodies have the capacity of conservation.

(ii) Leibniz displaces the conserving agent of motion in bodies. While Descartes attributes this to God, Leibniz considers that this version, besides presenting flaws in the mechanical analysis of bodies – as is the case of perpetual mechanical motion – also has a metaphysical misunderstanding,

[106] GM VI, p. 117.

namely, that God, being the creator and ordained of all things, would never create a world in which he would have to always intervene in matter in order to give it maintenance.

I do not say the material world is a machine or watch that goes without God's interposition, and I have sufficiently insisted that the creation wants to be continually

> influenced by its creator. But I maintain it to be a watch that goes without wanting to be mended by him; otherwise we must say that God bethinks himself again. No, God has foreseen everything. He has provided a remedy for everything beforehand. There is in his works a harmony, a beauty, already pre-established.[107]

Materiality is submitted to the question that the creator places in nature its own capacity to act and maintain itself, not by the movement it can produce from its extensive body, but by its own capacity to act and resist. Because of this the concept of force appears in the thesis with two complementary purposes: that of producing a certain effect and that of being the cause of action and maintenance of bodies.

In this vein, violent motion (that which causes bodies to acquire speed) and figure become relative qualities, since abandoning the Cartesian thesis means, in the end, centralizing the notion of the extensive body in the nature of force. Leibniz says: "*motion is not something entirely real, and when some bodies change their position among themselves, it is not possible to determine, merely from a consideration of these changes, to which body we could attribute motion or rest*"[108].

[107] L p. 679.
[108] DM §18, p. 182.

By relativizing the condition of motion in the body, Leibniz seems to grant reason the task in attributing or not motion to it, since it is not something real, but ideal. If motion has a relative and ideal character, force, being the provider of its triggering, could be reviewed, especially for whether it is something real. However, Leibniz explanes:

> Now, this force is something different from greatness, figure, and movement, and by this we can judge that not everything conceived in the body consists only of extension and its modifications, as our moderns are persuaded.[109]

The nature of force is essentially different from what Leibniz regards as motion applied to extended bodies. In dynamic science, motion means an unleashing of force and effort (nisus) that are natural to each substance that extends materiality as a body. Thus, the status of force must be the most real and absolute since it supports the phenomena and perception of bodies.

We must realize, above all, that force is something absolutely real in substances, even in created substances, while space, time, and motion are, to a certain extent, beings of reason, and are true or real, not per se, but only to the extent that they involve either the divine attributes (immensity, eternity, the ability to carry out works), or the force in created substances.[110]

While force is something real in created substances, Leibniz mischaracterizes space, time, and motion, i.e., elements related to the extensive body, as that which is fundamentally real and brings them into a cognitive realm, where they are operations of reason. In the cognitive realm,

[109] DM §17 p. 182-183.
[110] GM VI, p. 247. AG p. 130.

however, it is not something real, but ideal. The reality of the forces, however, remains in its entirety the most important part of the composition of created substances and how they are perceived, since cognitive attributes can distinguish the forces in the extensive body development of a created substance. There are idealistic conclusions that are considered insurmountable, I highlight the celebrated interpretation of Robert Adams (1994). The corporeality and reality of infinitely small and complex forces are, for Adams, actually incorporeal and finitely complex natures and it is these that express the maximum reality, since that which is proper to cognition is characterized by determination and finiteness, while recognizing reality in something that is infinite, becomes counter intuitive for this author[111]. In other words, the maximum reality given through the beings of reason is what is closest to the possibility of understanding force, substance, and the corporeal world.

The conclusion that I think Leibniz draws is not that real shapes are infinitely complex, though some things he says (e.g., in DM 6) might leave us with that impression. Rather, he concludes that shape as such is only a phenomenon. I suppose that an infinitely complex shape would involve a line segment of finite length that changes not merely its curvature but also the direction of its change of curvature infinitely many times, and that Leibniz would have thought that an absurd and impossible monstrosity. What I assume he would say, instead of postulating infinitely complex shapes, is that for every finitely complex shape that might be ascribed to a body there is another still more complex that more adequately expresses reality.[112]

[111] "*Leibniz would have thought that an absurd and impossible monstrosity*" (ADAMS, 1994, p. 230).

[112] ADAMS, 1994, p. 230.

To resolve this imbroglio over this fine line that divides what is real from what is ideal, we consider Adams' argument from the standpoint of what Leibniz regards as something infinitely small and complex, and which modifies the condition of extensive bodies. We then consider the situation postulated in the *Specimen Dinamicum* where Leibniz verifies the behavior of a sphere inside a tube that acquires violent and centrifugal motion from the motion that the tube imprints on this sphere by infinitesimal solicitations of force.

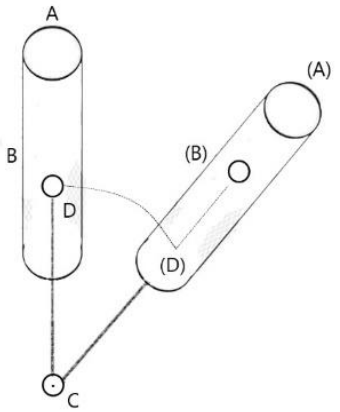

Figure 1. Representation of the experiment of a tube with center of gravity C and centrifugal motion. This experiment is used to make explicit the nature of the intrinsic force or its effort (nisus) present in body B. From LEIBNIZ. *Specimen Dinamicum.* GM VI, p. 238.

The natural forces on the spherical body remain at rest until the tube is moved from axis (C). When the sphere moves from point D to (D) its initial condition changes and, from point (B) to (A), the natural forces on this body handle the violent motion with two different incidences: i) resistance to the violent motion, i.e., maintenance, and ii) with an accelerated motion of by external conditions was required to produce the motion effect.

It is obvious that, in the beginning, the *conatus* for receding from the center, namely, that by virtue of which the ball B in the tube tends toward the end of the tube, A, is **infinitely small** in comparison with the *impetus* which it already has from rotation, that is, it is infinitely small in comparison with the *impetus* by virtue of which the ball B, together with the tube itself, tends to go from place D to (D), while maintaining the same distance from the center. But if the centrifugal impression deriving from the rotation were continued for some time, then by virtue of that very circumstance, a certain complete centrifugal *impetus* (D) (B), comparable to the rotational *impetus* D (D), must arise in the ball. From this it is obvious that the nisus is twofold, that is, elementary or infinitely small, which I also call solicitation, and that which is formed from **the continuation or repetition of elementary nisus**, that is, *impetus* itself. Nevertheless, I wouldn't want to claim on these grounds that these mathematical entities are really found in nature, but I only wish to advance them for making careful calculations through mental abstraction.[113]

The circumstance involving impetus and conatus presupposes the characteristics of force being natural to bodies and real in created substances, since *impetus* plays the role of belonging to the calculation of the amount of progress that are incorporated to estimate the amount of force or mv^2, in other words, *impetus* means that which is maintained despite what the body suffers with the vectorial movement or *conatus*. Put this way, the phenomenon that the motion of the tube imprints on the sphere from centripetal displacement is the result of a series of natural forces solicited by something external that triggered apparent motion. Infinite natural forces of the spherical body aroused with the movement in the tube and generated *conatus*. The minute efforts (*nisus*) are elementary ones that, through continuous solicitations, alter the resting state of the object.

[113] GM VI, p. 238; AG p. 121.

Furthermore, just as the numerical value of a motion [motus] extending through time derives from an infinite number of impetuses, so, in turn, impetus itself (even though it is something momentary) arises from an infinite number of increments successively impressed on a given mobile thing. And so impetus too has a certain element from whose infinite repetition it can only arise.[114]

The *impetus* is the primordial reason for any movement because the request for its action, given from infinitesimals to infinitesimals, is capable of successively influencing its bodies. Thus, to postulate the motion that a body can produce when considering the quantity of force, which always remains the same, means to preserve the primitive causes of being a body in motion. Leibniz therefore considers the maintenance of forces to be indubitable since they are part of the recognition of the extensive body, it is enough, however, and in opposition to Descartes, not to stop the verification of bodies in their most apparent qualities such as figure, motion, and extension. The recognition of force as the cause of motion subjects it to a status of derivation from the reason that force is arguably the most real thing in the world[115]. It remains to say, finally, that movement is complementary to force because it is an effect of their successive activities that are natural to bodies.

