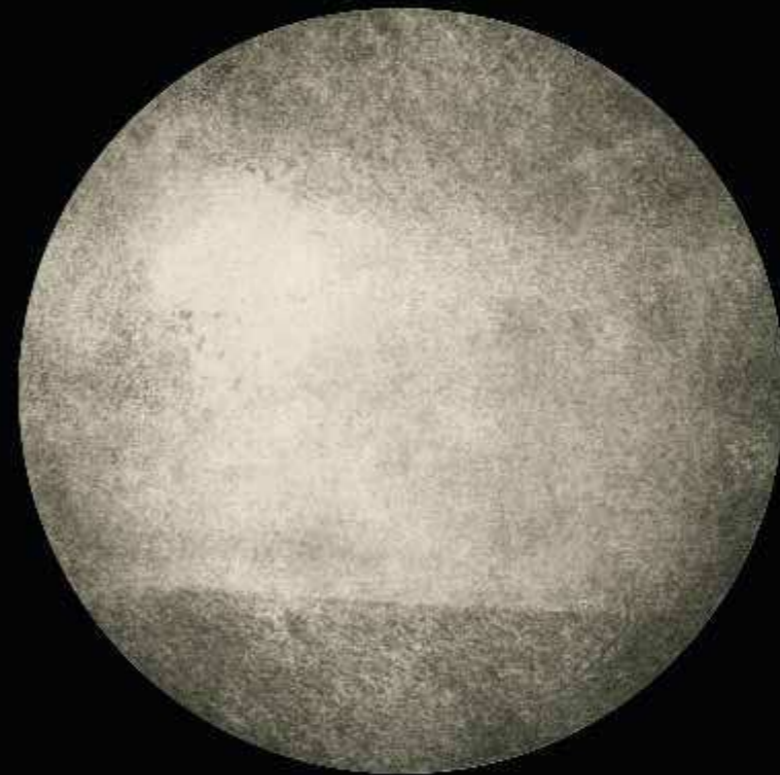


THE CASE FOR SPACE

REVIVING COSMIC CONSCIENCE



PROVISIONAL RESEARCH
A PROVISIONS LIBRARY JOURNAL

VOL 1 / ISSUE 4

© 2013 PROVISIONS LIBRARY. ALL RIGHTS RESERVED.

NO PART OF THIS BOOK MAY BE REPRODUCED IN ANY WRITTEN, ELECTRONIC, RECORDED, OR PHOTOCOPIED FORM WITHOUT WRITTEN PERMISSION OF THE PUBLISHER OR AUTHOR, ALTHOUGH COPIES OF ITS DIGITAL FORMAT MAY BE CIRCULATED AT NO COST OR AUTHORIZATION IF ATTRIBUTED TO PROVISIONS LIBRARY. BRIEF QUOTATIONS WITH PROPER ATTRIBUTION ARE WELCOME.

ALTHOUGH EVERY PRECAUTION HAS BEEN TAKEN TO VERIFY THE ACCURACY OF THE INFORMATION CONTAINED HEREIN, THE AUTHOR AND PUBLISHER ASSUME NO RESPONSIBILITY FOR ANY ERRORS OR OMISSIONS. NO LIABILITY IS ASSUMED FOR DAMAGES THAT MAY RESULT FROM THE USE OF INFORMATION CONTAINED WITHIN.

ALL REQUESTS FOR REPRODUCTION OF CONTENT SHOULD BE SENT TO PROVISIONS LIBRARY ([HTTP://PROVISIONSLIBRARY.ORG](http://provisionslibrary.org)) BY EMAIL AT [PROVISIONSLIBRARY@GMAIL.COM](mailto:provisionslibrary@gmail.com)

PUBLISHED BY: PROVISIONS LIBRARY, WASHINGTON DC
INTERIOR DESIGN BY: STEPHANIE SHERMAN & DREW ____
WRITING & EDITING BY: STEPHANIE SHERMAN & DON RUSSELL
WORKS & GRAPHICS BY: GREG BLOOM, NATE LARSON, ANNE ELIZABETH MOORE, TIM SCHWARTZ
RESEARCH & DRAWINGS BY: CLAY HARRIS, SARAH BERTIE, AMY LOKOFF, EMILY RAKOWSKY

PROVISIONS LIBRARY 2013 – COPY RIGHTS

10 9 8 7 6 5 4 3 2 1

1. ART 2. LAW 3. MEDIA

FIRST EDITION

DIGITAL PUBLICATION

ABOUT PROVISIONS

Provisions Library is an art and social change research center initiated in 2001. Provisions uses art to present information and promote learning: to explore models of inclusion, equity, and connection. Working with a variety of individuals and institutions, Provisions discovers and amplifies new cross-cultural narratives, grassroots strategies, and open sources of knowledge. Provisions' library, public programs, and research opportunities support artistic, intellectual, and activist endeavors that explore social topics in contemporary culture. These include local, national, and international projects, such as public art projects, exhibits, residencies, forums, and publications.

Provisions Research Residencies were launched in 2011 to provide artists, scholars, and creative researchers access to the capital's unique wealth of archives, resources, and public spaces that speak to our political legacy and its social futures. Fellows from across the nation and within the capital build a

more robust and socially-engaged field of contemporary art and cultural scholarship through creative research projects.

Provisional Research is a digital journal that documents research and projects through open-access downloads. Provisions provides a platform for considering and reflecting on public process, with the goal of advancing art and social change in cognizance and consciousness.

Support is provided by Gaea Foundation, Andy Warhol Foundation, Open Society Foundations, Nathan Cummings Foundation, Lambent Foundation, CrossCurrents Foundation, DC Commission on the Arts and Humanities, Cafritz Foundation, and George Mason University.

Provisions Library
<http://provisionslibrary.org>

to open skies

CONTENTS

1. CONTEXT	
INTRODUCTION.....	06
2. SUITS	
HUONG NGO.....	09
3. SPACE HERITAGE PARK	
HEIDI NEILSON.....	27
4. DEBT	
CASSIE THORNTON.....	39
5. DRONES	
KATE CHANDLER.....	75
6. APPENDIX	
PARTICIPANTS, REFERENCE.....	84



CONTEXT

The Case for Space assembled researchers Heidi Neilson (NY), Huong Ngo (NY), Cassie Thornton (CA), and Kate Chandler (DC) in Washington DC to explore the ethos, aesthetics, and ecology of outer space and to creatively consider the role that space programs play in cognitive and spiritual life, social consciousness, and political progress. It proposed such questions as: how does space on a macro and micro level serve as a ground for human identification, relationship, and reflection? How do space technologies, tools, and tactics help us encounter plateaus of the possible? Can the diversity of cosmic orders help us imagine constellations for change here at home?

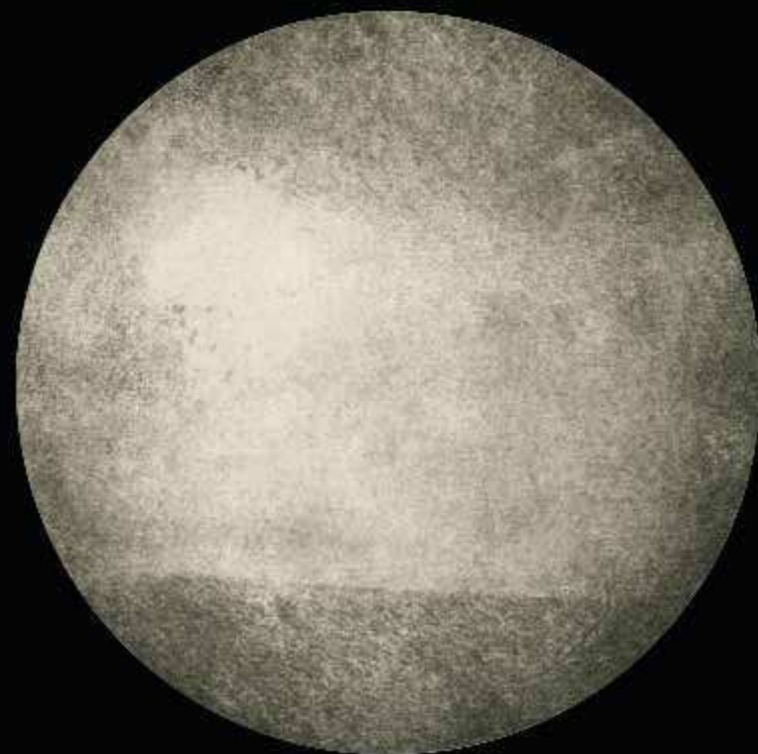
The residency launched just as DC's cherry blossoms finally bloomed after a long winter, one year after the Mars rover so popularly landed, one month before Tom Sachs staged his mock mission to Mars at the New York Armory. In 2013, Virgin Galactic has advanced the idea of space tourism further than ever before (although it has yet to actually occur) and Trevor Paglen has placed 100 images in geosynchronous orbit. As Senator McCain champions space as a strategic military resource, NASA faces more budget scrutiny than ever, and first and last NASA artist-in-residence, Laurie Anderson, has called into question any need for art and space to connect on the level of infrastructure. The notion of the unlimited sky is in hibernation, and it seems eons have passed since there was a good alien movie.





The residents explored The National Air and Space Museum, NASA's Goddard Space Flight Center, the National Archives, and eventually made the trek to the National Radio Astronomy Observatory at Green Bank, WV. They observed construction of the Webb Telescope, visited the space blanket fabrication shop and viewed various testing facilities. Their projects, in the end, considered space as material, money, place, and premise. Huong Ngo explored the role of the space suit and space gear in performing the role of the astronaut. Heidi Neilson proposed a space memorial park. Cassie Thornton analyzed the space of debt, and outer space in our economic investment in dreams and visions. Kate Chandler researched the role of drones in charting our future landscape. Their projects explored space as both metaphor and meme for a lost, imagined, future society.

Space is about extremes--of atmosphere, temperature, geography and radiation. The "spaces" of space-- junk yards, facilities, research centers, are micro experiences of the expanse of everything. The space of the unknown is the space of today's future. Through space, the body discovers its limits. As a terrain for art practice, the first step is to understand how we work in space, and how space works in us.



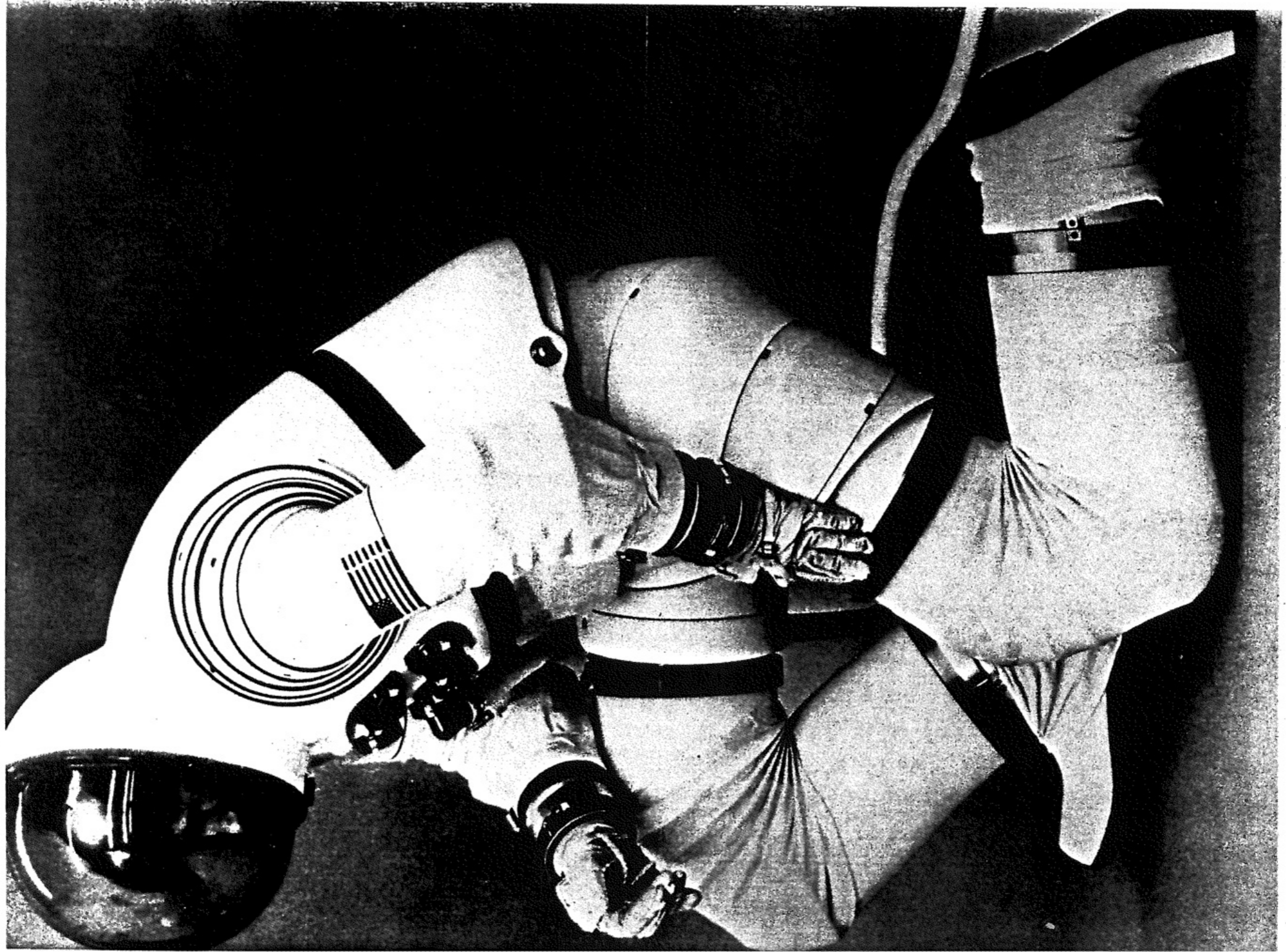
SUITS

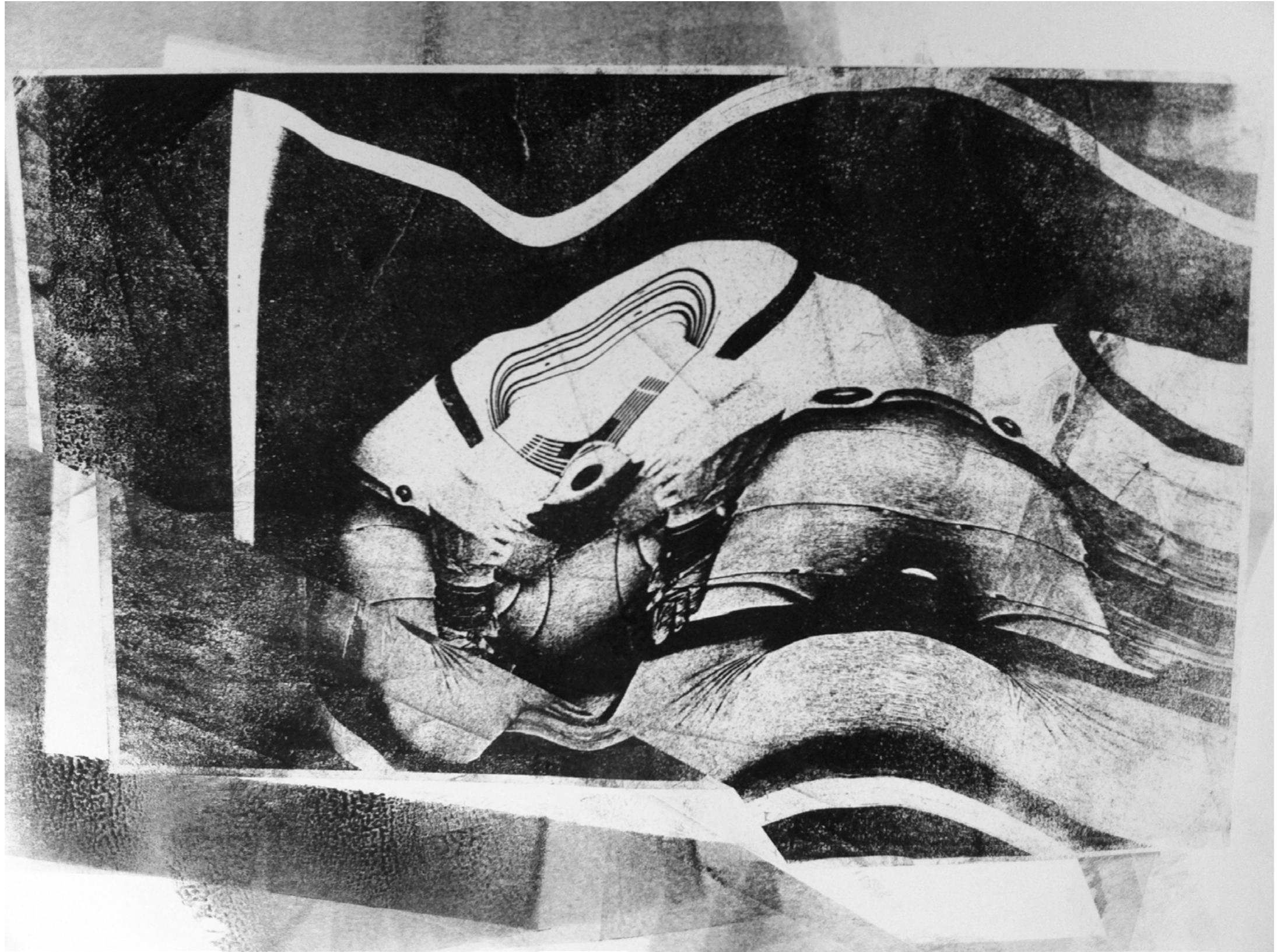
HUONG NGO

ANALOG: PERFORMING THE FUTURE

Huong Ngo

Provisions Library Research Residency
Spring 2013





Cover: A Commons (Double Moon), Huong Ngo, Monotype, 2013.

Previous Right: Litton RX-5 Hard Suit Design, 1964. Courtesy of National Air & Space Museum, Smithsonian Institution, Washington, DC, and NASA.

Previous Left: A Commons (Future Body), Huong Ngo, Monotype, 2013.

“Art is not a mirror held up to reality but a hammer with which to shape it.”

Bertolt Brecht

On April 22, 1969, Buzz Aldrin and Neil Armstrong donned their spacesuits and walked on the surface of the moon. This moon, however, was not the same moon that graced every television and newspaper in the United States on the day of the historic landing of July 21, 1969. It was a clean room measuring approximately three stories high with a tiled floor covered in sand, lit with fluorescents, and ringed with NASA engineers.

The goal of their mission, known as a simulation or “analog,” was to test equipment such as the then new extravehicular spacesuits, cameras, and research modules. Yet, the men were not just gauging the performance of their gear, but also performing themselves. In their surreal new outerwear, they were determining what it meant to perform the identity¹ of an astronaut and with that, a body that represented notions of the future, national ideology, and political hegemony. How then do such performances of identity intersect with critical discourses around difference, in particular those of race, gender, and sexuality? Moreover, how does the apparatus of technology supporting the astronaut (e.g. the spacesuit) contribute to that performance?

How do these notions apply to the contemporary conversation around traveling to and colonizing Mars? What might we learn if we put fictional performances of space travel and mars colonization on the same plane as Mars analogs and attempt to understand these missions in terms of power and knowledge in addition to affect and wonder? Finally, how can we apply contemporary notions of the commons to understand our shared entitlement to outer space as well as our space here on Earth?

¹ See Butler, Judith. “Performative Acts and Gender Constitution: An Essay in Phenomenology and Feminist Theory.” *Theatre Journal*, Vol. 40, No. 4 (Dec., 1988), pp. 519-531.



