

# QUEST



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THE HISTORY OF SPACEFLIGHT

Q U A R T E R L Y



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TO JUPITER (PART TWO)**

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Artist's view of *Galileo* flying past Jupiter's volcanic moon Io. The image incorrectly shows the spacecraft's high gain antenna in its fully deployed position. Credit: NASA

## FROM THE ARCHIVES



While searching for high-resolution images to accompany the article on “Primate Lives”, volume 20 #4, we came across this undated, uncredited image.

## FROM THE ARCHIVES

### Gordon Cooper

Normal Apollo crew rotations from back-up crew to prime flight crew was as follows—the back-up crew would be named the prime crew of the third mission down the line in the Apollo flight program. Based on this rotation, I should have been selected as commander of *Apollo 13*. However, office “politics” in the Astronaut Corps, the return to flight status of Alan Shepard after the correction of an inner ear disorder, and the view points of certain NASA managers allowed for the selection of Shepard ahead of me for command of *Apollo 13*. Shepard fell behind in training and was allowed to switch to commander of *Apollo 14*, moving Jim Lovell and his crew

up to *Apollo 13*. Of course, if I had received command of *Apollo 13*, it would have been my “lost moon.” I would not have been able to walk on the moon because of the flaw in the oxygen tank which caused the explosion...If I had been selected for command on *Apollo 13*, there would not have been a falling behind in training because of my extensive work experience during back-up on *Apollo 10*. Shepard was very fortunate to be pulled from command of “13” and placed on “14.” As it turned out, he was the only one of us Mercury guys to actually fly to and land on the moon.

RR Auction, Lot 540,  
21 November 2013

# RETHINKING THE OVERVIEW EFFECT

## 2013 Winner of the Sacknoff Prize for Space History

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By Jordan Bimm

I have left the world. There is only the ship to identify myself with... and with this adrenaline inflicted state floats the feeling of detachment.

William Bridgeman  
test pilot, 1955

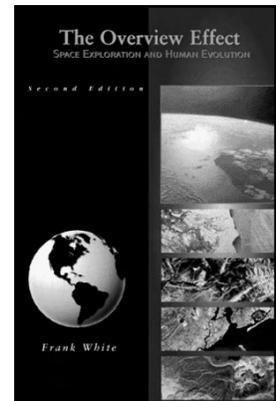
## Introduction

In his 1987 book, *The Overview Effect: Space Exploration and Human Evolution*, American author Frank White coined “the overview effect” to describe a collection of positive mental experiences reported by astronauts and cosmonauts returning from outerspace. Since then, White’s idea that viewing the Earth from space fundamentally changes people “for the better” has resonated with a number of important groups, including space psychologists, space industry advocates, politicians, members of environmental and peace movements, and most recently, members of the public with an interest in space exploration, who in 2013 shared the short film *Overview* via social media.<sup>1,2</sup> In 1997, U.S. President Bill Clinton referenced the overview effect in his opening remarks at The White House Conference on Climate Change.<sup>3</sup> In space psychology, the overview effect has become an axiom guiding research and development projects, and

is now influencing spacecraft design.<sup>4</sup> Environmental and peace movements have also evoked the overview effect to justify “whole Earth” or “borderless” perspectives. Advocates for space science and technology have used the idea in attempts to accelerate investment and speed technological change, and have even begun work on virtual reality and immersive video design with the hopes of triggering the overview effect via simulation here on Earth. The overview effect has been such a successful idea that, real or not, it has become a self-fulfilling prophesy. People now go to space *expecting* to experience it.<sup>5</sup> In 2008, Frank White founded The Overview Institute in Washington, DC, to consolidate support and further popularize the idea.<sup>6</sup>

This paper looks at three historical data sets from the archive that complicate the evidence for, and conclusions drawn from, White’s concept of the overview effect. In *Overview*, White’s argument is that the overview effect is a reliably produced mental effect—a naturally occurring phenomenon “between the environment and the human mind” that is triggered when the brain gets a realistic view of Earth from high up above. White argues that the growing number of astronaut tales about experiencing a “conversion” of sorts on seeing the Earth from space reflects a natural feature of the universe that affirms ambitions to colonize outerspace. For White, overview is “natural” and not a product of history, culture, or any other external social factor.

However, a look in the archive suggests—ironically—that “overview” is an all-too-narrow view of the possible ways of seeing and experiencing planet Earth. In this paper, I suggest the overview effect is only one possibility among many for the human experience of viewing the Earth from outer space, and that it is worthwhile to reconsider the origins and implications of White’s idea. First, to better introduce the concept, I review the existing literature on both sides of the debate surrounding the existence of the overview effect, which has



