LIBERTY UNIVERSITY

Montview Journal of Research & Scholarship

Volume 10 Article 5

2023

Galileo and the Church: An Ecological Perspective

Holly J. Lawson
Liberty University

Follow this and additional works at: https://digitalcommons.liberty.edu/montview

 Part of the Catholic Studies Commons, Cultural History Commons, European History Commons, History of Christianity Commons, History of Religion Commons, Other Psychology Commons, Personality and Social Contexts Commons, Social History Commons, and the Theory and Philosophy Commons

Recommended Citation

Lawson, Holly J. (2023) "Galileo and the Church: An Ecological Perspective," *Montview Journal of Research & Scholarship*: Vol. 10, Article 5.
Available at: https://digitalcommons.liberty.edu/montview/vol10/iss1/5

This Original Research: Theoretical Contribution is brought to you for free and open access by the Center for Research and Scholarship at Scholars Crossing. It has been accepted for inclusion in Montview Journal of Research & Scholarship by an authorized editor of Scholars Crossing. For more information, please contact scholarlycommunications@liberty.edu.

Introduction

Bronfenbrenner, quoting Goethe, said, "Everything has been thought of before. The difficulty is to think of it again."[1] In heated issues like Galileo's clash with the Catholic Church and other conflicts between religion and science, it can be tempting to pick a side and view the issue dichotomously. This project aims for a fair, balanced approach that considers the many sociocultural factors in play and how they relate to each other. Rather than solely tearing down one side or the other, the goal of presenting a whole, nuanced picture of the events can lead to a better understanding of both parties. With the spurning of objective truth in postmodernism and the extreme divisiveness that shapes many current conflicts, learning to carefully analyze a historical situation as prominent as Galileo's can help scholars reconsider the broader picture of other historical and current conflicts. Ultimately, a better understanding of this conflict in history can aid in better understanding and navigating other historical events and current events in society.

Research Questions:

1. How does the conflict between Galileo and the Catholic Church (CC) demonstrate cultural and contextual factors that may be involved in other historical and current clashes of religion or faith and science?

2. Using Bronfenbrenner's ecological theory (PPCT), what specific elements make up each layer of sociopolitical and cultural context in the conflict?

3. How does the sociopolitical context inform the way Galileo's conflict with the CC should be interpreted by current readers and scholars?

Research Methods and Sociopolitical Emphasis

"In ecological research, the properties of the person and of the environment, the structure of environmental settings, and the processes taking

[1]Urie Bronfenbrenner, *The Ecology of Human Development: Experiments by Nature and Design* (Cambridge: Harvard University Press, 1979), vii.

place within and between them must be viewed as interdependent and analyzed in systems terms."[2]

Research Methods Overview:

- Reviewing Galileo's life through original texts, biographies, and scholarly writings
- Studying the nature of the conflict between Galileo and the CC
- Considering the wider sociocultural forces in play and their impact on the conflict
- Applying Bronfenbrenner's ecological theory to map out specific contextual realities
- Synthesizing the data regarding the conflict and contextual influences to inform a more nuanced understanding of the events

Qualitative Methods: document analysis, retrospective case study, thematic analysis, and secondary ethnographic analysis—all with a focus on phenomenological understanding. I also make use of grounded theory in the analysis through inductive theory construction.

Emphasis on Sociopolitical Context

Even though the major structures and defining characteristics of Galileo's time are unlike those now, the underlying forces driving current conflicts are often the same. Sociopolitical forces press in on both the Church and academia, vying for the most trending or socially desirable outcome. The Protestant Reformation, the Catholic Counter-Reformation, a Classic Greek scholastic tradition, the execution of Bruno and others, the Copernican theory's lack of proof, epistemological and hermeneutical confusion, warring Jesuits and Dominicans, and a disfavored pope due to his handling of the Thirty Years War (1618-1648): this is a non-exhaustive sampling of the contextual, sociopolitical factors driving the conflict between Galileo and the CC. The Copernican cosmological issue required a deep, long-term solution over the course of history;

[2]Ibid., 41.

Galileo desired to play his part during his lifetime, but he was ultimately only a small piece in an enormous puzzle.

Bronfenbrenner's bioecological theory is one way of breaking down the various personal and contextual pieces of Galileo's life and situation to examine them more closely and aid in interpretation. The theory's process model consists of four basic, interconnected components: Process, Person, Context, and Time (PPCT). Each of these components will be considered in Galileo's life.

Galileo: Process, Person, Context, and Time

The life, faith, and scientific work of Galileo Galilei (1564-1642), known as "the father of modern science,"[3] took place within the context of the post-medieval Roman Catholic Church (CC). Galileo **(P2 of PPCT)** was an Italian, Roman Catholic mathematician, inventor, astronomer, musician, logician, and physicist at a time when the fields of astronomy and physics were barely recognized.[4] He was not a wealthy or high-born man. His father was a court musician and composer, and eventually, Galileo became a court mathematician and philosopher. In every way, Galileo (fig. 1.1) was the epitome of a post-medieval, post-renaissance, humanistic scholar. He was committed to the CC, but he was also committed to human reason and eschewed much of the overemphasis on the ancient Greeks due to the Renaissance. The post-medieval church, which included Galileo and other members with whom he interacted, was surrounded by intense sociocultural factors, including the recent Protestant Reformation and the Catholic Counter-Reformation.[5] In general, the CC supported scholarly and even early scientific pursuits. In Galileo's case, however, a complex interplay of factors led to a highly pressurized encounter between the Inquisition and Galileo based on some of his writings.[6] Although "the Galileo affair," as it has been dubbed in the years since,[7] is generally presented as a case example of the conflict between science and faith or religion, it is far more complex than these two issues alone.

[3]Maurice A. Finocchiaro, *The Galileo Affair: A Documentary History* (Berkeley, CA: University of California, 1989).

[4]James Reston, Jr., *Galileo: A Life* (New York, NY: HarperCollins, 1994).

[5]Galileo Galilei and Maurice A. Finocchiaro, *Galileo on the World Systems: A New Abridged Translation and Guide* (Berkeley, CA: University of California Press, 1997).

[6]David C. Lindberg and Ronald L. Numbers, *When Science & Christianity Meet* (Chicago: University of Chicago Press, 2003).

