

## Holidays: Then and now

Come summer vacation time, and social media is full of people wearing bermudas grinning at us as they sip something lurid some place exotic. Vacation snaps are to social media what show-cases are to our drawing rooms- pictorial windows that give others a glimpse of the best parts of our life, spent lolling about in the beaches of Bali or the sidewalks of Rome.

Competitive holidaying is a bruising contact sport, and nothing makes us happier than making other people miserable about our happiness. Of course, holiday photographs make all happiness generic- it is impossible to distinguish one family or location from another. Everyone becomes the same person on holiday, or so it would seem.

In some cases, this particular property of holidays photographs can be quite revealing. Many traditional families on holiday present a completely different picture than what they do in normal everyday life. Traditional roles get relaxed, the clothes get way more daring, and sometimes, altogether different people emerge from under their everyday selves. People travel not merely to reach somewhere else, but to also become someone else. It is difficult to tell what is being enacted- the holiday persona or the person one pretends to be in regular life.

The idea of the holiday has begun to take on dimensions of a giant project. Every year needs to feel different, not just from previous years but from the holidays other people might be planning. The idea of a week or ten day long period packed with superlatives, makes the holiday less like a pause and more like an accelerated and anxious affirmation of enjoyment. We must have so much fun, and it must look like we are having so much fun. From the free welcome drink to a free day at the spa, every element in the holiday counts. The holiday has evolved considerably over time. Growing up, it holidays had a rudimentary quality- they were meant to plug ourselves back to our roots, and recharge the connections that made us who we were. Every year, one headed to one's hometown, after having reserved the train months in advance. Nothing much happened in one's home town; indeed most home towns were designed to be that way, but it was still a wonderful time spent in the bosom of a bewilderingly large family. The holiday month ( or even two) started slowly, droned by for a while and then galloped alarmingly as it became time to go back to one's primary life.

There were other kind of holidays that were permitted; the pilgrimage being the most legitimate. Families travelled together, carrying bundles of many kinds, and a lot of shouting in the name of organizing took place. Pilgrimage travel made the idea of budget holidays feel lavish, and between dharamshalas, dormitories and cramped houses of really obscure acquaintances, there was little scope to spend money. Occasionally, one could also go to a hill station to walk up and down mall road and get one's photograph taken while wearing a 'traditional hill costume' which someone from Garhwal would have committed suicide before wearing.

Then there were the package tours, with an impossibly large number of destinations being crammed together to deliver a feeling of value for money. The South Indian temple tour was a staple, and as a child the idea of being lugged across from town to town to wade through enormous crowds to visit what at the time seemed like the same exact temple was hardly a treat. In retrospect, the worst tours were the ones where large families were packed into the Matador, a vehicle designed as an orientation programme for Hell. A virtually windowless metal box, that disdained the idea of suspension, the Matador could take in an infinite number of people, simply by always being able to accommodate one extra person. Breathing was optional.

The Maruti changed holidays for good. This was a new luxury, this ability to jump into a car, which in turn darted on to the road and took us where we wished to go, led by the merest whisper of an intention. Our life began to have a radius; in our case up to ten hours in a day. The freedom that the Maruti brought was unparalleled; the idea of a zippy reliable, affordable car, made travel feel like an imperative.

It is only post liberalization and the relaxing of the foreign exchange norms that international travel began in any real sense. It began with a somewhat narrow focus on shopping and a particular kind of sub-culture popular in some specific streets of Bangkok. Flying to Thailand was cheaper than flying between Delhi and Chennai, and full use was made of this startling anomaly.

For those born after the 80s, it might be difficult to explain the lure of the foreign to the Indian mind. In Gujarat, for instance, newspaper ads were routinely taken out to welcome back someone from an international sojourn, or to bid them farewell. Massive groups would travel to Mumbai to see a departing relative off or to receive them. Among the three things that one asked astrologers, 'the chance of foreign travel' was bound to be one. The ability to go abroad for a holiday, just like that, thus strikes a very resonant chord.

The holiday serves many purposes. It detaches us from a life that seems to consume us with its rhythm. It allows families, separated by goals and technology to come together for a while. It allows us to live out our fantasies in a concentrated manner. It helps us find aspects to ourselves we didn't know existed. It also helps us show the world how splendid our life is. It stints on its most basic ingredient, time, and fills up what little is retained by an overriding compulsion to have fun. The holiday of today makes us work at having fun, and we have the pictures to prove it.