been lopsided in favor of overview existing. Then, I present three archival data sets that complicate White’s claim that the overview effect is a timeless, pre-existing natural phenomenon that affects all people in a similar way. First, I investigate the Cold War military origins of three key ideas White uses to support “overview”: James Lovelock’s Gaia hypothesis, Richard Buckminster Fuller’s concept of “spaceship Earth,” and *Apollo 17*’s famous “blue marble” photograph, which became emblematic of these “total system,” cybernetic visions. Drawing on scholarship in the history of science, and science and technology studies, I will first argue that these models of Earth are deeply political objects, asserting a claim of American control and technological mastery at a global scale, and that the overview effect implicitly adopts these cultural claims. Second, because astronaut tales comprise the main evidence for the overview effect, I look to the history of American space psychology, where there have long been questions about the reliability of astronaut self-reporting, and tension among astronauts and psychological data gatherers. The last data set I draw from documents a historical alternative to the overview effect, something that 1950s American aviation and space medicine experts described as “the break-off phenomenon”—feelings of separation, anxiety, and depression that were being reported by military pilots after viewing the Earth from very high altitudes. These three data sets

complicate and call into question White's conclusion that the overview effect constitutes an ontologically pre-existent naturally occurring "sign from the universe" indicating that humans should colonize outer space as quickly as possible.

### **Background: What Is the Overview Effect?**

On an internet radio show in 2007, White described the overview effect as:

That experience of seeing the Earth from orbit, or from the Moon, and having a realization of the inherent unity and oneness of everything on the planet. It's a realization that we are all one in terms of our place in the universe and our destiny... It's a shift in consciousness, a shift in awareness, and identity, and a harbinger of many more evolutionary transformations.<sup>7</sup>

White's primary sources are the self-reported experiences of a number of astronauts and cosmonauts as communicated through public speeches, published memoirs, media interviews, and White's own series of interviews conducted in the 1980s and 1990s with 22 people who have been to space. The final third of his book, *The Overview Effect: Space Exploration and Human Evolution* (1987), compiles these interviews in digest form. Here are three examples of the astronaut tales that White has gathered together under the banner of the overview effect:

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Marc Garneau (STS-41-G): "Looking down at Earth. It's very, very beautiful. There are wars going on, there's pollution down there, but these are not visible from up above. It just looks like a very beautiful planet, particularly when you see it interface along the edge with space. There you suddenly get the feeling that, 'Hey, this is just one small planet which is lost in the middle of space.'"<sup>8</sup>

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Al Sacco Jr. (STS-73): "Once you get into space, I tell them about something I call 'The Astronaut's Secret.' It's a realization all of the astronauts have, which is

that we are a member of the whole human family. It goes beyond being a citizen of the Earth—you are really a citizen of the universe. When you are in orbit, you ask yourself, 'Why do people have the differences that they have down on Earth?' You see that Earth is just a small part of a large universe, and you have a feeling about it that is hard to describe."<sup>9</sup>

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Jake Garn (STS-51-D): "You fly over Ethiopia and you have vivid pictures in your mind of those starving little kids with their bony ribs, or Iran and Iraq and the war that is going on there, or Afghanistan or Nicaragua, and you look at the trouble spots. You fly over Africa and you recognize what occurs in so many of the Third World countries around the world, and you think, 'how sad,' because certainly we have the natural resources to take care of all of God's children... You recognize that the Russians, the Nicaraguans, the Canadians, the Filipinos—it doesn't matter where they're from—all they want is to raise their kids and educate them, just as we do... As you fly around you look at the controlled countries compared to the democratic ones, and there is such a vast difference. It made me feel even more strongly that as Americans who enjoy so much, we really have an obligation and responsibility to our fellow human beings to try to help them have freedom and opportunity."<sup>10</sup>

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From these astronaut tales, White crafts a grand teleological narrative about humanity's past, present, future, and inherent purpose in the universe. For White, these astronaut reports constitute a giant cosmic road sign indicating that humanity is headed in the right direction: "[space-flight] represents a great hope for the future of humanity because it is aligned with universal purpose."<sup>11</sup> In short, White argues that these tales should be interpreted together as a natural affirmation of the imperative to colonize outer space. White's view is ontologically realist and deterministic with regard to social, biological, and technological change. For example, with regard to the latter, White writes, "The human space program has existed in the

collective unconscious of humanity since the dawn of awareness."<sup>12</sup> This implies that technological types exist in stable forms independent of when human cultures make and use them. White argues that the "effect" represents "a message" or "a signal" from the universe itself: "the larger environment [the universe] is supporting these positive directions in evolution because humanity has something useful to offer the universe as a whole."<sup>13, 14</sup>

One of White's core beliefs is that humanity's destiny is to colonize the entire universe by passing through three Kardashev-like stages of development that he refers to as "three civilizations": Terra (the earth), Solarius (the solar system), and Galaxia (the galaxy, and beyond). In the later chapters of the book, White attempts to convert readers into "Terranauts."<sup>15</sup> This, as White describes, is a type of person who has not been to space themselves, but constantly thinks in terms of the overview effect, and dutifully promotes the development of space science and technology in everyday life. "Ask yourself daily," White instructs potential Terranauts, "how does my life support the positive evolution of the human future?"<sup>16</sup>

### **Critics and True Believers**

Since 1987, the conversation about the overview effect has been lopsided in favor of White's claims. However, one early critic, historian Stephen J. Pyne, had this to say in a 1989 book review published in the journal *Futures*:

If throwaway allusions to Columbus and to 'Christian thought' as a 'mental technology' that laid low the Roman Empire satisfy your yearning for historical explanation, then this book is for you. If not, then the book may strike you as a muddled fly-by of human history, a recapitulation of the U.S. National Commission on Space's report fluffed with intellectual sawdust, a pep-talk better suited for life as a banquet speech to New Age devotees than as a compelling argument for the impact of the space programme and the need to continue it. Unless you already accept its premises, the book is gibberish.<sup>17</sup>

He also adds that White's fashioning of "Terranauts" is best read as an attempt to turn spaceflight into a cultish "conversion experience."<sup>18</sup>

Enthusiastic support for White's concept is much easier to find. Before introducing White on the internet radio call-in show *The Space Show*, on 17 June 2007, host David Livingstone said:

I can't count the number of times I have said it, Frank White, who wrote *The Overview Effect*, that is my favorite space book, and that book is more responsible for *The Space Show* than anything else I have ever come across, encountered, been with, discussed, or had anything to do with space or anything related to *The Space Show*... remember everybody, we don't support or endorse business propositions, and things like that, although tonight I'm telling you right off the bat that I support the overview effect, and what Frank [White] and David [Beaver] are doing. Full force.<sup>19</sup>

A glance at the roster of the Overview Institute confirms that Livingstone is far from alone in his devotion to White and the popularization of the overview effect. Twenty scientists, scholars, and even Apollo astronaut Edgar Mitchell, are listed as members. On the institute's website, each member offers a statement of support for White's worldview.

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Alan Ladwig (NASA and Northrop Grumman manager): "To see the planet from an extraterrestrial perspective reveals a fragile spaceship protected by a thin atmosphere. Many who have had the privilege to experience this view have returned with a new sense of purpose and perceptivity that is more global, more spiritual, and more humane."<sup>20</sup>

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Ray Idaszak (computer simulation and special effects specialist): "Simulating the Overview Effect is humankind's runway to the actual experience enabling all of us—as collective stewards of planet Earth—to understand more holistically not



NASA astronaut Clayton C. Anderson, 2007.  
Credit: NASA

only our place in the created universe, but our role as well."<sup>21</sup>

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Loretta Hidalgo Whitesides (founder of *Yuri's Night* and partner of Virgin Galactic CEO George Whitesides): "When I first came upon Frank's book in the school library in the early 1990s I felt like someone had finally put to words the part of space that I was most excited about. I read it cover-to-cover and took it up as an explanation of the huge promise of space, its ability to transform our current level of thinking from the level of nation states to the level of planets. I am still inspired about it to this day."<sup>22</sup>

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### **Immediate Predecessors of The Overview Effect**

Many of the astronaut conversion narratives that make up White's body of evidence include a common pivot point: the sudden appreciation of the "whole Earth" as "a total system," or some close variation on this. However, the concept of Earth as a single bounded system has a deep military history at odds with the seemingly—peaceful veneer of overview. Beginning in the 1960s, scientists working within the American military industrial

academic complex, fashioned a number of ideas about the "whole Earth" as a "total system" in service of the space race and other globally-scaled projects motivated by fears of Soviet expansion. Two ideas and one image from this work are continually evoked by White in *The Overview Effect*: James Lovelock and Lynn Margulis's "Gaia hypothesis," Buckminster Fuller's concept of "Spaceship Earth," and the "Blue Marble" photograph of the Earth surrounded by the void of space, captured by the crew of *Apollo 17* on their return voyage from the Moon in 1972.

Historian of science Peder Anker argues that military work on enclosed space cabin ecological systems in the 1950s and 1960s changed the way that we think about living on planet Earth. Describing Cold War-era, military-funded work on maintaining human life in small, enclosed, hermetically sealed cabins, Anker aptly points out how the "technology, terminology, and methodology developed for ecological colonization of space became tools for solving environmental problems on Earth."<sup>23</sup> Research into a sealed cabin's "carrying capacity" for astronauts in space was repurposed into a



Buzz Aldrin, *Gemini XII*, 1966. Credit: NASA

way to think about how many humans “Spaceship Earth” could support.

Anker points out that one of the first nonspecialists to popularize this way of thinking was R. Buckminster Fuller, who in 1969 published his *Operating Manual for Spaceship Earth*, in which he famously proclaimed, “we are all astronauts.”<sup>24</sup> Fuller argued that techniques developed for managing life in sealed space cabins should be transferred and applied to globally scaled environmental problems on Earth.