[7]Finocchiaro, *The Galileo Affair*, 1989.

Figure 1.1 *Inventor of the Telescope Galileo Galilei*. Portrait by Justus Sustermans, 1636, oil on canvas. Located in The Uffizi Collection, Florence, Italy. https://www.uffizi.it/en/artworks/ portrait-galileo-galilei-by-justus-sustermans%20.

The Post-Medieval Church Context

Although mentioned little in works of Galileo's life, the Protestant Reformation (1517) changed the landscape of Christendom and created tension within the CC **(T of PPCT)**.[8] Literal interpretation of Scripture was more Protestant than Catholic, with the CC holding up the traditional opinions of the Church fathers as equal to biblical interpretation.[9] Nevertheless, in the aftermath of the Protestant Reformation, the CC also tended towards literal interpretations of Scripture when these were also in agreement with the ancient Church fathers and traditional understandings of a topic.[10] In general, though, the cataclysm of the Reformation shook the foundations of both Protestant and Catholic biblical hermeneutics and, more broadly, epistemologies of truth. The new Protestant epistemology became solidified in the five *solas*, whereas the epistemology of the CC was less clearly defined and included both Scripture and Church leaders.[11]

[8]Ibid.
[9]Galileo and Finocchiaro, *Galileo on the World Systems*, 1997.
[10]Ibid.
[11]Lindberg and Numbers, *Science & Christianity Meet*, 2003.

Galileo lived in Italy **(C of PPCT)**, the center of Roman Catholicism. The CC was the defining religious, cultural, political, legal, and educational force for all Catholics and those living in Catholic-dominated areas.[12] The role of the Church in judging and censuring scientific works seems absurd to current readers, but it was the natural way of life for those in Galileo's time. This was not a solely Catholic phenomenon, either; the Protestant leaders sometimes filled these same roles to a lesser degree for their followers. The post-Medieval CC was the highest institutional authority in Catholic societies, and nothing in life was ultimately disconnected from this reality.

Galileo was mostly interested in novel fields of study that needed developing apart from the accepted classics. After trying out religion and medicine in his scholarly pursuits (the most respected and well-paying fields at the time), he settled on mathematics as his main area and struggled for years to live on a meager salary.[13] Eventually, he switched from filling the role of a professor to becoming the court philosopher and mathematician for the Grand Duke of Tuscany, to whom he wrote his *Discourse on Floating Bodies*.[14] Galileo was an unusually passionate, creative, competitive, and adventurous scholar who took on scientific projects simply to be the first to reach a conclusive, persuasive argument and present it to others.[15] There were others who shared many of his ideas, so he was not entirely alone. However, he still pursued novel areas of study that were more purely personal interests.

[12]Wade Rowland, *Galileo's Mistake: A New Look at the Epic Confrontation between Galileo and the Church* (New York: Arcade Publishing, 2003).

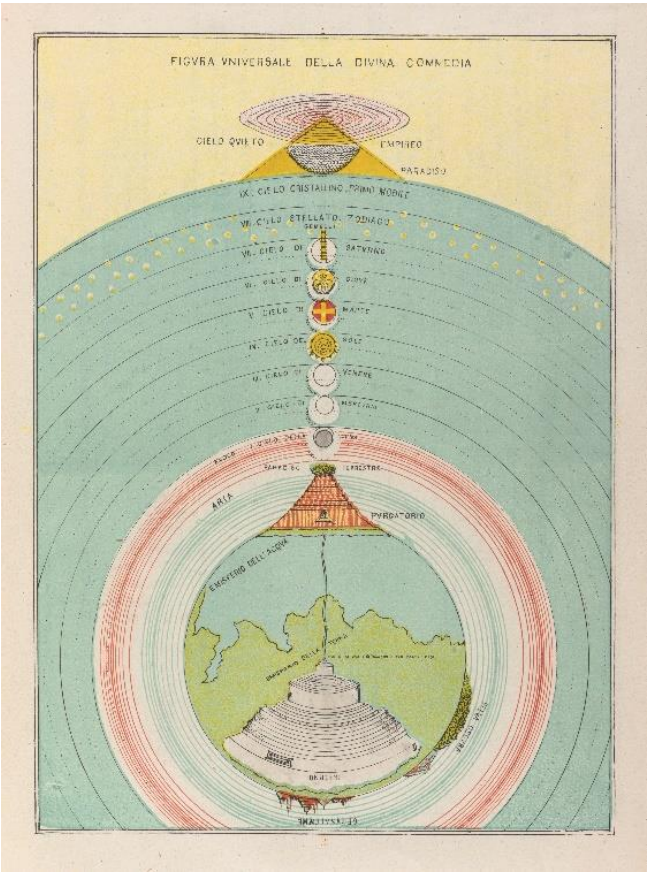
[13]Reston, *Galileo*, 1994.

[14]Galileo Galilei, *A Discourse Presented to the most Serene Don Cosimo II, Great Duke of Tuscany, Concerning the Natation of Bodies Upon, and Submersion in, the Water*, trans. Thomas Salusbury (London: William Leybourn, 1663).

[15]Reston, *Galileo*, 1994.

The Copernican Issue

The Galileo affair erupted primarily due to competing explanations of how the universe is organized, which is an issue that predates Galileo.[16] The Medieval cosmology, consistent with the Greek authors Aristotle and Ptolemy, was still the dominant understanding of the arrangement of the cosmos: the Earth stands immovable at the lowest point (with only hell beneath it) of the universe with all other "heavenly bodies" positioned above the Earth to varying degrees, with heaven at the very top (fig. 1.2).[17] There were multiple reasons for this view of the cosmos, and it had many points of evidence in its favor including face validity



[16]Ernan McMullin, *The Church and Galileo* (Notre Dame: University of Notre Dame Press, 2005).

[17]Reston, *Galileo*, 1994; Galilei and Finocchiaro, *Galileo on the World Systems*, 1997.

