Extraterrestrial Anthropomorphism: Hollywood's Sci-fi Revolution

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Abstract

Perhaps because of their tremendous popularity, Hollywood's sci-fi films have exerted a powerful influence on our psyches – piquing our curiosity and igniting our imagination regarding life beyond Earth.

Hollywood's science fiction franchise has richly entertained us over many decades. From 2001: A Space Odyssey to Star Trek, Star Wars, and Avatar, science fiction films have kept us on the edge of our seats. Who doesn't enjoy X-wings shooting down Tie fighters in an effort to keep the Death Star from destroying the Rebel base, or the sentient HAL 9000 on Discovery One? I'm sure you would be hard pressed to find a person who doesn't have at least one favorite Hollywood science fiction film. Perhaps because of their tremendous popularity, Hollywood's sci-fi films have exerted a powerful influence on our psyches – piquing our curiosity and igniting our imagination regarding life beyond Earth. One of Hollywood's greatest impacts is the anthropomorphism of modern day extraterrestrials. Nowadays, the world "alien" is synonymous with two-legged walking humanoids with bug eyes, green skin and round, almost child-like heads. Is this what extraterrestrial life on another planet would be like, or is this merely an extrapolation of our imagination, aided by the overarching influence that the media has induced?

Who doesn't love E.T., one of the 20th century's most famous extraterrestrials? From the eye and nose placement to the oval-shaped head, everything about E.T. is oddly human. Well maybe everything except for the glowing finger. (Image of E.T. is copyright of Universal Studios and courtesy of dvdsnapshot.com)

To answer this question, we would have to look at the history of human evolution on our own planet. The Earth was formed around 4.5 billion years ago and the first sign of life on this planet was around 3.6 billion years ago in the form of simple, prokaryotic cells. In that entire time period, all species in the genus Homo (including modern day humans) have been around for only the most recent 2.5 million years, or a mere 0.069% of the total history of life on Earth. To put this into context, as my favorite astrophysicist Neil Degrasse Tyson does on Cosmos: A Spacetime Odyssey, if we were to look at the cosmic calendar with January 1st being the Big Bang, the history of humans fills only the last minute of the last day of the year, 11:59pm on December 31st. Let that sink in for a minute. Isn't that nuts? And not only that, but look at all the steps that had to be taken before human evolution could even take place. Organisms had to evolve to walk on land. They also had to find the right conditions that would be advantageous for bipedalism. After all, if walking on two legs served no evolutionary benefit to organisms, then natural selection would not favor it at all. On top of that, during the 3.6 billion year history of life, there have been five major mass extinctions, all resulting in dramatic changes in the organismal hierarchies of the world.

For example the Cretaceous-Tertiary extinction event 66 million years ago brought about the abrupt end of the dinosaurs and dawned the age of mammals which allowed for humans to evolve. Without this event, dinosaurs would still be around and the world would be a modern day Jurassic Park, minus the humans. Putting it all together, it can be said that the evolution of humans on Earth is due to a combination of pure chance and extenuating circumstances. As New York Times columnist George Johnson recently noted, the emergence of humans on Earth was akin to hitting the lottery. The chance of winning the grand

prize for the Powerball is 1 in 175 million. The emergence of humanlike intelligence is about as likely as if a Powerball winner kept buying tickets and, round after round, kept winning a bigger jackpot each time. You do the calculation, but it doesn't take a mathematician to realize that the odds are stacked against us.

If it weren't for a chance asteroid strike, these guys may have still been walking the Earth today and we may not have been around. All we can do now is look back and wonder, "what if?" (Image courtesy of Stan Winston Studio)

Now let's look at the conditions that allowed for human evolution and compare them to the conditions that may exist on recently-discovered exoplanets. Earth is unique in that it is the only currently-known planet with liquid water on its surface. It is universally accepted that life on Earth arose in the oceans and then moved to land. For a planet to have liquid water on its surface, it has to orbit its host star within an annular zone called the habitable zone. This zone represents the optimum distance of the planet from its sun which would allow for liquid water to be on its surface. Too close and the water would evaporate, leaving a terrain that is as barren and empty as the surface of Mercury. Too far and the water would freeze, leaving only traces like we see in the polar ice caps of Mars.