Apollo astronauts supplied important visual aids for thinking in this manner when they took the first color photographs of the Earth from a significant distance out in space. The “Earthrise” photograph, depicting a three-quarters-full Earth looming over the edge of the Moon’s surface, taken by the crew of *Apollo 8* in December 1968, was the first in this new photographic genre. However, the most famous was “The Blue Marble,” taken in 1972, as the crew of *Apollo 17* left the Moon at the close of the Apollo program. This photo-

graph shows the Earth as a full circle, surrounded on all sides by the darkness of space.<sup>25</sup>

In 1974, James Lovelock and Lynn Margulis proposed the Gaia hypothesis, based on work Lovelock had done for NASA on developing a method for detecting the presence of life on Mars. Lovelock believed that life could be detected on a planetary scale by examining the composition of a planet’s atmosphere for imbalances in the predicted mix of gases. This work on Mars led the pair to then turn and postulate that Earth is also one giant self-regulating system or “superorganism,” which works to maintain an equilibrium suitable for life-as-we-know-it.<sup>26</sup>

These artifacts reflect a historical moment in America where the promise of space science and technologies was coupled with concerns about Soviet communism, threatening technologies, population growth, and pollution. As Anker nicely points out, “building cabin-ecology systems for astronauts later served as models for the ecological remodeling of life on Earth,” including the design of fallout shelters and nuclear survival bunkers.<sup>27</sup>

Through its creation in the context of the Cold War space sciences, ecological systems thinking became deeply enmeshed with the political, intellectual, and technological goals of the military industrial academic complex, a connection that persists but is not always as apparent as it should be.

These ideas greatly influenced White’s concept of the overview effect. Besides a section titled “Spaceship Earth,” in which he agrees with Fuller’s view that “humanity is as essential to the universe as life is to Earth,” White’s figuration of his disciples as “Terranauts” also heavily draws on Fuller’s declaration that “we are all astronauts.”<sup>28</sup> At the beginning of White’s final chapter, he writes: “If the Earth is a natural spaceship, then everyone on it is either a passenger or a crew member. R. Buckminster Fuller was one of the first people to realize that the Earth is not only a spaceship, but that it needs a crew. He was certainly one of the first pilots of the ship. Today, we need mission specialists, payload specialists, citizen participants, and more. Those who qualify are the human space program’s Terranauts.”<sup>29</sup> White uses the lexicon of shuttle crew designations to describe a new way of being human on Earth: you can be a payload specialist on spaceship Earth!

White also includes a section titled “Gaia Hypothesis” in which he backcasts, claiming that Gaia “can be seen as a result of the overview effect.”<sup>30</sup> White uses Gaia to make the case for political action in support of space science, noting that every part of a self-regulating system can effect the whole. Also, by claiming that his concept anachronistically influenced Lovelock’s early work, White legitimizes the overview effect as “an outstanding spin off from space research.”<sup>31</sup> It is worth reflecting further on the implications of Anker’s point that views of “the whole Earth” as a self-regulating “total system” were products of Cold War projects.

Both the concept of “Spaceship Earth” and the “Gaia hypothesis” are cybernetic visions of Earth as a closed system constantly undergoing processes of self-regulation. In “The Ontology of the Enemy,” historian of science Peter Galison cautions postmodern theorists about their use of the cyborg as a figure of liberation

from social categories by reminding the reader that the melding of human and machine into a single closed system was at first a military project, premised on politics of antagonism, violence, and death. Before the cyborg got its catchy name at a space medicine conference in 1960, the cybernetic organism emerged during World War II as a mathematical approximation of a cold, calculating, enemy bomber pilot.<sup>32</sup> Soon after, the pilot's nemesis, the allied anti-aircraft gunner, was similarly abstracted and abducted into the loop of information between scope, computer, and gun barrel. Galison reminds the reader that people who make ideas and artifacts imbue them with politics that continually constrain and shape all that is done with them, even if this effect slips out of everyday view. Critiquing Haraway's vision of the cyborg as an emancipatory figure, Galison points out that what was first a category of enemy cannot simply be recast as the enemy of all categories. The specific historical circumstance of any idea or artifact's creation imbues it with a "field of meaning" that has a kind of constricting momentum going forward. Galison's point about the checkered history of the cybernetic organism applies just as well to these "overview" precursor concepts that figure the Earth as a sort of cybernetic planet. The military history of the cybernetic planet has been eclipsed in a similar way as the figure of the cyborg. Beginning in the 1960s, ideas like "the whole Earth perspective," and "the Earth as a superorganism" were uncritically adopted and repurposed by environmental and peace groups opposed to the American military industrial academic complex.<sup>33</sup> The military origins have slipped out of everyday view, but if one tugs at the history of these concepts, connections to Cold War military politics emerge from the tangle.

With regard to "The Blue Marble" photograph, Haraway's work on situated knowledges nicely shows us that the view of Earth from space is still a view from somewhere, taken at some time, made possible by a particular assemblage of certain humans and machines. She writes, "the 'whole Earth', the lovely, cloud-wrapped, blue, planet Earth... could only exist if a camera on a satellite had taken the picture. Only in the context of the space race in the first place, and the militarization and com-

modification of the whole earth, does it make sense to relocate that image as the special sign of an anti-nuclear, anti-militaristic, Earth-focused politics. The relocation does not cancel its other resonances; it contests for their outcome."<sup>34</sup> It is these other, older resonances—Galison's "field of meaning"—of the military industrial academic complex that first provided the political impetus and material infrastructure for the creation of ideas like "space-ship Earth," and the "Gaia hypothesis," and "The Blue Marble" photograph, that have been adopted wholesale into the overview effect. The implicit political argument here—that this way of experiencing the Earth is "nature's way"—eclipses and discredits other ways of seeing, experiencing, and thinking about the planet. Spaceship Earth is simply assumed to be an American (or at the very least "Western") ship.<sup>35</sup>

