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Chapter 1 : Galileo Galilei - Wikipedia

His Galileo, written in collaboration with the British movie actor Charles Laughton, is an extension of the discussion of modern science in Max Horkheimer and Theodor W. Adorno's *Dialectic of Enlightenment*.

Galileo became an accomplished lutenist himself and would have learned early from his father a scepticism for established authority, [19] the value of well-measured or quantified experimentation, an appreciation for a periodic or musical measure of time or rhythm, as well as the results expected from a combination of mathematics and experiment. Michelangelo would also occasionally have to borrow funds from Galileo to support his musical endeavours and excursions. When Galileo Galilei was eight, his family moved to Florence, but he was left with Jacopo Borghini for two years. The Italian male given name "Galileo" and thence the surname "Galilei" derives from the Latin "Galilaeus", meaning "of Galilee", a biblically significant region in Northern Israel. In it he made a point of quoting Acts 1: She is buried with him in his tomb in the Basilica of Santa Croce, Florence. Despite being a genuinely pious Roman Catholic, [29] Galileo fathered three children out of wedlock with Marina Gamba. They had two daughters, Virginia born in and Livia born in , and a son, Vincenzo born in Both girls were accepted by the convent of San Matteo in Arcetri and remained there for the rest of their lives. Livia took the name Sister Arcangela and was ill for most of her life. Vincenzo was later legitimised as the legal heir of Galileo and married Sestilia Bocchineri. To him, it seemed, by comparison with his heartbeat, that the chandelier took the same amount of time to swing back and forth, no matter how far it was swinging. When he returned home, he set up two pendulums of equal length and swung one with a large sweep and the other with a small sweep and found that they kept time together. It was not until the work of Christiaan Huygens, almost one hundred years later, that the tautochrone nature of a swinging pendulum was used to create an accurate timepiece. However, after accidentally attending a lecture on geometry, he talked his reluctant father into letting him study mathematics and natural philosophy instead of medicine. Galileo also studied disegno, a term encompassing fine art, and, in , obtained the position of instructor in the Accademia delle Arti del Disegno in Florence, teaching perspective and chiaroscuro. Being inspired by the artistic tradition of the city and the works of the Renaissance artists, Galileo acquired an aesthetic mentality. In , his father died, and he was entrusted with the care of his younger brother Michelagnolo. In , he moved to the University of Padua where he taught geometry, mechanics, and astronomy until His multiple interests included the study of astrology, which at the time was a discipline tied to the studies of mathematics and astronomy. Cardinal Bellarmine had written in that the Copernican system could not be defended without "a true physical demonstration that the sun does not circle the earth but the earth circles the sun". He circulated his first account of the tides in , addressed to Cardinal Orsini. As a general account of the cause of tides, however, his theory was a failure. If this theory were correct, there would be only one high tide per day. Galileo and his contemporaries were aware of this inadequacy because there are two daily high tides at Venice instead of one, about twelve hours apart. Galileo dismissed this anomaly as the result of several secondary causes including the shape of the sea, its depth, and other factors. It began as a dispute over the nature of comets, but by the time Galileo had published *The Assayer* *Il Saggiatore* in , his last salvo in the dispute, it had become a much wider controversy over the very nature of science itself. Grassi concluded that the comet was a fiery body which had moved along a segment of a great circle at a constant distance from the earth, [50] and since it moved in the sky more slowly than the moon, it must be farther away than the moon. Scientific opposition came from Tycho Brahe and others and arose from the fact that, if heliocentrism were true, an annual stellar parallax should be observed, though none was. Copernicus and Aristarchus had correctly postulated that parallax was negligible because the stars were so distant. However, Brahe had countered that, since stars appeared to have measurable size, if the stars were that distant, they would be gigantic, and in fact far larger than the Sun or any other celestial body. According to Maurice Finocchiaro, this was done in a friendly and gracious manner, out of curiosity. Prompted by this incident, Galileo wrote a letter to Castelli in