Force as a real and absolute nature

Motion has nothing absolute about it, except for its link to the true causes of its appearance. Force, on the other hand, is an indispensable nature to everybody, because besides the unleashing

[114] GM VI, p. 238; AG p. 121.
[115] GP VI, p. 507. [AG p. 192].

of movement through *impetus* and *nisus*, it is as a primordial foundation to substances. In dynamic science to consider the reality of something, without referring to force, becomes an impasse, because "indeed, primitive force (which is nothing but the first entelechy) corresponds to the soul or substantial form"[116]. In this way, the function of this nature for dynamic science is to establish general principles that can be accessible to the relative conditions of a body – such as figure and motion – and that by their quality of relative do not lose their foundation in the realm of what is real.

Now, a multitude can derive its reality only from true unities, which have some other origin and are considerably different from [[mathematical]] points [[which are only the extremities and modifications of extension,]] which all agree cannot make up the continuum (…) Hence, it was necessary to restore, and, as it were, to rehabilitate the substantial forms which are in such disrepute today, but in a way that would render them intelligible, and separate the use one should make of them from the abuse that has been made of them. I found then that their nature consists in force, and that from this there follows something analogous to sensation and appetite, so that we must conceive of them on the model of the notion we have of souls. But just as soul must not be used to explain the particular details of the economy of the animal's body, I judged that we must not use these forms to explain the particular problems of nature, even though they are necessary to establish the true general principles. Aristotle calls them first entelechies; I call them, perhaps more intelligibly, primitive forces, which contain not only act or the completion of possibility, but also an original activity.

[116] GP VI, p. 235. [AG p. 119].

The dependence between the modifications of extension with the reality of true unity is precisely the justification that motion takes place from the original activity of force. This nature of primitive form becomes indispensable for understanding the verification of the motion of bodies, since Leibniz centers the unity, activity, and primitiveness of all extensive existence in the scope of the nature of force (by the way, an entirely metaphysical scope).

I also perceived the nature of motion. Furthermore, I also grasped that space is not something absolute or real, and that it neither undergoes change, nor can we conceive absolute motion, **but that the entire nature of motion is relative**, so that from the phenomena one cannot determine with mathematical rigor what is at rest, or the amount of motion with which somebody is moved. (…) For the rest, it is enough for practical purposes for us to investigate not the subject of motion as much as the relative changes of things with respect to one another, since there is no fixed point in the universe.[117]

The mathematical rigor of the verification of bodies must be associated with the nature of force so that movement is a constituent item of the physical world, without losing sight of the relativity of its nature. Because of this, the movement itself must have some characteristic of force, so that empirical verification is not founded only on entities of reason or some kind of ideality permeates the thesis of dynamic science. Primitive force by having a continuous nature – again, in opposition to the nature of motion – triggers derivative force that are a constituent part of the modifications of extension[118]. Such force drives the determinations of a movement in a way that is always connected to a material body and are modifications of the true unity, that is, of the primitive

[117] GP VI, p. 244. [AG p. 125].

[118] *Derivative forces are only the modifications and resultants of the primitive forces.* GM II, p. 248–253. [AG p. 176].

force. "*Derivative force is what certain people call impetus, conatus, or a striving* [*tendentia*]*, so to speak, toward some determinate motion, and therefore, it is that by which a primitive force or principle of action is modified*"[119]. More precisely, the derived force fulfills the function of making the effort (*nisus*) of the body become accelerated movement or resistance. A little more succinctly, it is understood that:

I. Primitive force is the true unity of a substance, the form, the entelechy, the original, real and absolute activity.

II. The derived force is a modification of the primitive one, it triggers actions and reactions proper to an extensive body such as impetus, nisus and the conatus, moreover, it is linked to movement, it is real, but it does not correspond to the true unity of a body or of a substance.

III. Movement is relative and an apparent triggering of derived forces binds to substance and body through the nature of force.

The relativity or ideality of things can be conferred according to the scope of approach. In the case of motion, it is known that its ideality is compensated by the reality of force. In this vein, mathematics, which is essentially ideal, can be applied in reality. Leibniz reasons:

> In this way we can say that 1/2 and 1/4, taken in the abstract, are independent of one another, or rather, the complete relation 1/2 is prior (in nature (dans le signe de la raison), as the scholastics say 35) to the partial relation 1/4, since as regards

[119] GP IV, p. 393. [AG p. 253].

> the order of ideas it is by subdivision of a half that we arrive at a quarter; and similarly with the line, where the whole is prior to the part, because the part is only possible, or ideal. But in real things, where we are concerned only with divisions which are actually made, the whole is only a result, or assemblage, like a flock of sheep. In fact, the number of simple substances which make up a mass, however small that mass may be, is infinite, since in addition to the soul which constitutes the real unity of an animal, the body of a sheep (for example) is actually subdivided: that is to say, it too is an assemblage of invisible animals or plants, which themselves are also compounded, in addition to also having that which makes up their own real unity. And even though this goes on to infinity, it is obvious that, all in all, everything comes down to these unities, all the rest, or the resultants, being only well-founded phenomena.[120]

Leibniz expands the question of reality and ideality into the realm of the composition of bodies. It is known that figure, motion, and extension are indeed items that he considers relative, but through dynamic science: every relative and ideal has a real foundation, namely force. In this way, the question of corporeality could not be different; although there is a plurality of matter that constitutes the extensive body, or the well-formed phenomenon, there is a unity that underlies this corporeality. During the verification of the behavior of the bodies of their content of reality, two modalities of distinction must be considered: i) that bodies, like the line, have infinite parts that constitute it, however, ii) it is before its unity, that is, what makes it real, that one can assume that this corporeal whole is priority before its infinitely divisible material parts. In other words, unity overrides plurality, because it refers to the primordial stage of every well-formed body or corporeal phenomenon. The verification of bodies considers both the real and relative - and what is said to

[120] GP IV, p. 491. [WF, p. 46]

be ideal – aspects attached to them. Moreover, corporeal relations are insurmountable, meaning that when one body is relative to another, all its physical and metaphysical characteristics interact on one plane, which ultimately is the genuine verification environment of physical nature.

Thus, as far as the verification of the mechanical effects of a substance is concerned, if at least two things exist in a referential frame, then it is possible to guarantee that they have basic conditions for verification, that is, their own extensive nature. In view of this, it is indisputable that the unity of each of these things is existent. The reality of the substance prevails in its corporeal condition and in the referential frame, that is, in its relation with another substance, because the intrinsic activity of its primitive force configures characteristics of existence. With this, the dualism between the real and the ideal is broken, for Leibniz ensures that existing things are well grounded in the reality of forces as much as in the relation of coexisting substances. Ideality, finally, is restricted to an argumentative stage, so that one can show how forces are articulated in the constitution of the real and the existent.

Conclusion

Things occupy a certain place in time and space and their characteristics may be relative, yet the content of dynamic science does not make what is relative less real in any respect. Primitive force and derived force are as much present in the relative characteristics of figure, extension, and motion as they are in their metaphysical character of unity and primordial activity. Because of this, Leibniz formalizes an epistemological condition based on metaphysics, in which, under the

quantity-of-motion critique of Descartes and the Cartesians of his time[121], he demonstrates the insufficiency of a science that has as its main axis the investigation of the extension of bodies. It should be noted that, based on the quantity of force, as something invariable, Leibniz can also argue that God does things in a more perfect way, because it is not necessary his government for everything to follow his designs. By this I mean that the quantity of force also joins a philosophical project in which the substance already has its own designations of the effects it can produce on the metaphysical plane and on the physical plane, that during coexistence with other extensive substances, all things already have inclinations to perform actions. In these terms, Leibniz considers the metaphysical subsidies of a pre-established harmony while expounding the content of forces in dynamic science. However, I will leave this discussion for another time.

[121] Leibniz discourses in letters with many supporters of Cartesianism, among them, and in the scope of dynamic science I cite as reference, Mr. Catelan, Bayle, Arnauld and De Volder.

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VERÔNICA CALAZANS (UTFPR)

Geometry and nature: a newtonian project of mathematization

Newton's mathematical practice apparently has two distinct and subsequent stages. The first, analytic, benefited from the Cartesian mathematical developments, which offered the tools to deal geometric curves algebraically. The second, synthetic, is described by many commentators as a "return to the geometry of the ancients", since it dismisses Cartesian formalism and resorts to classic geometric constructions. However, this two-phase distinction characterizes only two major movements in Newtonian mathematics when one intends to describe it in very general terms, due to (i) these blocks not being homogeneous, since Newton, still in the so-called analytical stage, occasionally resorts to geometry and vice versa and (ii) seeing under a certain aspect, we could say

that these two approaches are stages of the same method: the analysis and synthesis method and, therefore, there would be no sense in establishing a radical division between them.