White, who was educated at Harvard and Oxford, views spaceflight through a lens that is eerily similar to American manifest destiny. But rather than America being destined to colonize the West, White argues that humanity is *supposed* to colonize space: "The role frontiers play in society's evolution not only allows civilization to expand outward into empty spaces, but they also allow consolidation at home."<sup>36</sup> His monolithic regard for "civilization," and the supposedly "empty spaces" that it inevitably expands to fill, is evidence of a lingering colonial worldview. He believes that the overview effect is the universe confirming that western "civilization" is the "best" form of human culture because it was the first to develop technologies of spaceflight (supposedly a goal for humanity set by the universe long ago). Western culture is ethnocentrically assumed to be the default logical social model to carry forward in an ever-expanding sphere of colonial activity in outer-space. Even as White tries to get readers to visualize humanity and the Earth as a total system devoid of cultural barriers like political borders, his ethnocentric assumption of cultural superiority and colonial-style expansionist destiny permeates just below the surface of the entire overview philosophy.

For White, the overview effect is more than a collection of stories, or a new psychological phenomenon; it is a totaliz-

ing teleological worldview, built around the idea that humans naturally belong in outer space, and that there is a strong universal imperative to get there soon. White believes that nothing short of the fate of humanity is at stake in political decisions to colonize space.

## The Limits of Astronaut Self-Reporting

The main ingredients in White's concept of the overview effect are stories told by astronauts who have flown on NASA or Soviet/Russian space missions. White assumes that because astronauts are carefully selected for their exemplary military, scientific, or engineering backgrounds that they must also always be reliable reporters; that their stories of subjective experiences are still objective observations and are rendered faithfully without any influencing factors. However, space psychologists at NASA and in academia have long worried that sociological pressures within astronaut culture routinely dissuade members of the corps from truthfully revealing to mental health professionals (and presumably anyone taking notes for a book) how they really feel during spaceflights.

Since the 1950s, aviation and space psychologists have worried that test pilots and astronauts habitually resist telling them (or anyone else) the truth about their emotions and feelings during missions for fear that any negative or abnormal reports will result in being removed from flight-ready status. In short, psychologists assume that a subtle "lie to fly" culture persists, and that it influences what astronauts will tell them. Ever since Deke Slayton was bumped from a Project Mercury flight in 1962 for a having minor heart defect, all astronauts have known that their careers in space depend on their continued presentation of perfect mental and physical health. Rigid selection requirements and a growing pool of candidates means that astronauts know that they are easily replaceable.<sup>37</sup> While physical abnormalities are hard to mask from biomedical detection, mental feelings are harder defined, sometimes impossible to detect, and therefore easier to hide from investigators.

In *Choosing The Right Stuff: The Psychological Selection of Astronauts and Cosmonauts* (1994), former NASA psychologist Patricia A. Santy discusses this

epistemic impasse in the mental management of astronauts. “The expression of emotions such as sadness or fear is considered a weakness. The pilot/astronaut culture is overtly hostile to the expression of such problems—in themselves and others. Denial is the name of the game.”<sup>38</sup> To combat this, NASA has tried to promote a strict doctor-patient confidentiality among astronauts and space medicine experts, but despite these efforts there are always a number of well-known exceptions, like how the expression of “any symptom or condition [which] might negatively affect safety of flight” can lead to a permanent desk job.<sup>39</sup> To this point, one of the conclusions reached by the expert panel that authored *Safe Passage: Astronaut Care for Exploration Missions* (2001), a report published by the Institute of Medicine on the state and future directions of space medicine and psychology, was that “implications regarding disclosure and use of clinical data may have led to the underreporting of relevant information.”<sup>40</sup>

Writing in *Psychology and Space Exploration: Contemporary Research in Historical Perspective* (2011), Albert A. Harrison and Edna Fiedler observe that “Astronauts remain sensitive to possible threats to flight assignments and careers,” and that this has been an enduring obstacle to psychological research on, and psychiatric support for astronauts.<sup>41</sup> This problem remains so acute that psychologists are developing “a computer-interactive video countermeasure technology for the prevention and treatment of depression,” so that astronauts can access mental health advice anonymously while in space, ostensibly without the knowledge of flight surgeons back in mission control.<sup>42</sup>

Clearly there exists a systemic incentive for astronauts to not report or at least to underreport negative feelings (such as anxiety, stress, fear, or loneliness) on their return to Earth. This has serious implications for the evidence at the core of White’s concept of the overview effect. If astronauts are encouraged to only report positive experiences, then of course it will appear to a data gatherer such as White that space is the sure-fire transformative experience that he hopes it will be. But this pattern, or, “realization all of the astronauts have,” may be the result of skewed and biased self-reporting, now reinforced by

the popularization of such narrative types into a sort of self-fulfilling prophesy.