## Space tourism

**Essay (1):** An advantage of space tourism is the jobs that the industry is going to provide. There are already multiple companies all competing for space tourism business. Those are all companies and jobs that didn't exist a decade ago. Pilots are needed, programmers are needed, manufacturing jobs are needed, and many many other people will be working in order to see that those companies are successful.

Another advantage of space tourism is going to be its ability to renew interest in space and space exploration. With renewed interest, financial backing will follow, and that will support further innovation in the industry and space exploration in general.

One disadvantage to space tourism is currently that it is a rich man's game. The start up costs are prohibitively high for starting up this kind of company. Not only is it an expensive business to run, but it is also an expensive ticket to buy for the consumer. Right now, Virgin Galactic's ticket cost for a single seat is \$250,000, and the entire flight lasts only two and a half hours. The *entire* flight. You are weightless for less than 10 minutes.

Another current disadvantage is that the industry is in its infancy. There isn't much regulation happening, and the business hasn't been around long enough to have its safety protocols dialed in. It's a very dangerous industry currently, and Virgin Galactic proved that when their test platform, Space Ship 2, crashed and killed the pilot.

**Essay (2):** One of the reasons why fictional universes like those in Star Wars or Star Trek are popular is because they show us a reality where hope is possible anywhere. In the former, space exploration leads to an independent spirit where the fate of one's culture and identity are at risk of being overrun by a zealous government. In the latter, humanity overcomes its core problems of conflict, hunger, and poverty to become great explorers of space.

Numerous science-fiction novels and stories over the years show us that exploring space could be exciting and profitable. What we don't always discuss are the potential dangers and expenses that such an action would bring to us as well. When European settlers came to the Caribbean as explorers, some tribes lost up to 90% of their population because of the introduction of new diseases.

If we were to begin exploring alien worlds or encountering new life, our entire planet could experience the same problems as those island tribes.

That is why it is critical to examine the advantages and disadvantages of space exploration before launching these missions to ensure that we can all achieve the best possible result.

#### List of the Advantages of Space Exploration

1. Space exploration allows us to prepare for potential hazards. The universe is a vast place where hidden dangers could be lurking almost anywhere. Even if you consider only our solar system, there are asteroid and comet threats which could devastate our planet if an impact were to occur. Exploring space gives us an opportunity to locate these hazards in advance to prepare an encounter that could help to preserve our race.

Then there are the interstellar items to consider. Oumuamua, or 11/2018 U<sub>1</sub>, was discovered by the Pan-STARRS<sub>1</sub> telescope in 2017 by the University of Hawaii through funding from the Near-Earth Object Observations Program. It was originally thought to be an asteroid, then a comet since it was accelerating, and up

to 10 times as long as it was wide. These items could create interstellar impacts as well.

2. It gives us more information about our solar system, galaxy, and universe. When we take on the effort to start exploring space, then we can discover new truths about our planet and culture simultaneously. The information we obtain from these studies can then be applied to our STEM resources here at home. NASA technologies that were originally developed for space programs include infrared ear thermometers, LED lighting, ventricular-assist devices, anti-icing systems, and even temper foam.

Because it requires us to innovate to reach to the stars, our efforts to solve critical problems create opportunities to make life better here on our planet at the same time.

3. Exploring space is one of the few human endeavors that crosses borders. There are currently 72 countries who claim to have a space program, but there are only three which have an operating government space agency: China, Russia, and the United States. Despite the political conflicts that occur between these nations, their capability of producing human spaceflight provides the gold standard for future exploration efforts. Only 14 of the 72 nations who operate in this space even have a basic launch capacity and six (adding Europe, India, and Japan) have the capability to launch or recover multiple satellites.

Because of the expenses and resources necessary to achieve space flight, the remaining nations work together with those who have the capability of a full launch to manage this aspect of human existence. This endeavor is one of the few ways that humans from all nations cooperate without conflict.

