

RESEARCH DONE IN THE EFFECT OF LITERATURE ON SOCIETY OVER TIME.

TO WHAT EXTENT DID LITERATURE CAUSED A CHANGE IN THE AREA OF PHYSICS?

Literature is the reflection of a society. The main events that happen in there, come to the format of writing. With that, space discoveries are much more than the human ego, to understand the nature of the world and how it began. For centuries now, it has been discussed what happens out of earth. The constant expansion of science knowledge, helped understand those factors. And build a more complex literature by sparking the imagination of science fiction authors, challenging existential themes and shaping science fiction.

Firstly, scientific discoveries has helped on the authors to develop their creative thinking skills. The constant space discoveries, made the society more aware about what happens around Earth, and inspired scientists to base their novels, around those concepts. One example can be given, during the space race. When Apollo 11 landed the first men on the moon, in 1969. At the time, it stunned society. During the time, science was polarizing over politics. This was a very significant movement to literature. Authors were fascinated by the concept of orbital and quantum mechanics in space. With that, they started pushing boundaries, to write about future scenarios, based on those theories. As a consequence, space novels, were mostly about travelling over stars, to other planets and contact with other species (aliens). One example can be given by the novel by Larry Niven "Ring World". In this novel the main character, Louis Wu, is on a mission at the ring world ro2 tating to an artificial world, that was created by an alien. In this example, is possible to analyse the author uses the idea of going into another universe. In which is principally described as a flat surface. Here the author uses some of the concepts of orbital mechanics. Because the massive ring was healed by gravitational forces. Or when the stability depends on the rotation, for the generation of artificial gravity (emulation of the force of gravity). In this extracts, is possible to analyse that the author based himself on those concepts, to explain why the structure could remain pleasurable around the star. In other terms, the author said that the stability depends on angular momentum (bodies rotational intertia) for the generation of the force of gravity.

Furthermore, another physics concept, used is the space travel, mixed with the concept of interstellar exploration. The plot itself, focuses on going to distance stars, and civilizations. The character, uses advance technology to travel towards space. In this process, as he encounters with "aliens", there is the concept of interstellar travel. As an overall, what stunned the authors creativity, were the new physical ideas being presented and discussed. Those made them base their novels on them Another example can be given by the film Interstellar. Here the authors, based themselves on the concept of the space time. The movie is about a dad, who is chosen to get into a space mission. In order to find another orbit, where humans can leave, before Earth resources end up. Here the author based himself, in the idea of time dilatation. And how in each place in space it passes different. One clear example can be when he leaves. His daughter is eight years old, and he is over thirty six. When he comes back, his face continues the same. While his daughter is over a hundred and twenty years old. In this example of the movie, there is a reference on how time passes slower in space. Five years on Earth, are considered one in space. And this is the main ideia the author

wanted to pass. Secondly, science is also used in literature as a form of questioning the impact of knowledge. Physics challenges the concept of reality. Space advancements have shown how technology is developing fast. Scientists are trying to push boundaries each time more, for understanding other types of life, out of Earth. For example on the time, scientists were promoting studies of possible life conditions in Mars. Moreover, principally now a days, but also for a good time now, authors have been questioning, the consequences of space exploration. While literature received this influence, and questions about the role of scientists when using this knowledge. With that, science fiction developed a concept, that mixes with dystopia. Where they discuss about the abuses of science discoveries to Earth.

One example can be given by Mary Shelly, on the book "Frankenstein". At the time, the author was inspired by the fast development of galvanism and electromagnetism. As a consequence, the book is about a scientist who creates a sapient 3 creature, in a scientific experiment. The book had the objective of raising the question, of the consequences in exceeding the limits of understanding and ethical implications. The creation of the creature, serves as an example of dangers about unchecked scientific curiosity. It serves as an example of how the constant expansion, is not always positive, because is happening to fast. Furthermore, another example can be given, in relation to space travel. Written by Stanis law Lem "Solaris". The author was a strong fan of cosmology and space exploration. As a consequence, is a book that criticises the constant search of humans for knowledge. The book is about a scientist, on a research station, where they try to understand the extraressial intelligence. Therefore, they are cared to a vast ocean, at a titular alien planet. In this example, is being done a critique, for the constant human desire for the exploration of what is unknown. The author wanted to criticize the constant expansion to space, and its consequences.

As an overall, literature can be defined as a reflection, of what is happening in society. With that, scientific events were also so stunning, that made people interested on knowing more about them. And at the same time generated more theories and critiques to space.

