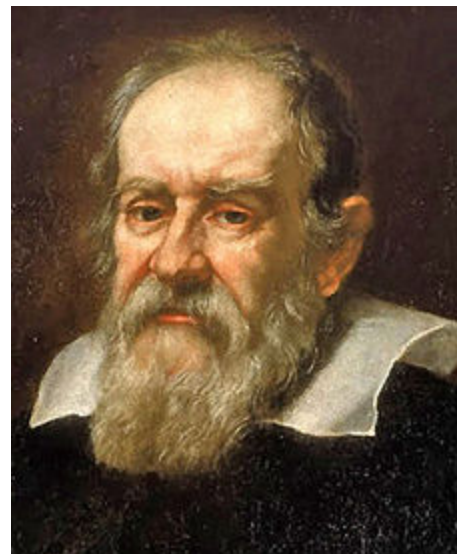


BOOKS THAT CHANGED THE WORLD: Dialogue Concerning the Two Chief World Systems

It is of course an undisputed fact that more than one book were certainly responsible for inducing changes in our understanding of the world as well as of ourselves. In fact many people have prepared lists of 10, 100 or 1000 most influential books ever written. Depending on their cultural, religious and social background there are variations in the content of such lists. However there exist few books that are common in most of these listings. 'Dialogue concerning the Two Chief World System' written by Galileo Galilei in the year 1632 is one such unique book that chartered the course of the scientific revolutions which marked the renaissance period.

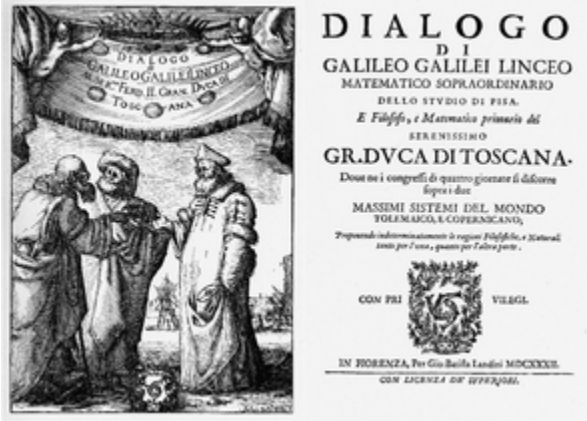
The book was originally written in Italian language and was named *Dialogo sopra i due massimi sistemi del mondo*. Later in 1635 it was translated into Latin as *Systema cosmicum* by Matthias Bernegger. In those days in Europe anything which went against the teachings of the church was considered as heretic and invited punishment meted out by the 'Inquisition' which was a formal Tribunal of the Roman Catholic Church created to discover and suppress heresy. Many intellectuals were burnt at stake or were summarily executed for their teachings or writings which were not in line with the views of the Church. Earth was considered as the centre of the Universe; everything else like the stars and planets revolve round the earth and the astronomy based on this view was called the Ptolemaic system. In 1609 Galileo turned his telescope skywards and found many heavenly bodies orbiting other planets as well as the sun. He was convinced that earth is no longer the centre of the Universe and it is just one of the planets like others going around the sun. In 1543 Nicolaus Copernicus had already put forward the idea that the geocentric system of the world is not tenable and the planets revolve around the sun. One strong objection against such sun-centered or the heliocentric system was the motion of the earth through space is not felt by us living on it and for all practical purposes earth appeared to be stationary.

In his 1632 *Dialogue* Galileo presented a physical theory to account for tides, based on the motion of the Earth. If correct, this would have been a strong argument for the reality of the Earth's motion. In fact, the original title for the book described it as a dialogue on the tides; the reference to tides was removed by order of the Inquisition. His theory gave the first insight into the importance of the shapes of ocean basins in the size and timing of tides; he correctly accounted, for instance, for the negligible tides halfway along the Adriatic Sea



compared to those at the ends. As a general account of the cause of tides, however, his theory was a failure. Kepler and others correctly associated the Moon with an influence over the tides, based on empirical data. A proper physical theory of the tides, however, was not available until Newton.

Few books have ever caused the authors such hardship as the *Dialogue*. The *Dialogue* was published in Florence under a formal license from the Inquisition appointed by the Church.



Following the publication of the *Dialogue* Galileo had to stand trial in 1633 and was found 'guilty'. Galileo was convicted of "grave suspicion of heresy" based on the book and he was placed under house arrest for the rest of his life. *Dialogue* was then placed on the Index of Forbidden Books. In another action by the Church the publication of anything else he had written or ever might write was also banned by the Authorities. He became blind in 1638 and died of fever and heart problems in 1642. Only in 1822 the theories which *Dialogue* discussed

were permitted to be printed and consequently in 1835 it was removed from the Index of Forbidden Books. Vatican waited for three and half centuries before they cleared Galileo Galilei of all charges of blasphemy.

When the manuscript went to the Inquisition for approval its title was *Dialogue on the Ebb and Flow of the Sea*. Galileo was ordered to remove all mention of tides from the title and to change the preface, since granting approval to a title containing the word 'Tides' would look like approval of his theory of tides, which attempted to prove the motion of the earth physically. As a result, the formal title on the front page is *Dialogue*, which is followed by Galileo's name and academic positions followed by a long subtitle. The name by which the current title is known is extracted from deep within the subtitle from which Galileo's motives for writing the book are evident.

The book is presented as a series of discussions among two philosophers and a layman over a period of four days. Salviati is an Academician who argues and presents the case for the Copernican system and through this person Galileo presents his own views about the heliocentric world. He is actually named after Galileo's friend Filippo Salviati. Sagredo is an intelligent layman who is initially neutral and this gentleman is named after another friend of his viz., Giovanni Francesco Sagredo. The third person, Simplicio is a dedicated follower of Ptolemy and Aristotle and presents the traditional views and arguments against the Copernican system. Simplicio is modeled after one of his Paduan colleague (Cesare Cremonini) who refused to look through the telescope.

Although the book is written in a manner where formally both systems are supposed to get equal treatment, as it was necessary to get it published at all, it is obvious that the Copernican side gets a better treatment and consequently Galileo succeeds in getting his viewpoint well established. The discussion is not narrowly limited to astronomical topics, but covers much wider subjects which touch the contemporary science of those days. By considering the behaviour of objects and creatures within a smooth sailing ship and a ship docked in a port he gets across the idea of ‘inertial frames’ of reference, the concept of which became handy for Albert Einstein to develop his theory of relativity nearly three centuries later.

After nearly four centuries we may find some flaws in Galileo’s arguments; but there is no doubt, in those days the *Dialogue* must have produced a paradigm shift in the thinking of humanity. Galileo is one of the earliest authors who showed the courage to stand up to his convictions and was bold enough to challenge the authorities risking his freedom and life itself. Deviating courageously from the Aristotelian approach of dumping everything as the ‘nature of things’ Galileo showed how logic and reason can be used successfully to explain natural phenomena. Thus one may say that the *Dialogue* marked the birth of a new scientific age. He is now considered to be the “father of modern science”. As Stephen Hawking says “Galileo, perhaps more than any other single person, was responsible for the birth of modern science”. The *Dialogue* by Galileo Galilie spearheaded this scientific revolution ushering in the era of Renaissance in Europe.

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