4. We can see humanity in a different way with space exploration. Carl Sagan suggested that Voyager 1 take a picture of Earth while it was 4 billion miles away at more than 30 degrees above the ecliptic plane. In that image, our planet appears as a 0.12 pixel crescent. All of our conflicts, political battles, successes, failures, love, loss, and life occur on this one-tenth of a pixel. In the scope of a universal lens, we are but one small point of light amount countless others.

"Look again at that dot," wrote Sagan. "That's here. That's home. That's us. On it everyone you love, everyone you know, everyone you ever heard of, every human being who ever was, lived out their lives. The aggregate of our joy and suffering, thousands of confident religions, ideologies, and economic doctrines, every hunter and forager, every hero and coward, every creator and destroyer, every king and peasant... every saint and sinner in the history of our species lived there – on a mote of dust suspended in a sunbeam."

5. Space exploration provides us access to new raw materials. When we began to launch satellites into space, it allowed us to find new raw material deposits on our planet that we could access to make life easier here. If we apply this technology as an extension to the rest of our solar system, then it gives us the same benefit to find minerals, precious metals, and even new materials that we

can use. Although the expense of exploring space is admittedly high, this advantage gives us a way to offset those costs somewhat. There is even the potential that it could become profitable one day if we can provide these efforts with enough capital.

6. Investments into space exploration create real economic benefits at home. The governments which provide the majority of our space exploration infrastructure employ over 20,000 people per agency who make direct positive economic impacts on their community. There are private companies who look at the potential benefits of this industry and contribute to this advantage as well, such as SpaceX and their thousands of staff.

People from all walks of life contribute to space exploration every day, ranging from astronomers to actual rocket scientists. Even though many of these programs receive taxpayer funding, the wages, manufacturing, and indirect investments contribute over 70% more in overall value at the local level compared to each dollar spent in the United States. These opportunities allows us to explore many different fields of study in addition to what is waiting in the universe as well.

7. Anyone can become a space explorer. Space exploration doesn't need to involve starships, space stations, or intergalactic travel. If you own a telescope and can look up at the sky, then you can embrace this element of human existence. Our scientists have taken this advantage to the next level with the Hubble Space Telescope, which has made over 1 million observations in almost 30 years of service. We have made some incredible discoveries with this technology already.

We have a better idea about the age of the universe (around 13.7 billion years). Images of the deep universe show that there are thousands of galaxies out there. It helped us to discover four of the five moons that orbit Pluto.

We have a better understanding of planetary seasons in our universe. It works to peer into the atmospheres of alien planets so that we know what is waiting for us in our future exploration efforts.

8. Space exploration encourages us to share instead of being selfish. Being human-first from a space exploration standpoint isn't about dominating other cultures that we might find waiting for us in the universe. It is a way for us to find common ground outside of our physical appearance, cultural differences, or religious preferences. For far too long, we have allowed ourselves to be consumed by our petty problems instead of looking at the big picture.

If someone is hungry, then we should feed them. If they are cold, then we should clothe them. If they need a job, then we should help to train them. Space exploration unites us in ways that other global efforts do not because we see ourselves as humans first. This advantage won't solve our problems, but it can shift our attitude toward something that is healthier than our current state.

9. We know more about our planet thanks to our efforts to explore space. Because space exploration gives us a different perspective, it allows us to look at our planet in a different way. The view from outside of our atmosphere allows us to see

the big picture instead of trying to extrapolate information from micro-scale research. This advantage allowed us to discover the problem of ozone depletion in the upper atmosphere, begin the conversations on global warming, and examine the current and future impact of weather pattern changes that may happen because of a changing climate.

Space exploration helps us to look inward as well as outward, helping us all to find the changes that are necessary to keep our planet healthy for our children, grandchildren, and beyond.

List of the Disadvantages of Space Exploration

1. Our current technology makes it dangerous to get into space in the first place. Several agencies are developing "space tourism" packages that can take people in a comfortable aircraft to the very outer layers of our atmosphere, but that is not an exploration effort. We currently strap astronauts into a vehicle that gets attached to a very large rocket so that there is enough speed available to break the grasp of gravity.