Following Marco Panza, we could even maintain it is not an opposition between analysis and synthesis, since the analytical approach concerns legitimately geometric objects. That is, they are not two discrepant orientations, two ways of doing mathematics or two opposing languages; but two paths within the same mathematical practice. The argumentative nucleus and the mathematical procedures from which the differential geometry of the *Principia* will emerge, can be extracted from this same practice. Thus, continuity is assumed in Newtonian work, guaranteed by the geometric nature of the objects, problems and resolutions in question.

However, completely dissolving the issue is to some extent unproductive. The abandonment of mathematical tools achieved by the development of the Cartesian method, cost Newton a loss of reach, in terms of generality, for the problems' s solution. We assume, then, that the reasons for this abandonment are significant and we wonder if it is possible to inventory these reasons, based on Newton's mathematical choices. Our research points to the reading that the successive choices for analytical or synthetic presentation, throughout Newton's work, may show the author's commitment to the realism of mathematical objects, especially on what concerns the mathematization of nature.

The geometrical algebra introduced by Descartes in *Geometry* (1637) consists of certain argumentative procedures, capable of associating, to a wide class of curves, algebraic equations that define them. Such procedures were extended and enriched by Newton reaching more general algorithms: Newton's first mathematical studies, called analytic, still do not constitute a new theory, distinct from geometry, but only its first steps. Assuming the preservation of the geometric character of objects in the analytical stage of Newtonian mathematics, how would it be possible to state that

the later option for the synthetic method is due to the requirement, supposedly not fulfilled by the analysis, of a geometrically representative character of the symbols of the equations? Is it feasible to explain the passage from one stage to another by requirements of an ontological order, since the objects of Newton's first results are still geometric?

The theory of proportions plays a unifying role, from Cartesian mathematics through all stages of Newtonian mathematics. So, analysis and synthesis seem to consist only in different approaches to the same method and there would be no point in establishing significant differences in passing from one approach to the other. However, we assume here the hypothesis that precisely this unifying aspect is a central element, which points to a possible reworking/rethinking of the issue.

From the analythical step to the kinematic geometry

The task of expanding the Cartesian formalism occupied the early years of Newton's mathematical practice. The great benefit of this approach resided in the generality regarding the solution of problems, since, by representing the curves through algebraic relations, it became possible to treat these curves by their characteristic elements, dispensing with the individual geometric construction. However, this does not mean that the analytical approach goes beyond the scope of geometry. As the equations are formulated based on the geometric properties of their respective curves, there is no reason to doubt that these are legitimate geometric objects. Although Newton extended the scope of Cartesian algebra applied to curves by adding certain algorithms to it, the scope of this algebra is not extrapolated until problems of composition of motion come into question.

For example, the "Roberval's method of tangents" establishes the relation between the problem of tangents and the problem of punctual velocities – understood as the problem of quantitatively determining the punctual movement of a body whose direction is known. Newton established this relationship even before knowing what had been postulated by Roberval and despite being known as a "method", this formulation only confirms the relationship between the two problems, highlighting a particular case.

Newton, on the other hand, having developed the algebraic algorithms to deal with the problem of tangents, points to the possibility of relating such algorithms to the kinematic problem of punctual velocities, under the condition that the bodies in question describe segments whose relationship is known and passible. to be expressed by algebraic equations, which gives greater generality to its approach. Newton wrote three notes, dedicated to this problem, underlying what is now known as the "parallelogram method".

Newton intended to establish the mathematical means to treat all composed movement through the same algorithms, that is, the same modality of composition of the movement. Considering two variable segments, named x and y, described by two movements Newton calls p and q, respectively, the punctual velocities of these movements. By establishing the relationship between x and y, we arrive at:

$$\frac{p}{q} = \frac{stg_x}{y},$$

which relates the velocities to the subtangent of one of the segments. However, this equality, established through algebraic equations, does not clarify the link between the problem of tangents and of velocity.

By approaching, more specifically, the logarithmic curve, Newton achieves a significant gain: when considering any point on this curve, given in Cartesian coordinates, the tangent of the curve at that point can be interpreted as the diagonal of a parallelogram built on two segments, whose origin is the point in question. Such segments represent the punctual velocities of the increment movements of the coordinates to which the curve refers.

Having reached this conclusion, the relationship between the problem of velocity and the problem of tangents becomes more evident. The intrinsic link between the two problems does not result from the algebraic developments of the problem – even though Newton has followed this path – but depend exclusively on two elements: geometry and kinematics. The algebraic equations lose, here, its privileged status since the solution is given by the possibility of expressing the punctual velocities by the segments p and q.

This seems to be a "turning point" in Newtonian mathematical practice, as the algebraic, analytical approach gives way precisely to the need that was wanted to be suppressed: the geometric representation. However, this is not a "return to the geometry of the ancients", since kinematics is incorporated as a fundamental element. Kinematic geometry, assumed by Newton, will be the centerpiece for the project of mathematization of nature, whose mature version is found in the *Principia*. Before that, some obstacles to the solution of certain classes of mathematical problems, Newton to improve the mathematical tools that we call here "kinematic geometry".

De Methodis, for example, achieved great success regarding the solving of problems involving kinematics. However, the difficulties in the geometric treatment of such problems raised relevant questions, such as, for example, the composition of the continuum. In that sense, there is certainly a debate about Barrow's influence on Newton's work. Regardless of this, it can be safely assumed that these two authors shared what is called a kinematic representation of geometric

quantities. Barrow is faced with the problem of explaining the composition of the continuum by indivisibles. In short, it is about knowing how the composition of "quantities" smaller than any given quantity can form a continuous geometric quantity, such as, for example, a line. This question leads to important problems surrounding mathematics at the time. Just remember Zeno's paradox and its many variations.

In this context, the kinematic representation is a resource capable of circumventing these problems, by introducing the dimension of time in geometry. The time in question here is geometric time, a resource of the mind that gives a fluent character to geometric entities. Thus, the line ceases to be considered as an aggregate of its points to be treated as a trace, or trace, of a point that moves in space. In the same way, the plane is the result of the movement of the line and the solid, of the movement of the plane. This feature, however, is not without difficulties. According to a classical conception, ratios are abstract relations and quantities are necessarily concrete things. Therefore, ratios cannot be quantities. Such a conception is entirely assumed by Barrow. Then there is the problem of determining the amount of velocity. It is a relationship between time, considered as an only imaginable notion, and space, tangible to the senses.

Newton sidesteps this problem by assuming that the expression of the curve by the equation means that the ratios between the quantities are actually implied in the curve. Furthermore, he does not consider time only as a resource for generating figures. Rather, he takes time and space into his own hands. It is then shown that Barrow's kinematic scheme is assumed by Newton in a much more literal way. Newton gives this schema an ontological reinterpretation. If, for Barrow, movement is an abstract method responsible for generating figures in geometry, for Newton this is the real way in which quantities are generated.

In the Newtonian kinematics conception, the increase and decrease of magnitudes occur in time and, of course, have some velocity. However, these quantities present an important distinction. Time, taken formally, which flows uninterruptedly and uniformly, is one and the same for all movements, even if their speeds are different. This guarantees that the different movements can be compared, attributing to each one its speed or, in other words, measuring the intensity with which each quantity increases or decreases. That is, velocity cannot be measured directly, as in extensive magnitudes, but, as an intensive magnitude, its measurement takes place exclusively through extensive magnitudes: space (assumed to be an extensive magnitude), for example. However, this conception allows the treatment of time as an extensive quantity, since all local movement occurs in "true time" and, by analogy, time will be included in the equations as a quantity that, even though it is not "true time", refers to it.

From this succinct description some important elements can be highlighted to understand the Newtonian project of mathematization of nature. The conception that geometric space and time are the same space and time of nature guarantees a direct applicability of geometry to nature. By adhering to a kinematic conception of geometry, Newton brings together the mathematical tools to deal with problems related to movement. It is important to point out that it is not a question of extracting a mathematical regularity from physical manifestations, but, on the contrary, having developed such mathematical tools, in the context of kinematic geometry, "going down to physics", assuming the magnitudes of nature as objects. This will be the path presented in the *Principia*: from a "rational mechanics", built in the context of mathematics, the necessary structure is removed to mathematically treat the objects of physics.

Principia (**Book I**): **a brief example of the synthetic step**

The *Principia* concentrates the synthetic, geometric presentation of Newtonian mathematics. However, it is not about a return to the ancient geometers. Although expressed in a way that evokes classical geometry, the mathematical developments present in the *Principia* are a part of a new mathematical style. They differ from Cartesian geometry by abdicating the equations and, consequently, the generality they provide, resorting to a geometric presentation that particularizes each proposed problem. However, the treatment given to this geometric presentation evokes the notions developed in the context of the fluxion method (limits and quadratures of the curves, for example).