Top: Apollo 11 simulation. Courtesy of NASA, April 22, 1969. Two members of the Apollo 11 lunar landing mission participate in a simulation of deploying and using lunar tools on the surface of the Moon during a training exercise on April 22, 1969. Astronaut Buzz (Aldrin Jr. on left), lunar module pilot, uses a scoop and tongs to pick up a soil sample. Astronaut Neil A. Armstrong, Apollo 11 commander, holds a bag to receive the sample. In the background is a Lunar Module mockup.

Bottom: Apollo 11 training. Nevada Test Site, February 16, 1965. Courtesy of NASA.



Left: Lieutenant Uhura (Nichelle Nichols) from *Star Trek, The Original Series*, a popular science fiction show that featured an multi-ethnic spaceship crew.

Below: Dr. Mae Jemison, first black woman to travel in space, photographed aboard the Space Shuttle Endeavour on September 12, 1992. Courtesy of NASA. Jemison cited Uhura has a major influence in joining NASA.



The existence of the space program in the United States immediately launched a debate around who was qualified to travel in space. Because of the requirement that astronaut candidates also be military test pilots, women were excluded from the space program. From December of 1968 to May of 1969, the group NOW protested this exclusion. The president of the organization, Nita Ladewig, also protested the exclusive use of names of male gods for NASA's spaceships.

Women, however, *were* tested to determine whether women could physically handle space travel through a program private funded and run by a NASA doctor, Randy Lovelace. Many of the women in the group perceived these tests as the effectual rehearsal of astronaut training and advocated for changing the qualifications. Jerrie Cobb and Janey Hart (shown right), two women who were part of this Women in Space Program, petitioned for a hearing in front of a Special Congressional Subcommittee to argue their case. Despite the women's more than adequate performance in the tests and a sympathetic subcommittee, NASA would not change the qualifications for astronauts. The first woman to go into space for the U.S. was Sally Ride, not until 1978.²

Likewise, NASA's inclusion of people of color was slow and politically fraught.³ This history is charted in *Ebony* and *Jet* Magazines as the African-American community moved from excitement about the space program to disillusionment due to exclusionary practices and finally outcry over the spending of money on the space program over other sectors such as education and urban development.⁴ Interestingly, Mae Jemison, the first African-American woman to go into space, credits the fictional character Uhura of *Star Trek* as her inspiration, not Buzz Aldrin or even Guion Bluford.

Right: Jerrie Cobb and Janey Hart testify in front of a Special Congressional Subcommittee to evaluate the requirements for the qualifications for astronauts, July 17, 1962. Courtesy of the Library of Congress.

The two were part of the Women in Space Program, privately funded by Randy Lovelace to determine whether women could physically handle space travel. Despite the women's more than adequate performance and a sympathetic subcommittee, NASA did not change the qualifications for astronauts. The first woman to go into space for the U.S. was Sally Ride in 1978.



² There are many very engaging and reliable accounts of this history, including Margaret A. Weitekamp's *Right Stuff, Wrong Sex: America's First Women in Space Program* (The John Hopkins University Press, 2005).

³ You can read a comprehensive history of NASA's struggle to integrate entitled "Racism, Sexism, and Space Ventures: Civil Rights at NASA in the Nixon Era and Beyond" by Kim McQuaid in *Societal Impact of Spaceflight*, (NASA, 2007).

⁴ *Welcome to the Dreamhouse: Popular Media and Postwar Suburbs*, (Duke University Press Books, 2001) by Lynn Spigel is, I have found, the best resource for an analysis of this conversation.



The men of the Mercury 7 were aware of the value of their image connected to this historic event. They brokered a deal with each other that regardless of which ones went into space first, they would all get a \$500,000 contract with Life Magazine for exclusive coverage about their lives, wives, etc. They also negotiated book deals as individuals and as a group. Yet, the notion of a manned space program has never been popular in the United States and really had to be sold to the public.

The spacesuit was instrumental in this task, yet it took a makeover of the suit by way of science fiction in order to accomplish it. In fact, the Mercury suit and partially-pressurized Navy suit that it was based on are nearly identical, except that the Mercury suit is coated in silver. According to the biography of Scott Crossfield, a pilot that advised in the design, Crossfield suggested to the designer, David Clark, that it be coated in silver, “A coverall of this material would look real good, like a space suit should—photogenic. To justify it technically, we can tell them this silver material is specifically design to radiate heat or something.”

Between 1953 and 1958, the suit was even presented differently to the public to reflect this desire to connect the spacesuit, and thus the astronaut with a more fantastical, imagined body of the future.⁵



Top: Mercury Seven Astronauts. Courtesy of NASA.

NASA's caption: “NASA introduced the Project Mercury astronauts to the world on April 9, 1959, only six months after the agency was established. Known as the Mercury Seven or Original Seven, they are (front row, left to right) Walter M. ‘Wally’ Schirra Jr., Donald K. ‘Deke’ Slayton, John H. Glenn Jr., M. Scott Carpenter, (back row) Alan B. Shepard Jr., Virgil I. ‘Gus’ Grissom and L. Gordon Cooper, Jr.”

Bottom Left: Pressure Suit, Mark IV, Model 3, U.S.N., Courtesy of National Air & Space Museum, Smithsonian Institution, Washington, DC.

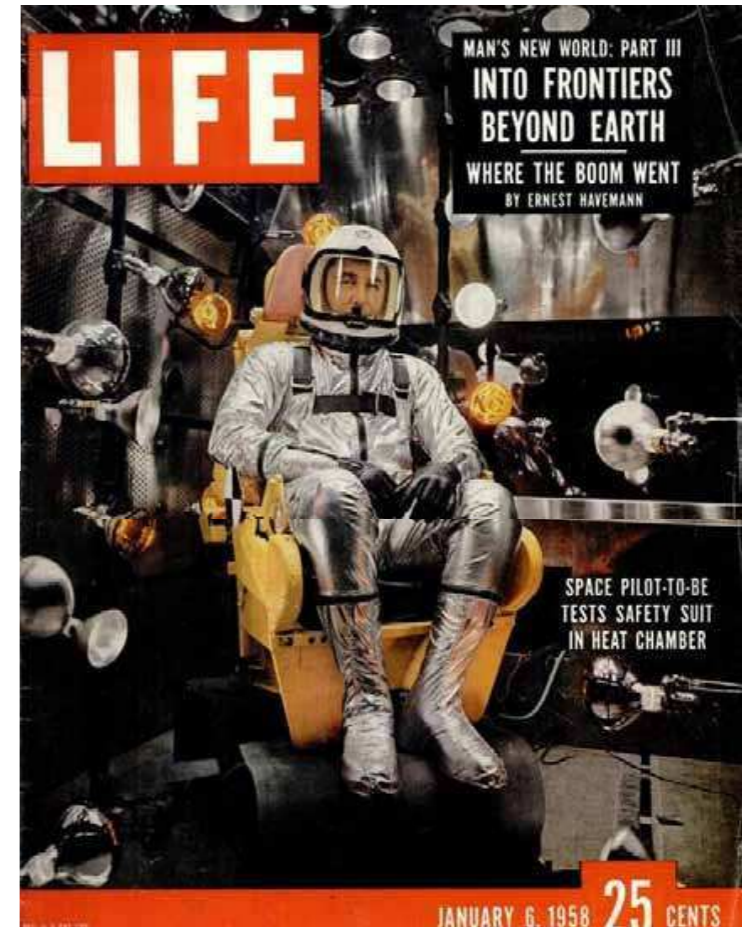
Bottom Right: Pressure Suit, Mercury, Shepard, MR-3, Flown, Courtesy of National Air & Space Museum, Smithsonian Institution, Washington, DC. Designed by B.F. Goodrich, operational 1960.

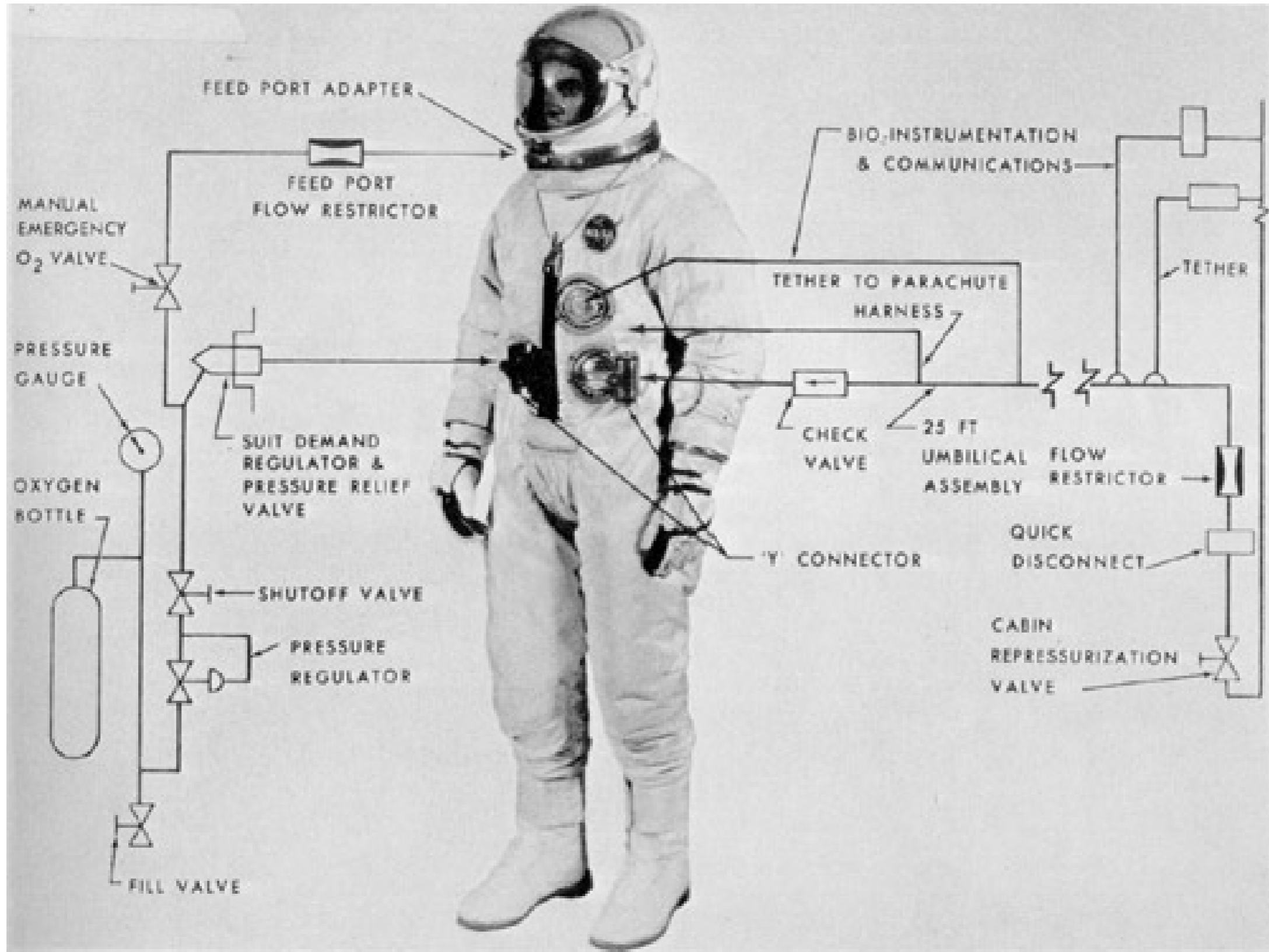
⁵ This history is documented far more rigorously in Lillian Kozloski's *U.S. Space Gear* (Smithsonian Institute Press, 1994) and Nicholas de Monchaux's *Spacesuit: Fashioning Apollo* (The MIT Press, 2011).

Top Left: Cover of *Collier's*, February 28, 1953.

Top Right: Cover of *Life Magazine*, January 6, 1958. Featuring the X-15, designed by David Clark, in silver.

Below: Detail of a poster for *Oblivion*, 2013. Tom Cruise plays a former NASA astronaut who must return to earth and understand the past before the recent apocalypse. Like the Mercury 7, his suit has a painted on veneer of silver.





Previous: Diagram of the Gemini G4C extravehicular suit, 1965
Courtesy of NASA.

Despite these image-oriented goals, the diagram of the Gemini suit (previous) is indicative of manner in which NASA presented space gear to itself, the science community, and increasingly to the public. This example of systems thinking implied a perfect, closed cycle with the suit at the center. The astronaut's actions were highly controlled in order to keep the system in equilibrium. Along with other functions, heart rates were monitored by the system, with arrhythmic medication on hand for irregular heart beats, particularly during take off and re-entry.

Blending function with symbolic value, China's space program utilizes a hybridization of Russian and US space suits and shuttles. In a meeting in February of 2010, Lewis Croog, an expert from Jacobs Engineering, briefs NASA on Chinese spacesuits, shrouded in mystery because of China's notorious practices of secrecy. Croog seems almost bewildered at the Chinese melding of US and Russian technologies. Moreover, he compares images of Taikonauts after re-entry to those of Cosmonauts, baffled by the uncanniness of their re-performance.

The comparison serves as little more than a curiosity for him, but to me indicate an important desire of the Chinese to not only demonstrate technological capabilities, but also to establish themselves amongst the ranks of the modern by performing not only the actions needed to complete a mission, but also the gestures, poses, and looks to further construct their identities as bodies of the future.

Top: Chinese taikonauts get out of Shenzhou-7 re-entry module after their safe landing in North China's Inner Mongolia Autonomous Region on Sep. 28, 2008. Courtesy of Xinhua.

Middle: Tracy Caldwell Dyson, left, Soyuz commander Alexander Skvortsov, center, and flight engineer Mikhail Kornienko, right, relax after landing. Courtesy of NASA/Bill Ingalls.

Bottom: NASA audience during an analysis of Chinese spacesuits, Courtesy of Youtube, February 18, 2010. The analysis emphasizes a comparison between Chinese spacesuits and their US or Russian equivalents.





Previous: A Commons (Double Mars), Huong Ngo, Monotype with rust-based ink, 2013.

Right Top: Mars 500 team. On the team are three Russians (Alexey Sitev, Sukhrob Kamolov, Alexander Smoleevskij), a Frenchman (Romain Charles), an Italian (Diego Urbina) and a Chinese citizen (Yue Wang).

Right Middle: Mars 500 living quarters. Courtesy of Space.com.

Bottom: Slideshow from a talk by QED, the hosting institute of Mars 500, delivered at the 61st International Astronautical Congress, 2010. The slide is a visualization of the group's social dynamics, illustrating the amount of dialogue among crew members (height) and their perceived closeness (distance of points).

So, what are the implications of these performances of the astronaut body on contemporary Mars analogs, simulations of the conditions to travel to, work, and live on Mars? Pictured right is the Mars-500 team, a collaboration among Russia, the European Space Agency, and China in which six crew members stayed in a confined space for 520 days, the approximate time for a return trip to Mars.

Like other Mars analogs, their living and working space, diagramed (middle), is the focus of much new technological development. These habitation modules are analogous to the spacesuit—they are containers that contribute to the performance of the astronaut. In contrast to the Mercury, Gemini, or Apollo missions cited above, the identity here is performed by the group, rather than by individual pilots.

This shift in focus is key in unraveling a lecture from a recent conference, co-authored by scientists from QED, the hosting institute, delivered at the 61st International Astronautical Congress 2010, at the beginning of the Mars-500 analog, culling research from their past analogs. The scientists mapped the interactions of the crew on three-dimensional planes in order to understand how they negotiated communication and affect. Height reflects quantity of interactions and the proximity of points roughly estimates their sense of closeness. Like the measuring of the heart rate, irregularities are monitored in the hopes that they might be flattened out in the future.⁶

⁶ This system is based on one developed by Samuel Huntington, author of the *Clash of Civilizations and the Remaking of World Order*, New York (Simon & Schuster, 1996), who has been much criticized for its skepticism of diversity and outright called racist by Edward Said.

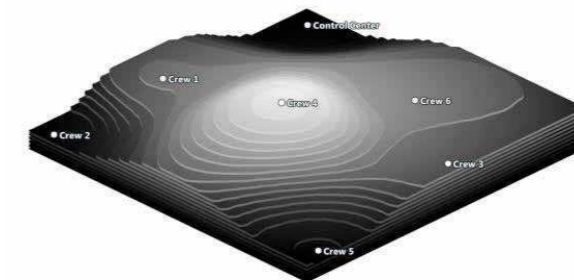
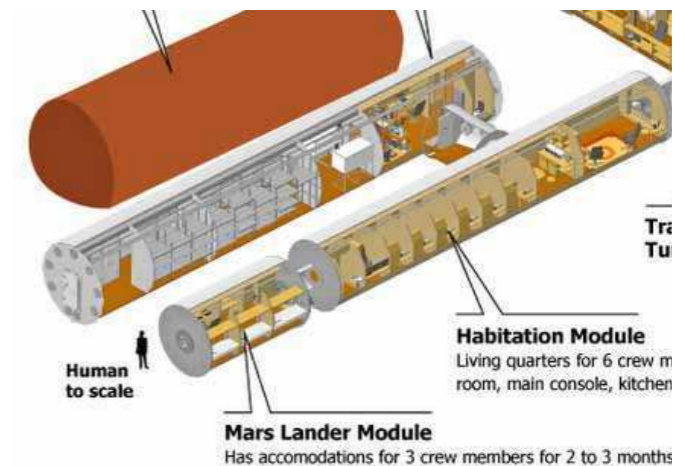
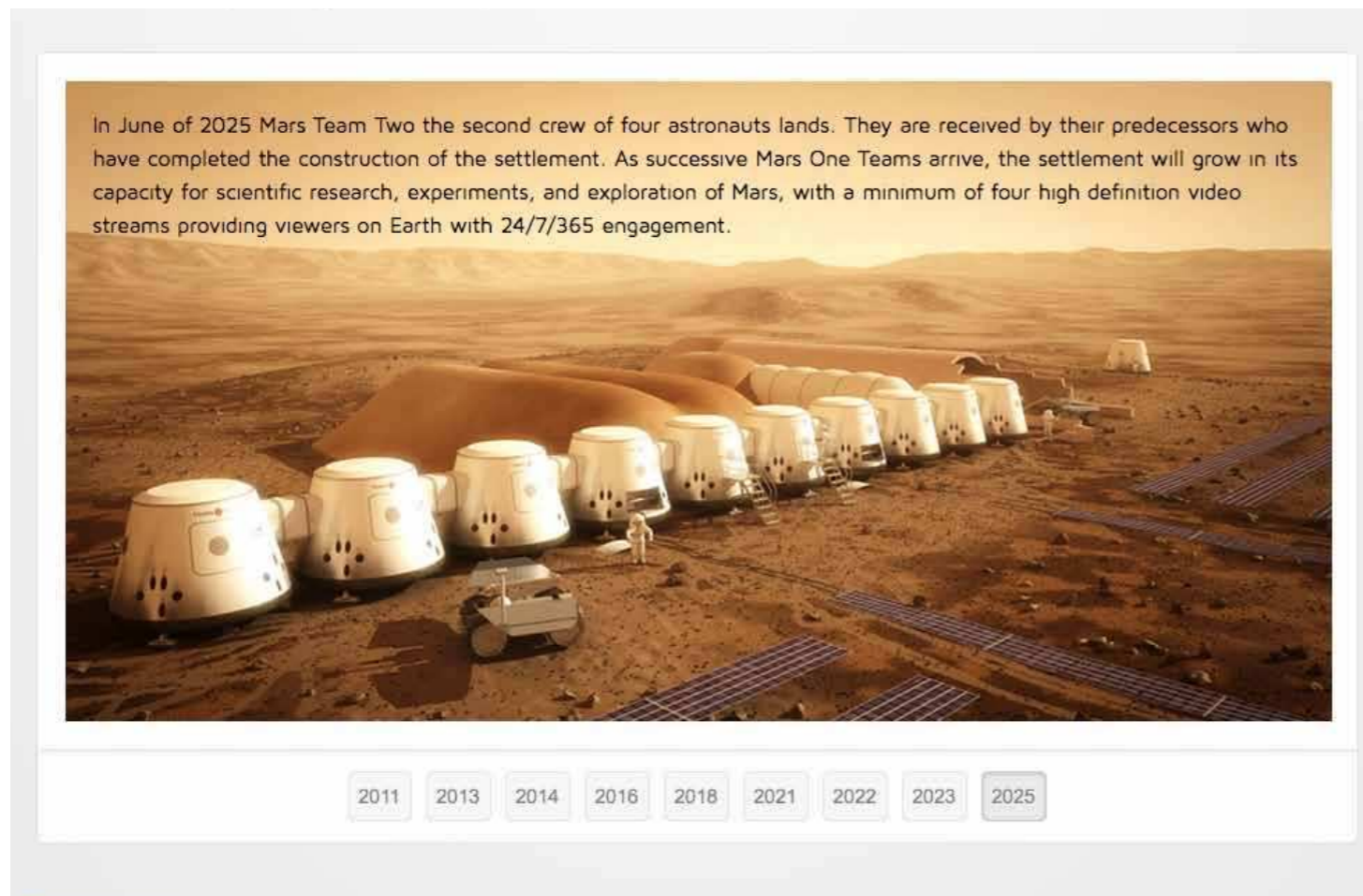


Fig.1 The general map of the experiment of the crewmembers social situation



In comparison, Mars One, the private spaceflight project led by Dutch entrepreneur, Bas Lansdorp to establish a permanent human colony on Mars, is represented online with slick graphics, up-to-date social media, and a seductive, introductory video. They argue for Mars colonization thusly:

“...there are individuals for whom traveling to Mars has been a dream for their entire life. They relish the challenge. Not unlike the ancient Chinese, Micronesians, and untold Africans, the Vikings and famed explorers of Old World Europe, who left everything behind to spend the majority of their lives at sea, a one-way mission to Mars is about exploring a new world and the opportunity to conduct the most revolutionary research ever conceived, to build a new home for humans on another planet.”