Figure 1.2 *Map of the Medieval View of the Cosmos*. Drawing by Michelangelo Caetani, 1865, chromolithograph. Based on *The Divine Comedy* by Dante Alighieri, 1320. Private Collection of PJ Mode, Cornell University Library Digital Collections. https://digital.library.cornell.edu/catalog/ss:3293735.

and Bible passages that seem to support it (Josh. 10:12-13; Psa. 104:5; Ecc. 1:5).[18] The scholar is credited with initiating discussion of a new, contradictory view of the cosmos, with the sun standing stationary in the center as the Earth moves around it, was Nicolaus Copernicus in his book *On the Revolutions of the Heavenly Spheres* (1543).[19]

Although Copernicus ended up being right in his hypothesis, his work lacked sufficient evidence to support his view of the cosmos.[20] Medieval cosmology had the support of the ancient classics, the Church, the universities, and years of acceptance. A new cosmology, especially one as radical as the one Copernicus proposed, needed strong support to make an impression. At the time, there was no way to observe outer space, much less travel to it. Until Galileo later used a telescope to observe the planets directly, the evidence against Aristotelian and Copernican cosmology was weak.[21] In 1600, the Italian mathematician, cosmologist, Dominican friar, heretic, and occultist Giordano Bruno was convicted by the CC and killed by burning at the stake. One of the theories that Bruno supported was the Copernican system of cosmology.[22]

The Protestant Reformation, the Catholic Counter-Reformation, a scholastic tradition steeped in the Classics, the execution of Bruno and others, the lack of proof for the Copernican theory, epistemological and hermeneutical confusion, warring Jesuit and Dominican factions within the CC, and (later) a disfavored pope under pressure due to his handling of the Thirty Years War (1618-1648): this is a non-exhaustive sampling of the contextual, sociopolitical factors driving the conflict between Galileo and the CC.[23] The complexity present in Galileo's Inquisition trials (1615-1616 and 1632-1633) is astounding. Ultimately, the most significant influences on the reception of Galileo's findings had little to do with science and much to do with sociocultural factors.[24]

---

[18]Reston, *Galileo*, 1994.

[19]Galilei and Finocchiaro, *Galileo on the World Systems*, 1997.

[20]Ibid.

[21]Finocchiaro, *The Galileo Affair*, 1989.

[22]Rael Ruiz, "Nova Galileo Documentary The Earth Spins," NOVA by PBS, YouTube video, 1:48:55.

[23]McMullin, *The Church and Galileo*, 2005.

[24]Ibid.

Galileo, Catholic Scientist

Despite Galileo's fervent expressions of commitment to the CC and belief in the holy origins of Scripture, surprisingly, Christianity is one of the lesser aspects of Galileo's life.[25] It was important to his life but played a much more marginal role than his family, academics, career, inventions, and writings. Most of Galileo's writings that include theological content are more about academic disciplines than his own personal faith. It is worth mentioning, though, that in the matter of the CC's criticism of Galileo's writings, Galileo ultimately sided with the CC and abjured what he had written.[26] The most notable of Galileo's surviving writings that include theological content is his "Letter to the Grand Duchess Christina of Tuscany" (1615).[27]

By the time Galileo wrote this letter, talk had begun to circulate that he was under investigation by the Inquisition for believing and writing about content antithetical to Scripture.[28] This was the Copernican theory that the Earth moves around a stationary sun. An investigation like this placed Galileo's position as a court mathematician in jeopardy, so he set out to explain his position on science, Scripture, epistemology, and truth in as clear terms as possible.[29] It was only one of many times that Galileo wrote or traveled to defend himself against those who questioned or were confused by his works.[30] In the matter of Galileo's views of Scripture, theology, and science, his own words explain his position and beliefs best. Galileo writes:

> With regard to this argument, I think in the first place that it is very pious to say and prudent to affirm that the holy Bible can never speak untruth — whenever its true meaning is understood. But I believe nobody will deny that it is often very abstruse [sic], and may say things which are quite different from what its bare words signify. Hence in expounding the Bible if one were always to confine oneself to the unadorned grammatical meaning, one might fall into error.[31]

---

[25]Rowland, *Galileo's Mistake,* 2003.

[26]Galileo and Finocchiaro, *Galileo on the World Systems,* 1997.

[27]Galilei and Seeger, *Galileo Galilei,* 1966.

[28]Reston, *Galileo*, 1994.

[29] Stillman Drake, *Galileo: Pioneer Scientist* (Toronto, Ontario: University of Toronto Press, 1990).

[30]Reston, *Galileo*, 1994.

[31]Galilei and Seeger, *Galileo Galilei,* 270.

The pivotal phrase in this quotation is undoubtedly "whenever its true meaning is understood," meaning that whenever Scripture is accurately interpreted, it cannot fail to reveal truth. However, human interpretations are always susceptible to error, especially when it comes to unclear, non-literal passages of the Bible. He continues in his letter:

> I think that in discussions of physical problems we ought to begin not from the authority of scriptural passages, but from sense-experiences and necessary demonstrations [science]; for the holy Bible and the phenomena of nature proceed alike from the divine Word, the former as the dictate of the Holy Ghost and the latter as the observant executrix of God's commands….For the Bible is not chained in every expression to conditions as strict as those which govern all physical effects; nor is God any less excellently revealed in Nature's actions than in the sacred statements of the Bible.[32]

Here, he explicitly tackles the relation of science to theology or the study of God's creation to the study of God's Word. He offers two supports for his argument: that the laws of nature are more fixed than the variety of material in the Bible and that God's truths are evident as clearly in nature as in His Word (Rom. 1). These are bold theological, hermeneutical, and epistemological claims, especially in Galileo's cultural context. Humanistic optimism and pre-enlightenment valuation of human reason are present in his letter.

Galileo was a dedicated scholar and creative, passionate inventor.[33] At the time, competitions to produce new scientific discoveries or inventions were common, and Galileo seemed to jump at the chance to participate.[34] Earning renown by being the first to publish or invent something meant better career and salary prospects, which Galileo desperately needed.[35] It is a misconception that Galileo invented the telescope. The actual inventor is shrouded in mystery, but a glassmaker applied for a patent for the device in 1608.[36] Galileo heard about it in 1609, and he began working on his own version. The earliest telescopes were rudimentary, and Galileo painstakingly sought to improve the clarity and range possible (from 3x magnification to 30x).[37] Other inventors quickly caught on, producing a race not unlike the modern Space Race.