which he argued that heliocentrism was actually not contrary to biblical texts, and that the bible was an authority on faith and morals, not on science. This letter was not published, but circulated widely. At the start of , Monsignor Francesco Ingoli initiated a debate with Galileo, sending him an essay disputing the Copernican system. Galileo later stated that he believed this essay to have been instrumental in the action against Copernicanism that followed. Ingoli wrote that the great distance to the stars in the heliocentric theory "clearly proves Barberini was a friend and admirer of Galileo, and had opposed the condemnation of Galileo in . Only the latter of those requests was fulfilled by Galileo. Whether unknowingly or deliberately, Simplicio, the defender of the Aristotelian geocentric view in Dialogue Concerning the Two Chief World Systems, was often caught in his own errors and sometimes came across as a fool. Indeed, although Galileo states in the preface of his book that the character is named after a famous Aristotelian philosopher Simplicius in Latin, "Simplicio" in Italian , the name "Simplicio" in Italian also has the connotation of "simpleton". Most historians agree Galileo did not act out of malice and felt blindsided by the reaction to his book. Galileo had alienated one of his biggest and most powerful supporters, the Pope, and was called to Rome to defend his writings [84] in September . He finally arrived in February and was brought before inquisitor Vincenzo Maculani to be charged. Throughout his trial, Galileo steadfastly maintained that since he had faithfully kept his promise not to hold any of the condemned opinions, and initially he denied even defending them. However, he was eventually persuaded to admit that, contrary to his true intention, a reader of his Dialogue could well have obtained the impression that it was intended to be a defence of Copernicanism. It was in three essential parts: Galileo was found "vehemently suspect of heresy", namely of having held the opinions that the Sun lies motionless at the centre of the universe, that the Earth is not at its centre and moves, and that one may hold and defend an opinion as probable after it has been declared contrary to Holy Scripture. He was required to "abjure, curse and detest" those opinions. His offending Dialogue was banned; and in an action not announced at the trial, publication of any of his works was forbidden, including any he might write in the future. The earliest known written account of the legend dates to a century after his death, but Stillman Drake writes "there is no doubt now that the famous words were already attributed to Galileo before his death". Galileo was ordered to read the seven penitential psalms once a week for the next three years. However, his daughter Maria Celeste relieved him of the burden after securing ecclesiastical permission to take it upon herself. Here he summarised work he had done some forty years earlier, on the two sciences now called kinematics and strength of materials , published in Holland to avoid the censor. This book has received high praise from Albert Einstein. He went completely blind in and was suffering from a painful hernia and insomnia , so he was permitted to travel to Florence for medical advice. In this context, Sobel argues that the problem of Galileo was presented to the pope by court insiders and enemies of Galileo. Having been accused of weakness in defending the church, Urban reacted against Galileo out of anger and fear. In The Assayer , he wrote "Philosophy is written in this grand book, the universe It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures; He was often willing to change his views in accordance with observation. In order to perform his experiments, Galileo had to set up standards of length and time, so that measurements made on different days and in different laboratories could be compared in a reproducible fashion. This provided a reliable foundation on which to confirm mathematical laws using inductive reasoning. Galileo showed a modern appreciation for the proper relationship between mathematics, theoretical physics, and experimental physics. He understood the parabola , both in terms of conic sections and in terms of the ordinate y varying as the square of the abscissa x . Galilei further asserted that the parabola was the theoretically ideal trajectory of a uniformly accelerated projectile in the absence of air resistance or other disturbances. This observation upset the notion that all celestial bodies must revolve around the Earth. Galileo published a full description in Sidereus Nuncius in March The phases of Venus , observed by Galileo in Based only on uncertain descriptions of the first practical telescope which Hans Lippershey tried to patent in the Netherlands in , [] Galileo, in the following year, made a telescope with about 3x magnification. He later made improved versions with up to about 30x magnification. He could also use it to observe the sky; for a time he

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was one of those who could construct telescopes good enough for that purpose. On 25 August , he demonstrated one of his early telescopes, with a magnification of about 8 or 9, to Venetian lawmakers. His telescopes were also a profitable sideline for Galileo, who sold them to merchants who found them useful both at sea and as items of trade. He published his initial telescopic astronomical observations in March in a brief treatise entitled Sidereus Nuncius Starry Messenger. Since these new stars displayed no detectable diurnal parallax , Galileo concluded that they were distant stars, and, therefore, disproved the Aristotelian belief in the immutability of the heavens. On 10 January, Galileo noted that one of them had disappeared, an observation which he attributed to its being hidden behind Jupiter. Within a few days, he concluded that they were orbiting Jupiter: He discovered the fourth on 13 January. These satellites were independently discovered by Simon Marius on the 8th January and are now called Io , Europa , Ganymede , and Callisto the names given by Marius in his Mundus Iovialis published in The heliocentric model of the solar system developed by Nicolaus Copernicus predicted that all phases would be visible since the orbit of Venus around the Sun would cause its illuminated hemisphere to face the Earth when it was on the opposite side of the Sun and to face away from the Earth when it was on the Earth-side of the Sun. Traditionally, the orbit of Venus was placed entirely on the near side of the Sun, where it could exhibit only crescent and new phases. It was, however, also possible to place it entirely on the far side of the Sun, where it could exhibit only gibbous and full phases. Thus in the early 17th century, as a result of his discovery, the great majority of astronomers converted to one of the various geo-heliocentric planetary models, [] such as the Tychonic, Capellan and Extended Capellan models, [d].