The language from their site is perhaps not surprisingly very close to G. Harry Stine’s Handbook for Colonization⁷ in which he argues for the inevitability of human space colonization. Stine ends his first chapter, entitled “Space is for People” with: “the only question left is ‘what language will people speak?’”

Mars One thinks it will be English. In fact, it is their only requirement for application into their program.

The ambitious trajectory for their mission, detailed in a timeline on their site, emphasizes repeatedly that the entire one-way journey will be televised on Earth 24/7/365. Like Mars-500, the group is performing as a group, but now televised in real time with the ‘spacesuit’ now in the form of pre-fab pods.

⁷ Stine, G. Harry. Handbook for Space Colonists (Henry Holt & Co., 1988).

Previous, Top Left: Stills from the Mars One website, 2013. The website for Mars One, the private spaceflight project led by Dutch entrepreneur Bas Lansdorp to establish a human colony on Mars by 2023, features video from thousands of applicants expressing their desire to be including in this one way trip to Mars.

Previous, Top Right, Bottom: Stills from the Mars One website, 2013. The website includes a timeline for establishing a settlement on Mars. Each slide emphasizes the mediated spectatorship of the event with the repeated text: "Every part of this adventure will be broadcast to Earth 24/7/365."

Somewhere in between the spectrum created by Mars-500 and Mars One is the Mars Society, an American non-profit with chapters in Canada and Europe, supported by Science Fiction writers and film makers like James Cameron. They are working with NASA in the arctic (Devon Island) and the desert of Utah, to study seismic waves and the effects of living in extreme environments.

Similar to Mars-500, they are attempting to chart their relationships quantitatively, a process that gestures towards an interest in understanding the effects of difference within the group. However, their oversimplification and mapping along binary or essentialist lines of identity might merely add a veneer of scientific rigor to a study that could be much more elucidating through granular case studies, anecdotes, or perhaps even a different sort of analogy.



Top and Middle: Mars Society, Flashline Mars Arctic Research Station (FMARS), Devon Island. From the presentation "In Situ Geophysical Exploration by Humans in Mars Analog Environments" for UND 997 Symposium, May 13, 2010. Documentation of the team tracking Seismic EVAs.

Bottom: Detail from the report "FMARS 2007: Stress and Coping in an Arctic Mars Simulation," Bishop, Sheryl, et al., IAC-08-A.1.1.3, 2007. Mars Society, Flashline Mars Arctic Research Station (FMARS), Devon Island. The graphs and description quantify patterns of stress and coping among crew members.

3.1.2 Stress and Coping

The pattern of stress (Figure 7) was dramatically different between males and females at mission beginning. However, males displayed a significant increase between baseline and the end of the first month and stayed elevated above females until mission end. Females displayed a reduction of similar magnitude by the end of Month 1 with small steady reductions until mission end.

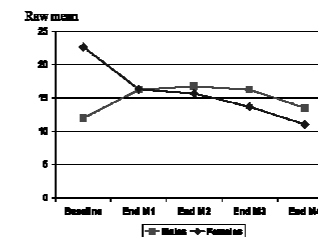


Figure 7 Stress Comparisons Between Genders

Comparisons of global coping styles across mission duration (Figure 8 and 9) indicated that males

inefficacy of avoidance coping has been supported consistently in previous studies.

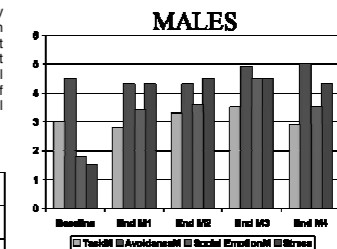
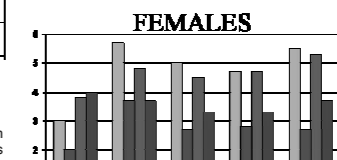


Figure 8 Male Global Coping Styles Across Time





Thus, might it be productive to introduce a body of fiction, drama, and historical precedents to this discourse about future bodies in space? For instance, what if we looked at the unofficial Zambian space program from the 1960's (started by a grade school teacher who was also an activist for Zambian decolonization from Great Britain) not as a program that was much maligned and dismissed by British media, but as a Mars analog in which the activists also rehearse a model for decolonized peoples to find their own modernity?

Or what if we took Sun Ra's *Space is the Place*, a 1974 afrofuturist film directed by John Coney, a biting critique of, among other things, NASA's discriminatory practices and their connection to racialized urban planning decisions, including subsidization of suburban sprawl, which perhaps should be a warning for future Mars One sprawl? Could *Space is the Place* be a Mars analog?

And what about *Aelita, Queen of Mars*, the 1924 Russian film that contrasts a futuristic, capitalist Mars with a socialist state on Earth? The meeting of these two worlds inspire an imagined collective uprising in the film. How might the worker rebellion in *Aelita* also be an analog of a future uprising of Mars One workers, fed up with selling their image 24/7/365 and disillusioned by exploitative practices of primitive accumulation?

We're going to Mars!
WITH A SPACEGIRL, TWO CATS AND A MISSIONARY
 By EDWARD MAKUKA NKOLOSO
 Director of his own "Academy of Sciences and Space Technology"

I SEE the Zambia of the future as a space-age Zambia, more advanced than Russia or America. In fact, in my Academy of Sciences our thinking is already six or seven years ahead of both powers.

It is unlucky for Lusaka that I did not have the chance to run for mayor. If I had been elected, the capital city of Zambia would quickly have been another Paris, if not another New York.

If I had been mayor, Matero, Kamwala and Chilenge suburbs would quickly have been filled with flats and skyscrapers. Old houses would have vanished.

trained) and a missionary will be launched in our first rocket.

But I have warned the missionary he must not force Christianity on the people in Mars if they do not want it.

One other difficulty has been holding us up. UNESCO has not replied to our request for £7,000,000, and we need that money for our rocket programme. Then we can lead world science.

I feel the Zambian Government should help now if we are to become controllers of the Seventh Heaven of Interstellar space. The Government

Handwritten notes in the top right of the clipping:
 Keisimua
 Chris
 Mwaniso
 Chawala

Top Left: Film still from *Space is the Place*, directed by John Coney, written by and featuring Sun Ra, 82 minutes, 1974.

Top Right: Film still from *Aelita: Queen of Mars*, directed by Yakov Protazanov, 1924.

Bottom: Zambian Space Program, Newspaper op-ed by Edward Makuka Nkoloso (pictured at the front), 1964.

How might we read these stories differently by placing these disparate attempts at performing the unknowable on the same plane? How might we queer our backwards gaze at our collective history in order to look forwards more clearly?

In 1989, the space conglomerate Rockwell International created the Integrated Space Plan (right bottom), a projection of where we should be in terms of space exploration. By now, we should be well on our way to transition from a terrestrial life towards multi-planetary existence.

I see it as a failure, not because we did not meet these goals, but because these mapmakers do not consider the space right around us. Where is the Rockwell map for understanding the process of commoning space? What about for changing notions of space entitlement which stem from class, race, sexuality and gender privilege? And how about keeping checks on resource exploitation which is based on politically or socially unjust structures? Where are we on that map?



Top: Levittown, N.Y., in 1948. Courtesy of Associated Press. According to its Wikipedia entry, “Levittown was the first truly mass-produced suburb and is widely regarded as the archetype for postwar suburbs throughout the country.”

Middle: Mars One “Settlements,” Courtesy of Mars One.

Bottom: Detail of The Integrated Space Plan by the space conglomerate Rockwell International, 1989. Courtesy of Rockwell International/Ronald M. Jones. Rediscovered by Sean Ragan.

RESOURCES

Ackmann, Martha. *Mercury 13: The Untold Story of Thirteen Women and the Dream of Space Flight*. (Random House, 2003).

De Monchaux, Nicholas. *Spacesuit: Fashioning Apollo*. (The MIT Press, 2011).

Fuller, Buckminster. *Operating Manual for Spaceship Earth*. (1969) PDF.

Kozloski, Lillian. *U.S. Space Gear*. (Smithsonian Institution Press, 1994).

Lathers, Marie. *Space Oddities: Women and Outer Space in Popular Film and Culture, 1960-2000*. (Continuum, 2010).

Light, Jennifer. *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America*. (The John Hopkins University Press, 2003).

Meier, Richard. *A Communications Theory of Urban Growth*. (The MIT Press, 1962).

Nama, Adilifu. *Black Space: Imagining Race in Science Fiction Film*. (University of Texas Press, 2008).

Odum, Eugene and Barrett, Gary. *Fundamentals of Ecology*. (Cengage Learning, 2004).

Spigel, Lynn. *Welcome to the Dreamhouse: Popular Media and Postwar Suburbs*. (Duke University Press, 2001).

Stine, G. Harry. *Handbook for Space Colonists*. (Henry Holt & Co., 1988).

Swanson, Leland and Glenn Johnson, eds. *The Cybernetic Approach to Urban Analysis*. (University of Southern California, 1964).

Torrey, Volta. *Science and the City*. (US Department of Housing and Urban Development, 1967).

Weitekamp, Margaret. *Right Stuff, Wrong Sex: America's First Women in Space Program*. (The John Hopkins University Press, 2005).

Wolfe, Tom. *The Right Stuff*. (Bantam, 1979).

Young, Amanda. *Spacesuits: The Smithsonian National Air and Space Museum Collection* (powerHouse Books, 2009).

Films:

Space is the Place (1974, dir. by John Coney).

She Should Have Gone to the Moon (2008, dir. by Ulrike Kubatta).

No Gravity (2010, dir. by Silvia Casalino).

Brother from Another Planet (1984, dir. by John Sayles).

Shorter Texts:

Butler, Judith. "Performative Acts and Gender Constitution: An Essay in Phenomenology and

Feminist Theory." (*Theatre Journal*, Vol. 40, No. 4, Dec., 1988, pp. 519-531).

Launius, Roger. "Public Opinion Polls and Perceptions of US Human Spaceflight" (*Space Policy* 19, 2003. pp. 163-175).

McQuaid, Kim. "'Racism, Sexism, and Space Ventures': Civil Rights at NASA in the Nixon Era and Beyond." (*Societal Impact of Spaceflight*, (NASA, 2007, pp. 421-449).

Young, Amanda. "The Preservation, Storage, and Display of Spacesuits." (Collections Care, Report Number 5, December 2001).

Library of Congress Documents:

Congressional Subcommittee Hearing, July 17-18, 1962.

Many thanks to the staff and interns at Provisions Library, my fellow residents, and the archivists at the National Air & Space Museum.



SPACE HERITAGE PARK

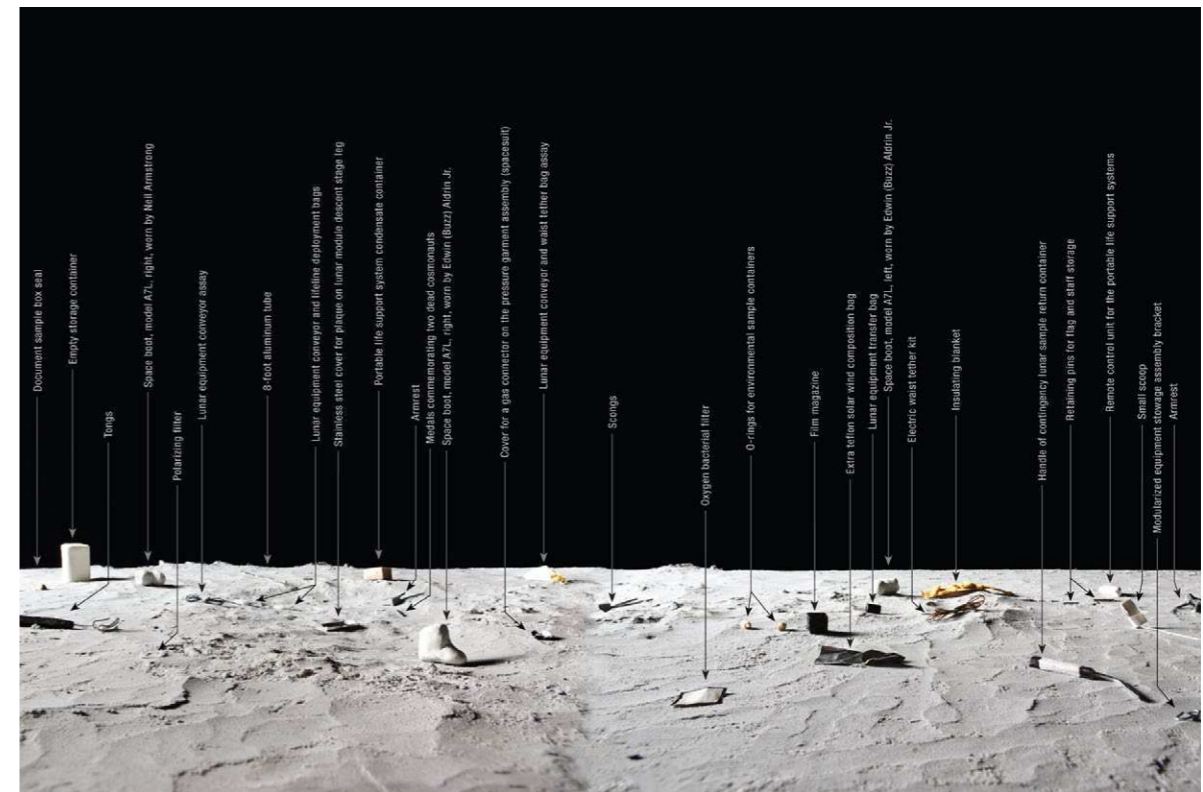
HEIDI NEILSON



SPACE PARK RESEARCH REPORT HEIDI NEILSON

Outer space is usually considered a new frontier, but it isn't as new as it once was. Over 40 countries with operational space programs maintain over 800 active satellites and have plans for manned missions to Mars, revisiting the moon, and mining asteroids. Humans have so thoroughly occupied space, in fact, that we are encountering problems associated with any long-term living situation, in particular dealing with our trash.¹

The situation bears some resemblance to points in the history of other frontiers, such as the expansion into the American West, when the National Park Service was established to set aside and protect land from exploitation. And as such, as others have suggested as early as 1984,² it is not too early to consider the establishment of a park system in space. Such a park today would of course be different than Earth parks, but based on similar principles. It would protect pristine, unvisited 'wilderness' areas, and additionally protect sites and objects important to human history in space.



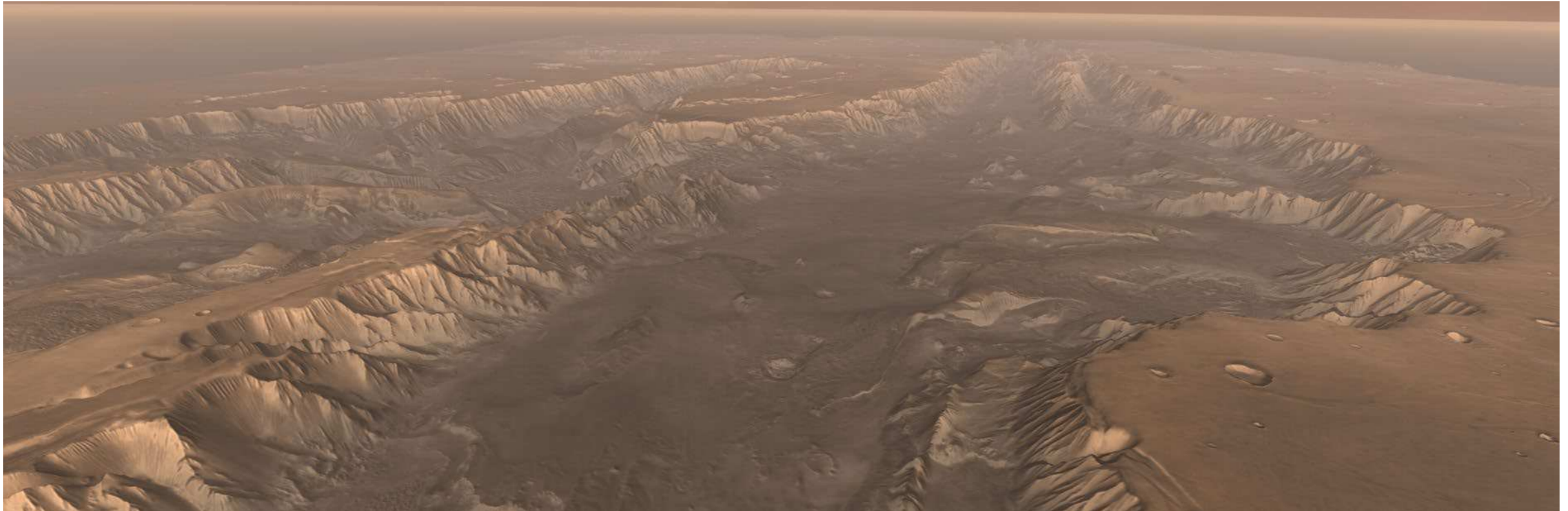
Page spread from Heidi Neilson's *Tranquility Base*, a visual catalog of items left at the Apollo 11 landing site made with photos of miniature handmade models in diorama settings."

Many man-made objects on other planets, large and small, as well as defunct satellites still in Earth orbit³ are part of an international initiative for heritage designation⁴ and are studied by archeologists specializing in the material culture of space exploration.⁵ Tranquility Base, the first human landing site on the moon, is actively promoted for declaration as a World Heritage Site, complete with tracks, experiments, tools dropped on the surface, and litter.⁶ Since no one wants to see the footprint from the first step on the moon run over by a rover, or landed on by a probe, guidelines have been established to protect this site on upcoming moon landings,⁷ a tiny step toward a recognized space park site.

