Climate change is now obvious from accurate and precise measurements of greenhouse gases like carbon dioxide and the increase in the global mean temperatures. The high correlation between the two can be put in the context of longer-term climate variability of Earth to raise all kinds of doubts about causal links. Yes, climate always changes and has changed throughout the history of our planet starting at its inception about 4.6 bya. But the physics of the system is well understood and we know that the increase in greenhouse gases traps more of the outgoing longwave radiation and warms the planet. This increase in greenhouse gases and the consequent warming has been the most rapid in at least the last 20 million years. The carbon dioxide levels are increasing at about 3% per year now and the concentration in the atmosphere is near 395 parts per million by volume compared to the 280 ppm at the start of the Industrial revolution. The warming rate is about 0.13° C per decade in the last 50 years, which is twice the rate of warming for the past century. Both the increases in greenhouse gases and global warming are accelerating. The perfect blanket we inherited keeps us from getting hot as hell like on Venus or freezing to death like on Mars - the Goldilock syndrome was solved for us by a unique set of circumstances that likely made life itself possible on Earth; like the gravitational trapping of the moon to stabilise Earth’s obliquity to 22.5 to 24.5 degrees varying slowly at a 41,000 year cycle and keeping the seasonal changes relatively mild and preventing the climate from varying at a rapid rate.

The multiplicity of evidences for the impact of human activities on the functioning of our planet provides additional scientific foundation for the causal links - increasing humidity, warmer and more acidic ocean, warmer atmosphere and land, melting of ice and glaciers, delayed arrival of winter and early arrival of spring, rising sea levels, and of course the crazy weather and the rapid loss of biodiversity in many places. All global warming is local and unlike the ozone hole problem, where all life on Earth stands to lose, global warming will create winners and losers.

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Jonathan Haidt, a social psychologist
proposed the concept of the human mind being split - a rational rider that is thoughtful, logical, and systematic but can rationalise forever and never make a decision, vs. an emotional elephant that is slow to get motivated and hard to steer but once the path is clear, makes a decision and moves steadfastly to achieve the goal.

Survey after survey indicate that the rider has in fact seen clear evidence of climate change but is simply spinning his wheels and rationalising about whether anything needs to be done right away. The climate community and the environmental movement have taken charge of trying to save the planet but have convinced themselves that the planet will be saved simply by throwing up images of melting ice and polar bears and issuing increasingly alarming messages about the dangers of climate change. The success of this approach has been extremely limited in terms of engaging the human mind to act, other than the small changes by a minority, since even the most conscientious human mind is subject to the one-action bias.

Buying a hybrid car or switching to CFL bulbs or a vegetarian diet is often employed to feel good about having done one's part for saving the planet. I would argue that all our energies now need to be focused on motivating the rider to act in a comprehensive way to change our lifestyle by providing solutions for everything from how to minimise energy use from the time we turn on the lights in the morning to saving water as we brush our teeth before bedtime. The fundamental behavioral change required is so monumental that a serious set of indicators and incentives are needed that will, throughout the day, show us how much of the planet's resources we are consuming - from electricity to gasoline to food to water. This should not simply be a case of putting up signs that warn us at every step and every minute that the World is coming to an end since that will surely lead to a sense of hopelessness and the response may well be to assume that there is nothing anybody can do to save the planet from ourselves. The message should in fact intelligently mix positive messages of the incredible and bountiful future we will all share if we are mindful of our consumption.

The human being is the most cooperative species on this planet and has repeatedly
With our ability to dominate the planet like no other species can, it may be more important for us to understand whether we have it in us to save us from ourselves. That would mean reaching the emotional elephant in the most cooperative species of all.

shown the ability to share intelligence for accomplishing infinite combinations of non-zero exchanges and to avoid the tragedy of the commons with consensual norms and punishments. The human mind is also unique in internalising the norms and making it a preference - like stopping at the red light in the middle of the night even when nobody is watching and obeying the rule of reciprocation by repaying favors received and punishing the free-riders who do not follow social norms. Surely, we can appeal to such an exalted mind that also possesses intrinsic values that make it care about friends, family, and the environment, to save the very planet we live on! We must find a way to whisper to the elephant about climate change to get it going in the right direction as it is very well capable of, once the path is clear.

How did we come to be the most cooperative species on the planet and may be in the universe? The Big History view of historian David Christian provides a nice long-term perspective. Time and space both came to be with the Big Bang about 13.7 bya and lighter elements like hydrogen, helium, and lithium filled the universe in the first half a billion year. Earlier stars and galaxies were born and they died to produce heavier elements - especially those necessary for life as we know it, i.e., carbon, oxygen, nitrogen, phosphorus, and sulfur. The four fundamental forces - strong and weak nuclear forces, gravity, and electromagnetism rule the universe with the help of the law of gravity and the second law of thermodynamics.

Exactly how life came to be and what the earliest form of life was or where it was conceived remain as mysterious as what existed before the Big Bang. That does leave room for a Creator and as Stephen Hawking joked, if you ask what the Creator was doing before the Big Bang, St. Augustine could say he was busy preparing hell for people who ask such questions. Schroedinger wondered what life was and, as a physicist, his quest was to see if the laws that govern the rest of the universe have any role within life itself. He did note that life can locally create order out of disorder and appear to violate the second law of thermodynamics which demands that disorder increase forever. He was also quick to point out that life does increase disorder globally. He motivated Watson and Crick to seek structures that define life leading to their discovery of the DNA.