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Chapter 2 : Watch Galileo () online. Free streaming

Galileo is popularly given this title because most people have little detailed grasp of the early history of science and Galileo is the only figure in early modern science before Newton that most people have heard of.

The modest house where he was born is today preserved as a Brecht Museum. From her, too, came the "dangerous image of the self-denying woman" that recurs in his drama. When Brecht was 16, the First World War broke out. Initially enthusiastic, Brecht soon changed his mind on seeing his classmates "swallowed by the army". His expulsion was only prevented through the intervention of his religion teacher. But the man he learnt most from was the clown Valentin, who performed in a beer-hall. He did short sketches in which he played refractory employees, orchestral musicians or photographers, who hated their employers and made them look ridiculous. The employer was played by his partner, Liesl Karlstadt, a popular woman comedian who used to pad herself out and speak in a deep bass voice. Between November and April Brecht made acquaintance with many influential people in the Berlin cultural scene. Brecht changed the spelling of his first name to Bertolt to rhyme with Arnolt. In while still living in Munich, Brecht came to the attention of an influential Berlin critic, Herbert Ihering: Brecht is a dramatist because his language is felt physically and in the round. Their daughterâ€” Hanne Hiob â€” â€”was a successful German actress. Opening night proved to be a "scandal"â€”a phenomenon that would characterize many of his later productions during the Weimar Republic â€”in which Nazis blew whistles and threw stink bombs at the actors on the stage. Decline of a Family , opened at the Deutsches Theater in October , but was not a success. From the very start Provided with every last sacrament: And brandy To the end mistrustful, lazy and content. Together the "collective" would go to fights, not only absorbing their terminology and ethos which permeates Man Equals Man but also drawing those conclusions for the theatre as a whole which Brecht set down in his theoretical essay "Emphasis on Sport" and tried to realise by means of the harsh lighting, the boxing-ring stage and other anti-illusionistic devices that henceforward appeared in his own productions. For us, man portrayed on the stage is significant as a social function. It is not his relationship to himself, nor his relationship to God, but his relationship to society which is central. Whenever he appears, his class or social stratum appears with him. His moral, spiritual or sexual conflicts are conflicts with society. Erwin Piscator , The emphasis on Reason and didacticism, the sense that the new subject matter demanded a new dramatic form , the use of songs to interrupt and comment: From that point on Caspar Neher became an integral part of the collaborative effort, with words, music and visuals conceived in relation to one another from the start. The principle, a variety of montage , proposed by-passing the "great struggle for supremacy between words, music and production" as Brecht put it, by showing each as self-contained, independent works of art that adopt attitudes towards one another. Brecht formed a writing collective which became prolific and very influential. Elisabeth Hauptmann , Margarete Steffin, Emil Burri, Ruth Berlau and others worked with Brecht and produced the multiple teaching plays , which attempted to create a new dramaturgy for participants rather than passive audiences. These addressed themselves to the massive worker arts organisation that existed in Germany and Austria in the s. Retitled The Threepenny Opera Die Dreigroschenoper it was the biggest hit in Berlin of the s and a renewing influence on the musical worldwide. One of its most famous lines underscored the hypocrisy of conventional morality imposed by the Church, working in conjunction with the established order, in the face of working-class hunger and deprivation: Erst kommt das Fressen First the grub lit. It was a personal and a commercial failure. Brecht only claimed authorship of the song texts. The Mahagonny opera would premier later in Berlin in as a triumphant sensation. In addition, Brecht worked on a script for a semi-documentary feature film about the human impact of mass unemployment, Kuhle Wampe , which was directed by Slatan Dudow. It still provides a vivid insight into Berlin during the last years of the Weimar Republic. They later bought their own house in Svendborg on Funen. This house located at Skovsbo Strand 8 in Svendborg became the residence of the Brecht family for the next six years, where they often received guests including Walter