The three books that constitute Newton's *Principia* keep particularities that distinguish them from each other, although they are articulated in a single work. Book I begins with an exposition of the method of first and last reasons. Next, and until the end of Book II, Newton addresses problems involving terms directly linked to nature, such as "velocity", "force" and "attraction"; abstracting them, however, from their qualitative aspects and treating them quantitatively. Such a treatment is obviously a mathematical treatment. In Book III, Newton establishes his "world system" and is therefore faced with the need to explain physically (qualitatively) the terms involved.

They are many, the examples capable of illustrating this mathematical style which, although it is in a geometric presentation, resorts to the expedients of the method of fluxions. However, we chose to resort to a mathematical development that seems, at first reading, even more faithful to the classical presentation of geometry. We hope, with this, to offer a more precise contrast between Newtonian geometry and the so-called "geometry of the ancients", with the purpose of highlighting the close relationship between Newton's mathematical options, in the *Principia*, and the objectives

that lie beyond the scope of mathematics, that is, the project to mathematize the explanations of the phenomena of nature.

Section II of Book I deals with the determination of centripetal forces, considering rotating bodies, describing curves that are in the same plane as their respective immovable centers of force. Initially, are considered curves in general. Next, Newton deals with motion in circles and, finally, deals with the ellipse. Thus, section III begins by locating the center of force at one of the foci of the ellipse described by the body's motion. The generality – which served as a starting point – gives way to the analysis of the particular case (ellipse) that allows Newton to deal directly with the orbits of the planets.

The proportion between the areas covered by the rays that connect the body to its center of force and the times in which these areas are described had already been stated by Halley and Hooke, regarding the orbits of the planets. However, before dealing with elliptical orbits, Newton establishes a more general relationship, applicable to other conics. In other words, Newton develops the mathematical foundations before "going down to the phenomena" of nature. Proposition I, Theorem I, deals precisely with this proportion between areas and times. It states that the areas traversed by the rays – which connect the body to its power center – are proportional to the times in which they are described. In the following propositions, Newton deals with centripetal force, in general, without considering gravity yet. The relationship between the centripetal force and the square of the distance from the center is also established.

However, I consider here not the theorems, but one of the problems that are found from Proposition V onwards, since these better show the author's mathematical options.

Problem I (Proposition V) is stated as follows:

Two main elements are evoked in the solution of this problem. The first is the association of certain geometric segments to velocities. The second, the geometric construction from the data. Although the solution is applicable to all conics, since the problem assumes any curve, Newton constructs this solution using an ellipse as an example. Taking three points of the curve (P, Q and R), three straight lines (tangents) are drawn that touch the figure at these points: PT, TQV and VR, which meet at T and V. Then, PA, QB and RC are plotted perpendicular to the tangents and inversely proportional to the velocities at the respective points. That way:

PA: QB:: velocity in Q: velocity in P,

The same way,

QB: RC:: velocity in R: velocity in Q.

Starting from the ends A, B and C of the perpendiculars, AD, DBE and EC must be drawn at right angles, meeting at D and E. Having defined these two points, draw two straight lines (TD and VE) that meet you will find it at point S. This point will be the required center.

As we can see, this is a solution strictly driven by geometric construction. What separates it from the ancient's geometry is only the proportion established between the segments and the velocities of the body at the points in question. However, to state that Newton made a "return to the geometry of the ancients" does not mean to assume that this will be the standard solution present throughout the entire work. The very extrapolation of geometry to the cases of nascent and evanescent movements shows that this supposed return expands the reach of the method, even if without the resources reached in the analytical stage. Thus, although what is called "return" is not synonymous with retrogression, there was a significant change in approach that is evidenced by Newton's mathematical choices.

The examples presented here allow us to point to a process of abstraction of terms, originally situated in the realm of nature. The mathematical development that, for example, associates the velocity (of a point) to a geometric segment allows the problem to be treated in terms of proportions. However, although these terms evoke physical quantities, there is no commitment with the qualitative description of such quantities, only with their mathematical proportion. Noticing that, in the case of the problems of determining the centripetal force, Newton establishes as a final answer a sentence that states: "the centripetal force is inversely like…". That is, the centripetal force establishes with this value – which is, in reality a combination of segments or other elements of the curve – an inverse proportionality relation. The path that leads to this relationship necessarily includes the construction of the figure that describes the movement and its characteristic elements, such as the tangent of the curve, chord, segments parallel to the first ones and, frequently, the construction of similar triangles that include such characteristic elements. The novelty, regarding the geometry of the ancients, is that the characteristic segments and elements are associated with physical quantities and, through the geometric relationship they maintain with each other, they also relate these physical quantities.

Although this abstraction process leads the approach of problems to a strictly mathematical scope (rational mechanics), the final objective is to analyze particular cases of physical phenomena. Thus, the renunciation of generality, achieved by analysis, seems quite justifiable. From a methodological point of view, the choice for the synthetic method is justified by offering the geometric construction for the particular movement to be considered. In the case of Book I, it is intended to demonstrate the laws that govern the movement of the planets in their orbits. Some of these laws, such as the square of distances, had already been stated earlier. So, what is at stake is the proof, the demonstration of these laws and, for that, the synthetic approach is naturally resorted to.

Unlike the consequences drawn from the synthetic presentation of the method of fluxions, the preference for synthetic geometry by the ancients, at this stage of Newton's mathematical practice, is based on predominantly methodological reasons. It does not seem possible to extract requirements of an ontological order that determine such an option. If they exist, they are due to more fundamental questions that permeate the work as a whole. However, if we consider that this general plan includes a Newtonian project of mathematization, it is also necessary to consider the severe ontological difficulties that involve the admission of forces that would attribute to inert matter a principle of activity.

The mathematical abstraction operated in the first two books of the *Principia* does not establish a project apart from the theory of universal gravitation, the core of which is exposed in the third book. On the contrary, such ontological difficulties seem to condition, in advance, the path that will lead Isaac Newton to the mature formulation of his theory. The *Principia* reads:

> (…) I use interchageably and indiscriminately words signifying attraction, impulse, or any sort of propensity toward a center, considering these forces not form a physical but only from a mathematical point of view. Therefore, let the reader beware or thinking that by words of cause or reason, or that I am attributing forces in a true and physical sense to center (which are mathematical points)" (Newton, 1999, p. 408).

This abstraction does not empty the ontological content of force, as a physical entity, but it provides the conditions so that, in Book III, the force of attraction receives a mathematical treatment based on the similarity, or analogy, of the relationships.

Newton's first mathematical writings are stained by the development and expansion of Cartesian formalism. The possibility of referring the curves to a rectilinear system of coordinates and representing them by algebraic relations gives great generality to the resolution of problems. It is worth noting that such formalism does not go beyond the field of geometry. As the equations are formulated based on the geometric properties of their respective curves, there is no reason to doubt that these are legitimate geometric objects. Although Newton extended the scope of Cartesian algebra applied to curves by adding certain algorithms to it, the scope of this algebra is not extrapolated until comes into question problems of composition of motion.

The so-called "Roberval's method of tangents", which establishes the relationship between the problem of tangents and the problem of punctual velocities – understood as the problem of quantitatively determining the punctual movement of a body whose direction is known – was later known by Newton. He himself established this relationship before knowing what had been postulated by Roberval. Despite being known as a "method", this formulation only confirms the relationship between the two problems, highlighting a particular case.

Newton, on the other hand, having developed the algebraic algorithms to deal with the problem of tangents, points to the possibility of relating such algorithms to the kinematic problem of punctual velocities, under the condition that the bodies in question describe segments whose relationship is known and passible. to be expressed by algebraic equations, which gives greater generality to its approach. Newton wrote three notes, dedicated to this problem, underlying what is now known as the "parallelogram method".

Newton intended to establish the mathematical means to treat all composed movement through the same algorithms, that is, the same modality of composition of the movement. Considering two variable segments, named x and y, described by two movements, Newton calls p

and q, respectively, the punctual velocities of these movements. By establishing the relationship between x and y, we arrive at:

$$\frac{p}{q} = \frac{stg_x}{y},$$

which relates the velocities to the subtangent of one of the segments. However, this equality, established through algebraic equations, does not clarify the link between the problem of tangents and of velocity.

Considering, more specifically, the logarithmic curve, Newton achieves a significant gain: when considering any point on this curve, given in Cartesian coordinates, the tangent of the curve at that point can be interpreted as the diagonal of a parallelogram built on two segments, whose origin is the point in question. Such segments represent the punctual velocities of the increment movements of the coordinates to which the curve refers.

