Although the so-called 'Galileo Affair had many facets, it is better described as a conflict within science, than a conflict between science and religion. Critically discuss this statement.

Introduction.

The Galileo Affair (1564 – 1642) spans the events leading up to the ultimate condemnation of Galileo as a heretic at the trial in Rome in April 1633 on the grounds that "he believed in the earth's motion and the earth's motion contradicted scripture"[1]. The 'Galileo Affair' has often been portrayed by scholars such as Andrew Dickson White in a similar light to Darwinism[2]; as evidence that science and religion are two distinct and incompatible forces, engaging throughout history in a dramatic warfare. However, this depiction, despite lending itself to the 'conflict-thesis' often used to portray the relationship between science and religion, is not only overly simplistic, but historically deficient.

Not only is the terminology of 'science' and 'religion' somewhat of a misnomer. Indeed, science and religion were not two distinct categories, but inseparably intertwined in their shared goal of understanding God. But also, science itself cannot be regarded as a uniform category in the 'Galileo Affair' due to Galileo's failure to marshal sufficient evidence to demonstrate the truth of heliocentric cosmology. As such, while it is certainly true that the Galileo Affair is truthfully described as a conflict *within* science, the idea that it is a conflict *between* science and religion requires nuance.

Nevertheless, to see the Galileo Affair as simply a conflict within science is a highly inadequate reading of the historical events. While internal scientific conflict is an important factor for the failure of Galileo's heliocentric hypothesis to gain traction, Galileo's reception was largely driven by the conflict between science and religion. Indeed, Galileo's arrest and forced recantation were as a result of his charge as a heretic, rather than as an unconvincing scientist.

The conflict that occurred is best understood as a conflict between science and religion if we consider the underlying methodological and epistemological disagreement that triggered this heretical charge. That is over the question of how we determine the true nature of the world: through the scientific method of observation (championed by Galileo), or through a literal reading of scripture as defined by the church Fathers.

Finally, as Lindberg convincingly argues, the 'Galileo Affair', whilst certainly an ideological conflict between scientific empiricism and biblical literalism, is ultimately a conflict between people, placed in their historical and political context. The human and political dimension of the 'Galileo Affair' must not be overlooked when seeking to understand how the complex historical conflict is best described.

Complexity thesis – Science and Religion were not distinct faculties in the 16th / 17th CE.

The implication of a conflict between 'science' and 'religion', is that there were two distinct and incompatible forces engaging in a warfare narrative. However, this is a radical oversimplification as a division between science and religion did not really exist in 16th/17th century Europe. As John Henry

[1] Maurice A. Finocchiaro, 'That Galileo Was Imprisoned and Tortured for Advocating Copernicanism,' in *Galileo Goes to Jail and Other Myths about Science and Religion*, ed. Ronald L. Numbers (Cambridge, Mass. and London: Harvard University Press, 2009) pg.69

[2] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' in *When Science and Christianity Meet*, eds. David C. Lindberg and Ronald L. Numbers (Chicago: University of Chicago Press, 2003) pg.58

perceives, virtually all natural philosophers (scientists) were religious: "whatever the tensions between religious institutions and science, it is a matter of historical fact that many, if not all, of the leading natural philosophers of the Scientific Revolution were devout believers"[3]. Indeed, if we consider the approach of scientists such as Robert Boyle, Isaac Newton, Galileo, Leibniz, Pascal, and Descartes, we become acutely aware that their natural philosophies are centred around and driven by and underlying theology. Their scientific explorations are theologically centred around understanding the secondary causes of God, as a kind of theological empiricism, a natural theology that retains God's position as the primary cause. As such Amos Funkenstein's suggestion that "science, philosophy, and theology could be seen as one and the same occupation"[4] is an accurate depiction of the complex relationship between science and religion in the 16th and 17th centuries. Moreover, Lindberg's warning that we cannot draw a line between scientists willing to interpret the Bible allegorically in the face of contradicting empirical evidence, and geocentric theologians committed to church tradition and biblical literalism[5] is absolutely necessary for navigating the complexity of the Galileo conflict. The religious zeal of Galileo and his contemporary natural philosophers muddies the waters between science and religion and compels us to reject the overly simplistic warfare narrative of Andrew White.

Complexity thesis – Lack of Scientific consensus around Galileo's heliocentric cosmology.

The 'Galileo Affair' cannot be regarded as a distinct disagreement between religion and science since Galileo's heliocentric model was largely unaccepted by the scientific community. As such, we should firstly regard the 'Galileo Affair' as a conflict *within* science. As Lindberg argues,

"the evidence that could be marshalled in the middle of the sixteenth century in support of the heliocentric model as physically true was not convincing. No observation, taken by itself, could prove that the Sun rested and the earth moved"[6].