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Benjamin , Hanns Eisler and Ruth Berlau. During this period Brecht also travelled frequently to Copenhagen, Paris, Moscow, New York and London for various projects and collaborations. When war seemed imminent in April , he moved to Stockholm , Sweden, where he remained for a year. During the war years, Brecht became a prominent writer of the Exilliteratur. Although he was one of 19 witnesses who declared that they would refuse to appear, Brecht eventually decided to testify. He later explained that he had followed the advice of attorneys and had not wanted to delay a planned trip to Europe. On 30 October Brecht testified that he had never been a member of the Communist Party. The remaining witnesses, the so-called Hollywood Ten , refused to testify and were cited for contempt. The day after his testimony, on 31 October, Brecht returned to Europe. He lived Zurich in Switzerland for a year. It was published under the title *Antigonemodell* , accompanied by an essay on the importance of creating a " non-Aristotelian " form of theatre. In he moved to East Berlin and established his theatre company there, the Berliner Ensemble. He retained his Austrian nationality granted in and overseas bank accounts from which he received valuable hard currency remittances. The copyrights on his writings were held by a Swiss company. Though he was never a member of the Communist Party, Brecht had been schooled in Marxism by the dissident communist Karl Korsch. Brecht received the Stalin Peace Prize in . He dedicated himself to directing plays and developing the talents of the next generation of young directors and dramaturgs, such as Manfred Wekwerth, Benno Besson and Carl Weber. At this time he wrote some of his most famous poems, including the "Buckow Elegies". At first Brecht apparently supported the measures taken by the East German government against the uprising of in East Germany , which included the use of Soviet military force. The great discussion [exchange] with the masses about the speed of socialist construction will lead to a viewing and safeguarding of the socialist achievements. After the uprising of the 17th of June The Secretary of the Writers Union Had leaflets distributed in the Stalinallee Stating that the people Had forfeited the confidence of the government And could win it back only By redoubled efforts. Would it not be easier In that case for the government To dissolve the people Death[edit] Brecht died on 14 August [66] of a heart attack at the age of . A report of a radiograph taken of Brecht in describes a badly diseased heart, enlarged to the left with a protruding aortic knob and with seriously impaired pumping. Brecht thought that the experience of a climactic catharsis of emotion left an audience complacent. Instead, he wanted his audiences to adopt a critical perspective in order to recognise social injustice and exploitation and to be moved to go forth from the theatre and effect change in the world outside. Brechtian theatre articulated popular themes and forms with avant-garde formal experimentation to create a modernist realism that stood in sharp contrast both to its psychological and socialist varieties. Brecht believed, "Traditional Chinese acting also knows the alienation [sic] effect, and applies it most subtly. The [Chinese] performer portrays incidents of utmost passion, but without his delivery becoming heated. He recognized that the Chinese style was not a "transportable piece of technique," [77] and that Epic theatre sought to historicize and address social and political issues. Many of the poems take a Marxist [citation needed] outlook. Throughout his theatric production, poems are incorporated into this plays with music. In , Brecht issued a recantation of his apparent suppression of poetry in his plays with a note titled *On Poetry and Virtuosity*. It seemed not only unimportant, but misleading, and the reason was not that the poetic element had been sufficiently developed and observed, but that reality had been tampered with in its name Such works and performances may have some effect, but it can hardly be a profound one, not even politically. For it is a peculiarity of the theatrical medium that it communicates awarenesses and impulses in the form of pleasure: In particular, the poem " Reminiscence of Marie A. Brecht at Night by Mati Unt , transl. The film *Witness 11* draws upon historical events exploring the justice-thirsty courtroom through the eyes of Brecht as he is called to testify in front of the House Un-American Activities Committee. In the novel *Leaving Berlin* by Joseph Kanon , Brecht appears as a cynical returnee to Soviet Berlin, lauded by the authorities as a symbol of communist German culture and willing to ignore moral issues to pursue his art. This is "theatre as collective experiment [

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Chapter 3 : History of science - The rise of modern science | blog.quintoapp.com

Galileo - the establisher of modern science Enikő Biró Kabály Mathematics-physics teacher, Reformed Secondary Grammar School, Debrecen, Hungary phd-student, Eötvös Loránd University, Budapest, Hungary.