### The Break-Off Phenomenon

In the 1950s, American aviation and space medicine experts working for the U.S. military became anxious about pilots reporting quite different feelings at very high altitudes. They called this diverse collection of disconcerting pilot stories “the break-off phenomenon.”<sup>43</sup> By bringing this historical concept into the conversation with the present-day overview effect, I hope to show how in a different moment in time, a different group of data gatherers looked at a similar situation, but reached different conclusions about what it might mean to see the Earth from high up above. I hope the comparison will suggest, at a general level, that human feelings at very high altitudes vary across people and cultures, and change over time. While these pilots were not traveling into outer space, they were viewing the Earth from very high altitudes, and in fact, in the opening paragraph of *The Overview Effect*, White claims that “anyone who flies in an airplane has an opportunity to experience a mild version of [the overview effect].”<sup>44</sup>

In the 1950s, the nascent field of space medicine (the preventative medical practice of selecting and protecting humans sent to outer space) was a purely speculative exercise investigating a number of analog situations to model different aspects of future human spaceflights. Because many early space medicine experts came to the field via careers in military aviation medicine, test-pilot populations were most often used as analogs for future astronauts. In the United States, white, male, Christian, military test pilots were the only humans permitted to fly experimental planes on experimental flight paths, and this took them to very high altitudes. Space medicine experts predicted that astronauts would face many of the same mental and physical problems during spaceflight, and so took test pilots up as objects of investigation.

In 1956, aviation medicine experts conducting a routine survey of naval pilots reported hearing about something new that the pilots themselves had labeled “break-off.” This was defined as “a feeling of physical separation from the Earth when piloting an aircraft at high altitude.”<sup>45</sup>

These reports prompted a focused study of the phenomenon by Brant Clark, a professor of psychology at San Jose State College, and Ashton Graybiel, director of the Naval Aeromedical Institute at Pensacola, Florida, and later, part of NASA’s Project Mercury. The results of their study were published in the April 1957 edition of *The Journal of Aviation Medicine*.

For their study, they interviewed 137 naval and marine pilots about “break-off” by asking each if they had experienced “a feeling of physical separation from the Earth when piloting an aircraft at high altitude.”<sup>46</sup> They found that 48 of the 137 pilots (35 percent) had personally experienced feelings like this. However, due to the same self-reporting problem discussed above, the pair of researchers guessed that some held back despite promises of anonymity, noting that many answered that it was a “very personal” experience, and “not the sort of thing flyers talk about.”<sup>47</sup>

They concluded that the break-off phenomena, like the onset of anoxia, presented itself in slightly different ways in each case. However, they were able to offer a qualified generalization: “Those pilots who experienced it characterized the break-off effect as a feeling of being isolated, detached, or separated physically from the Earth. They perceived themselves as somehow losing their connection with the world.”<sup>48</sup> Here are three samples of the anonymous pilot tales that Clark and Graybiel grouped together under the break-off phenomenon:

Pilot 1: “It seems so peaceful; it seems like you are in another world... I feel like I have broken the bonds of the terrestrial sphere.”<sup>49</sup>

Pilot 2: “He feels alone, light, remote, and insecure. He is unhappy until he gets to a lower altitude. He feels the need to have an important objective to take his mind off of it.”<sup>50</sup>

Pilot 3: “You do have a feeling of loneliness...It’s very lonely alone at high-altitude. I’d rather fly at 20,000 or 25,000 feet...at 44,000 feet you are pretty lonely up there.”<sup>51</sup>

Despite noting differences in the stories and experiences, the researchers con-

cluded that the break-off phenomenon was “a clearly defined...condition of spatial orientation in which the pilot conceives himself to be isolated, detached, and physically separated from the Earth.”<sup>52</sup>

Another study, this time of Italian jet pilots, was conducted by T. Lomonaco in 1958 and found that 52 of 388 (13 percent) interviewees reported experiencing break-off as defined by Clark and Graybiel. In 1958, U.S. Air Force space medicine expert David G. Simons, spoke about experiencing the break-off phenomenon during one of his experimental high-altitude balloon flights (Manhigh II) in August 1957, as part of the First International Symposium on Submarine and Space Medicine.<sup>53</sup> Simons noted that he did not experience the effect during his ground-based, 24-hour claustrophobia test, but during the day-long flight that took him above 100,000 feet, he experienced feelings he interpreted as break-off at four different times, in four slightly different ways.

I experienced a sense of detachment from the Earth at four different times. The first was before sunset when the cloud formations gave a “cliff” effect which provided a frame of reference that helped to emphasize the true vertical distances involved...during the night I felt in much closer contact with the stars and space above than I did with the beautiful, but remote, clouds below.<sup>54</sup>

Simons makes the case that break-off can happen during balloon flights to very high altitudes and that the phenomenon is not specific to powered flight. He reiterates and amplifies Clark and Graybiel’s anxiety that this effect could cost the military men and machines. Frozen in a “break-off” moment, operators would be in a state “equivalent to sleep or a state of reversible self-hypnosis, precluding useful activity.”<sup>55</sup> From a Cold War military perspective, when seconds counted more than ever, these strange feelings could compromise the human factor at a critical moment. Simons saw potential problems for NASA: “In spaceflight, solitude, monotony, and generally reduced variety and intensity of sensory stimulation, must be expected.”<sup>56</sup> He likens the

break-off phenomenon to some of the strange mental states reported by experiments in sensory deprivation conducted by J. P. Henry and John C. Lilly.<sup>57</sup>