Preserving extraterrestrial areas without human history or any life that we know of, the two easiest arguments for protection, is a more remote idea. There are a number of philosophical arguments for maintaining wilderness on Earth. Astrobiologists Charles S. Cockell and Gerda Horneck, in their studies of Mars, isolate the points in these wilderness arguments which apply to a landscape without life: the classroom argument (it can teach us), the art gallery argument (wilderness is a place of natural beauty), the necessity argument (we need wilderness to create a complete concept of culture and civilization), the intrinsic value argument (land and 'things' have value in their own right), the future generations argument (protect land for future generations), and the unknown and indirect benefits argument (we don't know it and it might be beneficial later).

Cockell and Horneck propose a planetary park system for Mars based on a combination of these rationales, choosing areas with particular scientific, aesthetic and historical value.⁸ Adapting the definitions of wilderness from the US Wilderness Act, they outline criteria for a comprehensive park system on the surfaces of other planetary bodies, separate from designated areas of exploration. A list compiling the sites on Mars and other proposed space sites and objects identified as preservation-worthy can be found at the end of this essay. This summary could be used as a starting point for delineating a planetary park system, while the especially complicated particulars of ownership, management, law, and administration are worked out in the coming decades.

In the discussion of the preservation of outer space, the elephant in the room is space itself. Cockell and Horneck's comprehensive thinking lays a solid foundation for protection on extraterrestrial bodies, but not for protection of volumes of space. Once the argument to preserve stark and lifeless places is accepted, why not designate volumes of space itself as protected? I'd like to extend their proposal to include consideration of these volumes, in an approach that engages space on its own terms: not only its planetary formations and human residue analogous to what we know on Earth, but also its utterly alien attributes, its



“Valles Marineris, the ‘Grand Canyon of Mars,’ a site proposed for park designation, image courtesy NASA/JPL-Caltech.”

vast emptiness and the astrophysical phenomena that shape it. The apparently lifeless void, with the absence of any attribute other than position to characterize it, could be thought of as a different kind of space. Can we apply the arguments based on ideas of cultural preservation and scenic/aesthetic value, and adapt the definition of a park to respond to astrophysical phenomena previously alien to human experience?

The park system proposed for Mars broadly defines wilderness

as “an area of planetary surface (with its communities of life, if they exist) untrammelled by people, where people are visitors (even in the form of robotic craft) who do not remain.” If we replace ‘area of planetary surface’ with ‘defined area anywhere,’ space fits this general definition.

Could space also qualify as ‘wilderness’ under the more specific requirements of the proposed Martian park system, adapted from the US Wilderness Act?

1. An area generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable.

In space this appears to be true if we go beyond the debris in Earth's orbit.

2. It has outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Yes, one can find abundant solitude in space.

3. It has at least 5000 acres of land or is of sufficient size to make practicable its preservation and use in an unimpaired condition.

Size is certainly sufficient just about anywhere in space.

4. It may also contain ecological, geological or other features of scientific, educational, scenic or historical value.

While space is unlikely to contain ecology, it might have some geologic interest in the form of very occasional dust, and it might have historic value, if it can be determined that an historic spacecraft such as one of the Pioneers or Voyagers passed through it. More importantly, it might contain something of educational or scientific interest a unique gravitational

position such as one of the LaGrange points, for example, might qualify a volume of space for protection.

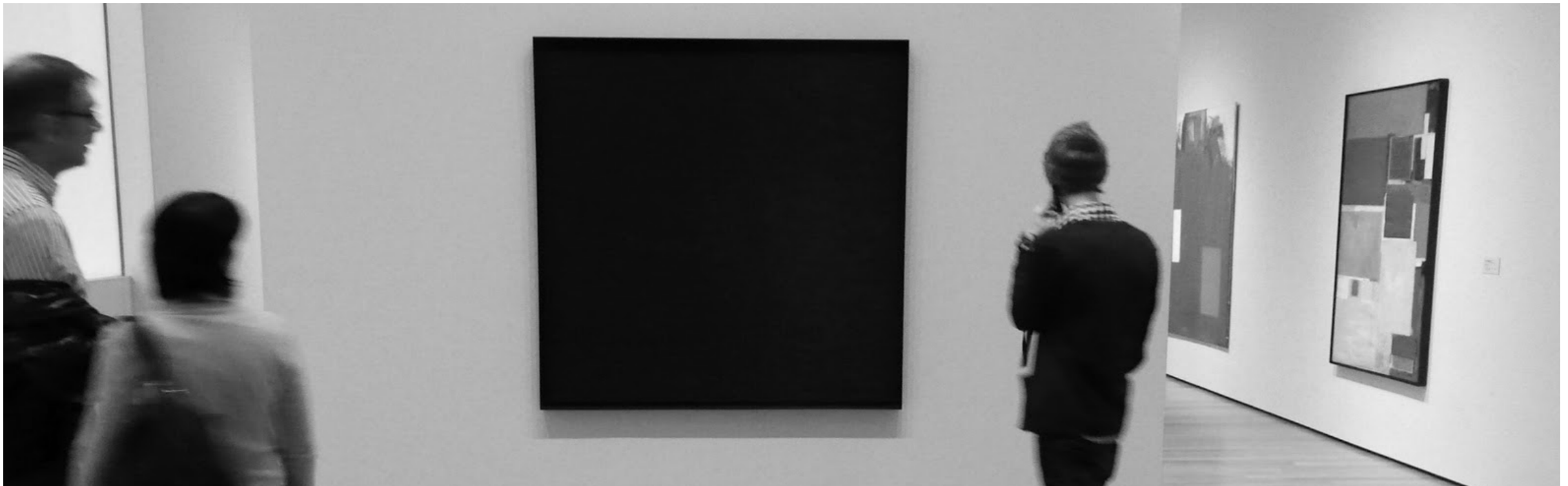
What about scenic value? Can we recognize space as scenic? The areas outside of earth we've to date identified as preservation-worthy are land-based they at the very least have a form to them, where we can recognize a particularly bleak kind of beauty, the "magnificent desolation" Buzz Aldrin found on setting foot on the moon. But since space has no form, how can we see it as beautiful?

We do have precedents for recognizing and appreciating blackness and nothingness in modern and contemporary art. Here are a few examples from the world of art which we can take as cues for appreciating space itself aesthetically. Ad Reinhardt is best known for his black paintings. He wasn't thinking about outer space that we know of, but he was concerned with painting nothing, and completely avoiding representation. His intention was to "push painting beyond its thinkable, seeable, graspable, feelable limits." It was his idea that they represent both the end of Western tradition and the beginning of a new mode of perception, since they create perceptual demands radically different from those of Western painting. Because the paintings require an act of focusing so it demands that it changes the state of viewers' consciousness, the black paintings reflect some of the values of Eastern culture Reinhardt became progressively involved with.⁹

Mark Rothko's color field paintings are often associated with meditative and spiritual experiences, culminating in the Rothko Chapel, completed after his death. Fourteen large apparently black paintings created using layer upon layer of color surround visitors in the octagonal chapel, and serve as, some people have put it, windows to the beyond—as if you are looking at the infinite.¹⁰

In the realm of earthworks, Michael Heizer works with concept and a meditation on negative space, where the form of the work frames emptiness. His piece *Double Negative* does this directly

with landscape instead of with the landscape, where large gaps were carved on either sides of a ravine, to make it appear as a continuous bridge between the two gaps. “*Double Negative* is composed of space itself: it is a void. Although massive in scale, it is barely palpable. The two sunken enclosures call to each other across the great chasm of the escarpment, providing an experience of vastness conveyed through the arrangement of space that is compellingly distinct from the intrusive, space-occupying character of traditional monuments. One is inside this piece.”¹¹



“Image by Flickr’s ‘cuartogolpe’.”

Walter DeMaria's *The Lightning Field* also frames space in such a way as to change our awareness of it. The numerous vertical poles are spaced widely and evenly in a grid measuring a mile on each side. The ability to see the poles changes greatly with proximity and light. The ability to perceive the poles in a grid as a whole has to do with imagining and extrapolating experienced distance—seeing them and walking the space between them.

The *Lightning Field* was intended to be experienced directly and as such (combined with the remote location and restricted visitor policy) it has become a destination.¹² It is a kind of contemporary pilgrimage site for those seeking a perceptual contemplation experience meditating on geometric perfection embedded in nature.

Perceptual experience is also inherent in Carsten Höller's work pieces which alter the audience's physical and psychological sensations. His sensory deprivation baths, long twisting slides, and other work transfer the viewers into seekers of experiences beyond themselves.¹³

This kind of perception-change and experience-seeking pilgrimage may be a precursor to how space parks could function. Especially in areas of pure space, one imagines that

our existing experiences of the notion of distance, direction and perspective do not apply when confronted directly with space and its extreme physical forces, inasmuch as we can understand them. Space tourists now are greatly motivated by wanting the experience of weightlessness, of defying gravity itself.

The experience of a space park could also be a purely conceptual one, based on the understanding that the area is delineated and exists, however intangibly and remotely. This is a main idea in Amy Balkin's piece *Public Smog*,¹⁴ a fluctuating park in the atmosphere that is constructed and opened to the public through financial, legal or political activities. For example, the park has been opened a few times by the purchase of emission offsets in regulated emissions markets and then withholding them from being used by polluting industries. The *Public Smog* initiative also includes an ongoing attempt to submit Earth's atmosphere for inscription on UNESCO's World Heritage List.

The motivation for establishing a system of space parks, which include terrestrial and space areas will be at least in part for the scenery—for a place of reflection and inspiration. The appreciation for space landscapes needs to encompass both the traditional terrestrial-based 'sublime landscape' derived from a 19th-century landscape aesthetic and from a modern and contemporary minimal aesthetic. Appreciating a void as scenery might be the beginning of a bigger transformation in thinking:



“Space tourists experience zero gravity.”

“Humans ought to preserve those places that radically transform perspective. Just as it was a good thing for medieval Europe to be dislodged from its insularity, challenged by the Enlightenment and the Scientific Revolution, it will be a good thing for Earthlings to be unleashed from the Earth-givens. We can reduce human provinciality with the diverse provinces of solar-planetary nature. In space, so much is scrambled—what counts as day or night, year or season, hot or cold, up or down, bizarre or normal, what counts as land, sea, sky, the feel of gravity. These disorienting, unsettling discoveries will expand our juvenile perspectives. For intellectual and moral growth one wants alien places that utterly renegotiate everything in native ranges. These will prove radical places to understand, not merely in the anthropic sense that our roots lie there, but in the

nonanthropic sense that they uproot us from home and force us to grow by assimilating the giddy depths and breadth of being. Those who cannot be seriously confounded by nature have not yet seriously confronted it.”¹⁵

SPACE PARK SITES AND ITEMS

Sites and objects in space or on planetary surfaces which have been identified by experts as noteworthy and/or preservation-worthy, to date. In the future this list might also include designated areas on additional planets and volumes of space itself.

MOON

Area to include Apollo 11/Tranquility Base site and nearby Surveyor 5 4

Area to include Apollo 12 site, Surveyor 3, Apollo 14, S-IVB 16
Apollo 15 site 16

Apollo 16 site 16

Area to include Apollo 17 site and Luna 21 16

Luna 9 4

Luna 16 4

Lunokhod 1 (first moon rover) 4

MARS

Mars 3 18
 North pole, a section of 17
 Olympus Mons 17
 Pathfinder landing site 17
 Valles Marineris, an eastern part 17
 Viking 1 landing site 17
 Viking 1 probe 4
 Viking 2 probe 4

VENUS

Venera 3-14 4, 18

SPACE: IN EARTH ORBIT OR NEAR EARTH-SUN ORBIT

Asterix 19
 Azur 19
 Chandra spacecraft (x-ray observatory) 4
 Courier 1B 19
 Dong Fang Hong 19
 Explorer 7 19, 20
 Hubble Space Telescope 4
 IRS-P2 19
 Kepler Space telescope 4

Luna 1 19
 Luna 3 4
 Mariner 2 (Venus flyby) 19
 Ofeq 5 19
 Pioneer 4 19
 Planck satellite 4
 Prospero 19
 Snoopy (Lunar Module ascent stage from Apollo 10 mission) 19
 Spitzer infrared space telescope 4
 Symphonie I 19
 Syncom 3 (Early Bird) 19
 Tansei 1 19
 Timation 1 19
 TIROS 1 (first weather satellite) 19, 20
 Transit 4a (first nuclear power sources on spacecraft) 20
 Transit 4b (first nuclear power sources on spacecraft) 20
 Telstar 1 (first active telecommunications satellite) 20
 Vanguard 1 19, 20
 Vanguard 2 20
 Vanguard 3 20
 Westford needles and release capsule 20
 Wilkinson Microwave Anisotropy Probe (WMAP) 4
 Zond 3 19

SPACE: SOLAR SYSTEM BEYOND EARTH-SUN ORBIT

Giotto (flyby of Halley comet) 4

Galileo (now satellite of Jupiter) 4

Huygens (on Titan, Saturn's moon) 4

Hyabusa (Asteroid Itokawa) 18

Minerva (microrover meant for asteroid Itokawa but now in heliocentric orbit) 18

NEAR (Near Earth Asteroid Rendezvous) - Asteroid Eros 18

Pioneer 10 19

Pioneer 11 19

Vega (flyby of Halley comet) 4

Voyager 1 4

Voyager 2 4

1. NASA Orbital Debris Program Office: “<http://orbitaldebris.jsc.nasa.gov/>” <http://orbitaldebris.jsc.nasa.gov/> (July 31, 2013)

2. William K. Hartmann, “Space Exploration and Environmental Issues,” *Environmental Ethics* 6, no 3 (1984): 227 – 39.

3. Robert Barclay and Randall C. Brooks, “In Situ Preservation of Historic Spacecraft,” in Ann Garrison Darrin and Beth Laura O’Leary, eds., *Handbook of Space Engineering, Archaeology, and Heritage* (Boca Raton, FL: CRC Press), 679-699.

4. Mikhail Marov, “Space Achievements as World Heritage,” in Clive Ruggles and Michel Cotte, eds., *Heritage Sites of Astronomy and Archaeoastronomy in the context of the UNESCO World Heritage Convention: A Thematic Study* (Paris, France: ICOMOS [International Council on Monuments and Sites] and the International Astronomical Union, 2010), 233-237.

5. Beth Laura O’Leary, “Evolution of Space Archaeology and Heritage,” in Ann Garrison Darrin and Beth Laura O’Leary, eds., *Handbook of Space Engineering, Archaeology, and Heritage* (Boca Raton, FL: CRC Press), 29-44.

6. Beth Laura O’Leary, “One Giant Leap: Preserving Cultural Resources on the Moon,” in Ann Garrison Darrin and Beth Laura O’Leary, eds., *Handbook of Space Engineering, Archaeology, and Heritage* (Boca Raton, FL: CRC Press), 757 – 778.

7. National Aeronautics and Space Administration, NASA's Recommendations to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artifacts (Washington, DC: National Aeronautics and Space Administration, 2011).
8. Charles S Cockell and Gerda Horneck, "Planetary Parks: Formulating a Wilderness Policy for Planetary Bodies," *Space Policy* 22 (2006): 256-261.
9. Barbara Rose, ed., *Art-as-Art: The Selected Writings of Ad Reinhardt*, (Berkeley and Los Angeles, CA: University of California Press, 1991), 81.
10. Pat Dowell, *Meditation and Modern Art Meet in Rothko Chapel*, National Public Radio, "<http://www.npr.org/2011/03/01/134160717/meditation-and-modern-art-meet-in-rothko-chapel>" <http://www.npr.org/2011/03/01/134160717/meditation-and-modern-art-meet-in-rothko-chapel> (March 1, 2011)
11. John Beardsley, *Earthworks and Beyond*, (New York, NY: Abbeville Press, 1998), 17.
12. Geoff Dyer, "Poles Apart: Notes from a pilgrimage," *The New Yorker*, April 18, 2011, 62.
13. The New Museum, "Carsten Höller: Experience" is the most comprehensive US exhibition to date of the artist's engaging work. "<http://www.newmuseum.org/exhibitions/view/carsten-hoeller-experience>" <http://www.newmuseum.org/exhibitions/view/carsten-hoeller-experience> (accessed July 31, 2013).
14. Amy Balkin, *Public Smog*, "<http://www.publicsmog.org/>" <http://www.publicsmog.org/> (accessed June 15, 2013)
15. Holmes Rolston, III, "The Preservation of Natural Value in the Solar System," in Eugene C. Hargrove, *Beyond Spaceship Earth: Environmental Ethics and the Solar System* (San Francisco, CA: Sierra Club Books, 1986), 179.
16. P.J. Capelotti, "Culture of Apollo: A Catalog of Manned Exploration of the Moon," in Ann Garrison Darrin and Beth Laura O'Leary, eds., *Handbook of Space Engineering, Archaeology, and Heritage* (Boca Raton, FL: CRC Press), 421 – 441.
17. Charles S Cockell and Gerda Horneck, "A Planetary Park System for Mars," *Space Policy* 20 (2004): 291-295.

-
- 18.** Robert Gold, “Spacecraft and Objects Left on Planetary Surfaces,” in Ann Garrison Darrin and Beth Laura O’Leary, eds., *Handbook of Space Engineering, Archaeology, and Heritage* (Boca Raton, FL: CRC Press), 399-419.
 - 19.** Daniel E. Clemens, “Orbital Artifacts in Space,” in Ann Garrison Darrin and Beth Laura O’Leary, eds., *Handbook of Space Engineering, Archaeology, and Heritage* (Boca Raton, FL: CRC Press), 347-362.
 - 20.** Alice Gorman, “Heritage of Earth Orbit: Orbital Debris-- Its Mitigation and Cultural Heritage,” in Ann Garrison Darrin and Beth Laura O’Leary, eds., *Handbook of Space Engineering, Archaeology, and Heritage* (Boca Raton, FL: CRC Press), 381 – 397.