A Life of Galileo: Book Review , Culture , Science The central tourist strip of Stratford-upon-Avon is not the sort of place you expect to find much Marxism. The play is very much a product of the late s, re-written by Brecht in in the still-blazing light of Hiroshima. The Galileo portrayed here is far from heroic. The play may start with Galileo naked, but he makes no pretence at purity. More to the point, the play is much more about the distribution of power than the doctrines of Catholicism. Later, after Galileo is threatened with torture and renounces his earlier work as heresy, one of these workers turns to the others to complain: In many ways, the science is there for symbolic purposes too. There is much talk of being unsettled and the people not knowing their "place", as this particular thread of the scientific revolution is used as an extended allegory for possible social ones. There is, importantly, still the worry that scientists themselves will become too powerful and simply create new hierarchies based on their own claims to expertise. This is why Galileo is shown up for exploiting his workers and we are continually told of the use of the worth of listening to people to make better science. Galileo replies humbly "No. Unhappy the land that is in need of heroes". Our scientist is an anti-hero not just for dramatic reasons or historical accuracy, but because Brecht wants to argue for collective rather than individual agency when it comes to understanding our world and working out how to make it better. The rallying cry of this play is to build a science and technology for the people, by the people, not simply defer to experts. Perhaps befitting the astronomy-based talk of a topsy-turvy world, this new RSC production is a highly carnivalesque affair. This street festival then turns into a ball, with Galileo in shiny shoes, his daughter in a gown to announce her engagement to a wealthy landowner and clerics in glittery animal masks. Throughout, the historical span of the play is connected with a chorus who set the scenes by sing into large microphones. Ian McDiarmid, playing Galileo, seems to dance around the stage as the boyish scientific excitement comes almost entirely from his hips. Indeed, the BP deal invites us to think about one of the plays key themes: As Galileo bitterly declares in his closing speech: If scientists follow the orders of those in power, if they store up knowledge for the sake of storing it up, then science will be crippled and your new machines will bring new forms of oppression. Apples have iconic status in the history of knowledge. Apparently Newton also thought he was no coincidence he shared a birthday with Christ, make of that what you will. We should expect scientists to share their work and be public accountable, but non-scientists should be proactive in the processes of opening it up too: Work with scientists and put them to work because other people already are. Be inspired by the possibilities. Bite into that apple. Dr Alice Bell is a research fellow at the University of Sussex, focusing on public engagement with science.

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Chapter 4 : Galileo by Bertolt Brecht

The modern period has widely been regarded as one of the most innovative and productive in the history of the theatre and the modern plays such as Bertolt.

Table of Contents Brief Overview Galileo Galilei was born in Pisa, Italy, on February 18, 1564, to a family of aristocratic lineage but average wealth. When he was seventeen, his father, a noted musician who also earned money in the wool trade, sent him to study medicine at the University of Pisa. Galileo, however, soon turned to a career in mathematics. A lack of money forced him to leave school in 1585, and for four years he supported himself by tutoring students in mathematics. In 1589 he obtained a position lecturing at the University of Pisa, where he remained for three years, making discoveries that challenged the then-dominant view of physics, which was based on the ancient writings of the Greek philosopher Aristotle. Most famously, he discovered that two objects, dropped from the same height, fall at the same rate regardless of their weight. In 1592, he moved on to the University of Padua, where he would remain for more than fifteen years. There, he met Marina Gambi, who became his mistress and bore him three children. He also did groundbreaking research in physics, discovering the law of inertia and paving the way for the work of Sir Isaac Newton in the 17th century. Meanwhile, in the world of astronomy, a great debate was raging between the ancient system of Ptolemy, which placed the earth in the center of the universe, and heliocentric system of Copernicus, which posited the sun at the center, and the earth in an orbit around it. In 1609, after word came from Holland of the invention of the telescope, Galileo built his own version of the instrument. In 1610 he published *Sidereus Nuncius*, cataloguing his discoveries, and the book made him a celebrity in Europe. Using new evidence provided by his telescope, Galileo now began to advocate strongly the Copernican theory. The Catholic Church, however, disapproved of heliocentricity, feeling that it was contrary to the statements in the Bible: In 1616 the Church sent Galileo formal warning that they considered his theory a denial of Christian doctrine. Thus he refrained from publishing anything about his theories for the next decade, but the ascension of a liberal Pope, Urban VIII, encouraged him to publish the *Dialogue Concerning the Two Chief World Systems* in 1632, which openly argued for the Copernican system. The Church now accused Galileo of heresy, tried him before the Inquisition, and forced him to renounce his views and submit to the Church. Galileo lived under house arrest for the last eight years of his life. Yet he still continued to write: Galileo went blind in 1634 and died on January 8, 1642, at the age of seventy-seven.