In 1965, another “exploratory study” into the break-off phenomenon was conducted at the Pensacola Naval School of Aviation Medicine, this time by base psychiatrist John A. Sours. During a period of six months, Sours surveyed all naval and marine pilots who (for various reasons) received psychiatric evaluations, about whether or not they had also experienced the break-off phenomenon. Out of 37 pilots, seven reported experiencing “break-off” before experiencing more intense “signs and symptoms of a psychiatric disorder.”<sup>58</sup> Sours concluded that feelings of “break-off” can be an early indication of future “acute anxiety attacks,” which could build up to a “fear of flying reaction.”<sup>59</sup> It is interesting to note that despite the very small sample size, Sours found great diversity in the reports of “break-off”: “the predominant findings were affective, either arousal or exhilaration resulting in a desire to fly higher or faster; or, on the other hand, reduced awareness, apprehension, or frank anxiety associated with feelings of detachment, isolation, or physical separation.”<sup>60</sup>

The final study of the break-off phenomenon appeared in the *Journal of Aviation Medicine* in 1973. This study, conducted by A. J. Benson at the Royal Air Force Institute of Aviation Medicine in Farnborough, England, surveyed aircrew sent in for clinical assessment after experiencing “disorientation in flight.”<sup>61</sup> Out of 78 pilots, 29 described “incidents in which they experienced feelings of unreality and detachment.”<sup>62</sup> He concluded that the effect was still “inadequately understood” but not “a serious threat to flying personnel.”<sup>63</sup>

After this, the term “break-off phenomenon” disappears from aviation and space medicine literature. No NASA astronauts ever reported experiencing the break-off phenomenon during a spaceflight, but it is important to note that at present this is impossible to know for sure, because of the fact that starting in 1961, NASA greatly restricted the access of psychologists and psychiatrists to astronauts.<sup>64</sup>

In the context of the overview effect,

the break-off phenomenon represents an idea that is currently displaced by White’s positive conversion narrative. Few remember a time when looking at the Earth from very high altitudes was sometimes very scary, and fostered feelings of disconnection rather than feelings of human unity and communion with a newly revealed “whole Earth.” Pilots frequently reported feeling more connected to outer space or their vehicle than to any sort of pan-human, or total-Earth system. It remains quite possible that some astronauts have had disturbing or negative feelings in orbit similar to the break-off phenomenon, but felt unwilling or unable to report them. This will likely remain the case unless steps are taken to change the nature of astronaut and astronaut management culture.

The break-off phenomenon also serves as a reminder that the human experiences of environments are never fixed, and are never the same for everyone. Data gatherers working in military aviation and space medicine recorded a wide array of feelings that they tried to group together as “the break-off phenomenon” for practical purposes. Unlike the overview effect, they were never seen as conversion narratives or expanded into a grand vision of humanity. The earlier work of these military scientists demonstrates how human feelings in extreme environments can be studied without scaling up to a grand narrative about universal human purpose. It is also a reminder of the military origins of this field of concern (how does going to high altitudes affect human consciousness?) that White enters into in the 1980s. While the overview effect has been interpreted as a reason to be hopeful and bold, the breakoff phenomenon was taken to signal caution, if anything. The break-off phenomenon also illustrates the root problem of pilot self-reporting in a culture of masculine peer-pressure and career anxieties, now seen as affecting astronauts by those charged with assessing their mental health.

## Conclusion

In *Alien Ocean* (2009), Stefan Helmreich argues that the ocean is both a natural and cultural object that changes throughout time in the minds of the different humans who think about it and interact with it. He argues that views of the ocean

have radically changed, depending on who was looking at the ocean, for what reason, and in which cultural context.<sup>65</sup> For Helmreich, the ocean is “a material thing that becomes meaningful only through perception, belief and action.” I think the overview effect (the effect of seeing the Earth from very high altitudes) is also both a natural and cultural object. It is this cultural valence that has been rendered invisible by claims that the effect is simply the result of “nature” affirming culture. This paper has presented three historical data sets that complicate simple claims to nature for the overview effect. The military roots of three foundational concepts: Spaceship Earth, the “Blue Marble,” and Gaia reveal the implicit cultural bias present in overview. The history of space psychology provides reason to doubt the veracity of astronaut self-reporting, and suggests how this standard “conversion narrative” has become a self-fulfilling prophesy. Finally, the history of aviation and space medicine reveals an early alternative to the overview effect called “the break-off” phenomenon, where pilots reported feeling depressed, anxious, and separated from the Earth when at high altitudes. Together, these selections from the archive suggest that the view of the Earth from outer space includes a reflection of how people see themselves. This historical and reflexive perspective should be appended to the current discussions about how the overview effect will influence future spacecraft design, crew selection, and mission planning.

### About the Author

Jordan Bimm is a fourth-year PhD student at York University’s Graduate Program in Science and Technology Studies (STS) in Toronto, Canada. His forthcoming dissertation focuses on the construction of the American astronaut during the 1950s by tracing the development of astronaut selection requirements between a host of related fields including space medicine, space psychology, and human factors engineering. This research has also led to studies of space medicine’s connections with animal testing, sports medicine, and mountaineering, as well as space medicine’s influence on early astrobiology studies.