Having reached this conclusion, the relationship between the problem of velocity and the problem of tangents becomes more evident. The intrinsic link between the two problems does not result from the algebraic developments of the problem – even though Newton has followed this path – but depend exclusively on two elements: geometry and kinematics. The algebraic equations lose, here, their privileged status since the solution is given by the possibility of expressing the punctual velocities by the segments p and q.

***

Newton assumes the new conception of nature, characteristic of his time: it contains mechanical principles, which allows the applicability of rational mechanics (mathematics). His purpose of offering a consistent system for the mathematization of nature involved the task of choosing and developing the mathematics best suited to his goals. We defend, in this text, that

Newton's mathematical journey was, from its beginning, located in the scope of geometry. Initially, it was about the analytical, algebraic approach, but whose objects remained geometric. As it reached maturity, Newtonian mathematical practice turned to a synthetic approach.

The kinematic character, introduced in geometry, played an important role in this process. The geometric construction, established from kinematic principles, enabled a strategic gain in the treatment of physical magnitudes. Although the rational mechanics of Book I deals with such magnitudes in a strictly mathematical way, this treatment did not need to maintain the generality, once achieved by analysis, since its purpose was the direct application to particular phenomena. Additionally, the conception that geometric figures are generated in time, through movement, combined with the identification between geometric space and the space of nature, guarantee, ontologically, such an application.

Another methodological aspect concerns the task of offering a proof for the regularities that had already been stated before, such as the law of the square of distances. It was no longer a question of describing the laws that govern the planets in their orbits, but of demonstrating these laws. Therefore, the synthetic approach becomes the most obvious methodological choice, as it is part of a long tradition that associates it with demonstrative rigor.

It is then concluded that, beyond any strictly mathematical reasons, Newton's methodological options are guided by the goal of mathematizing nature. Although, in the realm of mathematics, certain ontological commitments cannot be denied, especially regarding the composition of the continuum, in the general plan of Newtonian work, it is physics that exerts the most significant influence, regarding the author's mathematical options.

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Extended abstracts

DIEGO MARQUES BRINGEL[122]

The concept of definition within the Port-Royal Logic as an exponent of modern logic

We have the intent of explaining how the theory of definition within Arnauld's *Logique of Port-Royal* serves our understanding of sixteenth century logic, as symptomatic of the position opposed both by medieval logicians and contemporary historians of logic.

The modern position would seem, then, to be one that logic must indeed be endowed with the capacity to operate whatever contents it comes in contact with, without particularly defining them, but it should not be limited to that. As such, we strive to paint the moderns in such a light as

[122] Diego Marques Bringel researches the history of modern philosophy, with focus on the history of modern logic. Has an undergraduate title in Philosophy from the UFG (Universidade Federal de Goiás); Pursuing a Master's Degree from the UNICAMP (Universidade de Campinas) Graduate program. Currently studying whether the underlying need of a mental act as a part of the cogito argument within Descartes' *Meditationes* may present path to understand the conception of logic amidst modern philosophy.

to characterize them as intellectual descendants of Aristotle himself (a position diametrically opposed to that of historians of logic, that would be of affirming that the insufficiency of modern logicians laid in their opposition to Aristotle's formalizing effort within the *Prior Analytics*), but of an Aristotle viewed through the readings of the *Second Analytics*, where the syllogism is dealt with a greater focus on the possibility of its scientific relevancy.

Among the principles most frequently had as most fundamental in logic (including its formal facet) we have one which demonstration is clearly non-formal: the principle of non-contradiction (hereafter referred to as 'PNC'). Aristotle justifies the lack of demonstrative proof to the PNC through means of it simply being impossible to define first principles without the need of falling into *ad infinitum* demonstrations. The demonstration to the PNC is, thus, negative and, even more so, dependent on a dialectical component. It requires a signifying act, made by an opponent within an argument.

There is an argument from a source much more temporally close to (and philosophically aligned with) Arnauld that follows such form: Descartes' cogito. It shares not only the use of a principle whose denial would imply in internal contradiction ("I am, I exist, is necessarily true"), but also the necessity of a mental act ("(...) whenever it is put forward by me or conceived in my mind").

The position presently argued is that, in the broadest sense, the modern logicians would be, if not presented with a sort of aristotelic thought mediated through the medieval tradition, much more aligned with Aristotle that we would initially be led to think. And that Arnauld, as a good descendant to cartesian thought, built his logic (in this case explicitly referred as such) as endowed with such epistemological character that already made itself present in Aristotle's Second Analytics (or the Gamma book, from the *Metaphysics*).

We argue that, for the intents and purposes of the present work, the distinction between *quia* and *propter quid* syllogisms in Aristotle presents a relevant similarity with the distinction between nominal and real definitions in Arnauld.

It is worth emphasizing that the parallel we put forth is not between the definitions and syllogisms themselves, but between their internal distinctions. The nominal definition is such to the real definition, in the same manner the *quia* syllogism it to the *propter quid* syllogism; that is, the first part (nominal definition / *quia* syllogism) represents a sort of formality which the second part (real definition / *propter quid* syllogism) presupposes, even if to be able to surpass it. The comparison limits itself to the leap made within each pair of concepts, internally to their respective philosophical systems.

It would seem to be the case that the leap from a nominal definition to a real definition is the leap from a purely formal discussion to one that deals with particular contents. We intend such leap to be somewhat the same as the one made from the quia syllogism to the propter quid syllogism but, once more, considering that each of these concepts particular functions within their systems are not what the proposed parallel deals with, but only their internal distinctions. Even though in both cases there is such a thing as completely empty 'variables', the *quia* syllogism must have its validity verified by the correctness of its structure; while the nominal definition is invariably correct, given that one of its parts is empty and the other comes to signify it.

The correspondence to reality is required both by the *propter quid* syllogism and the real definition, allowing us to perceive that which, within both philosophical systems, is marked an impossibility of merely using formal logic to build sufficient framework to interpret reality. Formality, more than a way to more directly access the language of reality, is a useful tool that must, still, be surpassed.

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JOSÉ PORTUGAL DOS SANTOS RAMOS (UEFS)

Transition between medieval philosophy and modern science: Crombie and the notions of mathematics and method in the XIII and XVII centuries

The objective of this presentation is to critically debate Crombie's position, contemplated in the History of the Sciences, namely that modern philosophers developed and elaborated the fundamental structures of the experimental method from the methodological revolution that took place in the XIII century. In this perspective, we will initially clarify that the methodological reasoning developed by the thirteenth-century philosophers and, in particular, Robert Grosseteste, converge articulations between logical aspects bequeathed by the Aristotelian tradition and the demonstrations attributed to Euclid's *Elements*. Then, we will explain how Descartes, in the XVII century, inaugurates what he calls his "true method" based on a logic based on a new conception

of mathematics: the articulation between the analysis of ancient geometers and the algebra of the modern ones. Finally, we will explain through the tests of the 1637 method, namely, *Geometry*, *Dioptrics* and *Meteors*, that Descartes, unlike the thirteenth-century philosophers, breaks with the syllogistics method of the ancients and re-establishes geometric demonstrations through the feat of the road analytical and, to the detriment of the synthetic way exercised by Euclid in the *Elements*, which leads the aforementioned French philosopher to constitute a new methodological model in the practice of his scientific experiments. Such an innovative model, we believe to be a landmark that characterizes a methodological revolution in the middle of the XVII century.

Crombie defends the conception of a continuous evolution of scientific thought between the medieval and modern periods based on the thesis of a methodological revolution that took place in the XIII century, especially through studies by Robert Grosseteste. For him, the scientist-philosophers of this historical period discovered and elaborated the fundamental structures of the experimental method of modern science. Crombie's thesis argues that a systematic theory of experimental science was already understood and applied by enough philosophers to produce a "methodological revolution", whose modern science owes its origin. With this revolution, a clear notion of the relationship between "theory" and "observation" appeared in the western Latin world, a notion on which the conception and application of modern science and a clear set of methods that allow the treatment of physical problems by the end of the XVI century and beginning of the XVII century. Furthermore, for Crombie, the conception of the logical structure of experimental science, defended by eminent thinkers in the XVI and XVII centuries, such as Galileo and Descartes, was precisely that which had been elaborated in the XIII and XIV centuries. For him, such thinkers also inherited the concrete contribution that the different sciences received during that period.

Considering that the logic constituted in a new conception of mathematics conceived by Descartes inaugurates a revolutionary conception of method applied to the practice of private sciences in 1637, we assume differently from Crombie, who despite noticing a certain continuism between the investigative program in the natural sciences of the Philosophers of the XIII and XVII century, Descartes marks a break with the method of the XIII century philosophers and, in particular, that of Robert Grosseteste.