DEBT

CASSIE THORNTON

HUGE AND INVISIBLE

Debt = Space

Debt Space

Debt from

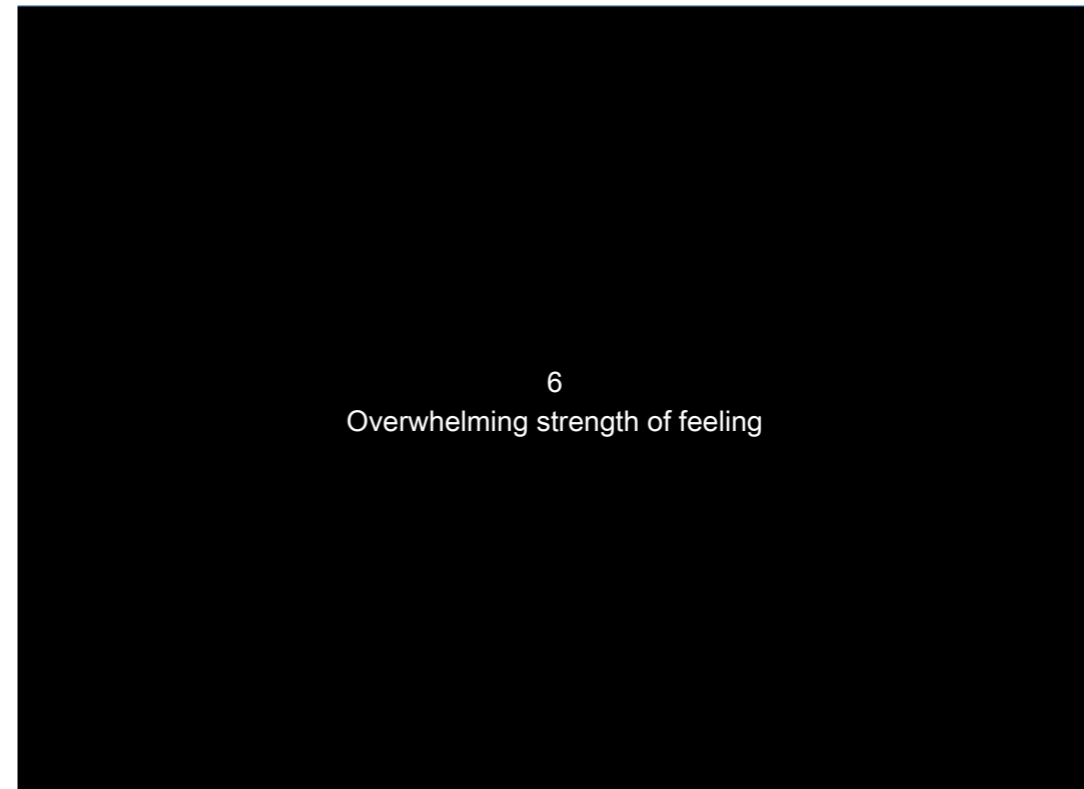
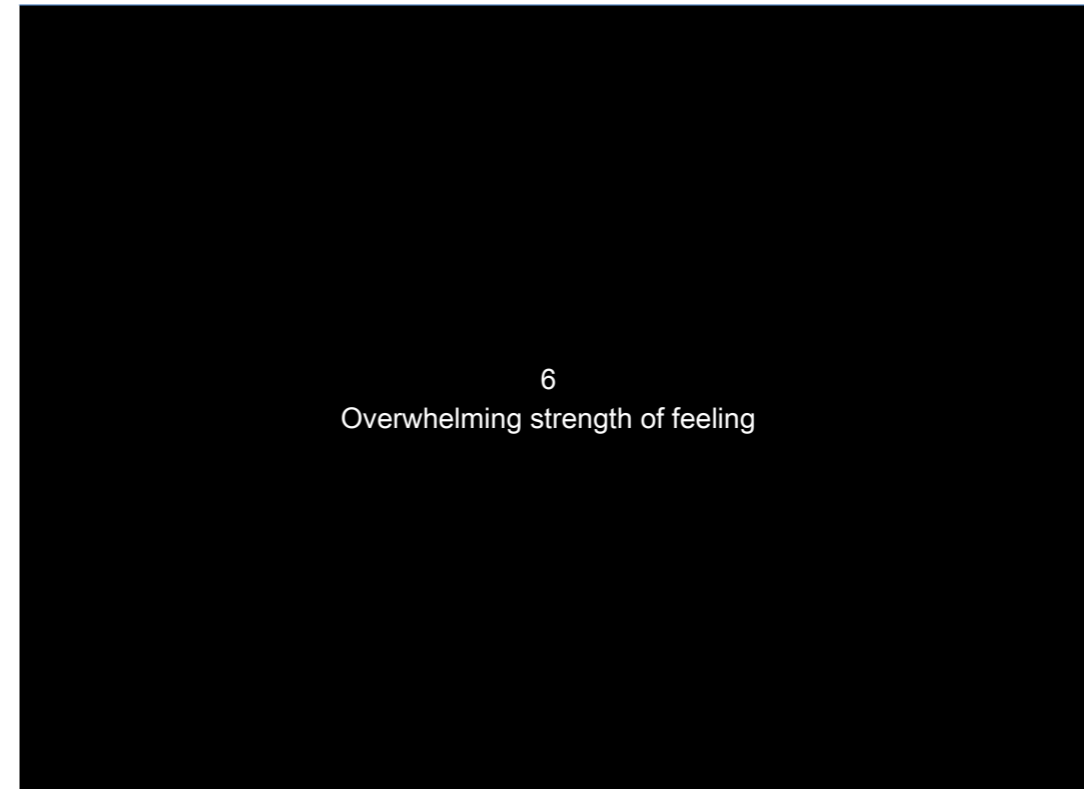
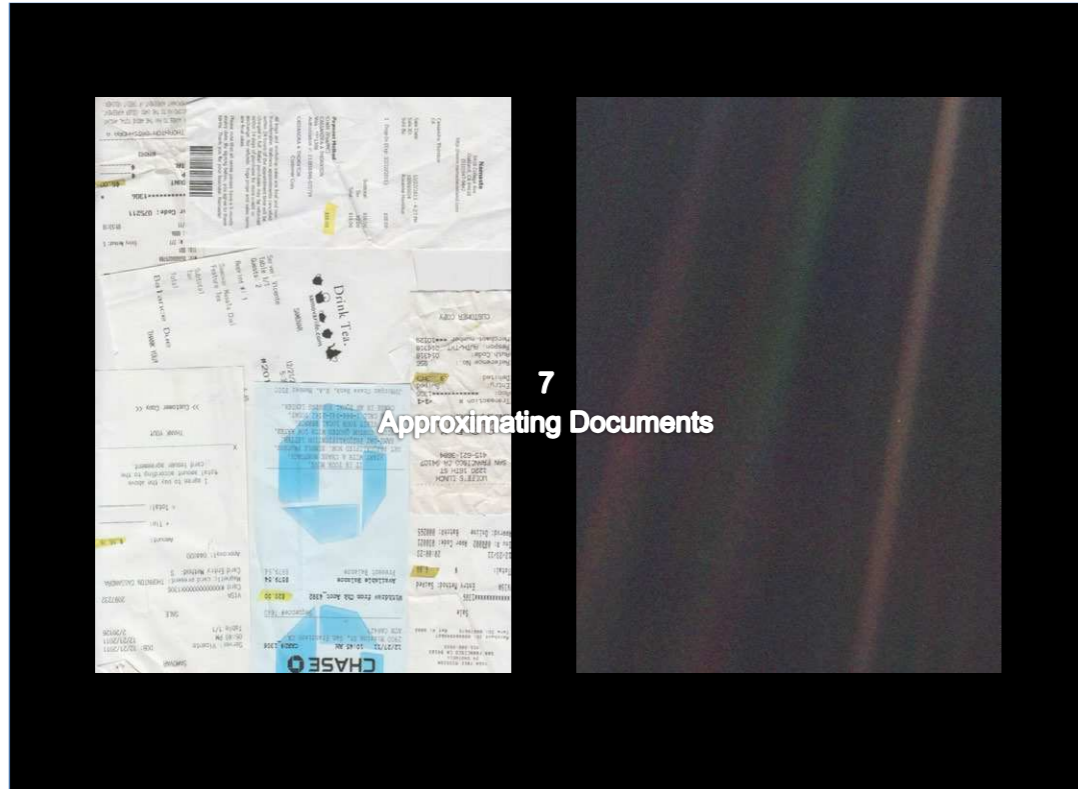
Space

10
I don't know, I don't know

9
Unconscious things

- a. I can't see it but I know it's out there.
- b. It's a feeling that I trust though I can't touch it.
- c. It offers great promise as well as a looming threat:
- d. I fear that I can never own this
- e. And I will never understand my own value.
- f. It makes me feel like I am exploding with risk and promise.
- g. I must escape it, I cannot live without it.
- h. I thrive under conditions of potential growth mixed with the threat of my own small scale.
- i. The unknown is traceable only through approximating documents. When I lose them I get internet reminders.


8
Huge Invisible Presence





OUR VISION

Planetary Resources is bringing the natural resources of space within humanity's economic sphere of influence, propelling our future into the 21st century and beyond. Water from asteroids will fuel the in-space economy, and rare metals will increase Earth's GDP.



Asteroids are the low-hanging fruit of the Solar System. There are close to 9,000 near-Earth asteroids, and nearly 1,000 more are discovered every year.

Low cost commercial robotic spacecraft will explore asteroids and determine their position, composition, and accessibility of resources.

 <p>SPACE LOOT! Asteroid Miner deserves a part of his asteroid to share with his friends about. When we succeed in bringing back to earth we will send you 4... (Click to see details) Estimated delivery: May 2013. \$150.00</p>	<p>IMAGE COMING SOON...</p> <p>ETCH ME INTO HISTORY Years from now you can share with your grandkids that you played a historical role in leaping mankind into space. Send your name into space and back to Earth. \$25</p>
 <p>NAME ON AN ASTEROID Put your name into space forever on our Mining Mission, that will stay on the asteroid. Only a few well known NASA Engineers have done this before! \$250.00</p>	<p>IMAGE COMING SOON...</p> <p>SUPER SIZE ME! (save \$41) The ultimate combo is here. Your choice of either Etch me into history OR Name on an Asteroid perk. In addition you will receive Space Loot... (Click to see details) \$40</p>

4
Not going out there looking like this.

NASA
ERIC SCHMIDT
BECHTEL
JAMES CAMERON
LARRY PAGE
ROSS PEROT JR.
GOLDMAN SACHS DUDE
JAMES DIAMANTI



Between graduate and undergraduate programs at both four-year and community colleges, all state institutions of higher learning collected just under \$60 billion in tuition in fiscal year 2012.

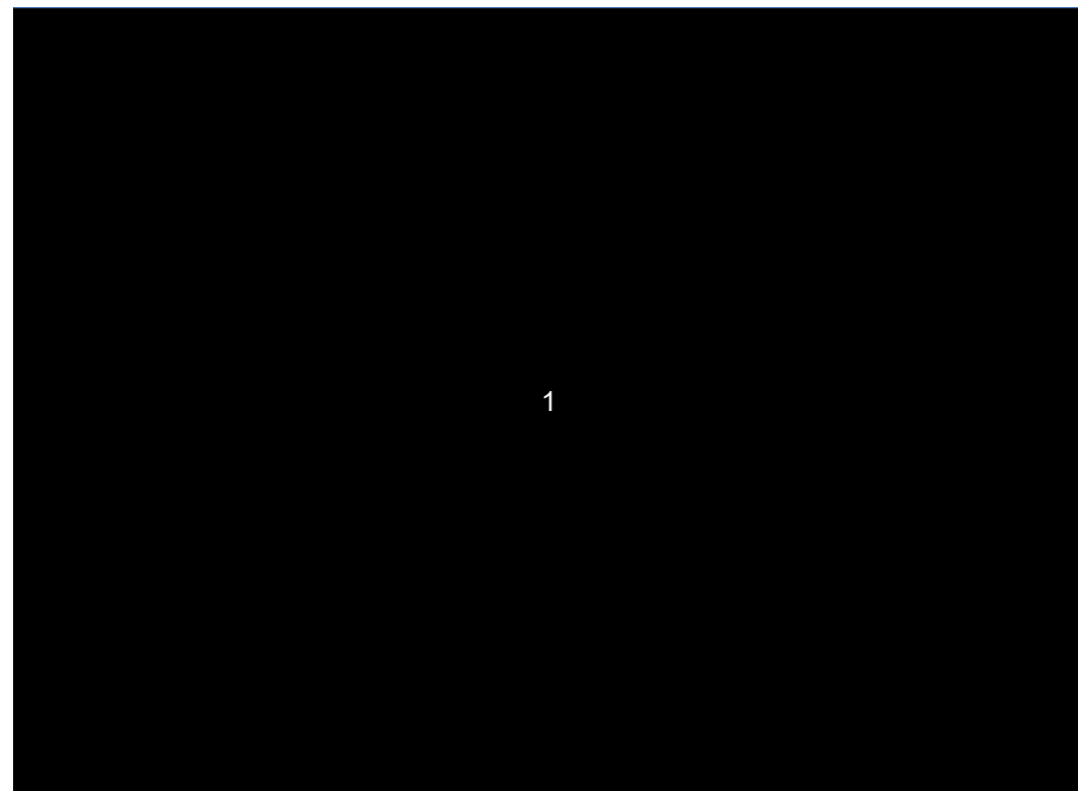
HigherEdInfo.org



3
We must send debt to space



Carl Sagan. Stephen Hawking and Arthur C. Clarke - God. The Universe ...



Quality	Debt	Space
A huge invisible presence.	We can't see it but we know it's there. Housed in the unconscious, debt informs sociality, decision-making, a sense of human potential and what is possible. It offers great promise and presents a looming threat of having without owning and owing without ever being able to pay back.	We trust it is there without personal experience of it. There is a dependence on the notion of infinity outside of earth that informs human behavior and consumption. It offers growth potential mixed with a sense of the earthling's relatively small scale. A great sense of possibility as well as a threat.
Traceable only through approximating documents.	We don't know what it is but the paperwork and communications about debt is all we have to represent the omnipresent force.	We can only know it through documents provided by a selected agencies/authorities.
Essential to nearly all earthly exchanges.	Credit creates the opportunity to have what is not presently financially available. The promise of debt relies on the idea that today's investment will expand in value tomorrow, allowing the debtor to repay the credit with ease. This assumption necessitates exponential growth in value and infinite resources of materials and labor.	Unconscious presence of space provides a psychic place of pure potential. Knowing that earth is finite, but that something exists beyond its bounds is an assumption inherent in all earthly exchanges. The presence of the idea changes earthly decisions because it creates the possibility of survival after the exhaustion of all earth resources.
Creates an overwhelming strength of feeling.	Holds immeasurable power over humans, instilling fear and organizing behavior, but also providing opportunities for immediate hope and growth.	Captivates people, offers hope and fear. Asteroids may be the thing that saves us by giving us important resources that help us expand space exploration and the possibility of colonization, but also threatens us with the possibilities of collision.
Functions because of a strong force of attraction.	Debt attracts parties in need (debtors) as well as those with resources (creditors). Size of debt determines the quality of the bond between the parties. The larger the debt, the more likely that interest and fees factor in, causing an accumulation of capital for the creditor.	Gravity is the force behind the formation of celestial bodies, through the mutual attraction of particles which accumulate to make asteroids, planets, and stars. Physical bodies attract each other with a force proportional to their masses, thus the larger the mass, the stronger the attraction. When a growing accumulation of particles is busted by a collision, the force of attraction by those particles is diminished. The gravitational pull of a nearly formed planet is very strong, its growth is complete only when it attracts every particle in its orbit.
Extreme Risk/Promise	Originally risk was to the creditor, who may not ever receive the principal back that they have lent the debtor. Present creditor debtor relationships have shifted, and the threat has shifted to the debtor, who risks being criminalized or jailed if they cannot pay back, and in many cases the US government supports the creditor by guaranteeing payback.	The threat of an asteroid hitting earth presents an urgent threat. The value of the materials within the asteroid are of great value to those trying to escape debt.

***Debt is ruining the earth, and it is trapping us in a zone of manmade impossibility. A redemptive future means escaping the debt, not carrying it around on our backs. Do we have to leave earth to escape it? Or can we just begin to reconsider its meaning, downsize it to joke status, leave it behind? If earth was free of debt, would it be alien enough to feel like a new universe?*

SILENT AUCTION



The Feminist Economics Department is a physical manifestation of the hope for a different, non-monetary value system for labor. Projects undertaken by the department endeavor to sustain workers who experiment with ways to provide mutual support without the exchange of money. The FED occasionally uses money to buy time from people so they can afford to come together to rethink what they value and how.

As a gesture of support to Provisions Library, we have released our first ever product.



The FED is built around the notion that value is not actually confined to money or the creation of it.
 Many labors cannot and should not be valued on a financial market, but should be supported by a different logic of value.
 Material objects, commodities, may be appraised for their function, aesthetic, mass, or materials.
 However, it is the labor that goes into this ring which makes it so valuable.
 This ring, which could be yours, is the product of running a business, exploring a new place, desire, bargaining, metal smithing, taking risks, letting go, cognitive labor, emotional labor, compromise, patience, acceptance, debt, trying something new, accepting inequity, participating in a market, pretending not to know, the labor of not knowing. All in all this ring is the culmination of a three year process, undergone by the FED to understand and undermine the abstraction of exchange.

2



This ring is made of 100% pawned metal. Ordered in a pawn shop jewelry store on Fulton Mall in Brooklyn, NY, it cost \$50, talked down from \$80. The jeweler misread the text on the order at first, almost designing it to say 'valve' instead of 'value'.

The metals in this ring consist of bits and pieces of broken, damaged, or unclaimed jewelry left at the pawnshop. Formerly collateral, these abandoned materials have been melted down and resurrected as art and jewelry.

When appraised by workers at another pawn shop, it was said to have been designed poorly. They saw no value in it, but also admitted that had they designed a better version, it would have cost more.

3



FED has watched as space travel, exploration and research has changed into space mining. Planetary Resources is the first asteroid mining company, [They claim they will "add trillions of dollars to the global GDP" and "help ensure humanity's prosperity" by mining asteroids for rare metals like gold and platinum.](#) The secret message we receive through the media is 'continue to consume at your current rates, because infinite resources are in space'. In truth, asteroids have very low amounts of precious metals. They are rich in iron, silver, water, and nickel.

4



The mission statement of this company: In light of fiscal challenges facing the spaceflight community, innovation in cost and market is as valuable as innovation in capability. Maybe Planetary Resources wouldn't be so market driven if they weren't on such a financially crunched planet. This ring belongs to an unemployed NASA employee who was laid off from his position on the Atlantis Mission in 2011 after the final launch.