Indeed, Galileo had arguments, but no decisive proof for his heliocentric hypothesis. While Galileo's model dealt more straightforwardly with retrograde motion than the existing Ptolemaic geocentric model, was praised for its simplicity, order, and coherency[7], and removed the much-criticised Ptolemaic equant, none of these arguments were decisive demonstrations for Galileo's cosmology. What's more, Galileo's hypothesis had the onus to demonstrate unambiguously the movement of the earth if it was expected to overthrow the reigning scientific paradigm of Aristotelian cosmology that recognized the stability and centrality of the earth[8]. However, it completely failed to achieve this. It is significant that Galileo's heliocentric cosmology was first rejected as "foolish and absurd in philosophy" by Bellarmine and the Holy Office of the Inquisition in 1616 before it was deemed "formally heretical"[9]. Indeed, the rejection of heliocentrism should not be seen as evidence of blind conservatism, or religious intolerance, but indicative of the prevailing scientific consensus at the beginning of the 17th century. As such, the 'Galileo Affair' should be described as both a conflict *within* science, and *between* a *minority* group of scientists and religion.

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[3] John Henry, 'Religion and the Scientific Revolution,' in *The Cambridge Companion to Science and Religion*, ed. Peter Harrison (Cambridge: Cambridge University Press, 2010), pg.41
[4] John Henry, 'Religion and the Scientific Revolution,' pg.41
[5] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' in *When Science and Christianity Meet*, eds. David C. Lindberg and Ronald L. Numbers (Chicago: University of Chicago Press, 2003) pg.58
[6] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' pg.37
[7] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' pg.39
[8] David C. Lindberg, 'Galileo, the Church, and the Cosmos, pg.42
[9] Ernan McMullin, 'Galileo on science and Scripture', in *The Cambridge Companion to Galileo* (Cambridge: Cambridge University Press, 1998) pg.322

Epistemological conflict.

However, the more fundamental issue that underlies the 'Galileo Affair', is not one of scientific accuracy, but epistemological authority. Indeed, it is doubtful whether Galileo would have been treated any differently in his trial in April of 1633 even if he had successfully united the scientific community. Bellarmine's response to Galileo's heliocentric arguments in 1616 not only outlines that Galileo fell short in his attempt to demonstrate the motion of the earth, but that he *never could* demonstrate this[10]. This reflects a prevailing theological opinion amongst the religious authority that mathematical astronomy cannot, in principle, reveal the state of nature as this is known only by the Creator, and communicated solely through the scripture, which is exclusively understood by the church Fathers[11]. Galileo's cosmology is not simply scientifically questionable, but "epistemological sacrilege"[12], (and thus heresy), as Redondi argues, by its subversion of the proper path to knowledge of the natural world. Indeed, it is worth recognising that the majority of leading theologians, both Catholic, and Protestant, regarded the natural sciences as incapable of determining our understanding of the world with certainty[13]. This theology was driven by the prevailing acceptance of Augustinian Original Sin, and the diminished status of humanity after the fall. As such, the empirical methods of observation that Galileo championed, were not only unconvincing scientifically, put, in principle, unable to undermine the "holy words" and the "literal truths" in Scripture, as Pope Urban VIII dictates[14].

The main issue at stake here is the question of epistemological authority: do we form our understanding of the natural world around a literal interpretation of the Bible, as dictated by the Church, or do we use the scientific method of experiment and observation? While Galileo regards theology and science as inseparable and calls for natural philosophers to read the book of nature and use the scientific method "as an appropriate aid to the correct interpretation of Scripture"[15], this kind of integration between science and religion, between natural and supernatural truth, was rejected with suspicion by theologians as a threat to the literal sense of certain scriptural passages[16]. Therefore, the 'Galileo Affair' is a conflict that draws on the fundamental question of epistemic authority between science and religion, rather than simply cosmological disagreement. This dilemma continues to resonate in the modern world with conflicts between 'evolutionists' and 'creationists'. While the surface level conflict is between Galileo's arguments for the motion of the earth and the unambiguously geocentric cosmology of scripture (literally interpreted), the crux of the conflict is one of epistemological authority.

Furthermore, the 'Galileo Affair' is best described as a conflict between science and religion as it draws on the question of the relative *functions* of scripture and scientific observation. Galileo articulated similar principles of biblical interpretation as Augustine in order to draw up boundaries and call for integration between the natural sciences and holy scriptures. While Galileo does not reject the authority of the church Fathers, as interpreters of the Bible, he limits their authority purely to "propositions that are articles of faith or involve morals"[17], arguing that "in disputes about natural phenomena one must begin not with the authority of Scriptural passages but with sensory experience"[18]. This limitation of the authority of scripture is markedly opposed to Bellarmine's

[10] Ernan McMullin, 'Galileo on science and Scripture', in *The Cambridge Companion to Galileo* (Cambridge: Cambridge University Press, 1998) pg.286
[11] Ernan McMullin, 'Galileo on science and Scripture', pg.286
[12] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' in *When Science and Christianity Meet*, eds. David C. Lindberg and Ronald L. Numbers (Chicago: University of Chicago Press, 2003), pg.197
[13] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' pg.48
[14] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' pg.51
[15] Ernan McMullin, 'Galileo on science and Scripture', pg. 305
[16] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' pg.45
[17] Ernan McMullin, 'Galileo on science and Scripture', pg.310
[18] Ernan McMullin, 'Galileo on science and Scripture', pg.305

extension of scriptural authority to every detail in the Bible. However, Galileo's arguments for the limitation of scriptural authority to areas of faith and salvation is not an unprecedented idea, articulated by many theologians prior to Galileo, such as Kepler, who did not receive censuring in the Index of Prohibited Books, the call for recantation, or house arrest. Nor is the idea of the motion of the earth proposed by Nicole d'Oresme in the 14th century, long before Copernicus (but received relatively moderate treatment). And so, while it is certainly the case that the 'Galileo Affair' is best described as a methodological and epistemological conflict between the status of the scientific method, and the literal interpretation of scripture, the further question of why Galileo was treated with such animosity requires a consideration of historical, personal, and political context.