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Chapter 5 : Bertolt Brecht (Author of Mother Courage and Her Children)

Galileo Master of Science Galileo is considered one of the best known scientists of his time; he was a teacher, astronomer, philosopher, and physicist and was known to be a major contributor to science during the scientific revolution.

The rise of modern science The authority of phenomena Even as Dante was writing his great work, deep forces were threatening the unitary cosmos he celebrated. The pace of technological innovation began to quicken. Particularly in Italy, the political demands of the time gave new importance to technology, and a new profession emerged, that of civil and military engineer. These people faced practical problems that demanded practical solutions. Leonardo da Vinci is certainly the most famous of them, though he was much more as well. A painter of genius, he closely studied human anatomy in order to give verisimilitude to his paintings. As a sculptor, he mastered the difficult techniques of casting metal. As a producer-director of the form of Renaissance dramatic production called the masque, he devised complicated machinery to create special effects. But it was as a military engineer that he observed the path of a mortar bomb being lobbed over a city wall and insisted that the projectile did not follow two straight lines—a slanted ascent followed by a vertical drop—as Aristotle had said it must. Leonardo and his colleagues needed to know nature truly; no amount of book learning could substitute for actual experience, nor could books impose their authority upon phenomena. The hold of ancient philosophy was too strong to be broken lightly, but a healthy skepticism began to emerge. The first really serious blow to the traditional acceptance of ancient authorities was the discovery of the New World at the end of the 15th century. Ptolemy, the great astronomer and geographer, had insisted that only the three continents of Europe, Africa, and Asia could exist, and Christian scholars from St. Augustine on had accepted it, for otherwise men would have to walk upside down at the antipodes. Augustine, and a host of other authorities were wrong. The dramatic expansion of the known world also served to stimulate the study of mathematics, for wealth and fame awaited those who could turn navigation into a real and trustworthy science. In large part the Renaissance was a time of feverish intellectual activity devoted to the complete recovery of the ancient heritage. To the Aristotelian texts that had been the foundation of medieval thought were added translations of Plato, with his vision of mathematical harmonies, of Galen, with his experiments in physiology and anatomy, and, perhaps most important of all, of Archimedes, who showed how theoretical physics could be done outside the traditional philosophical framework. The results were subversive. The search for antiquity turned up a peculiar bundle of manuscripts that added a decisive impulse to the direction in which Renaissance science was moving. These manuscripts were taken to have been written by or to report almost at first hand the activities of the legendary priest, prophet, and sage Hermes Trismegistos. Hermes was supposedly a contemporary of Moses, and the Hermetic writings contained an alternative story of creation that gave humans a far more prominent role than the traditional account. God had made humankind fully in his image: Humans could imitate God by creating. The reward for success would be eternal life and youth, as well as freedom from want and disease. It was a heady vision, and it gave rise to the notion that, through science and technology, humankind could bend nature to its wishes. This is essentially the modern view of science, and it should be emphasized that it occurs only in Western civilization. It is probably this attitude that permitted the West to surpass the East, after centuries of inferiority, in the exploitation of the physical world. The Hermetic tradition also had more specific effects. Inspired, as is now known, by late Platonist mysticism, the Hermetic writers had rhapsodized on enlightenment and on the source of light, the Sun. Marsilio Ficino, the 15th-century Florentine translator of both Plato and the Hermetic writings, composed a treatise on the Sun that came close to idolatry. A young Polish student visiting Italy at the turn of the 16th century was touched by this current. Back in Poland, he began to work on the problems posed by the Ptolemaic astronomical system. With the blessing of the church, which he served formally as a canon, Nicolaus Copernicus set out to modernize the astronomical apparatus by which the church made such important calculations as the proper dates for Easter