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CELESTE PEDRO (IF-UP)

Ontologias digitais para Diagramas Elementais: as formas que transmitiram o conhecimento sobre os elementos

A classificação dos atributos visuais dos diagramas (das mais diversas áreas do conhecimento) presentes em manuscritos medievais, pode desde logo ser útil na descoberta dos caminhos da transmissão de cópias e da produção de documentos originais. A partir das estravagâncias, desentendimentos e inovações de expressão gráfica, da relação com o texto que acompanham, da versatilidade das suas formas e também dos significados que permaneceram embebidos culturalmente (e cientificamente, e religiosamente) em determinadas construções geométricas, é possível questionar o uso dado aos diagramas como instrumentos de acumulação e solidificação de conhecimento, de disseminação de ideias e de devoção.

Usando como exemplo um *corpus* de diagramas elementais medievais, podemos facilmente reconhecer fórmulas gráficas permanentes, persistindo (algumas, lado a lado) ao longo de vários séculos.

Para que esse reconhecimento possa existir em ambiente digital, as descrições visuais devem fornecer ontologias pensadas especificamente para indexar pesquisas em bases de dados de imagens. Isto significa identificar não só os elementos textuais, como também os formais, pictóricos e simbólicos.

Do processo de classificação e descrição de diagramas da base de dados composta e trabalhada pelo projecto de investigação From Data to Wisdom,[123] fez parte uma análise ontológica, com vista à criação de um vocabulário controlado, descritivo na sua essência, que pudesse ser usado para o desenvolvimento de uma aplicação de visualização de dados. Esta análise tem como objectivo permitir a interacção dos utilizadores com um conjunto de imagens a partir da combinação e comparação de meta-dados e anotações que lhes estão associadas (baseados no vocabulário controlado), permitindo a criação de novas narrativas e novos olhares sobre a informação que temos ao nosso dispôr.

Abaixo descrevem-se quatro dessas fórmulas (ou categorias visuais): *syzygia elementorum*, *tetragonus*, cubo das propriedades e diagrama vertical. Estas designações (e/ou semelhantes) aparecem por vezes junto às próprias ilustrações (ou no texto que se lhes refere directamente), e existem também textos que, a mais, descrevem explicitamente diagramas; mas, frequentemente, o texto não menciona directamente uma figura, ou uma composição particular, ou elementos

[123] From Data to Wisdom. Philosophizing Data Visualizations in the Middle Ages and Early Modernity (13th-17th Century). POCI-01-0145-FEDER-029717 - Fundação para a Ciência e a Tecnologia - Portugal 2020.

definidos; os diagramas resultam, nestes casos, da necessidade posterior de clarificar um conceito ou de organizar conjunto de dados, e esta necessidade aparece de forma mais incisiva em comentários e na elaboração de obras pedagógicas.[124]

Syzygia elementorum

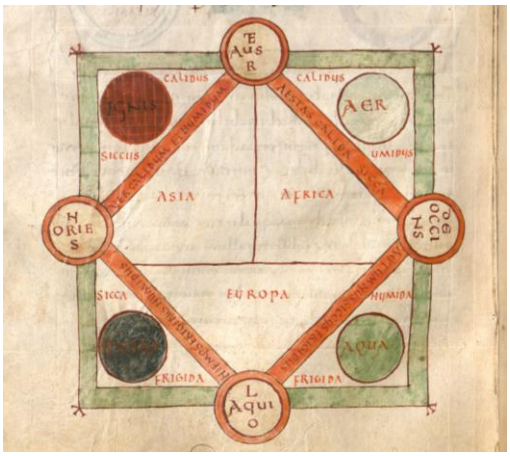
Etymologiae; De natura rerum, Rhineland, 1136. British Library, Harley 2660, f. 37r

Associado frequentemente ao arquétipo *Annus-Mundus-Homo*, a sua composição geométrica expressa a sobreposição (ou conjunção, de onde o termo *συζυγία*) de três componentes harmónicos: os quatro elementos (e as suas qualidades), os quatro humores e as quatro estações. Neste caso, quatro círculos concêntricos de crescentes diâmetros são entrelaçados por oito arcos

[124] Veja-se os exemplos de obras de *computus*, em: Dobcheva, I. (2013). The umbrella of Carolingian computus. In *La compilación del saber en la Edad Media: La compilation du savoir au Moyen Age/The Compilation of Knowledge in the Middle Ages* (pp. 211-229).

excêntricos, um a cada 45º, sendo tangentes ao círculo mais pequeno, de tal forma que se entrecruzam, criando espaços interiores para a informação textual ao longo dos três círculos restantes. As legendas, pela sua diferenciação de cor, reforçam o eixo vertical e horizontal da composição, dando a perceber uma cruz; os braços da cruz contêm espaços para (de fora para dentro) os elementos, as estações e os humores; para ambos os lados de cada braço, no círculo exterior, estão assinaladas as qualidades dos elementos, conferindo um formato "triangular" às extremidades da cruz.

Tetragonus

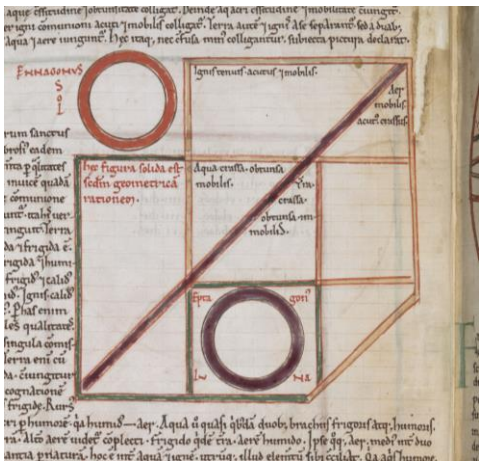


Astronomie, computistique, sciences naturelles - recueil de textes, Salzburg, 818. München, Bayerische Staatsbibliothek, BSB Clm 210, f. 132v. (Termos de uso: CC-BY-NC-SA 4.0)

Um quadrado com um losango no seu interior: nos vértices do losango, pequenos círculos têm inscritos os nomes dos quatro ventos principais: *Auster*, *Aquilo*, *Oriens* e *Occidens.* A forma como as letras individuais estão dispostas dentro dos círculos remete claramente para um tetragrama. Nos espaços triangulares criados pela imposição do losango em cima do quadrado, encontram-se os

quatro elementos (também dentro de pequemos círculos) e suas qualidades estão indicadas no espaço circundante, uma em cada canto agudo. No meio da composição, dentro do losango, há um mapa T-O invertido:[125] *Asia* e *Africa* dividem o espaço acima, *Europa* ocupa a parte inferior (i.e, fogo: quente e seco, situado entre *Oriens* e *Auster*, está contíguo ao espaço interior ocupado pela *Asia*). O losango, nos seus quatro lados, contém ainda inscrita informação sobre as estações e as propriedades elementais que lhes correspondem.

Cubo das Propriedades ou *Figura Solida*

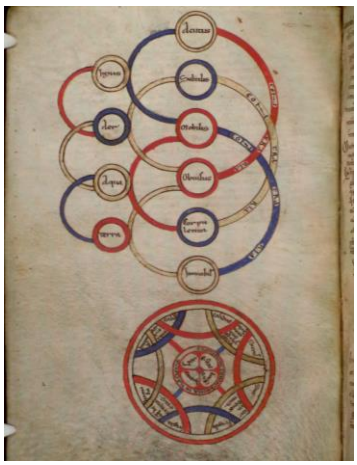


Cicero, Aratea with scholia; Germano-Roman Pontifical, Peterborough, England, c. 1120-1135.
The British Library, Cotton MS Tiberius C I, f. 6v.

[125] Para mais sobre este e outros diagramas de elementos, ver: Obrist, B. (1997). Wind diagrams and medieval cosmology. *Speculum*, *72*(1), 33-84.

O cubo das propriedades é um diagrama que estabelece relações espaciais entre propriedades compartilhadas e distintas de cada um dos quatro elementos, usando a sua posição dentro de partes específicas de um cubo. Uma linha diagonal cruza a projecção oblíqua, partindo do canto frontal inferior esquerdo até ao canto superior direito da face posterior, interrompendo a perspectiva mas permitindo que os elementos fiquem dentro de triângulos (de certa forma), onde cada canto representa uma propriedade. Muitos destes diagramas-cubo contêm ainda dois círculos, colocados no canto superior esquerdo e inferior direito; representam a Lua e o Sol, estando legendados como figuras geométricas: *Luna = Epagonus* e *Sol = Ennagonus*.[126]

Diagrama vertical



Timaeus, 12th century. Bodleian Libraries, University of Oxford, MS. Digby 23a, f. 54v.
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[126] Para mais sobre sólidos e diagramas dos elementos, ver: Bober, H. (1956). An Illustrated Medieval School-Book of Bede's" De Natura Rerum". *The Journal of the Walters Art Gallery*, *19*, 64-97.