5

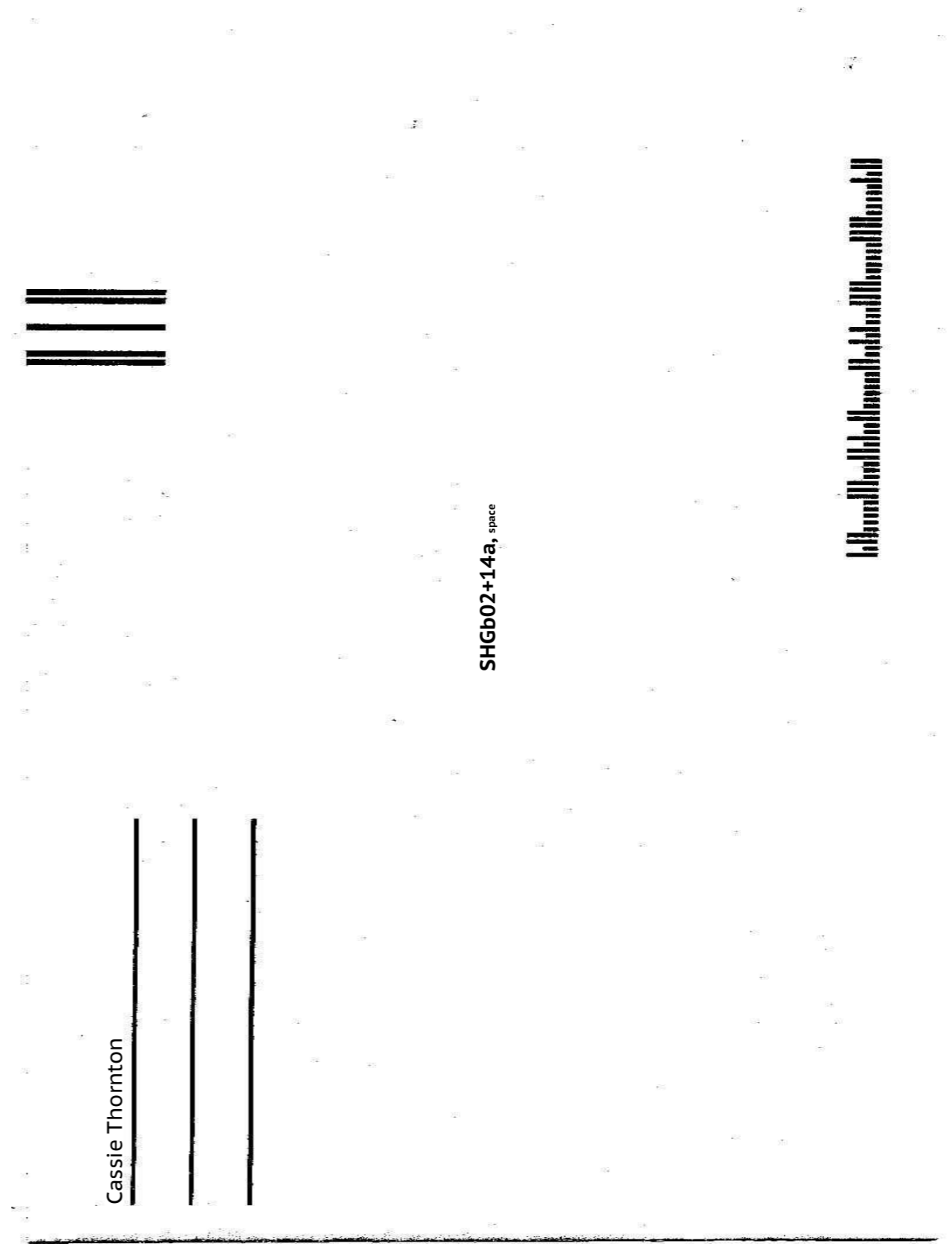


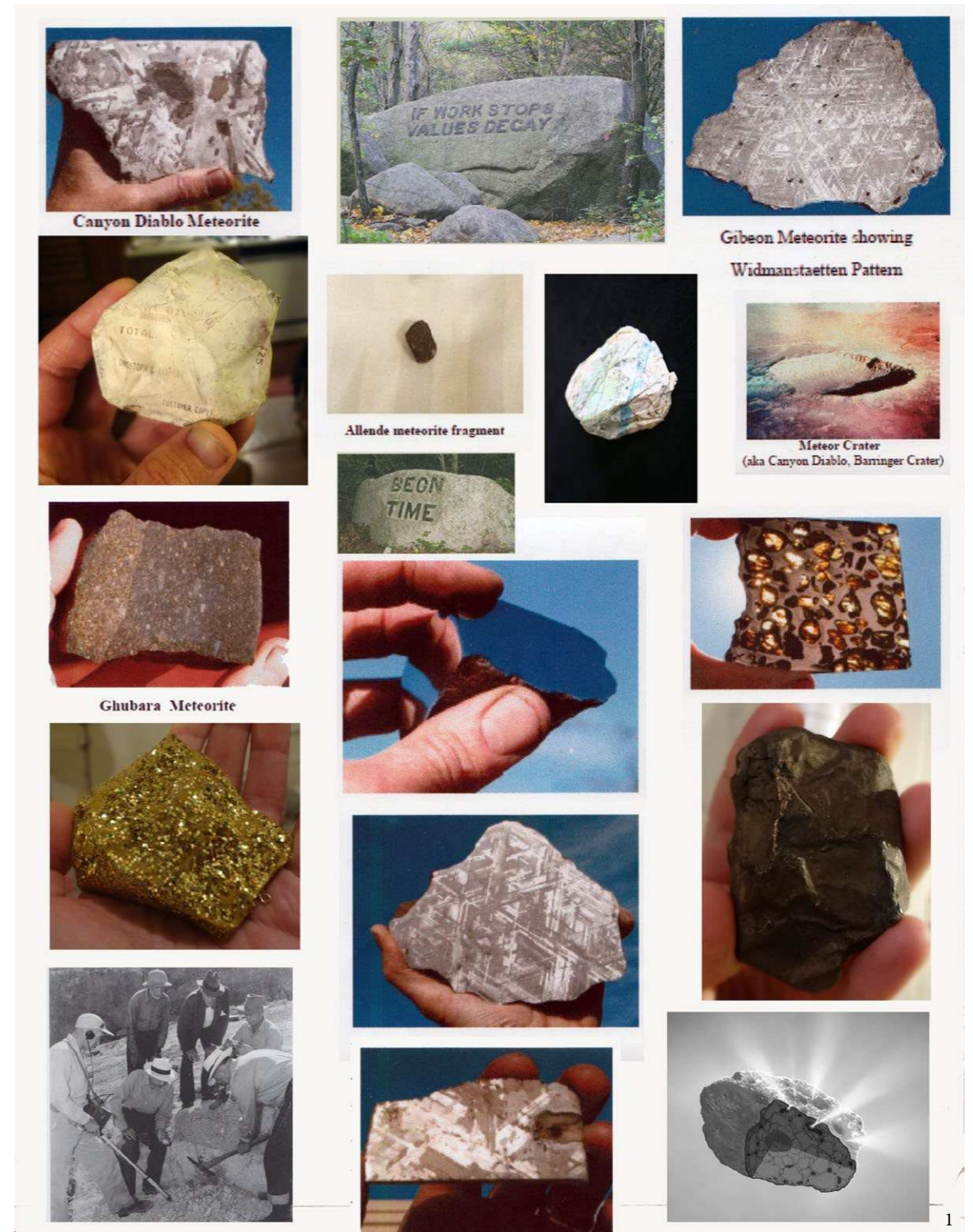
This ring is on earth, made of the same matter as asteroids: silver, nickel, gold.
This one was designed for use only on earth, doing human things like touching stuff, caring for things, gesticulating, and maybe picking.
Please proceed to the silent auction table. If you like to wear this ring, you can assess the value and make an offer.



was a sense of the active emotional labor involved in the selling

TO SPACE WITH DEBT











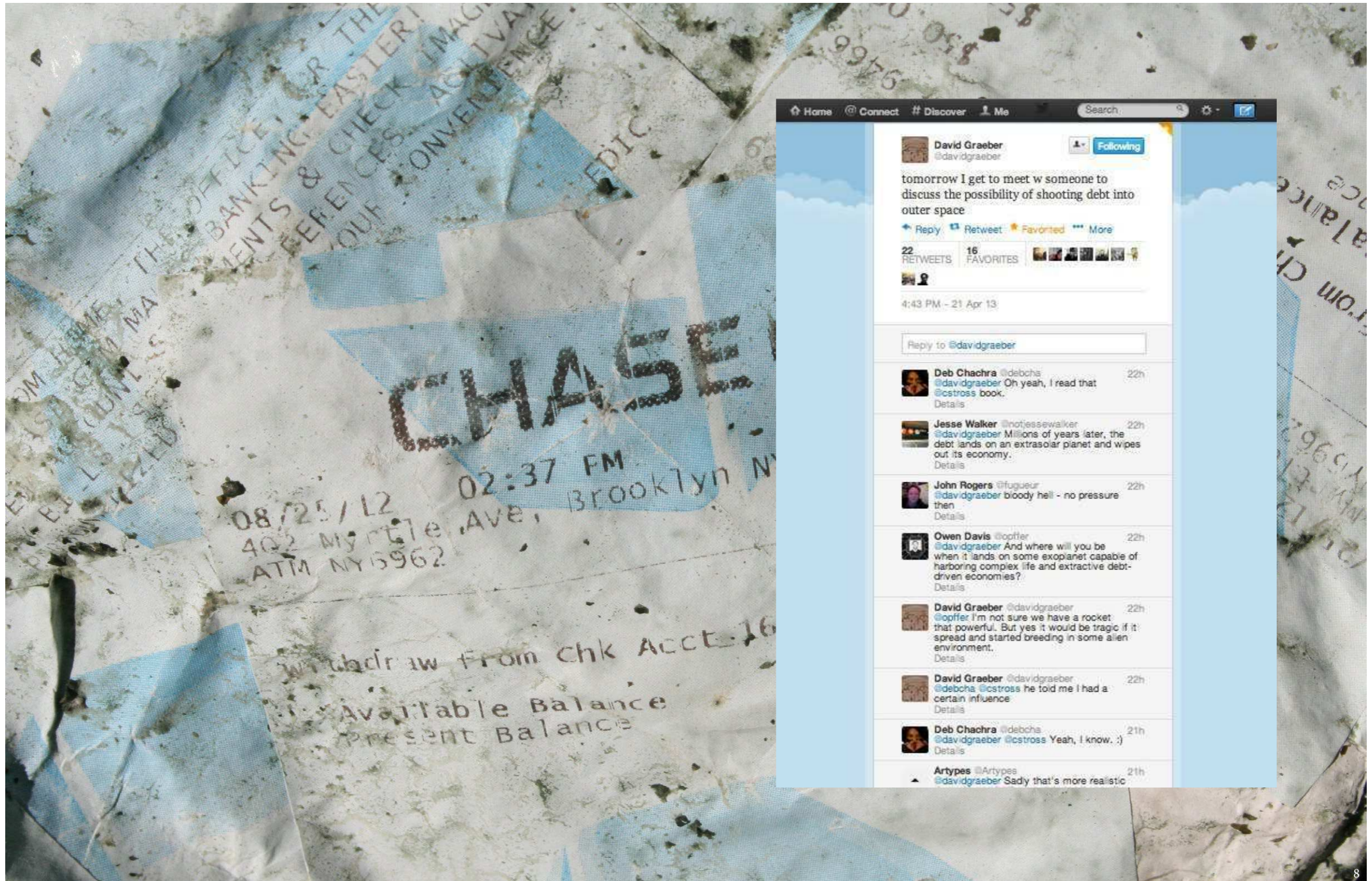
3

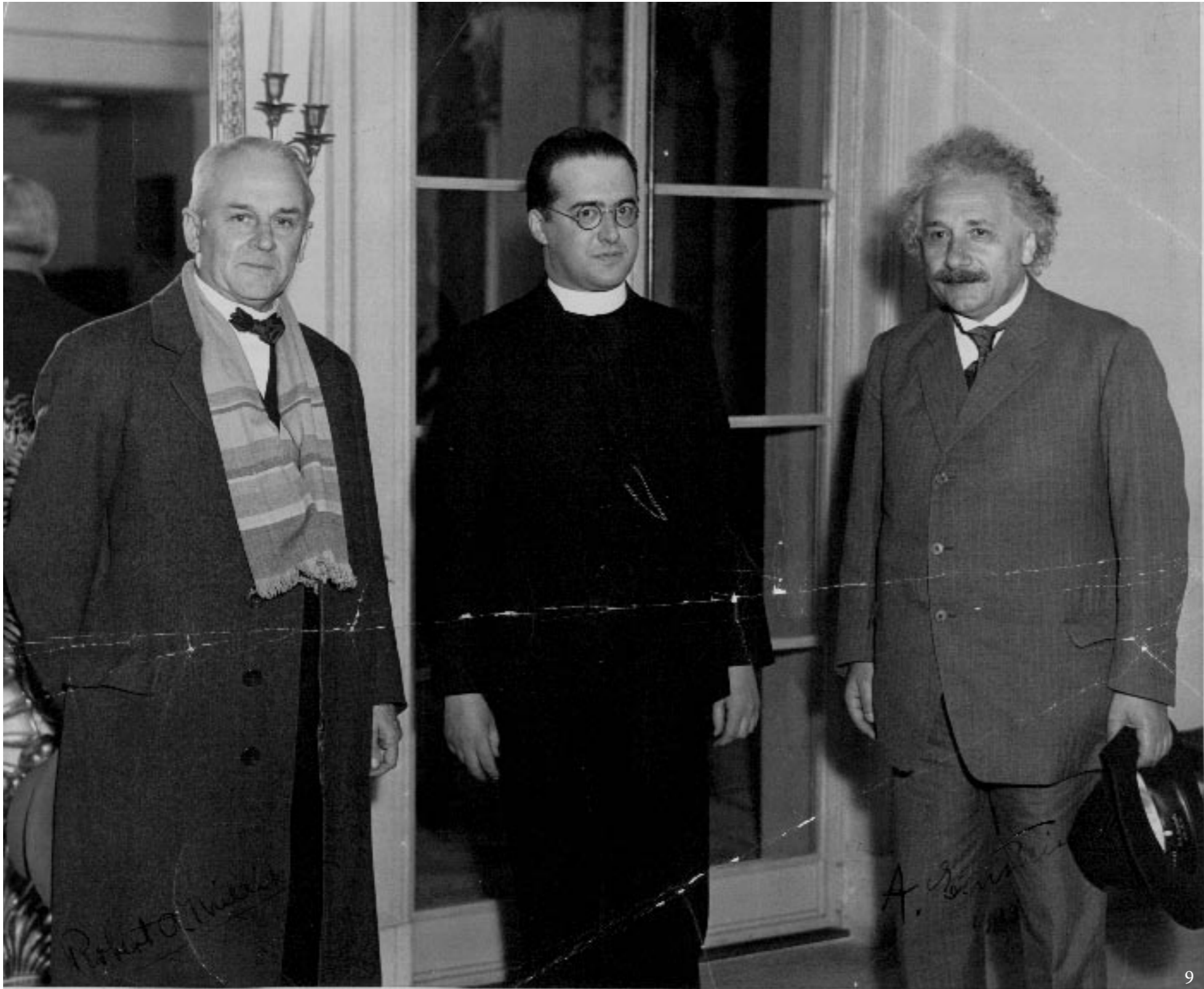


A
aire
tenu
del p
tenu
Mo
Tie
vers
do.
nub
gas
Prob
taña
tas
alta
de
desi
E
noc
alre
grac
te e
agra
con
med
dos.



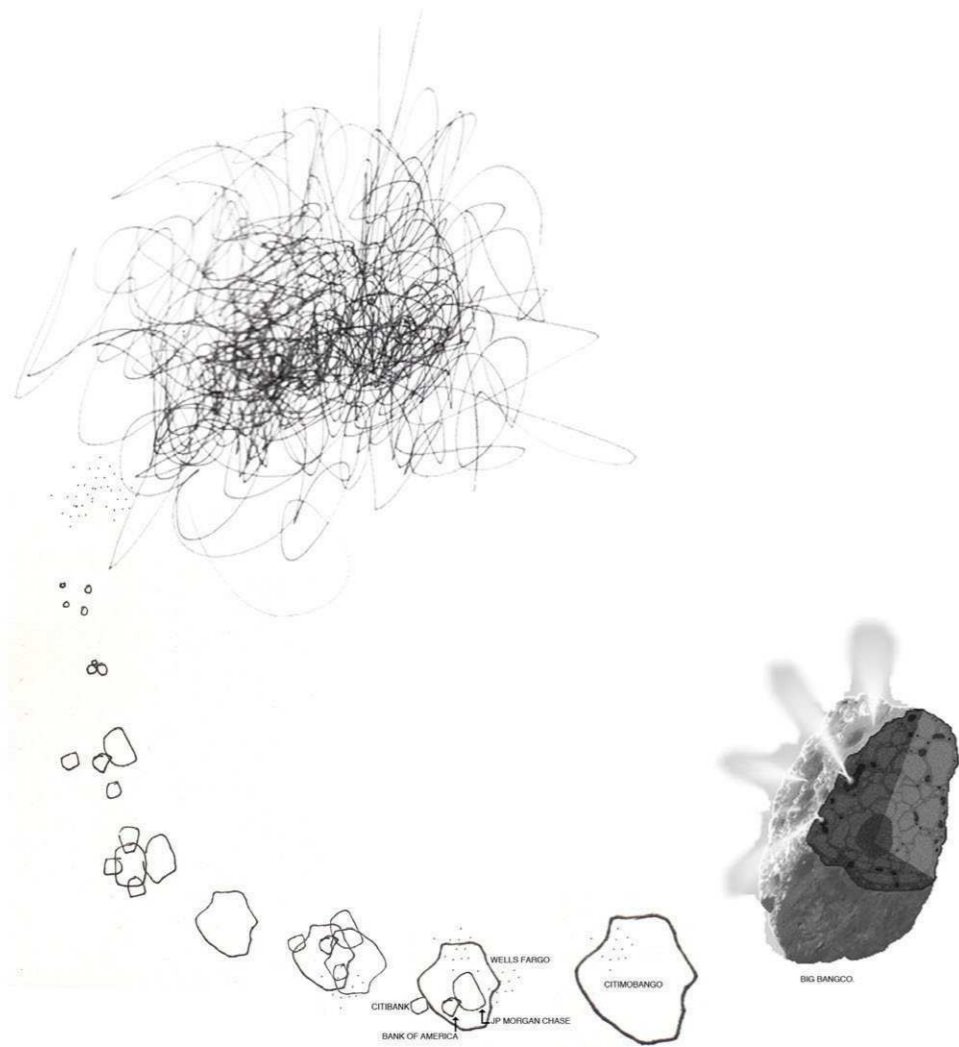










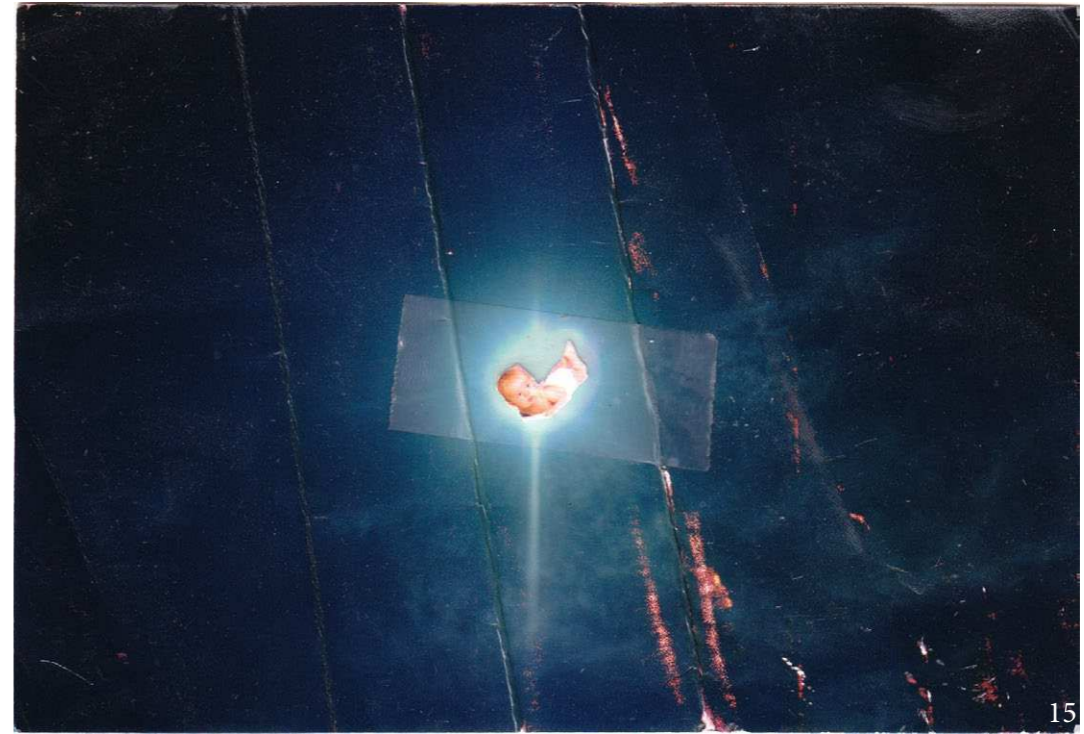




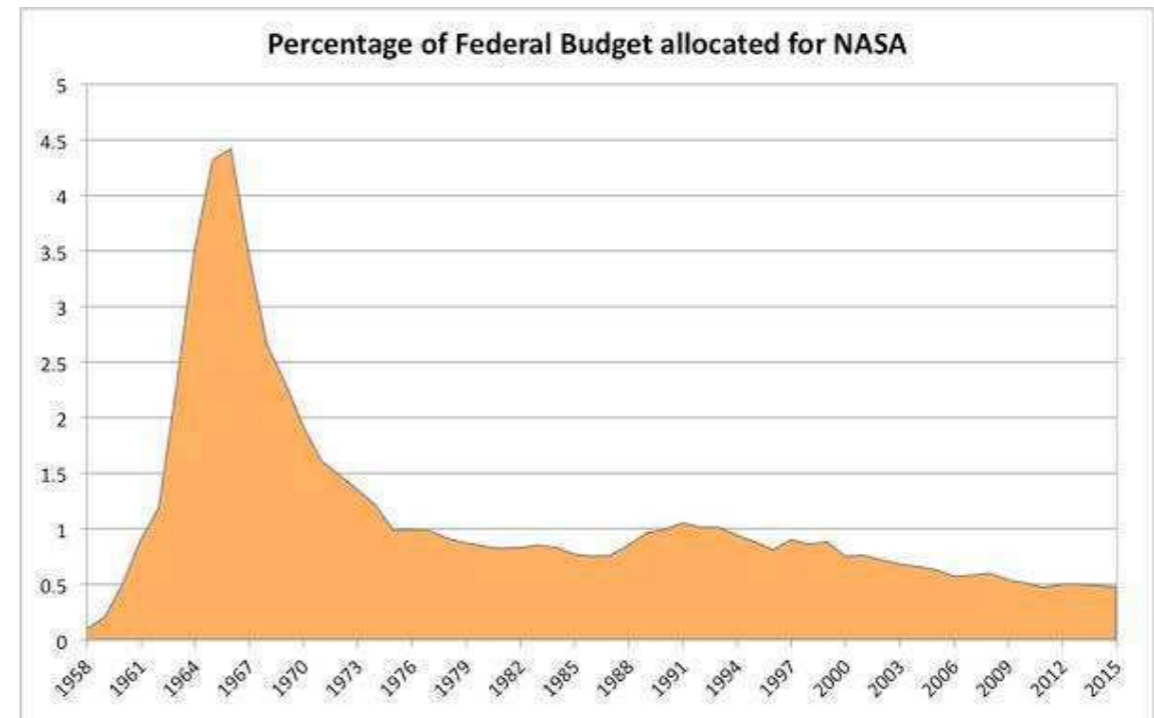
Carl Sagan, Stephen Hawking and Arthur C. Clarke - God, The Universe ...