and other festivals. The scientific revolution Copernicus In , as he lay on his deathbed, Copernicus finished reading the proofs of his great work; he died just as it was published. The scientific revolution radically altered the conditions of thought and of material existence in which the human race lives, and its effects are not yet exhausted. The astronomer is shown between a crucifix and a celestial globe, symbols of his vocation and work. Copernicus actually cited Hermes Trismegistos to justify this idea, and his language was thoroughly Platonic. But he meant his work as a serious work in astronomy , not philosophy, so he set out to justify it observationally and mathematically. The results were impressive. At one stroke, Copernicus reduced a complexity verging on chaos to elegant simplicity. Variation in planetary brightness was also explained by this combination of motions. The fact that Mercury and Venus were never found opposite the Sun in the sky Copernicus explained by placing their orbits closer to the Sun than that of the Earth. Indeed, Copernicus was able to place the planets in order of their distances from the Sun by considering their speeds and thus to construct a system of the planets , something that had eluded Ptolemy. This system had a simplicity, coherence , and aesthetic charm that made it irresistible to those who felt that God was the supreme artist. His was not a rigorous argument, but aesthetic considerations are not to be ignored in the history of science. He had to keep some of the cumbrous apparatus of epicycles and other geometrical adjustments, as well as a few Aristotelian crystalline spheres. The result was neater, but not so striking that it commanded immediate universal assent. Moreover, there were some implications that caused considerable concern: Why should the crystalline orb containing the Earth circle the Sun? And how was it possible for the Earth itself to revolve on its axis once in 24 hours without hurling all objects, including humans, off its surface? No known physics could answer these questions, and the provision of such answers was to be the central concern of the scientific revolution. More was at stake than physics and astronomy, for one of the implications of the Copernican system struck at the very foundations of contemporary society. If the Earth revolved around the Sun, then the apparent positions of the fixed stars should shift as the Earth moves in its orbit. Copernicus and his contemporaries could detect no such shift called stellar parallax , and there were only two interpretations possible to explain this failure. Either the Earth was at the centre, in which case no parallax was to be expected, or the stars were so far away that the parallax was too small to be detected. Copernicus chose the latter and thereby had to accept an enormous cosmos consisting mostly of empty space. God, it had been assumed, did nothing in vain, so for what purposes might he have created a universe in which Earth and humankind were lost in immense space? To accept Copernicus was to give up the Dantean cosmos. The Aristotelian hierarchy of social place, political position, and theological gradation would vanish, to be replaced by the flatness and plainness of Euclidean space. All astronomers were aware of it, some measured their own views against it, but only a small handful eagerly accepted it. In the century and a half following Copernicus, two easily discernible scientific movements developed. The first was critical, the second, innovative and synthetic. They worked together to bring the old cosmos into disrepute and, ultimately, to replace it with a new one. Although they existed side by side, their effects can more easily be seen if they are treated separately. Tycho, Kepler, and Galileo The critical tradition began with Copernicus. It led directly to the work of Tycho Brahe , who measured stellar and planetary positions more accurately than had anyone before him. But measurement alone could not decide between Copernicus and Ptolemy, and Tycho insisted that the Earth was motionless. Copernicus did persuade Tycho to move the centre of revolution of all other planets to the Sun. To do so, he had to abandon the Aristotelian crystalline spheres that otherwise would collide with one another. Tycho also cast doubt upon the Aristotelian doctrine of heavenly perfection, for when, in the s, a comet and a new star appeared, Tycho showed that they were both above the sphere of the Moon. Perhaps the most serious critical blows struck were those delivered by Galileo after the invention of the telescope. In quick succession, he announced that there were mountains on the Moon, satellites circling Jupiter, and spots upon the Sun. Moreover, the Milky Way was composed of countless stars whose existence no one had suspected until Galileo saw them. Engraving of Tycho Brahe at the mural quadrant, from his book *Astronomiae instauratae mechanica* The engraving depicts Brahe, in the centre with arm upraised, and the work of his observatory at Uraniborg, on the island of Ven. The hound at his feet

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symbolizes loyalty. Courtesy of the Joseph Regenstein Library, University of Chicago At the same time Galileo was searching the heavens with his telescope, in Germany Johannes Kepler was searching them with his mind. Ellipses tied all the planets together in grand Copernican harmony. The Keplerian cosmos was most un-Aristotelian, but Kepler hid his discoveries by burying them in almost impenetrable Latin prose in a series of works that did not circulate widely. Kepler, Johannes Johannes Kepler, oil painting by an unknown artist, ; in the cathedral of Strasbourg, France. If the Earth revolves on its axis, then why do objects not fly off it? And why do objects dropped from towers not fall to the west as the Earth rotates to the east beneath them? And how is it possible for the Earth, suspended in empty space, to go around the Sun—whether in circles or ellipses—without anything pushing it? The answers were long in coming. Bodies do not fly off the Earth because they are not really revolving rapidly, even though their speed is high. In revolutions per minute, any body on the Earth is going very slowly and, therefore, has little tendency to fly off. Bodies fall to the base of towers from which they are dropped because they share with the tower the rotation of the Earth. Hence, bodies already in motion preserve that motion when another motion is added. So, Galileo deduced, a ball dropped from the top of a mast of a moving ship would fall at the base of the mast. If the ball were allowed to move on a frictionless horizontal plane, it would continue to move forever. Hence, Galileo concluded, the planets, once set in circular motion, continue to move in circles forever. Therefore, Copernican orbits exist. From left to right are Aristotle, Ptolemy, and Copernicus. Ptolemy holds an astrolabe, Copernicus a model of a planet orbiting the Sun. Courtesy of the Joseph Regenstein Library, The University of Chicago Kepler realized that there was a real problem with planetary motion. He sought to solve it by appealing to the one force that appeared to be cosmic in nature, namely magnetism. The Earth had been shown to be a giant magnet by William Gilbert in , and Kepler seized upon this fact. A magnetic force , Kepler argued, emanated from the Sun and pushed the planets around in their orbits, but he was never able to quantify this rather vague and unsatisfactory idea.