The Urey-Miller experiment showed that throwing together a mixture of inorganic matter together in a flask with no free oxygen and bombarding it with simulated lightning led to the production of the basic building blocks of life a la the primordial soup, viz., amino acids and sugar molecules. The Cech-Altman experiment led to the discovery that the RNA could cleave and splice itself together and act as if it can be both the ‘chicken’ and the ‘egg’ and also allow the replication to include errors leading to mutation and new forms of life. Knowing that the RNA provides the enzymes to translate the instructions from the DNA to manufacture proteins, it has been argued that the RNA probably preceded the DNA. Chemical compounds like cyanide that make up the
nucleobases or the building blocks of the RNA and DNA would have been abundant on early Earth being bombarded by the debris of the solar system under construction. As David Christian points out, life is made up of chemical reactions which are ruled by the electromagnetic force that is much weaker than gravity and hence life is small compared to the stellar objects formed under the gravitational pull on the galactic dust. Leaving aside the fact that we cannot really agree upon a universal definition of life and hence we cannot know for now how and where life came to be, we can resort to Darwin’s theory of evolution to explain the history of life once life did originate.

Geological evidence indicates that biotic activities must have started within a billion years of the origin of Earth, probably in the ocean, as archeabacteria - cells with no nuclei called prokaryotes, when the atmosphere had almost no free oxygen. As noted by Lynn Margulis, mitochondria and plastids have their own DNA in cells and thus an endosymbiosis of these independent cells by some other cells led to photosynthesis and the increase of free oxygen in the ocean and the atmosphere. Rising oxygen levels would have made larger and larger life forms possible. As more complex life forms evolved, Darwin’s theory of evolution was in full force leading up to mammals and primates, and our ancestors.

Several accidents occurred along the way like the loss of control genes that made men the only primates with a spineless penis, but more importantly, one such loss also likely led to the expansion of the cranium. Invention of fire and consumption of meat and a concentrated protein diet would have led to the shortening of intestines and release of some of the metabolic energy for the brain to grow to fill up the cranium. In modern humans, 60% of the energy is required for brain activities during infancy! Use of the brain to build more precise tools also assisted the brain to become sharper via the Baldwinian evolution.

Does the largest of brains by body mass also make us the most intelligent of all species? The definition of intelligence is hardly unique but intelligence abounds in nature with the bumblebees solving the so-called travelling salesman problem to visit each flower only once and the dolphins learning to walk on water just for fun and teaching each other how to do it!

Current understanding is not sufficient to fully explain why humans evolved to master symbolic language and if there is a relation between the large brain and our ability to communicate and cooperate. Cooperation itself likely evolved to avoid visual theft and as a means of hunting big game and sharing it. Paleontologist and a Jesuit priest, Pierre Tielhard de Chardin argues that matter simply tends to complexify and the evolution of consciousness is a natural outcome of complexification of matter.

There are apparent linkages between changes in our diet, dopamine levels, and reward seeking behaviour. The combination of seeking rewards and the ability to communicate must be associated with the increasing need to cooperate and share intelligence since there are rewards associated with sharing intelligence and inventions. For example, capitalism thrives on the idea that market forces drive inventions and intelligence sharing for profit.

With our ability to dominate the planet like no other species can, it may be more important for us to understand whether we have it in us to save us from ourselves. That would mean reaching the emotional elephant in the most cooperative species of all.
Robert Wright points out the inexorable march of humanity towards ever increasing cooperation via non-zero interactions among individuals, groups, and nations. Even though the climate negotiations appear to be stuck or faltering, the very fact that the entire globe is at the table indicates, yet again, that the global human is seriously at work to face this daunting challenge in a cooperative way.

Climate scientists will do well by focusing on specific and usable solutions instead of being too busy talking about climate change to do anything about it. The rider has seen the enemy and realises that it is us. The elephant is not sure what to do because no clear way forward is being offered by the climate scientists. Considering the fundamental change needed in the way we consume natural resources to irreversibly convert them into junk like plastic and smartphones, a game-changer is required to wean ourselves off the carbon-based economies and to capture and sequester the carbon we have been throwing up and will continue to do so for the foreseeable future. This is well within our ability as has been seen over and over again in human history with things like the telegraph eventually leading to the internet and the smartphone and space travel.

A vision for the future of our planet is sorely needed to motivate the elephant and an elephant whisperer with a depth of conviction of people like Mahatma Gandhi or Martin Luther King should emerge for dealing with climate change in a non-violent and equitable way. The children of today and tomorrow should grow up dreaming about building rockets to explore the universe and not live in fear of a planet coming to an end due to our own actions. This is well within our reach once we realise that climate change will not be solved simply by portraying scarier and scarier images of the devastation underway but seriously focusing on clearing the path to a safe and secure future and finding ways to whisper to the elephant to take this path. Richard Dawkins posited that a species has come of age when it has understood the purpose for its being. Saving the planet from ourselves would bring us a step closer to understanding the purpose for our being. It certainly cannot be to make the planet a living hell for ourselves and for so many other species. The elephant needs to get moving post-haste.

Raghu Murtugudde is an ‘83 Aero alum following which he continued to sell firewood with his father in Dharwad for 6 months and returned to Aero as a project scientist. He went to the US for an MS in Aero from UT-Arlington, and a Ph.D. in ME at Columbia Univ. During his stint at NASA and as a faculty at UMD he took his CFD expertise to climate modeling including climate impacts. He has been engaged with NGOs on sustainable agriculture methods and research on human mind and its limitations in accepting risks that are not obvious and imminent like climate change.