Context - The Reformation and the Council of Trent.

When seeking to describe the nature of the 'Galileo Affair' it is vital to analyse the historical interaction of individuals in their specific political and religious context. The question of why Galileo was treated with such animosity, indeed, why Galileo's cosmology was deemed so *conflicting* to the Catholic Church to warrant his arrest as a heretic is largely explained, as Lindberg, Finocchiaro, and McMullin argue, by the religious climate in the 16th and early 17th centuries. The Catholic Church was in a debilitated state in the wake of the Protestant Reformation. Having lost half of Europe, the Church became cautious of their stability and authority[19]. This is clearly demonstrated by the conservative and authoritarian language of the Council of Trent (1545-63):

"The Council decrees that, in matters of faith and morals…, no one, relying on his own judgement and distorting the Sacred Scriptures according to his own conceptions, shall dare to interpret them contrary to that sense which the Holy Mother Church, to whom it belongs to judge their true sense and meaning, has held and does hold, or even contrary to the unanimous agreement of the Fathers"[20].

The focus on the authority of the 'Holy Mother Church' clearly demonstrates an impulse to reassert the importance of Church tradition in matters of biblical interpretation. The council expresses the theological climate of biblical literalism and the refusal to embrace spiritual interpretation unsanctioned by the church in which Galileo's deviant cosmology emerges. As such, it is understandable why Urban VIII regarded Galileo's cosmology as not a matter of "mathematical subjects, but with Holy Scripture, religion, and Faith… one is dealing with the most perverse subject one could ever come across"[21]; Galileo's perversity and threat to faith are in relation to its implications against the authority against the church, already fragile from the fallout of the Reformation, not simply his cosmology. Indeed, as McMullin argues, "Galileo had the misfortune to bring the Copernican claims to public notice at just the wrong time, a time when sensitivities in regard to questions involving scriptural interpretation and Church authority were at their most intense"[22]. Therefore, the conflict between science in religion in the 'Galileo Affair' was magnified by the impulse of the Catholic Church to re-establish their authority in Europe after the devastation of the Reformation.

Context – the life of Galileo.

Galileo's pugnacious rhetoric and lack of diplomacy served to be effective in aggravating the religious authorities and further contributed to the conflict of the 'Galileo Affair'. Lindberg's thesis that the Galileo affair was a conflict of individuals, rather than of ideologies is strongly supported by

[19] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' pg.45
[20] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' pg.45
[21] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' pg.54
[22] Ernan McMullin, 'Galileo on science and Scripture', pg,275

Galileo's foibles as an arrogant, and impetuous writer. Indeed, it was his refusal to discuss heliocentrism instrumentally in his *Dialogue* (1632) and flagrant insubordination and disrespect to Urban VIII by placing his geocentric arguments into the mouth of the slow-witted Simplicio, that enraged the Pope, as Niccolini's letters reveal. Moreover, his brazen denunciation of the church authority as having "no business assessing the merits of astronomical arguments"[23], display Galileo's strikingly poor judgement, that likely aggravated the already sensitive and confrontational Holy Office.

Conclusion.

While understanding the conflict within the scientific community is helpful insofar as it reminds us that this was not simply a tale of combat between scientific freedom, and religious intolerance, but of the genuine rejection of a scientific hypothesis, this analysis fails to capture the more fundamental conflict at play. Galileo's ignominious and tragic trial hinges on disagreements in epistemology and authority, on the question of whether we ground our understanding of the world solely in the church's interpretation of scripture, or whether we defer to our God-given abilities of observation and reason. As such, the 'Galileo Affair' is best described as a conflict between science and religion as it embodies the disagreement in the functional role of scripture (religion) and observation (science). However, as Lindberg reminds us, "science and religion cannot interact, but scientists and theologians can" [24]. We must not overlook the context of the Galileo tragedy. Ultimately, the conviction of Galileo as a heretic are largely explained by the vulnerability of the Catholic church (and thus, draconian impulse), and the arrogant and impetuous rhetoric of Galileo. Indeed, the trial centred around Galileo's insubordination towards the church, and not scientific error.

[23] Ernan McMullin, 'Galileo on science and Scripture', in *The Cambridge Companion to Galileo* (Cambridge: Cambridge University Press, 1998) pg.290

[24] David C. Lindberg, 'Galileo, the Church, and the Cosmos,' in *When Science and Christianity Meet*, eds. David C. Lindberg and Ronald L. Numbers (Chicago: University of Chicago Press, 2003), pg.57

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