It is difficult to determine whether or not an exoplanet orbits within its star's habitable zone, because many of the parameters that constrain the location and extent of the habitable zone are uncertain. These include the star's luminosity and degree of variability, the planet's orbital distance and degree of ellipticity, along with whatever warming atmosphere the planet may have. These parameters remain open to scientific debate. A study done by the Jet Propulsion Laboratory at CalTech in 2011 estimated that between 1 and 3 percent of stars like the Sun will contain Earth-like exoplanets orbiting within their host stars' habitable zones (see Catanzarite and Shao 2011). Actually finding and characterizing an Earth-like planet orbiting a Sun-like star within that star's habitable zone remains a major challenge, however.

Most of the exoplanets that have been discovered are gas giants which can't really support complex multi-cellular life forms. Finding and characterizing the much smaller Earth-like planets will require significant advances in our remote sensing technologies. Even if an Earth-like planet with clement surface temperatures is discovered, then the chemical conditions of the planet must be "ripe" for life to grow. The four most abundant elements in the universe are hydrogen, helium, oxygen and carbon. We breathe in oxygen and need it for our respiratory functions, but who knows what aliens would use? Perhaps they use hydrogen and helium for respiration, although helium would be unlikely because it is inert. If aliens are going to be like us humans, then they would probably be carbon-based organisms that use oxygen for respiration. That still leaves lots of wiggle room for evolution to proceed along many diverse paths. There is most likely an exoplanet out there that has all of the conditions for humanoid evolution to occur, but the chances of humanoids having actually developed there remain very poor.

So taking this all into account, why do we still shape aliens in our image? The answer, at least what I believe is the answer, goes beyond science. We see ourselves as the apex species on this planet. Where else on Earth would you see another species with great civilizations (the apes from Planet of the Apes don't count)? Where else would you see a species with the capacity to send one of its own into outer space. Some of us believe that we are so unique that there is no way that evolution could have led to us. And if evolution could not develop such superior beings, then some external "creator" must have shaped us in his image. It may sound crazy to many of us, but creationism is still prevalent in the world today. If we are to discover an alien species that is also intelligent and technologically sound, wouldn't we want them to be similarly favored by the creator and therefore look like us? When we watch Hollywood sci-fi, we see that in all the movies where humans meet another alien race that is superior both intellectually and technologically (ie. Mission to Mars, Indiana Jones and the Kingdom of the Crystal Skull, Predator), the aliens look eerily humanoid.

On the other hand, in movies where the aliens look biggish and far from human we are usually trying to kill them, subjugate them, and otherwise prevent them from destroying humanity. Independence Day, District 9, and the entire Alien franchise are among the many that come to mind. We want aliens to look like us because if we are to learn more about harnessing their technology and intellect, then which would be the better choice to learn from: a humanoid alien or a bug-eyed, four- or more-

legged creature? Hollywood has a powerful way of dramatizing our subconscious beliefs, and it has definitely done so with the concept of humanoid aliens in film. Somewhere in the universe, there may be technologically superior aliens out there and someday they may make contact with us. If ever that day comes, we will finally see what they look like. And if we survive the encounter, the knowledge we gain will change the way we think about ourselves forever.

Bio:

Ayan Purkayastha is currently a graduate student in biomedical sciences at Tufts University School of Medicine. An avid fan of astronomy, astrobiology and science fiction, Ayan was a teaching assistant in the astronomy department at Bucknell University, where he earned his B.S. in Biology. When he is not studying, Ayan enjoys reading both science fiction and non-fiction as well as writing about his interests, both in astronomy and in other fields.

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