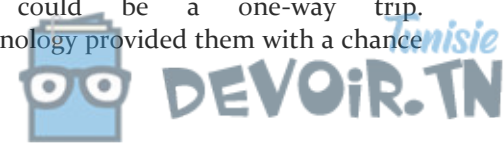
Starting with Theodore Freeman, who was killed in the crash of a T-38 in October 1964, there have been over 20 individuals who lost their lives in the line of duty while advancing U.S. space program interests. There have been two individuals (Gus Grissom and Peter Siebold) who were able to survive a problem that resulted in the loss of a space vehicle.

2. There are cost considerations to look at with space exploration. The cost of exploring space is one of the biggest criticisms of the efforts to launch a program that takes us beyond our planet. When the space shuttle program was active in the United States, the total cost of the launch was about \$500 million. That figure does not include the expenses of postponement that often occurred because the conditions were not right to send a rocket into space.

Manned missions in our solar system could cost 10 times that amount, and that might get us to Mars or one of Jupiter's moons. Technology advancements in recent years could make this issue cheaper for the next generation, but we should ask ourselves if spending billions on space exploration is the right thing to do if we have people dying of hunger on our planet.

3. Astronauts receive exposure to natural dangers while in space. If the launching process doesn't kill you during a manned space exploration effort, then the natural dangers that are present outside of our planet's atmosphere could become problematic in a variety of ways. The radiation that comes from the sun is a constant danger to astronauts when they are in space, and the weightless environment can change their physical conditioning. Experiments with identical twins, with one staying on our planet and the other spending a lengthy assignment in space, show that there are changes at the cellular and genetic level that occur with space travel as well.

4. Current space exploration efforts could be a one-way trip. When we sent astronauts to the moon, our technology provided them with a chance



to land on the surface and return to their spacecraft. It is possible that we could perform a similar action for asteroids, moons around other planets, and other celestial bodies that do not have an atmosphere. If we are going to start exploring Mars, then that journey could be a one-way trip for the astronauts.

Even if this journey does not become a one-way trip, the amount of time necessary to reach a destination beyond the moon makes it virtually impossible to mount a rescue mission if something goes wrong. Our current vision of space exploration requires perfection to create a successful result.

5. There may not be a reason to start exploring at this time. Human cultures have always had a fascination with exploring space because it satisfies our need to learn more about the universe. Taking long-distance pictures with the Hubble telescope is not the same as visiting the location in-person. What we must ask ourselves right now is if there is a valid reason to begin this effort, and the truth is that there are few pragmatic applications to consider.

We could start mining asteroids for their raw materials and mineral content in the future. Planetary colonization could be necessary in future generations. Since we are still dealing with issues like crime and poverty here at home, addressing our immediate concerns might be better than looking at future needs which might never be necessary.

6. Unmanned probes are even a waste of resources. One of the ways that we attempt to limit expenses with our space travel needs is to send unmanned probes into the dark vastness that lies beyond. There have been some successes with these efforts, most notably the Voyager 1 and Voyager 2 missions that allow us to peer outside of our solar system. This option allows us to almost eliminate the risk to human life entirely as well.

There are also disadvantages to consider with this approach, starting with the fact that there is little adaptability to changing circumstances. The Mars Climate Orbiter is an excellent example of this problem. When it received incorrect coordinates for landing, it burned up while entering the atmosphere before sending any data at a cost of more than \$120 million.

7. Our current information is well out-of-date. On February 22, 2017, NASA announced that it had found seven planets the size of Earth in a single solar system. Three of the planets were in the so-called Goldilocks Zone, which means they are at a distance from their star that is not too hot and not too cold. It is called the Trappist-1 group, and this set of planets lies in the Aquarius system. That's about 235 trillion miles away, which is at least a measurable distance.

The problem is that this planetary system is 40 light-years away from us. That means the information that we can observe right now took forty years to get to our scientists. Think about all of the changes that have happened in your life in just the past 5 years, and then apply that concept to a planetary scale. When we start exploring space, we must take into account that this delay is present so that we don't fly into an unexpectedly dangerous situation.

8. It may lead us into future conflict with beings who have superior technology. Space exploration makes us think in noble terms about what lies in wait for us in the universe. When we sent the Voyager spacecraft into our solar system and beyond, there were two records placed on the devices to communicate with whoever might find them to let that intelligent life know that we exist.