---

[32]Ibid., 271.
[33]Reston, *Galileo*, 1994.
[34]Ibid.
[35]Ibid.
[36]Rowland, *Galileo's Mistake*, 2003.
[37]Ibid.

Figure 1.3 *Galileo Galilei Showing the Doge of Venice How to Use the Telescope*. Painting by Giuseppe Bertini, 1858, fresco painting. Located in the Villa Andrea Ponti, Piazza Litta, Varese, Italy. University of Delaware Library Online Exhibition. https://exhibitions.lib.udel.edu/galileo-400-years/exhibition-item/galileo-galilei-showing-the-doge-of-venice-how-to-use-the-telescope/.

Galileo's observations and data through the telescope quickly accumulated in favor of the Copernican theory, but he continued searching for definitive proof that would persuade all doubters.[38] Galileo was a scientist at heart, passionate about observational data, measurements, persuasive arguments, and clear conclusions.[39] His writings are that of a skilled logician who could persuade just as well without observable evidence.[40] Still, he knew the value of evidence and sought to gather and present it. In 1632, he wrote what was deceptively titled "Dialogue on the Tides," which was later renamed posthumously "Dialogue Concerning the Two Chief World Systems" in 1744.[41] There are many interesting facts about this work, but some of the most pertinent is that the original title was a deliberate attempt to disguise its contents, the work was sanctioned and later approved for publishing by the CC, and the CC also prosecuted Galileo for the

[38]Reston, *Galileo*, 1994.

[39]Ibid.

[40]Galilei and Seeger, *Galileo Galilei*, 1966.

[41]Galileo Galilei and Stephen Jay Gould, *Dialogue Concerning the Two Chief World Systems*, trans. Stillman Drake (New York, NY: Random House, 1953).

work soon after publication.[42] The book is a conversation between three speakers who each take a different side in the cosmology debate, interspersed with seemingly unrelated material on tides.[43] The conversation is designed to present arguments without espousing a specific position.[44]

Galileo's Church Trials (1616/1633)

A man named Benedetto Castelli was a former student of Galileo's, and Galileo wrote him a letter (1613) containing a detailed argument against the biblical evidence for the Aristotelian cosmology.[45] He only argued against the biblical evidence as an outright, complete rejection of the possibility of the Copernican system.[46] This letter led individuals to alert CC officials, and Galileo later traveled to Rome to try to clear his name.[47] He was cross-examined and exonerated (1616), but the CC also launched an investigation into the Copernican matter.[48] They released an official statement with unanimous support "that Copernicanism was philosophically and scientifically untenable, and theologically heretical."[49] This was the first official statement from the CC on the matter. Two other important things happened: a document was produced reflecting a private warning issued to Galileo to abandon the Copernican theory, and changes were made to the Index of Prohibited Books.[50] Legally, Galileo was cleared and returned home.

For years, Galileo was a dutiful Catholic and followed these orders.[51] He went back to his scientific work. He later diverged from strictly following the CC's private warning after multiple conversations with Pope Urban VIII.[52] The details of these conversations are unknown, but Galileo and the Pope were good friends and seemed to think alike on many scientific matters.[53] Galileo began writing his *Dialogues* (1632) right after this. He returned to Rome later with the finished copy for the CC's revision and approval process. After making changes,

[42]Galileo and Finocchiaro, *Galileo on the World Systems,* 1997.
[43]Galileo and Gould, *Dialogue Concerning the Two Chief,* 1953.
[44]Finocchiaro, *The Galileo Affair,* 1989.
[45]Galileo and Finocchiaro, *Galileo on the World Systems,* 1997.
[46]Lindberg and Numbers, *Science & Christianity Meet*, 2003.
[47]Reston, *Galileo*, 1994.
[48]Galileo and Finocchiaro, *Galileo on the World Systems,* 1997.
[49]Ibid., 40.
[50]Ibid.
[51]Reston, *Galileo*, 1994.
[52]Finocchiaro, *The Galileo Affair,* 1989.
[53]Ibid.

the book was approved for publication.[54] It caused quite a stir and many complaints after publication. Soon, the CC decided to stop selling the book and launch another investigation.[55] Pope Urban was already dealing with disfavor due to political troubles, so Galileo's book added fuel to a burning fire.[56]

Figure 1.4 *Galilée [Galileo in Front of the Holy Office in the Vatican].* Painting by Joseph-Nicolas Robert Fleury, 1847, oil on canvas. Located in the Louvre, Paris, France. https://collections.louvre.fr/en/ark:/53355/cl010063376.[57]

This second investigation and trial was a long process. Galileo was eventually summoned to Rome despite very poor health and difficulty traveling.[58] The official decree was that Galileo was "vehemently suspected of heresy,"[59] which was the CC's second most severe conviction. Galileo's response was as follows:

> I, Galileo…swear that I have always believed…all that the Holy Catholic and Apostolic Church holds, preaches, and teaches...[I] published a book

[54]Galileo and Finocchiaro, *Galileo on the World Systems,* 1997.
[55]Ibid.
[56]Finocchiaro, *The Galileo Affair*, 1989.
[57]John Lewis, "Truth and Propaganda in Images of the Trial of Galileo," *Journal for the History of Astronomy* 38, no. 130 (2007).
[58]Reston, *Galileo*, 1994.
[59]Galilei and Finocchiaro, *Galileo on the World Systems*, 46.