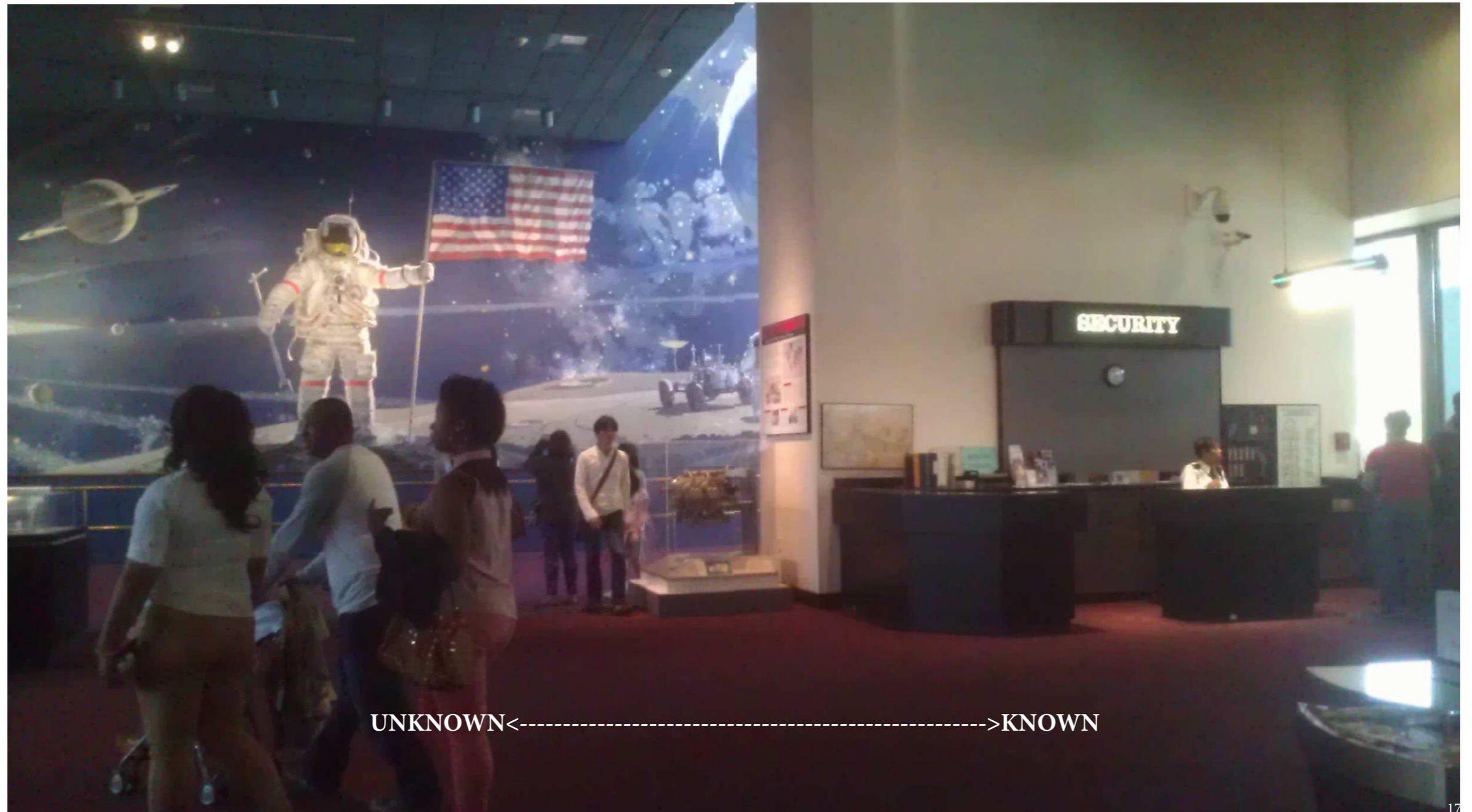
14

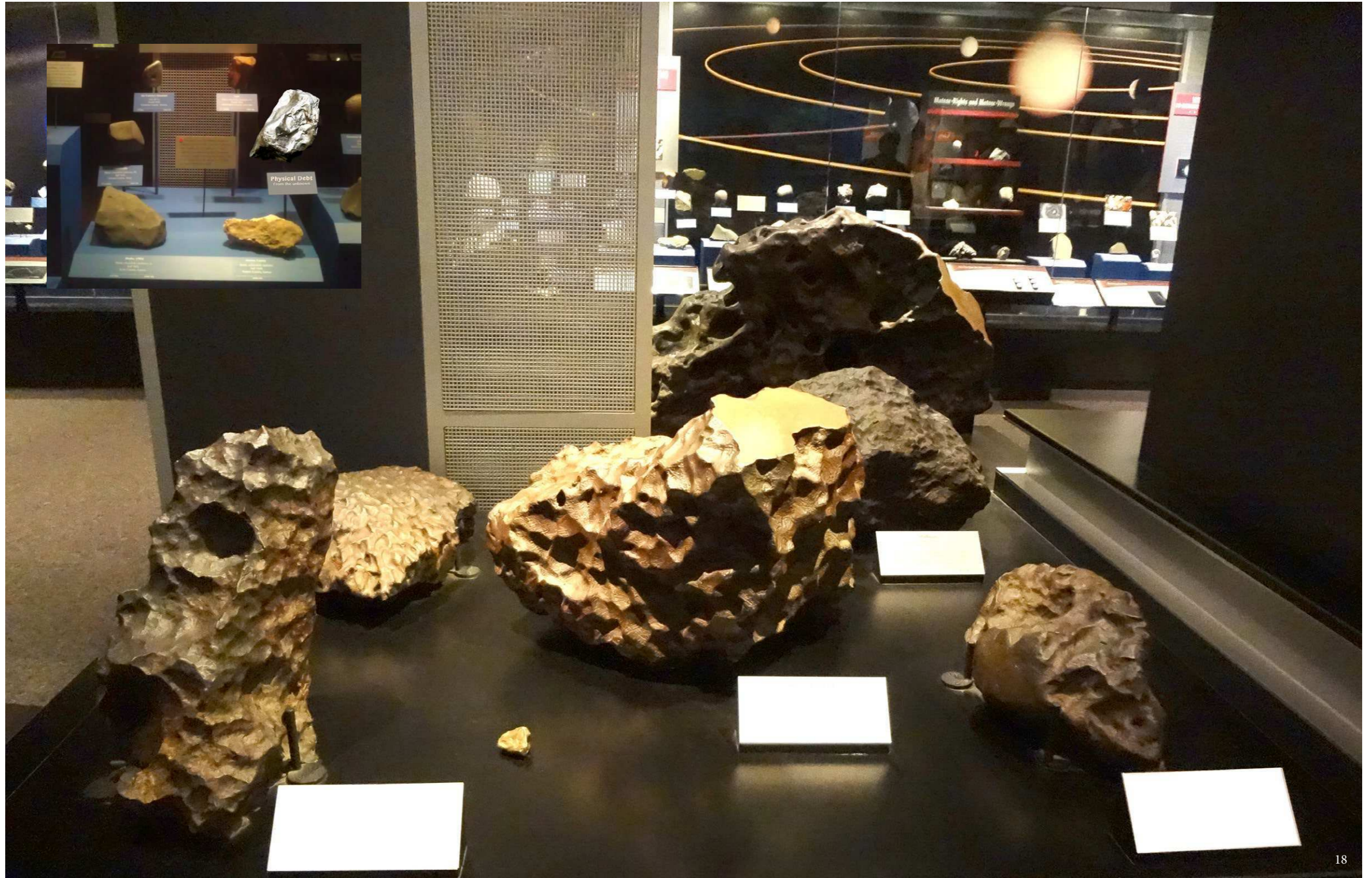


15















1. From the unknown to the solid, material found on Earth

2. DEBT CEILING

"The capitalist form is not only a set of economic rules and functions, it is also the internalization of a certain set of limitations, of psychic automatism, of rules for compliance."

-Franco "Bifo" Berardi : The Uprising, On Poetry and Finance, published in 2012

The debt ceiling is imaginary—it is an arbitrary number agreed upon by government. But there is a resource ceiling. This resource ceiling has opened up a new market for a way out of the limitations of this finitude. Market niche opens with a question: how can we continue to consume at the rate that makes us comfortable? Several private space exploration companies have emerged with solutions for the end of earth resources. The desire to go to space has been limited by the scientific-capitalist form. Above earth's atmosphere is a microscopically thin layer of the documentary papers mentioned in figure 2. The only way to break through the debt ceiling is to gather enough capital to fuel a projectile that will escape the gravity and the debt.

3. RECEIPT IN TRANSITION TO ROCK

Tight conglomeration (paper mâché) of documentation of expenditures (receipts)

by a 'student' (Cassie Thornton), December 2011

Under great, but common, atmospheric pressure to produce meaning and value, "student" #332-94-7276,001 wrapped dampened documentary papers (containing harmful PCBs) to create 'rocks' that may be 'meteors' if 'debt' and 'space' are similarly unknown.

4. ROCK IN TRANSITION TO METEOR

Casting of Fig.3 in bronze with 24k Gold

'Student' made a mold from Fig. 2, and cast bronze weapons/tools of unknown use. This rare piece was also covered in a thin layer of gold, similar to satellites launched in the same era.

5. WORK ROCK

"Planetary Resources is bringing the natural resources of space within humanity's economic sphere of influence, propelling our future into the 21st century and beyond. Water from asteroids will fuel the in-space economy, and rare metals will increase Earth's GDP."

Beginning in 2012, a space mining company called Planetary Resources circulated plans to mine asteroids for water and platinum.

The space acquisitions were not meant to be useful back on earth, they triggered a cycle of public inspiration about the potential use value of space travel to the economy. The myth of this company and its competitors has as much to do with their capital development campaigns as it does with science or innovation. The hurdle for them to get to space is how to convince investors, rather than how to projectile themselves miles into the sky. But, once past this initial hurdle, infinite growth becomes available.

Protestors, such as 'student' argued that the space miners were circulating the idea that space was a place to continue the infinite work of financialization in space, disavowing the well developed utopian mythology of space being a place to transcend trite social problems (like debt and financialization). Additionally, this industry, run by the largest benefactors of the current economy, acts to preserve human consumption at its current rate, based on the notion that we will never run out of resources (because space is one big infinite mine). There is a whisper of a "F.U." that develops from the miners/bankers as they lay subtle plans for the species to outlast the earth and to continue to consume in ways that defeat the progress made by the environmental movement, which many attribute to the first photographs of earth as taken from space.

6. SWEATING THE IMF

Invisible perspiration developed by "student" while running to the IMF in 2013

7. LIMP IN 2013

"Student" body, outside of the IMF

"In the longer run, I believe that human exploration is needed to answer two questions. One is: "Are there activities in other places in the solar system of such economic value that they justify high costs in performing them?" The other is: "Can humans living away from Earth obtain at least a major portion of what they need to survive from local resources?" If the answer to both questions is "yes," then I believe that eventually some number of people in the future will establish permanent settlements away from Earth, in the extreme case to ensure that the human species will survive a planetary catastrophe, but also because people migrate for both economic opportunities and new experiences. That is a big jump from today's argument regarding the costs and benefits of human spaceflight, but I believe such a long range perspective is the best way to justify a new start in human space exploration."

-John M. Logsdon writing for Freakonomics

In 2013 John was the Director of the Space Policy Institute and acting director of the Center for International Science and Technology Policy at George Washington University's Elliott School of International Affairs

<http://www.freakonomics.com/2008/01/11/is-space-exploration-worth-the-cost-a-freakonomics-quorum/>

8. David Graeber Tweets in 2013

David Rolfe Graeber is an American anthropologist and anarchist who is a Reader in Social Anthropology at Goldsmiths, University of London.

9. Priests and Physicists

“Apparently Einstein didn’t really say that “compound interest is the greatest force in the universe” but it’s significant so many people think he did.

-David Graeber, 2013

In January 1933, the Belgian mathematician and Catholic priest Georges Lemaitre traveled with Albert Einstein to California for a series of seminars. After the Belgian detailed his Big Bang theory, Einstein stood up applauded, and said, “This is the most beautiful and satisfactory explanation of creation to which I have ever listened.”

<http://www.catholiceducation.org/articles/science/sc0022.html>

10. Various meteorites/debts

11. Professor Harold Geller with debts by “student” and meteor collection.

“I began to wonder if this physical debt I produced was actually a meteorite. I had always believed that meteorites were delivered from space, but had no personal experience of ‘space’ or of what this imaginary ‘place’ produced.”

-‘Student’

12. PLANETISSIMALS: natural instructions for banks

According to our current understanding, planets form out of a collapsing cloud of dust and gas within a larger cloud called a nebula. Gravity causes physical bodies to attract each other with a force proportional to their masses. The larger the mass, the greater attractiveness. As gravity pulls material closer together, small clumps of material stick together to form larger clumps. Eventually these clumps grow to become planets. On earth, we can see this action modeled in the merging of all banks into a total of four large banks. The more credit they have access to, the more attraction they have to debtors of all scales. Soon there are no other competitors in their orbit.

Eventually, the material will begin to stick together, somewhat like household dust sticking together to form dust bunnies. As these small clumps orbit, sweeping up surrounding material, growing bigger and bigger.

The modest gravity of boulder-sized and larger chunks starts to pull in dust and other clumps. The bigger these conglomerates become, the more material they attract, and the bigger they get. Soon, the beginnings of planets — “planetesimals,” as they are called — are taking shape.

As each planetesimal grows bigger, it starts clearing out the material in its path, snatching up nearby, slow-moving rubble and gas while gravitationally tossing other material out of its way. Eventually, the debris in its path thins out and the planetesimal has a relatively clear lane of traffic around its star.

Conglomeration is a word that refers to a rock comprising pieces of other rocks, or a business organization.

The attraction of the weak to the concentration of power through credit only grows as the creditor attains more capital, and the debtors with more debt. Interdependence becomes a merger when the debtor can no longer afford their own particles.

13. The debt of gravitational energy will not have to be paid until the end of the universe.

Video still of Stephen Hawking telling a joke about the financial transaction that occurred at the Big Bang.

“After the big bang we believe that the universe expanded at a very rapid inflationary manner. This inflation puts its modern economic inflation in the shade. An increase of billions and billions of a percent in a tiny fraction of a second. Of course that was before the present government. During the inflationary period the universe borrowed heavily from its gravitational energy to finance the creation of more matter. The result was a triumph for the economics of the age. A vigorous and expanding universe filled with material objects. The debt of gravitational energy will not have to be paid until the end of the universe.”

“My immediate thinking is that Hawking is a strange half-human messiah for what is basically a religious view of the cosmos, translated into secular terms. As an anthropologist I know a mythic structure when I see one and the Big Bang is surely one. Then I learned in fact it was invented by a Jesuit priest who was also an astronomer in 1931 to reconcile Christianity and science, and adopted by the Pope in 1951, long before most scientists. Did I tell you this? Only in the late ‘60s did scientists accept it but since then it has become dogma as much as a religious doctrine ever has, so much so that they have had to bend themselves into pretzels to defend it (i.e., say “well we just don’t even know what 95% of the matter and energy in the universe is” to make the numbers work). So in cosmological terms cosmic debt is clearly his version of original sin. We can do something with this.”

-David Graeber email

With respect to Stephen Hawking’s writing, it is a bit confusing. I also think he is being a bit tongue-in-cheek. Hawking is speaking about the inflationary epoch that occurred shortly after the formation of the universe. Now string theorists have a different analogy for this formation of the universe (it involves such terms as bulk and branes - have you heard of those?), and explain the inflationary epoch (a time of space-time expansion at greater than light speed) in a different manner. I believe Hawking and his

colleague are trying to explain the inflationary epoch as being driven by the conversion of energy (in their case gravitational, although some would say Higgs Field energy, but the Higgs Field incorporated gravity before it was frozen out as gravity) into matter, which is of course the way matter was originally formed (all elements heavier than hydrogen and helium were formed in stars). Thus, he is using a play on the word inflation. He means it in the terms of expansion, and the energy for expansion comes from the Higgs Field.

-Professor Harold Geller

14. PALE BLUE DOT

“Our posturings, our imagined self-importance, the delusion that we have some privileged position in the universe, are challenged by this point of pale light. Our planet is a lonely speck in the great enveloping cosmic dark. In our obscurity – in all this vastness – there is no hint that help will come from elsewhere to save us from ourselves.”

-Carl Sagan, *The Pale Blue Dot*, sourced from Wikipedia 2013

The Pale Blue Dot was taken when the Voyager 1 spacecraft reached the edge of the solar system, 12 years after its launch and travelling at 40,000 miles per hour at a record distance of about 6 billion kilometers.

15. SPACE BABY

“It’s important to mention the historical parallel between, on the one hand, the growth of systems theory and cybernetics, and on the other, the development of space travel. Another point is the conceptual similarity between a planet and a system, or rather between the image of the planet and the system. The image of a planet, just like a system, is something you watch from the outside. But at the same time, you’re also inside it. And this is the aporia of the system, because the system always tells us: you can’t look at a system when you’re part of it. But you’re always part of it. And it’s the same with the planet. There is a strong analogy between system thinking and planet thinking.”

-Diedrich Diederichsen

The Whole Earth: In Conversation with Diedrich Diederichsen and Anselm Franke

<http://www.e-flux.com/journal/the-whole-earth-in-conversation-with-diedrich-diederichsen-and-anselm-franke/>

16. SIMILAR SIZE AND SHAPE

Unconscious awareness of space provides us with a psychic place of pure potential. Knowledge of earth’s finitude, and the infinite unknown that surrounds it, allows us to focus on the work of the species rather than the preservation of the planet. The idea of space allows humans to enjoy progress and its byproducts (planetary destruction), as we may rely on the idea of space’s potential colonization and infinite resources.

Similarly, credit creates the opportunity to have what is not presently financially available. The promise of debt relies on the idea that today’s investment will expand in value tomorrow, allowing the debtor to repay the credit with ease. This assumption necessitates exponential growth in value and infinite resources of materials and labor.

17. KNOWN UNKNOWNNS

“NASA space exploration should largely address a problem class in reliability and risk management stemming primarily from human error, system risk and multi-objective trade-off analysis... in every mission we can distinguish risk in three possible ways: a) known-known, b) known-unknown, and c) unknown-unknown. It is probable, almost certain, that space exploration will partially experience similar known or unknown risks embedded in the Apollo missions, Shuttle or Station unless something alters how NASA will perceive and manage safety and reliability.”