Most theorists who seriously consider the pros and cons of meeting alien life say that there are only two possible outcomes that can occur with first contact. That alien species will either be so advanced that their technological presence as led to a peaceful society where an exchange of information may one day be possible, or it will be aggressive and want to access our planetary resources.

9. Space exploration creates a lot of trash around our planet. There are over half-a-million items of trash from over 50 years of space travel and satellite placement which orbit our planet right now. Unless these items fall into the atmosphere and burn up, they will stay in place forever. The ring of debris that we have created makes space exploration more dangerous because an impact with a ship's hull could have deadly results. We will need to clean up this mess in the future to provide better safety to our future explorers, and we have no idea what the expense might be.

Verdict on the Advantages and Disadvantages of Space Exploration

Space exploration is beneficial even if we only look at it through the lens of hope. It is an idea that unites us as one race instead of over 190 different countries. We can proceed into the universe as one people, taking the first steps toward new experiences just like we did when we placed astronauts on the moon for the first time.

Explorers always face danger, and space is no exception to that rule. The vacuum of the universe was not meant for humans, which means we must constantly adapt and protect ourselves when we are outside of our atmosphere. Then there is the risk of an encounter with alien life to consider too.

The advantages and disadvantages of space exploration must come from a common sense perspective. Other races could harm us, but there is also the possibility that we could be dangerous to other life as well. We should continue with these efforts, but with the understanding that this work is not a race. It is a cooperative effort that will eventually define our humanity.

**Essay (3):**

Right now, one of the most exciting space facilities in the world is a World War Two hangar in the Mojave Desert in California.

The wooden hangar belongs to Xcor, one of the start-up companies building rocket planes to fly tourists into space. In the hangar next door, you can glimpse Virgin Galactic's spaceplane, slung beneath its carrier aircraft. Further along the runway, Microsoft billionaire Paul Allen's company, Stratolaunch, is developing a new space launch system. Eleven other small space businesses are spread around the site at the Mojave Air and Space Port.



Later this year, Virgin aims to fly its first paying passengers into space. The experience will not come cheap. Virgin Galactic is charging \$250,000 for the privilege of experiencing five minutes of weightlessness; Xcor plans to charge \$95,000 for a ride in its two-seater rocket ship. The cost alone puts this fledgling space-tourism industry beyond the means of most of us.

So it is easy to dismiss the whole enterprise as private jets in space rather than benefits for all mankind (as BBC Future readers have done on our Facebook page). But having followed the development of the private space industry for the last 20 years, and after a recent visit to the Mojave Air and Space Port for a BBC radio programme, I thought it was worth outlining why I think space tourism matters.

### **1. It frees space ambitions from traditional burdens**

The audacious plan to put men on the Moon was championed by politicians and backed with billions of taxpayer dollars. By the time men had actually stepped onto the lunar surface, Nasa's budget was already being cut. Subsequent US, Russian and European space programmes – from the Shuttle to the International Space Station (ISS) – have suffered from political compromise and lack of ambition.

Private spaceflight, on the other hand, is unburdened by the favour of taxpayers or whims of politicians. If the company can raise the cash, it can build a spacecraft. Inevitably, this free market favours people who already have a lot of money. But that is not true of all the companies in the private space business.

“We don't have a multi-billionaire funding us,” admits the CEO of Xcor, Jeff Greason. For him, building a sub-orbital tourist craft is part of a long-term strategy. “We started examining how a fully-reusable orbital system would look and realised we would need to develop earlier versions of that to learn how to build them,” he says. “Those earlier versions also have to make money.”

### **2. Failure is now an option**

Nasa is forever burdened with the phrase “failure is not an option”. Private companies have no such restrictions until the money runs out.

The entrance to the Mojave Air and Space Port is dominated by a reminder that not all space projects succeed. Resembling a giant white traffic cone, the Rotary Rocket is one of the most peculiar flying machines ever built – probably best described as half-helicopter, half-spacecraft, and if you were being cruel, you might also call the concept half-baked.

It was one of the first spacecraft to be developed at Mojave and, in 1999, made some brief atmospheric test flights. The engineering proved sound but funding problems caused the company to fold. Today it is gathering desert dust in a small memorial garden.

One person who worked on the Rotary is Kevin Mickey, President of Scaled Composites – the company now building Virgin's spaceplane. “I look at this, and I'm proud of it,” says Mickey, as we stand beside the white conical spacecraft.