> in which I treat of this already condemned doctrine…therefore, I have been judged vehemently suspected of heresy, namely of having held and believed that the sun is the center of the world and motionless and the Earth is not the center and moves…with a sincere heart and unfeigned faith I abjure, curse, and detest the above-mentioned errors and heresies…and I swear that in the future I will never again say or assert, orally or in writing, anything which might cause a similar suspicion about me…[60]

His penalty included imprisonment, but this was later downgraded to house arrest.[61] Galileo's conviction is interesting for many reasons, but one is that the original reason for the 1632-33 trial was not suspicion of heresy; it was due to an allegation that Galileo had defied the private warning issued to him in 1616.[62] The CC suspected Galileo of two heresies: the Copernican system of cosmology (decreed a heresy in 1616) and believing and defending "as probable a thesis contrary to the Bible."[63] Galileo spent the rest of his life under house arrest and died in 1642.[64]

The Years After "The Galileo Affair"

Galileo was buried at a church, but no inscription was placed on his tombstone.[65] Much later, the CC allowed a memorial statue (1734) and publication of the *Dialogue* in a collection (1744).[66] It was not until 1822 that books discussing the Copernican theory were allowed to be published, and Galileo's book was removed from the Index in 1835.[67] Clearly, this cosmological issue required a deep, long-term solution over the course of history; Galileo desired to play his part during his lifetime, but he was ultimately a very small piece in a very large puzzle. In 1979, Pope John Paul II specifically mentioned the mistreatment of Galileo by the CC. In his speech, he said, "in this affair the agreements between religion and science are more numerous and above all more important than the incomprehensions [sic] which led to the bitter and painful conflict that continued in the course of the following centuries."[68]

---

[60]Finocchiaro, *The Galileo Affair*, 406-7.
[61]Reston, *Galileo*, 1994.
[62]Finocchiaro, *The Galileo Affair*, 1989.
[63]Galilei and Finocchiaro, *Galileo on the World Systems*, 46.
[64]Reston, *Galileo*, 1994.
[65]Galilei and Finocchiaro, *Galileo on the World Systems*, 1997.
[66]Ibid.
[67]Ibid.
[68]Finocchiaro, *The Galileo Affair*, 40.

Galileo wrote his most important book while under house arrest: *Mathematical Discourses Concerning Two New Sciences* (1638).[69] It was a summary of much of his life's work in physics. Isaac Newton was born in England the year that Galileo died.[70] Newton capitalized on Galileo's work and turned it into a truly robust scientific system. From there, studies of motion and physics remained static to some degree. It was Einstein who changed the field with his theory of relativity (1905).[71] Even within the scientific fields that interested Galileo, the answers were long in coming after his death. The development of these fields was substantially helped by Galileo, but development did not begin or end with him. The Scientific Revolution dates roughly from 1543 (Copernicus) to 1687 (Newton), with Galileo positioned right in the middle as a key player.[72]

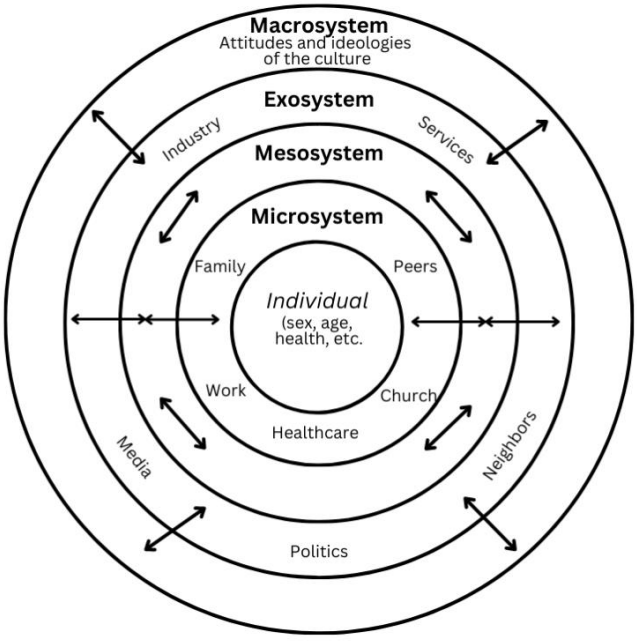
Galileo and Bronfenbrenner's Theory

Bronfenbrenner's bioecological theory is primarily a developmental theory, where development is defined as how a person makes sense of and relates to the environment over time and reciprocally plays a role in impacting it.[73] This theory's synergistic, reciprocal component is key; it is neither deterministic nor indeterministic. A person's life and successive levels of environmental influence are viewed holistically as constantly impacting and being impacted by each other. The primary utility of the theory is descriptive since "[t]he infinite tangles of past experience and present circumstances that make us what we are smother us in particulars, defying explanation or generalization; faced with such complexity…"[74] there is simply no robust way to entangle enough of the contextual factors to predict or determine causation. As a highly descriptive theoretical model that can encompass a dizzying array of environmental factors, Bronfenbrenner's theory is uniquely suited to retrospective case studies. There will be significant limitations, of course, as there always are when using a theory of this kind. The nature of Bronfenbrenner's social, developmental bioecological theory presents a helpful way of synthesizing and interpreting the multiple layers of personal and environmental characteristics in Galileo's situation.

There are six personal and environmental layers in Bronfenbrenner's theory: (1) the individual, (2) the microsystem, (3) the mesosystem, (4) the exosystem, (5) macro system, and (6) the chronosystem (see figure 1.5). The last

[69]Drake, *Pioneer Scientist*, 1990.
[70]Galilei and Finocchiaro, *Galileo on the World Systems*, 1997.
[71]Drake, *Pioneer Scientist*, 1990.
[72]Galilei and Finocchiaro, *Galileo on the World Systems*, 1997.
[73]Bronfenbrenner, *Human Development*, 1979.
[74]Ibid., viii.

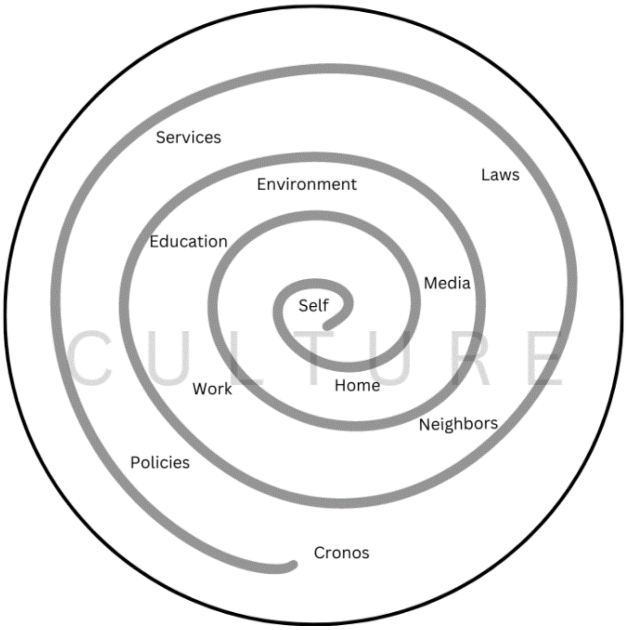
is more of an added dimension to each of the other layers than a new layer of its own. The crux of Bronfenbrenner's theory lies in the interactions between these layers or the way they permeate and reciprocally influence each other. Nested circles are typical for illustrating the theory, but it is important to remember that the layers form an indivisible whole. Unlike nesting dolls, they cannot be separated from one another. They are also hard to define clearly, particularly in real-life situations. They operate like various depths of the ocean in relation to each other. No layer is more important than any other, but an individual's ability to influence the environment necessarily emanates from the individual level. Within this layered but indivisible whole, the process model is situated. It can be applied to any event, action, or point in time. Although difficult, it is important to try and include as many of the PPCT components as possible when using the theory. Failing to do so without acknowledgment can inadvertently misrepresent the implications of the theory.[75]