O eixo central é formado por seis círculos para as propriedades dos elementos: *acutus, subtilis, mobilis, obtusus, corpulenta* e *immobilis*. Ligando pares de propriedades, existem quatro arcos à esquerda contendo quatro círculos para os elementos – que por sua vez também estão ligados, dois a dois, por arcos mais à esquerda, sem nenhuma outra informação, mas claramente referentes às qualidades elementares: quente, seco, frio, húmido. Existem também três arcos à direita que ligam pares de propriedades contrárias. Decorado com três cores (amarelo/bege, vermelho e azul) e distinto na execução em relação à maioria dos diagramas deste manuscrito, este exemplo segue estilisticamente o diagrama da Harmonia do Cosmos, o primeiro de uma série de dezoito diagramas que se encontram após o texto de Platão. Abaixo do diagrama dos elementos, existe um diagrama complementar dos elementos, um *Syzygia elementorum* que estabelece a relação entre os elementos, as suas qualidades e as estações do ano. No centro, dentro de um pequeno círculo vermelho estão desenhadas quatro pétalas para as quatro estações. À volta das pétalas, uma ligação directa ao conceito de micro e macrocosmos: "hominum concordantia in natura." Neste caso, o copista escolheu uma disposição em "x" e não em cruz, como no exemplo anterior.

Conclusão

As composições diagramáticas formadas por elementos gráficos de rápida identificação e figuras geométricas (incluindo a representação de sólidos em duas dimensões) ofereciam um óbvio receptáculo visual de um conhecimento que entendia o mundo a partir das suas concordâncias, da sua similitude, e da interligação das suas partes. Camadas de significados eram adicionadas em número e em qualidade em cada cópia, em cada interpretação e em cada disputa de conhecimento; em certos casos, os diagramas viriam a operar quase como emblemas; serviam a memória e a contemplação, eram experiência e prova.

A partir de uma análise baseada em ontologias digitais focadas em atributos visuais (anotações) ao mesmo tempo que em dados bibliográficos (meta-dados), é possível a criação de software que permita ao utilizador interpretar colecções do ponto de vista micro e macro. Uma leitura de proximidade (sobre cada elemento e sobre cada diagrama) combinada com uma leitura distanciada (referente ao contexto de produção dos diagramas), identificando nódulos de contacto entre imagens, que de outra forma poderiam parecer não-relacionadas, incompletas ou mesmo órfãs.

JOSÉ HIGUERA (UNED/IFLUP)[127]

Ramon Llull e a geometrização da matéria

A Geometria prática

Na divisão das ciências medievais, a geometria é a disciplina que estuda as "magnitudes imóveis", embora haja uma outra face da geometria que é aplicada aos objectos concretos. Aqueles que possuem movimento, como os corpos celestes ou objectos naturais como as árvores ou as montanhas, e aqueles que são construídos pelo Homem. Na *Doctrina pueril*, um tratado escrito em latim e catalão por Raimundo Lúlio, há uma exposição que cita a tradição que reúne estas duas faces

[127] Esta comunicação foi apresentada no âmbito do projeto: From Data to Wisdom. Philosophizing Data Visualizations in the Middle Ages and Early Modernity (XIIIth-XVIIth century). Instituto de Filosofia-Faculdade de Letras da Universidade do Porto. POCI-01-0145-FEDER-029717. https://ifilosofia.up.pt/proj/fdtw/fdtw_project

da geometria. De um lado, o estudo das "magnitudes imóveis"[128], abstractas e puras, de origem Boeciana; e do outro, o método de obter medições de objectos observáveis como uma parede ou a altura da lua quando é observada no céu. Lúlio descreve como obter uma medida geométrica usando o "quadrante" dum astrolábio:

> Onde, tu, filho, com o quadrante que está no astrolábio, fazes uma primeira medida da altura duma parede, usando os teus olhos e os teus pés; do teu pé à parede está a quantidade [proporcional] que há dos teus pés aos teus olhos, o que, portanto, é uma primeira medida geométrica[129].

O procedimento (ver a fig. 1) que explica Lúlio é o modo de aplicar o pé – como medida – para obter a distância entre o observador (c) e a parede (b). Portanto, aquela primeira distância à parede (cb) representada em pés, é usada no quadrante do astrolábio para calcular a distância dos olhos ao topo da parede (ca). O uso do astrolábio para o cálculo de distâncias foi muito comum na Idade Média e, de fato, há tratados específicos sobre o uso do *quadrans*, uma secção da circunferência total dum astrolábio, para obter diferentes medidas. A geometria das medidas de objectos físicos é denominada geometria prática e Lúlio fala de maneira explícita dela, assim como outros mestres medievais que valorizam positivamente o uso das medidas concretas dos objectos:

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[128] "Geomatria es doctrina de formes immovables montiplicades en nombre en humana pensa", Ramon Llull, *Doctrina Pueril*, ed. J. Santanach, NEORL VII, Palma de Mallorca, 2005, c. LXXIII.

[129] "On, si tu, fil, ab lo quadrangle qui es en l'estelabre fas .ia. mesura en l'alta paret, de tos huyls tro als teus peus e e·l peu de la paret, e que·n sies luny aytant con ha de tos peus a tos huyls, adoncs as la primera mesura de geomatria", Llull, *Doctrina Pueril*, cit., c. LXXIII.

> Agora bem, há dois que praticam [a geometria] operando com ela, a saber, os "medidores" e os "fabricantes". Existem medidores que calculam a altitude das terras, ou a profundidade ou o nível delas. E há artesãos que actuam fabricando, ou trabalhando, nas artes mecânicas, como o carpinteiro na madeira, o ferreiro com o ferro, o pedreiro com o barro e a pedra, e da mesma maneira todo artesão das artes mecânicas que segue a geometria prática[130].

A "geometrização" dos elementos

Esta formalização do cálculo geométrico das medidas, expressas em pés, nos objectos concretos, fazia parte da divisão das ciências medievais; o que inspirou Raimundo Lúlio a formular um cálculo figurativo das relações de influência recíproca que acontecem entre os elementos (terra, ar, água, fogo) e as qualidades (frio, calor, humidade, sequidade) que compõem a matéria. Aliás, Lúlio assume o pressuposto da física aristotélica que concebe os corpos desde o ponto de vista das suas dimensões: longitude, largura e profundidade. Dimensões que poderiam ser geometrizadas já que, segundo Lúlio, estão constituídas por linhas, pontos e superfícies, o que visa a formulação dum cálculo geométrico da sua medida; embora não exista a possibilidade duma "medição" com os olhos e com os pés no caso da composição dos elementos, tal como acontece no caso de objectos, como por exemplo, uma parede ou a altura da lua.

[130] "Duo autem sunt, qui eam operando exercent, scilicet mensores et fabri. Mensores sunt, qui terrae altitudinem vel profunditatem vel planitiem mensurant. Fabri vero sunt, qui in fabricando sive in mechanicis artibus operando desudant, ut carpentarius in ligno, ferrarius in ferro, cementarius in luto et lapidibus et similiter omnis artifex mechanicarum artium secundum geometriam practicam", Dominicus Gundissalinus, *De divisione philosophiae*, ed. A. Fidora, D.Werner, Freiburg, Herder, p. 212.

Esta dificuldade foi contornada por Lúlio por meio duma representação geométrica circular das relações dos elementos e das suas qualidades. Procedimento que é seguido pelo estabelecimento dos segmentos e superfícies das figuras geométricas que salientam as relações elementais no "interior" da composição material:

> Todas as partes [elementais] são diferentes umas das outras e, portanto, cada parte movimenta-se materialmente de uma maneira para outra na natureza, [movimentos] que possuem formas lineares, triangulares, quadrangulares e circulares[131].

O esforço luliano foca-se na localização, numa circunferência, das representações geométricas que indicam as relações entres as qualidades elementais: concordância (terra-água), contradição (calor-frio), agregação (frio-sequidade), subtração (água-fogo), acumulação (terra-fogo), conjunção (ar-calor), diminuição (de calor p. e.) e aumento (do frio p. e.). Todo isto acontece no interior da matéria e da representação geométrica (fig. 2)[132] e marca a complexidade das relações elementais por meio da superposição de superfícies geométricas que, num mesmo espaço abstracto, interagem para compor as variações materiais que acontecem nos corpos físicos.