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## Notes

1. Robinson et al., 79.
2. You can watch the short film *Overview* at: <http://www.youtube.com/watch?v=CHMIfOecrlo>
3. Clinton, 1295.
4. Harrison and Fiedler, 29.
5. White, 259. As Loren Acton (STS 51-F) notes in his interview with White (pp. 259): "I went up expecting that experience, and I had it."
6. <http://www.overviewinstitute.org>
7. *The Space Show* (17 June 2007): <http://archive.thespaceshow.com/shows/732-BWB-2007-06-17.mp3>
8. White, 230. Interview occurred 11 July 1986, in Ottawa after his first spaceflight.
9. White, 277. Interview occurred 14 August 1997 in Boston after his spaceflight.
10. White, 248. Interview occurred 23 July 1986. Garn was a sitting Republican senator from Utah at the time of his spaceflight, and had previously served in the Navy as a jet pilot.
11. White, 174.
12. White, 174.
13. White, 171.
14. It is interesting to contrast White's inference that reports of mental benefits imply positive feedback from "the universe", with the many physiological problems like vision degradation and muscle atrophy (not to mention the lack of atmosphere and abundance of radiation) which, by this logic, would seem to signal "negative feedback" that humans do not belong in outer-space.
15. Here, White's ontology of the "Terranaut" is notably in opposition to Ian Hacking's concept of dynamic nominalism—that types of people are social creations—White argues that "Terranauts" is a timeless category: "like the human space program, the Terranaut has always been there, unrecognized, without a label." For Hacking's concept of dynamic nominalism ("that numerous kinds of human beings and human acts come into being hand in hand with our invention of the categories labeling them.") see his chapter "Making Up People" in *Historical Ontologies* (2004).
16. White, 169.
17. Pyne, 219.
18. Pyne, 219.
19. *The Space Show* (17 June 2007): <http://archive.thespaceshow.com/shows/732-BWB-2007-06-17.mp3>
20. <http://www.overviewinstitute.org/AlanLadwig-bio.htm>
21. <http://www.overviewinstitute.org/Rayldaszak-bio.htm>
22. <http://www.overviewinstitute.org/LorettaWhitesides-bio.htm>
23. Anker, 239.
24. Buckminster Fuller, 10.
25. Anker, 246.
26. Anker, 246.
27. Anker, 259.
28. White, 89.
29. White, 169.
30. White, 87.
31. White, 87.
32. Galison, 233.
33. These groups included antinuclear proliferation groups, the environmental movement, and other counterculture groups. For a rich history of this connection, see Bryant's 2006 dissertation, "Whole system, whole earth: the convergence of technology and ecology in twentieth-century American culture."
34. Haraway, 97.
35. Here I paraphrase anthropologist Stefan Helmreich's line in *Alien Ocean*, "the acronym for the National Oceanographic and Atmospheric Administration—NOAA (pronounced "Noah") suggests that Spaceship Earth is an ark and the United States its steward" [12].
36. White, 109.
37. This was also evidenced by the last-minute replacement of CSM pilot Ken Mattingly with alternate Jack Swigert only two days before the launch of *Apollo 13*.
38. Santy, 69.
39. *Safe Passage*, 177.
40. *Safe Passage*, 187.
41. Harrison and Fiedler, 45.
42. Sandal and Leon, 202.
43. Clark and Graybiel, 121.
44. White, 3. White recalls having an airborne experience of the effect: "My effort to confirm the reality of the overview effect had its origins in a cross-country flight in the late 1970s. As the plane flew north of Washington D.C. I found myself looking down at the Capitol Building and Washington Monument. From thirty thousand feet they looked like little toys sparkling in the sunshine."
45. Clark and Graybiel, 121.
46. Clark and Graybiel, 121.
47. Clark and Graybiel, 122. One pilot responded, "You don't discuss things like this."
48. Clark and Graybiel, 122.
49. Clark and Graybiel, 122.
50. Clark and Graybiel, 122.
51. Clark and Graybiel, 123.
52. Clark and Graybiel, 124.
53. The symposium's papers were collected in the volume, *Environmental Effects on Consciousness* (1958) Karl E. Schaffer, editor.
54. Simons, 90-91.
55. Simons, 92.
56. Simons, 92.
57. It is interesting to note that the next chapter after Simons in the volume is "The Effect of Sensory Deprivation on Consciousness" by John C. Lilly.
58. Sours, 455.
59. Sours, 448.
60. Sours, 452.
61. Benson, 944.
62. Benson, 944.
63. Benson, 944.
64. Santy, xvii.
65. Helmreich. For example, Helmreich shows how in 19th century America, whales were emblematic of the ocean conceived as a site for work, trade, and natural history, but by the twentieth century this had shifted to the figure of the dolphin, which was associated with communication, intelligence, and environmental science. Helmreich argues that in the twenty-first century the emblem of the ocean in western culture has become the microbe, which paradoxically stands for both the genetic origin of life and the ultimate alien other.

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