[75]Jonathan R. H. Tudge et al., "Uses and Misuses of Bronfenbrenner's Bioecological Theory of Human Development," *Journal of Family Theory & Review* 1 (December 2009): 198-210.

Figure 1.5 *Bronfenbrenner's Ecological Theory.* Graph representing the second revision of Bronfenbrenner's theory in 1977. The arrows depict overlap and reciprocal impact between systems. Reproduced from figure 2 in "Bronfenbrenner's Bioecological Theory Revision: Moving Culture from the Macro into the Micro" by Vélez-Agosto et al., *Perspectives on Psychological Science* 12, no.5 (2017): 902.

Culture, like time, is more of a dimension present in all layers than a separate category (i.e., macrosystem). Culture defines the content of each layer, constantly undergoes change (chrono/time), and provides the interpretative, meaning-making framework for every event or interaction.[76] It is part of the individual and part of the environment (see Figure 1.6). "Culture is both the process and the content of daily activity and is thus inseparable from all contexts where developmental processes and outcomes take place, especially in the microsystems."[77]



[76]Nicole M. Vélez-Agosto et al., "Bronfenbrenner's Bioecological Theory Revision: Moving Culture from the Macro into the Micro," *Perspectives on Psychological Science* 12, no. 5 (2017): 900.

[77]Ibid., 903.

Figure 1.6 *Model of the Cultural Microsystem.* Graph representing the multisystemic presence and impact of culture across settings. Culture is present in all systems impacting the self, family, friends, and all aspects of life out to the microsphere in a reciprocal interaction. Reproduced from figure 3 in "Bronfenbrenner's Bioecological Theory Revision: Moving Culture from the Macro into the Micro" by Vélez-Agosto et al., *Perspectives on Psychological Science* 12, no.5 (2017): 907.

In the PPCT process model, process (P1) is further defined as "proximal processes." A proximal process is the nucleus of activity in the process model and the theory. Each one is a "progressively complex, reciprocal interaction" between (in this case) Galileo and a single person, object, or idea in his environment.[78] The potency of a proximal process depends partly on the frequency, regularity, and longevity of the interaction. See Figure 1.7 for a look at the environmental systems layers in Galileo's situation.

[78]Jessica L. Navarro et al., "Bored of the Rings: Methodological and Analytic Approaches to Operationalizing Bronfenbrenner's PPCT Model in Research Practice." *Journal of Family Theory & Review* 14, no. 2 (2022): 235.