[131] "Omnes partes sunt aliae in aliis, et ita qualibet pars movetur virtualiter alia in aliam secundum naturam, quam habet linearem, triangularem, quadrangularem et circularem", Ramon Llull, *Quaestiones per artem demonstrativam*, ed. F. Ph. Wolff, J. M. Kurhummel, Maguncia, Häffner, 1729, p. 162.

[132] Esta figura é tomada do livro: J. Higuera, *Física y teología: atomismo y movimento en el Arte Luliano*, IEM, Barcelona, 2014, pp. 170-180.

Conclusão: **o "realismo geométrico"**

Lúlio vai além da representação geométrica dos estados elementais, afirmando que cada uma das variações nas relações entre os elementos, quaisquer que sejam, são em si mesmas "pontos formais" e "pontos materiais". Por um lado, são formais porque podem ser conceptualizadas de maneira abstracta pelo intelecto humano (porque são objectos geométricos), mas essa compreensão é possível porque os "pontos" elementais compõem materialmente as substâncias na natureza. Ainda que haja precedentes nesta concepção, i. e. Roberto Grosseteste, a perspectiva luliana combina a qualidade "imóvel" dos objectos geométricos com a mudança nos estados físicos da matéria para obter um modelo que, de uma forma muito vaga, parece apoiar-se nas proporções geométricas para exprimir as mudanças dos estados físicos.

Imagens

Fig. 1

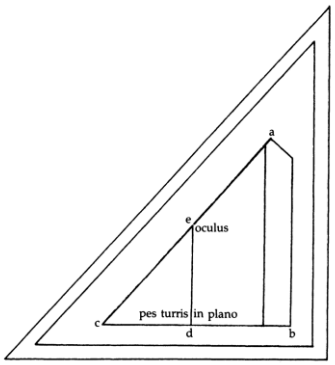
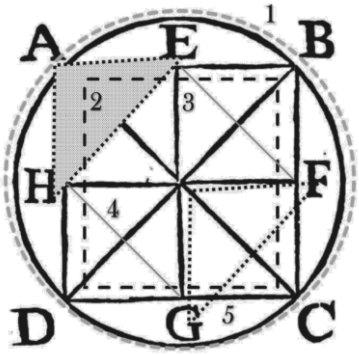


Fig. 2



A: ar, B: fogo, C: terra, D: água, E: calor, F: frio, G: umidade, H: secura; 1. A "esfera" dos elementos; 2. e 5. Concordância triangular (AHE; CFG) dos elementos e suas qualidades; 3. Oposição quadrangular dos elementos e suas qualidades (ABCD; EFGH); 4. Linhas de influência entre qualidades elementares (HG; EF; EG; HF…, etc.).

VICTOR FIORI AUGUSTO[133]

To live according to reason: considerations about the body and freedom in Spinoza

Based on Spinoza's notions of body and individual, the aim of this communication is to observe how Spinoza relates the idea of freedom to life according to reason and to the political context.

In Spinoza's philosophy, the affective character of human beings is of fundamental importance in order to understand both our freedom and our bondage. According to *Ethics* IV, preface, human beings that live in servitude are largely determined by the external bodies that affect them, thus being impotent to moderate and refrain their affects and live according to their own

[133] Doctoral student in Philosophy at the Federal University of Goiás (UFG).

nature, which means that, in servitude, passions and inadequate ideas predominate over active affects and adequate ideas.

It is important to observe that servitude is a common situation for human beings when conceived in isolation or in state of nature, outside the so-called civil state and outside the common life in society. Since the potency of each human being is largely surpassed by the potency of others, and given the difficulties for an isolated individual to protect oneself from dangers and natural hazards, civil or political life is necessary, without which human beings can do very little (Cf. ESPINOSA, *Tratado político*, Cap. II, art. 15).

For Spinoza, the free human being is that which lives under the conduct of reason (EIV, P66, scholium; *Tratado político*, Cap. II, arts. 7 e 11). It is true that, for Spinoza, we can only live according to reason when we cultivate our intellect, striving to understand our singular essence and the singular essence of things. As we read in *Ethics* V, where Spinoza deeply addresses human freedom, "human potency to curb the affects consists only in the intellect" (EV, P42, dem.). In fact, Spinoza left us a (albeit unfinished) *Treatise on the Emendation of the Intellect* (*TIE*), which can be seen as a medicine of the mind (Cf. REZENDE, 2015, p. 15) able to make our intellect capable of understanding things as required for human beings to be free and happy.

However, without mutual aid, human beings are hardly able to maintain health and cultivate the mind. If, on the one hand, life in society is not for itself capable to guarantee human freedom, on the other hand, human freedom can hardly be concretized without life in common, and Spinoza recognizes it also in the *Treatise on the Emendation of the Intellect*, where we see that, in his ethical project of achieving a firmer human nature and contributing so that many people also achieve it, Spinoza understands the need to "form such a society (*formare talem societatem*), which

is to be desired in order that many people arrive at it [i.e., at this firmer human nature] and [in order that they do it] very easily and securely" (*TIE*, §14).

In order for the human body to be able to affect the external bodies in multiple ways and be affected by them in many ways – something that reason dictates as useful (EIV, P38) –, the human body and the diverse parts that constitute it need continually of new and varied nourishment (EIV, P45, scholium to the corollaries). Since the human body is constituted by a determined ratio of movement and rest that its component parts have with each other, Spinoza understand that reason dictates us as good (or useful) those things that conserve this ratio of movement and rest. When one or some of the component parts of the body have their potency increased in such a way that the other parts are curbed in their potency to act, the potency to act of the body as whole will be decreased, and this will make the body more prone to impotency and servitude and less prone to freedom.

By individual, Spinoza understands a union of bodies that "adhere one to each other" or "communicate their movements one to each other in a certain ratio". In *Ethics* Part II, in the scholium to lemma 7 (in the so-called little physics), Spinoza observes that, if we think that all the existing bodies vary in infinite ways without changing the ratio of motion and rest of the whole, we can conceive nature as a whole as an individual. Without going that far, we can think from Spinoza a certain kind of individual, the political body, composed of human beings that share a certain territory and live according to certain common rules, which would be like the mind of this body (*Tratado político*, Cap. II, arts. 16-17).

Beyond this ideia, we can conceive – as Michael Hardt and Antonio Negri do from Spinoza's philosophy – a democratic political body, which, like the human body, is necessarily plural and capable of acting in common, and this doesn't mean that we're talking about "a unitary

whole divided by hierarchical organs" (HARDT & NEGRI, 2004, p. 190; cf. OLIVEIRA, 2014, p. 199). A multiple political body of the common multitude, in which the health and the well-being of each human being that composes it determine and constitute the health and the well-being of the whole body.

This idea of a political body allows us to think that, like the human body, the political body have its potency to act decreased or curbed when one of its parts is increased at the expense of the others. On the contrary, when the body as a whole becomes more able to act, it becomes more conforming to what reason dictates as useful for the parts and for the whole, and, as Spinoza observes in Chapter 16 of his *Theological-Political Treatise*, "the freest Republic is that whose laws are founded on right reason; because in it, each one, whenever one wills, can be free, that is, live entirely according to reason" (*Tratado Teológico-político*, Cap. XVI; cf. *Tratado político*, Cap. III, art. 7).

This point seems useful not only because of the importance it acquires when we think about the relation among life under the conduct of reason, the cultivation of the body (and of the political body) and freedom in Spinoza, but also because, according to data from the National Survey on Food Insecurity in the Context of Covid-19 Pandemic in Brazil, at the end of the year of 2020, more than fifty-five percent of the Brazilian population (almost 117 million people) live with food insecurity (lack of full and permanent access to food), and 19 million people live with hunger in this country (nine percent of its population) (cf. REDE PENSSAN, 2021).

I am not pointing this out to merelyobserve the impotency of brazilian society and, thus, makes us sad, but I think it is important to reinforce the need to reflect and act in order to build a society that is more conducive to freedom than the one we currently have here, and this, I think,

is not just a task for a part of the society, but for society as a whole, as Spinoza points out in the Chapter 17 of the appendix to *Ethics* IV:

> (...) helping all the indigent is something that surpasses by far the strength and usefulness of a private man. In fact, the wealth of a private man is not enough to solve the problem. Furthermore, the capacity of a single man is too limited for him to be able to unite everyone to him in friendship; therefore, taking care of the poor is the responsibility of the entire society and concerns only the common utility.

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