“One of the hurdles in today's society is an intolerance for risk and failure and if you are truly going to innovate, you are going to fail sometimes,” he says. The carbon

composite materials technology that went into the Rotary is now being adapted for Scaled Composite's aircraft and spaceplanes, so the expertise has not totally gone to waste.

### **3. It will inspire a new generation of engineers**

The spaceport looks more like a college campus than a space centre. Take, for example, 26-year-old Xcor engineer, Jeremy Voigt. He proudly shows me one of the rocket engines he is helping to develop: currently, it's a mass of pipes, wires and valves.

“It's the engineer's dream job,” he says. “Most engineers sit behind a desk all day, I don't. I get to come out here in the shop, turn wrenches and fire rocket engines.”

He looks around the crowded hangar, crammed with bits of rocket motor and partially constructed spaceplane. “If I was at Nasa, I would be part of a large team of engineers working on something,” he says excitedly. “Here I actually lead the rocket test, I get to push the button.”

The way of working at Mojave, in small teams with limited resources, is completely different to the way the space agencies work. Many people compare what is going on at Mojave with the early days of Silicon Valley and it is easy to draw parallels between the garage where Steve Jobs and Steve Wozniak built the first Apple computer, and the Xcor workshop. Maybe the young engineers here will have equally world-changing effects.

### **4. The cost of reaching space will go down**

Right now, if you want to launch a satellite, it will cost upwards of \$12m and that is before the compulsory insurance (which can sometimes double the price). Not only can conventional space rockets only be used once, they are extremely expensive to launch – and there is limited competition.

Compare that with the \$250,000 cost of a flight on the reusable Virgin spaceplane. Scientific institutions have already signed up to fly experiments on these sub-orbital flights. If the next generation of space planes can reach orbit then that will massively reduce the cost of getting into space.

This means we will be able to launch satellites, spacecraft and space exploration missions for a fraction of the cost. The final frontier could finally become economically viable to a lot more people.

It is certainly something that gets CEO of Virgin Galactic and ex-Nasa employee, George Whitesides excited. “By lowering the cost of space access, we'll be able to do things like sending little nanosats all over the Solar System and do all this incredible science, that is so expensive now,” he says. “If we are able to tackle some of these challenges by demonstrating access to space technologies, then I think that will be profound.”

### **5. Hypersonic travel could become a possibility**

Remember the idea that you can take off from London, fly into space and touch down in San Francisco an hour or so later? When discussing technologies that are promised but never quite deliver, a close runner-up behind flying cars has to be so-

called sub-orbital point-to-point travel. Could the space tourism companies at Mojave finally help make this dream a reality? George Whitesides thinks so: "This is fundamentally transformational for humanity," he tells me.

"I really think of our customers as pioneers, opening up the new frontier," he says. "For one thing, everyone would like to get there faster, another reason is that you're not chugging through the atmosphere for 12 hours, so there could be environmental benefits to that."

But few people are going to pay \$250,000, or even \$95,000, for a flight to San Francisco, however fast. Space tourism companies counter with the argument that as the technology evolves, costs will inevitably come down. The history of aviation suggests this is indeed the case.

"Most technologies at the front end are funded by wealthier folks," says Whitesides. "If you go back to the dawn of commercial aviation, the real adjusted cost of crossing the Atlantic was \$10,000 or if you look at the early cellphones they were thousands of dollars, now you can get them for free if you sign up for a contract."

Right now, the space companies are only on their first-generation rocket planes. By the 10th generation, point-to-point travel via space may become a reality.

#### **6. It will provide a new view of our planet**

It is widely accepted that one of the greatest achievements of the Apollo Moon programme was the view of the Earth from space. Apollo 8 astronaut Bill Anders summed up the impact of the pictures captured by his mission: "We came all this way to explore the Moon," he said, "and the most important thing is that we discovered the Earth". The images put us in our place, a blue marble against the backdrop of nothingness.

Every astronaut I have interviewed talks about how seeing the Earth from space changed their view of the world. So imagine what would happen if we started sending business and political leaders into space and back? Would that view of the world change them in the way it affected astronauts? And as a result, could it influence the decisions they make on border disputes, pollution or climate change?