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Chapter 6 : Bertolt Brechts Life of Galileo: Social and individual concerns are Essay

Leben des Galilei = Life of Galileo = Galileo, Bertolt Brecht Life of Galileo (German: Leben des Galilei), also known as Galileo, is a play by the twentieth-century German dramatist Bertolt Brecht with incidental music by Hanns Eisler.

The type written on a Sunday afternoon with a hangover. It is in this rejection that we can observe, what is perhaps, the driving force in Brechtian theatre; doubt Thomson It spans from the arrival of the telescope to Italy through to his persecution and exile by the Catholic Church, presenting his major scientific and astrological 1 Student number: Brecht wrote three versions of the play, the final version of which was first performed in Cologne on the 16 April Marx believes that theory 1 White 53 extract from Marianne Kesting: Bertold Brecht in *Selbstzeugnissen und Bilddokumenten* Reinbek , p. Selected Writings, Oxford p. III, New York p. Our theatre must stimulate the pleasure of recognising truth All the skill and fun of the inventor or discoverer, all the triumphant feelings of the liberator must be taught by our theatre. Brechtian theatre is didactic, defying, what was called, the Aristotelian tradition, which sought only to represent real life. Brecht wanted to show the changing world and, in keeping with his Marxist perspective, to educate his audience. Marx believed that for science to enable social revolution, it must be accessible to the people; therefore, science and politics are directly associated, and here one can have difficulty interpreting *Life of Galileo*. There are repeated 3 Student number: Furthermore Galileo is willing to forgo comfort, as illustrated by his debt to the milkman, and, ultimately, place his life at risk to indulge in his passion. For Galileo the desire to obtain knowledge is as fundamental as sleeping or eating and so must be regarded as separate from any political allegiance or perspective he may hold. For Brecht, faith represents the antithesis to knowledge and, if we regard its aim as being the collection, organisation and application of knowledge, by extension, the antithesis to science. This idea of religion as an ideal is consistent to Marxist philosophy. The abolition of religion as the illusory happiness of the people is the demand for their real happiness. To call on them to give up their illusions about their condition is to call on them to give up a condition that requires illusions. Though economic conditions may prevent people from finding satisfaction religion offers an illusion to soften this reality. The American version of *Galileo*, written between and with actor and director Charles Laughton, is most demonstrative of this. For example Brecht directs us towards the German scientists, Einstein, Stran and Hausmann, who enabled and developed the concept of nuclear fission. However perhaps the most evident political interpretation of *Galileo*, is as an analogy for Soviet rule. Galileo, who presents ideas dangerous to the dominant power, is the artist working within the communist state, and his persecution reflects the censorship imposed on dissident intellectuals. In this reading science is an embodiment of creative output, and, though this may seem particularly relevant to Brecht, it is 6 Student number: Conclusion *Life of Galileo* is, most certainly, a play about science, but our preconceptions of what science is make this a misleading synopsis. It is in no way a lecture about principles or theories, but instead an examination of the role of science and the scientist across a much broader social and political context. The greatest strength of *Galileo* is that it does not limit us to an authorial reading. Brecht, despite his best efforts, was unable to villainise or condemn his protagonist. Galileo is not a caricature, but a compassionate human being. As a result, we are left to make our own judgement. We are given a right to doubt.

Chapter 7 : Bertolt Brecht - Wikipedia

The rise of modern science was a chorological process of events which involved the founding fathers of the science. This process started from the time of Copernicans in he published the revolutions of the celestial sphere.

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A Life of Galileo: What Brecht can teach us about the public ownership of science by Alice Bell. The Royal Shakespeare Company's new production of Bertolt Brecht's A Life of Galileo puts themes of class struggle front and centre.