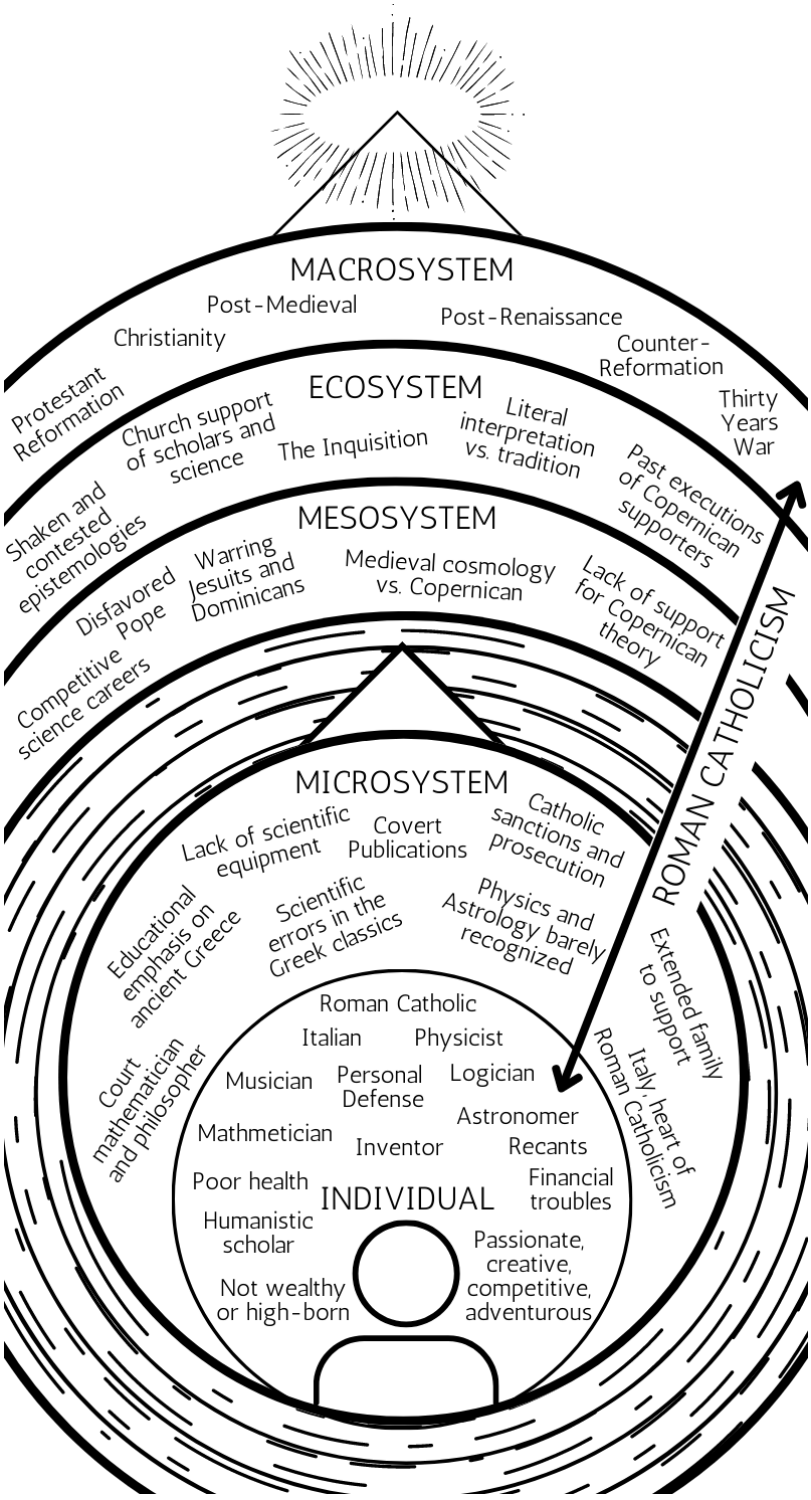

MACROSYSTEM
Post-Medieval
Christianity
Post-Renaissance
Counter-Reformation
Protestant Reformation
ECOSYSTEM
Church support of scholars and science
The Inquisition
Literal interpretation vs. tradition
Past executions of Copernican supporters
Thirty Years War
Shaken and contested epistemologies
MESOSYSTEM
Disfavored Pope
Warring Jesuits and Dominicans
Medieval cosmology vs. Copernican
Lack of support for Copernican theory
Competitive science careers
ROMAN CATHOLICISM
MICROSYSTEM
Lack of scientific equipment
Covert Publications
Catholic sanctions and prosecution
Educational emphasis on ancient Greece
Scientific errors in the Greek classics
Physics and Astrology barely recognized
Extended family to support Roman Catholicism
Roman Catholic
Italian
Physicist
Court mathematician and philosopher
Musician
Personal Defense
Logician
Astronomer
Mathmetician
Inventor
Recants
Poor health
INDIVIDUAL
Financial troubles
Humanistic scholar
Passionate, creative, competitive, adventurous
Not wealthy or high-born

Figure 1.7 *Ecological Model of the Galileo Affair.* Graph illustrating contextual factors in Galileo's life on each level of Bronfenbrenner's theory, patterned after figure 1.1: Michelangelo's drawing of the Medieval cosmos. The graph is far from exhaustive; it highlights only some of the major factors in Galileo's life and cultural context in a visual manner consistent with Bronfenbrenner's theory.

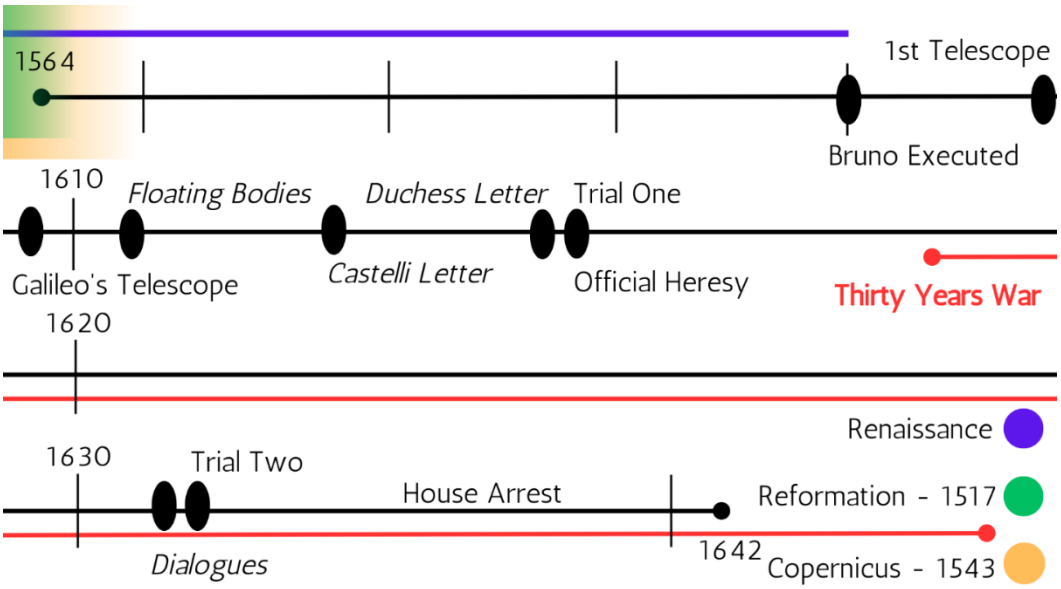


Figure 1.8 *Timeline of the Galileo Affair.* Graph depicting a basic timeline of key events in the Galileo Affair from 1600 (Bruno's execution) to 1632 (Galileo's conviction).

Galileo in Ecological Perspective: Results and Limitations

As a person, Galileo represented a unique blend of "demand, resource, and force characteristics" (Tudgeet al., 2009, p. 200). His sex, ethnicity, nationality, religious faith, and social standing place him in the center of Roman Catholic society. His talents for numbers, precision, logic, and creativity suited him for the scientific competitions of his day, and his need for money and passionate nature further propelled him. It is difficult to fully comprehend and account for all the place and context factors of Galileo's life and time. The most notable characteristic is the pervasive influence of Roman Catholic Christianity. It was the defining religious, cultural, political, legal, and educational force for all Catholics and those living in Catholic-dominated areas. It permeates each of

Bronfenbrenner's ecological layers, forming both the backdrop and the forefront of each cultural element. In the component of time, the Galileo Affair is positioned at the end of the Renaissance, in the aftermath of the Reformation, and in the very center of the Thirty Years War. Historical and political events were far from acting in Galileo's favor. The resistance of Galileo's time in history to his achievements is accentuated when looking ahead to the following centuries.

Considering the historical period and sociopolitical dynamics, the events that happened during Galileo's life were not unusual. They are explainable given the processes, person, context, and time.[79] Only in retrospect can modern critics find and point out errors with ease and make the issue seem dichotomous. Rather than using the Galileo Affair as an example of science vs. religion, it can be used as an example of the power of sociopolitical events and cultural worldviews. What took place during Galileo's life can and does happen today and throughout history, albeit in different places and contexts. An ecological perspective of the Galileo Affair supports the need for deep cultural and sociopolitical awareness amid current controversial events and ideas.