Physics theories explained

Physics is a field with incredible scientists, that help us to build the knowledge we have today. With that, during history people became each time more interested on what is happening in the universe. Modern films, such as Interstellar were done with the aim of explaining them. As a consequence, the most diverse theories were discussed. Such as the cosmological principle, space time, time travelling, parallax and the cosmic distance ladder. Firstly, the cosmological principle is the idea that the universe is homogeneous and isotropic. With that, the principle states that the universe would be the same everywhere. Independent of the direction that you would look, there would be no difference. One visual idea, can be given by a desert. It looks the same everywhere. Secondly, Space time proved a wrong universal theory. Space is where things happen. Time is defined as when things happen. When it comes to the concept of space time, it is the idea of opening multiple perspectives. As if there were different windows being opened, each one showing a different perspective. In mathematical terms, it can be defined as the model that uses three dimensions of space (height, length and width), and one of time. With that, space would have a four dimension framework. This event generates what is known as the theory of general relativity. Which explains that space time is

interconnected. The theory is used to explain why space time is interconnected, why space was considered curved, how time is relative, the idea of physical and nonphysical events, and can be measured by three geometries. Space time is interconnected because of two main factors. The speed of light is constant and the laws of physics are constant. Firstly, the speed of light became seen as an independent constant. With that, it is of extreme importance considering that those are not two independent entities.

They are directly proportional to each other, because they are a continuation to each other. In addition, there is the need to consider that the presence of matter and energy, cause the space to curve. This happens because of gravity. According to the theory of general relativity space is not "flat", but the curvature is caused by the presence of planets. The planets cause a deformation to the surface. This deformation happens in four dimensions. Moreover, according to the Einstein general relativity theorem, time is not exact, it is relative. The speed of light is independent of the motion, independent of the observer. This happens, because each person is going to feel it during a moment in space. So, the event will never happen for both of them, at the same time and end at the same time. One example can be given by a metro station. On the platform, when you are outside the train seems to be passing very fast. However, when you are inside the movement, it seems that time passes slowly. So, if there is one person inside, looking at you, and you are inside the metro looking at them, in their vision you will pass very fast. While, in your vision, they will pass slowly. Events in space time are described by the x,y, z and t. Where "t" by its definition, is the time, and the other coordinates are the physical location and position of the object. With that, the coordinates are used to cite the possible locations of it. It directly connects to the idea of four dimensions. Besides, there is also the point of the physical and nonphysical events. Physical events are described as something that we can measure in space and time, that happens slower than the speed of light, and can be defined as something that can physically happen. So, for example, run on a bike at a speed of 150km per hour. While a nonphysical event, are events that happen at a speed faster than the speed of light. One example can be given by traveling to the sun in 8 minutes. This is a non physical event, because it is impossible to happen. Lastly, there is also the need to consider that there are three different geometries. The use of pythagoras, hyperbolic and spherical geometry. With that, the hyperbolic and spherical geometry are used in the idea of spherical space. While pythagoras is the method used in the flat space. Thirdly, the idea of time is that is relative. An event will never have a specific timing. For each person it will pass in a different format, and will finish during a different time. Even when it happens on the same space.

One example can be given by a train station. When you are inside a train moving, looking at a person outside, it seems that you are passing in a low speed. But, for the person outside the train is going to be different. In their point of view, you are just going to be there for a fraction of seconds. In their vision, the time is passing in a different format.

5 Fourthly, The cosmological distance ladder refers to the form that astronomers use to measure distances in the sky. Using principally what is known as parallax. Parallax is defined as the displacement the object passes to, caused because of a change in the observer's point of view. In astronomy, it is a method for observing celestial objects and stars that relies on the principle of triangulation. In which can only be used for the close stars only, and is a very accurate method. In other words, the parallax method cites, that if you are in a car, looking at the window. There are trees in the front and mountains on the back. From your point of view, the trees will seem to be moving. And this is due, the shift in your own vantage point. Another example can be given. By when you place your finger close to your eyes, in front of your nose. Close one of the eyes. The finger is going to move a little bit. Now switch the eyes, and

move to the other side. You are basically measuring the distance between both of them. This is caused because your eyes are too far away apart. With that, if you repeat the experiment but, putting the finger further away from you, it is going to change less. And because of this idea, we can apply it in astronomy. By using the Earth and the Sun for it. If we measure the distance from Earth to a star, and then do this again six months apart, you can see they are further away apart. This is caused because we are measuring from a different place on the orbit. As a consequence, we use the movement to measure the distance, because the position has changed.