Challenges of the Current Project

- Sifting through a large amount of data
- Missing pieces of historical information (gray areas)
- Ethnographic reconstruction of the cultural context
- Integrating Bronfenbrenner's theory with historical data
- Adequately accounting for enough of the vast number of contextual factors

Suggestions for Future Work

1. What are some of the key **proximal processes** in Galileo's life during the years 1610-1633?
2. How does the ecological model of "the Galileo affair" inform our understanding of other historical clashes of faith and science?

[79]Phyllis Moen et al., eds., *Examining Lives in Context: Perspectives on the Ecology of Human Development* (Washington, DC: American Psychological Association, 1995).

3. How could the unknown historical elements of "the Galileo affair" impact the ecological model and interpretation?

4. What similar situations to "the Galileo affair" are taking place currently? How does an ecological perspective inform those events?

Conclusion: Implications of Galileo's Life for Christians Today

It is easy for modern readers to look at the life of Galileo and see only the dissimilarities with the world today. Much of the Western world is areligious or religiously confused. The sciences are prized above all else. The Church (all believers in Jesus Christ) sits in the middle of these dynamics, trying to make a difference. Even though some of the major structures and defining characteristics have changed from Galileo's time to now, the essence of current struggles is often the same as in Galileo's day. Sociopolitical forces press in on both the Church and academia, vying for the current, most trending, desired statement or outcome. Individual believers, like Galileo in his time, can choose to do their part, focus on the concerns right in front of them, seek to be men and women of integrity, and leave the outcomes of history in God's hands. Of course, Galileo was not an exemplary model in all these areas, but he did try and succeed at times in some of them.

One major lesson from the life of Galileo is that currently unpopular, controversial, and even censured opinions can turn out to be true in the end. Christians know this to be true simply from the Bible's testimony. In addition, there is no life more unpopular, controversial, or censured in all of history than the life of Jesus Christ (John 15:18-25). The Church today can look at the history of the CC's treatment of Galileo as a warning to keep biblical truths and the Gospel message unconnected from trying to control sociopolitical outcomes and gain or retain power. The most pressing issue of Galileo's day was not whether the Earth moved around the sun but whether believing that the Earth moved around the sun had any bearing on an individual's faith and position in God's family. These issues are much more important than specific opinions in scientific debates. Christians can hold to a particular position and defend it, as Galileo did at times, but their highest duty is always to "love one another" as God loves them (John 15:12, English Standard Version). The history of Galileo and the post-medieval church in an ecological context can warn current Christians to stay committed to the Gospel of Jesus Christ above all else.

Bibliography

Bronfenbrenner, Urie. *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge: Harvard University Press, 1979.

Drake, Stillman. *Galileo: Pioneer Scientist*. Toronto, ON: University of Toronto Press, 1990. https://doi.org/10.3138/j.ctt1287r03.

Finocchiaro, Maurice A. *The Galileo Affair: A Documentary History*. Berkeley, CA: University of California, 1989. https://doi.org/10.1525/j.ctt1ppb13. ProQuest.

Galilei, Galileo. *A Discourse Presented to the most Serene Don Cosimo II, Great Duke of Tuscany, Concerning the Natation of Bodies Upon, and Submersion in, the Water*. Translated by Thomas Salusbury. London: William Leybourn, 1663. Project Gutenberg, 2001. https://www.gutenberg.org/ebooks/37729 .

———, and Maurice A. Finocchiaro. *Galileo on the World Systems: A New Abridged Translation and Guide.* Berkeley, CA: University of California Press, 1997. EBSCOhost eBook Collection.

———, and Raymond John Seeger. *Galileo Galilei: His Life and His Works*. New York: Pergamon Press, 1966. Elsevier ScienceDirect.

———, and Stephen Jay Gould. *Dialogue Concerning the Two Chief World Systems.* Translated by Stillman Drake and foreword by Albert Einstein. New York: Random House, 1953.

Lewis, John. “Truth and Propaganda in Images of the Trial of Galileo.” *Journal for the History of Astronomy* 38, no. 130 (2007): 15-29. https://doi.org/10.1177/002182860703800102.

Lindberg, David C., and Ronald L. Numbers. *When Science & Christianity Meet*. Chicago: University of Chicago Press, 2003. ProQuest.

McMullin, Ernan. *The Church and Galileo*. Notre Dame: University of Notre Dame Press, 2005.

Moen, Phyllis, Glen H. Elder, Jr., and Kurt Lischer, eds., *Examining Lives in Context: Perspectives on the Ecology of Human Development*. Washington, DC: American Psychological Association, 1995.

Navarro, Jessica L., Christina Stephens, Blenda C. Rodrigues, Indya A. Walker, Olivia Cook, Leah O'Toole, Noírín Hayes, and Jonathan R. H. Tudge. "Bored of the Rings: Methodological and Analytic Approaches to Operationalizing Bronfenbrenner's PPCT Model in Research Practice." *Journal of Family Theory & Review* 14, no. 2 (2022): 233-253.

Reston, James, Jr. *Galileo: A Life.* New York: HarperCollins, 1994.

Rowland, Wade. *Galileo's Mistake: A New Look at the Epic Confrontation between Galileo and the Church*. New York: Arcade Publishing, 2003. ProQuest.

Ruiz, Rael. “Nova Galileo Documentary The Earth Spins.” NOVA by PBS. YouTube video, 1:48:55. https://www.youtube.com/watch?v=zVL1Bxylag4.

Tudge, Jonathan R. H., Irina Mokrova, Bridget E. Hatfield, and Rachana B. Karnik. “Uses and Misuses of Bronfenbrenner’s Bioecological Theory of Human Development.” *Journal of Family Theory & Review* 1, 2009: 198-210.

Vélez-Agosto, Nicole M., José G. Soto-Crespo, Mónica Vizcarrondo Oppenheimer, Stephanie Vega-Molina, and Cynthia García Coll. "Bronfenbrenner’s Bioecological Theory Revision: Moving Culture from the Macro into the Micro." *Perspectives on Psychological Science* 12, no. 5 (2017): 900-910.
.