<http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.111.3314>

18. SPACE SIMULATIONS

19. INFINITE VALUE

20. 2008 WALL STREET DEBT ROCK

photographed in 2013

After the financial collapse and bank bailout of 2008, “student” collected receipts from a table set up outside a Walgreens Pharmacy near Wall St., NY. “Student” made small conglomerations of these spending documents in order to make physical debts.

21. THE BIG BANG AND ITS EFFECTS: debt, love.

“And the tension is almost unbearable.”

Alain Badiou, *In Praise of Love* 2009

colleague are trying to explain the inflationary epoch as being driven by the conversion of energy (in their case gravitational, although some would say Higgs Field energy, but the Higgs Field incorporated gravity before it was frozen out as gravity) into matter, which is of course the way matter was originally formed (all elements heavier than hydrogen and helium were formed in stars). Thus, he is using a play on the word inflation. He means it in the terms of expansion, and the energy for expansion comes from the Higgs Field.

-Professor Harold Geller

14. PALE BLUE DOT

"Our posturings, our imagined self-importance, the delusion that we have some privileged position in the universe, are challenged by this point of pale light. Our planet is a lonely speck in the great enveloping cosmic dark. In our obscurity – in all this vastness – there is no hint that help will come from elsewhere to save us from ourselves."

-Carl Sagan, *The Pale Blue Dot*, sourced from *Wikipedia 2013*

The Pale Blue Dot was taken when the Voyager 1 spacecraft reached the edge of the solar system, 12 years after its launch and travelling at 40,000 miles per hour at a record distance of about 6 billion kilometers.

15. SPACE BABY

"It's important to mention the historical parallel between, on the one hand, the growth of systems theory and cybernetics, and on the other, the development of space travel. Another point is the conceptual similarity between a planet and a system, or rather between the image of the planet and the system. The image of a planet, just like a system, is something you watch from the outside. But at the same time, you're also inside it. And this is the aporia of the system, because the system always tells us: you can't look at a system when you're part of it. But you're always part of it. And it's the same with the planet. There is a strong analogy between system thinking and planet thinking."

-Diedrich Diederichsen

The Whole Earth: In Conversation with Diedrich Diederichsen and Anselm Franke

<http://www.e-flux.com/journal/the-whole-earth-in-conversation-with-diedrich-diederichsen-and-anselm-franke/>

16. SIMILAR SIZE AND SHAPE

Unconscious awareness of space provides us with a psychic place of pure potential. Knowledge of earth's finitude, and the infinite unknown that surrounds it, allows us to focus on the work of the species rather than the preservation of the planet. The idea of space allows humans to enjoy progress and its byproducts (planetary destruction), as we may rely on the idea of space's potential colonization and infinite resources.

Similarly, credit creates the opportunity to have what is not presently financially available. The promise of debt relies on the idea that today's investment will expand in value tomorrow, allowing the debtor to repay the credit with ease. This assumption necessitates exponential growth in value and infinite resources of materials and labor.

17. KNOWN UNKNOWN

"NASA space exploration should largely address a problem class in reliability and risk management stemming primarily from human error, system risk and multi-objective trade-off analysis... in every mission we can distinguish risk in three possible ways: a) known-known, b) known-unknown, and c) unknown-unknown. It is probable, almost certain, that space exploration will partially experience similar known or unknown risks embedded in the Apollo missions, Shuttle or Station unless something alters how NASA will perceive and manage safety and reliability."

<http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.111.3314>

18. SPACE SIMULATIONS

19. INFINITE VALUE

20. 2008 WALL STREET DEBT ROCK

photographed in 2013

After the financial collapse and bank bailout of 2008, "student" collected receipts from a table set up outside a Walgreens Pharmacy near Wall St., NY. "Student" made small conglomerations of these spending documents in order to make physical debts.

21. THE BIG BANG AND ITS EFFECTS: debt, love.

"And the tension is almost unbearable."

Alain Badiou, *In Praise of Love* 2009

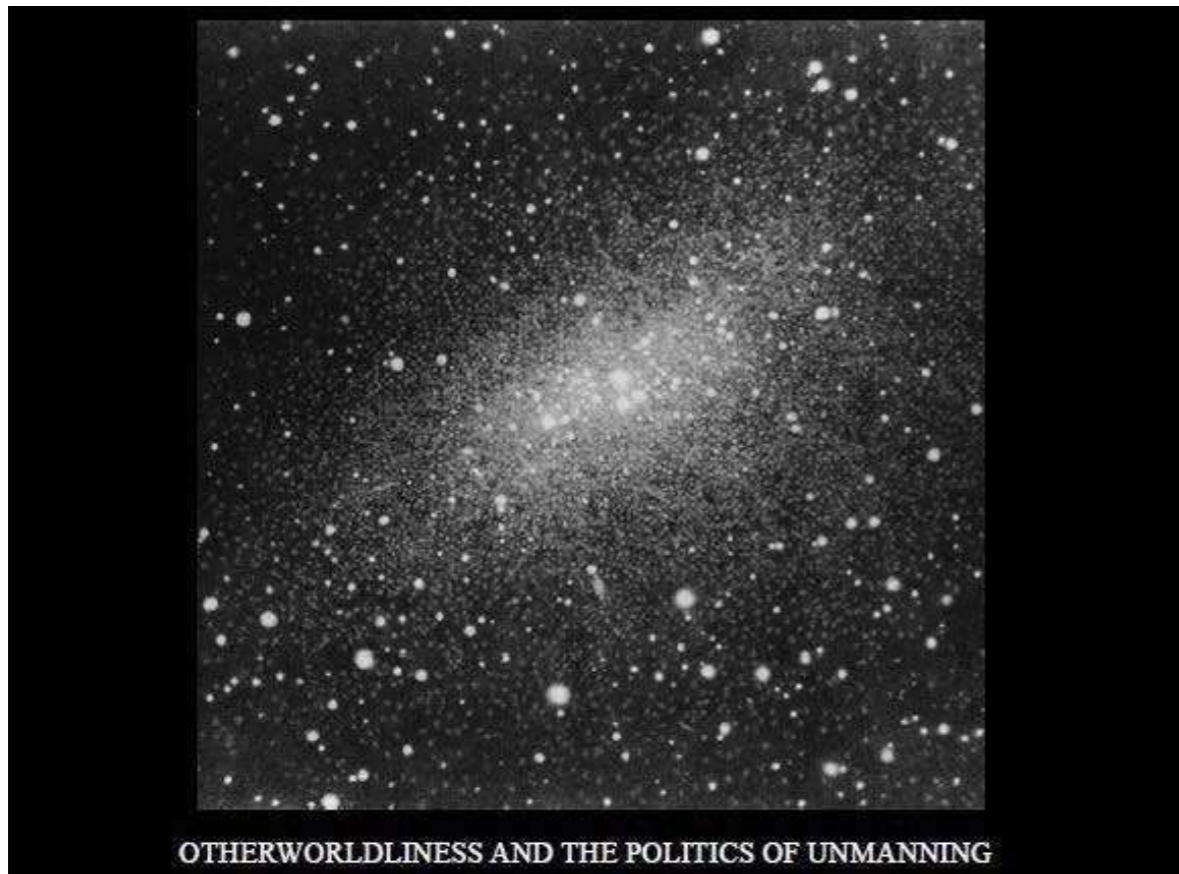


DRONES

KATE CHANDLER

OTHERWORLDLINESS AND THE POLITICS OF UNMANNING

KATE CHANDLER



Vija Celmins, from the series Night Sky.

I.

My project is about the politics of unmanning, a concern imbricated with both the material and conceptual layers of space. Space is otherworldly, i.e. what is not human, even if, over the past sixty years, a few astronauts, cosmonauts, and a plethora of unmanned space objects have slowly encroached on its vastness. Perhaps, it is because of space's position as a radical alterity that, for millennia, humans have looked to the heavens for infinity and possibilities beyond. Of course, stars and planetary bodies were never merely contemplative, serving to guide humans navigationally and astrologically.

Yet, the connection to space as a kind of infinity or as a technology seems to lead to exploitation and neglect. How many people recognize the connection to space they carry in their pockets, using phones to position themselves via satellite? The blinking dot on GPS maps is a complex set of scientific-military-

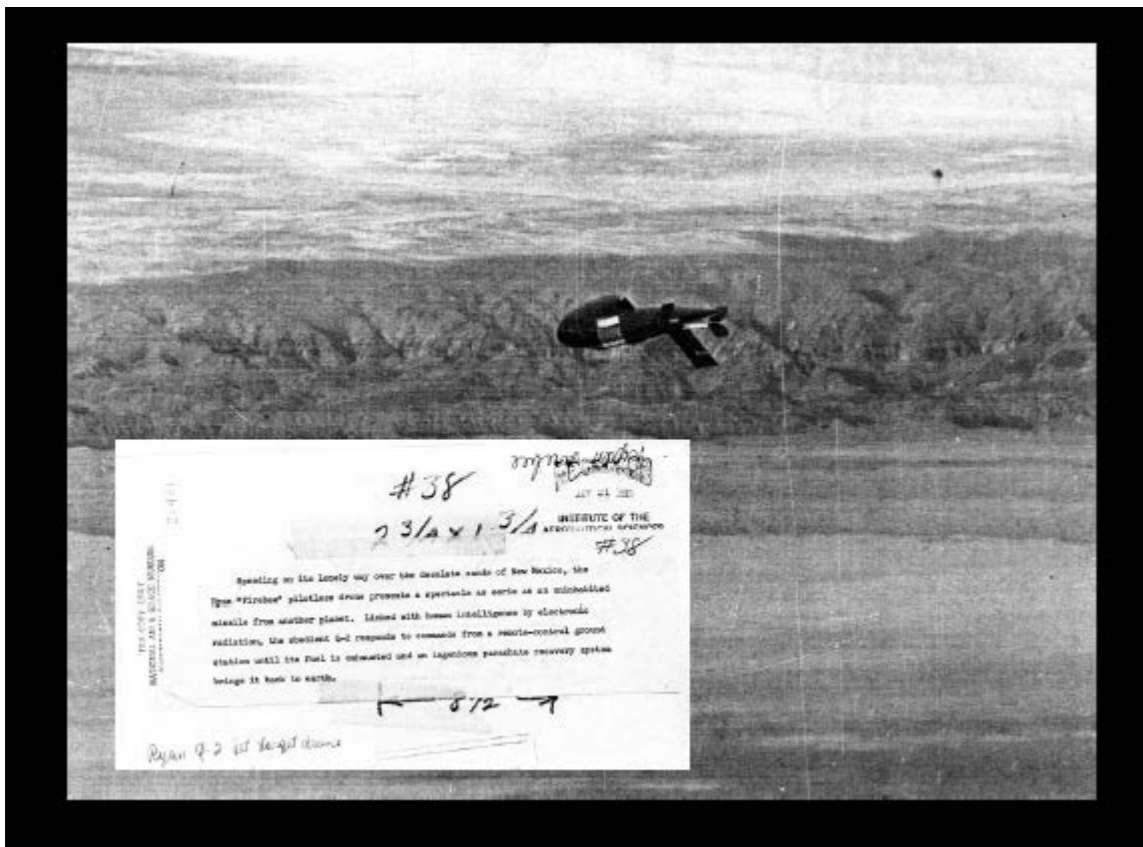
industrial-political relations that in addition to letting us find where we are, have transformed warfare, bombing, and the structures of geopolitics. The skies, in this way, are intimately connected to territory.

Drones, or unmanned aerial systems, are one of these new, earthly space creatures. Not only do they rely on satellites to navigate, they also use satellite connections to relay video between the aircraft and operators, linking geographies across the planet. And while reports often liken drones to video games or describe them as war machines for targeted killing,

they might be more accurately seen as resulting from changes to imaging, communications, and positioning systems, a lethal combination of GPS and image transmission. Indeed, drones are so similar to satellite television that Iraqis were able to watch video feeds from American drones using a \$26 software called “Skygrabber,” developed to freely download satellite television onto a computer.

Drones have a longer history being akin to outer space, dating to the early, Cold War and the pre-history of space exploration. Describing an experimental system on May 21, 1953, a poetic press officer wrote: “Speeding on its lonely way over the desolate sands of New Mexico, the Ryan ‘Firebee’ pilotless drone presents a spectacle as eerie as a missile from an uninhabited planet. Linked with human intelligence by electronic radiation, the obedient Q-2 responds to commands from a remote-control ground station until its fuel is exhausted and an ingenious parachute recovery system brings it back to earth.”

One might ask how the imaginaries of space, its hopes for infinity and frontiers for conquest, are layered onto earth. I propose that it is the limitation of space that should motivate our understanding of its vastness, which, in turn, might articulate a politics that emphasizes responsibility and intimacy, rather than exploitation and disregard.



Ryan Firebee Target Test Flight, White Sands, NM

II.

Humans are rarely invited to take the view of the drone. Of course, we hear about unmanned missions and deaths of targets known and unknown, as unmanned systems are ever more present in society and media. Yet, the flights themselves are shrouded in secrecy, as are the operators, the policies, and the legal analysts that guide them. We see the technology as an object, not as a working political practice. A New York Times article from 2009 reported that the systems captured more than 16,000 hours of video footage a month. Online, for the “Case for Space” project, I found 10 official videos, totally less than 10 minutes.

A Letter to Jane is a 1972 film by Jean-Luc Godard and Jean-Pierre Gorin that deconstructs a single photograph of Jane Fonda in Vietnam. The film suggests that what is significant

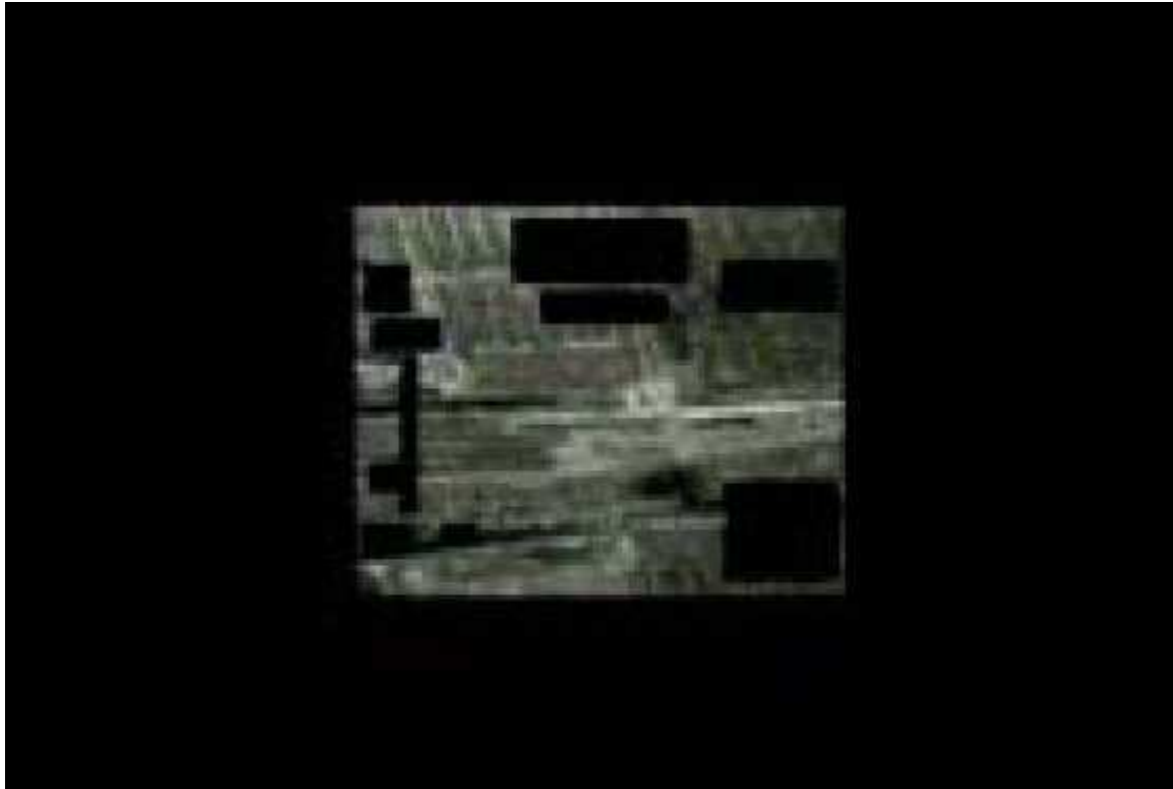


From <http://www.dvidshub.net>, Department of Defense

about the image is not what is shown, but what is blurry, on the edges of the photograph, and what is left out. Through the framework of unmanning, I have taken a similar approach to the 10 drone videos that I found on the Department of Defense website.

The short videos are pools of abstraction. Inky blots of black explode over scapes in Iraq or Afghanistan, light seen in reverse in black. A new lightweight model flies a test flight over an American desert. The UAV surveys the Iraqi elections and another looks at itself as it assesses recent flooding in North Dakota. Two figures fire gunshots, in silence, as the drone hovers overhead, attacking a few moments later. In the only video with sound, military personnel abort a missile strike after seeing an individual with a goat onscreen.

Like silent film, the videos have title cards that are intended to direct the viewer’s interpretation. Criminals, terrorists, and weapon caches all figure prominently in their framing. But what would it mean to see these videos as if they were a visual stream, captured on Skygrabber? What do they say about landscape and place? Humans and violence? The images are, at once, otherworldly and earthly rather than speaking to infinity, though, they are weighted by the secrecy of power, loss of life, and asymmetrical warfare.



UNCLASSIFIED

**MISSION ABORT
10 APRIL 2010**

UNCLASSIFIED

Multi National Division-Baghdad
MND-B Soldiers fire missile from
UAV, kill two terrorists
3:30 a.m., April 9, 2008

Soldiers using an unmanned
aerial vehicle observed a group
of terrorists with weapons
attacking Iraqi Security and
Coalition Forces

From <http://www.dvidshub.net>, Department of Defense

From <http://www.dvidshub.net>, Department of Defense



From <http://www.dvidshub.net>, Department of Defense

III.

At the end of the eighteenth century, the German philosopher, Immanuel Kant argued the infinities of space responded to a human capacity for moral reflection. He wrote, “Two things fill the mind with ever new and increasing admiration and reverence the more often and the more steadily one reflects on them: the starry heavens above me and the moral law within me.” It was the infinity of space and its infinite architecture of order that, for Kant, gave ground to the practice of making ethical choices.

While space is still infinitely beyond humans, Kant’s contemplations take on a different tone in the twentieth century. Through the convergence of rocket technologies, superpower competitions, material innovations, and the labor of many, space is a liminal sphere around the earth, visited by humans and marked by human-made satellites. The language used to describe this sphere, at least in America, often speaks of it as a frontier, a zone for potential colonization, and a site of progress. Just think of Neil Armstrong’s often quoted, “That’s one small step for man, one giant leap for mankind.” Infinity is increasingly being encroached upon.

In the mid-twentieth century, the German-American philosopher, Hannah Arendt also reflected on space. The prologue to “The Human Condition,” a study of modern

humanity, observes: “In 1957, an earth-born object made by man was launched into the universe, where for some weeks it circled the earth according to the same laws of gravitation that swing and keep in motion celestial bodies – the sun, the moon, and the stars.” She remarks it is curious that this feat, in her words, “second in importance to no other,” resulted not in awe, but in the hope humans might escape the earth.

Arendt’s work details how conditions of being human become manifest through shared political practices, conceived broadly as speech and action carried out in public. She notes that in modern political systems, those of mass society, humans share a propensity for expansion and progress rooted not in this world, but in otherworldliness. Moreover, technologies separate how sight, sound, and action function, making it increasingly difficult to mediate our commons. What is shared through some scopic and sonic regimes is not shared by others.

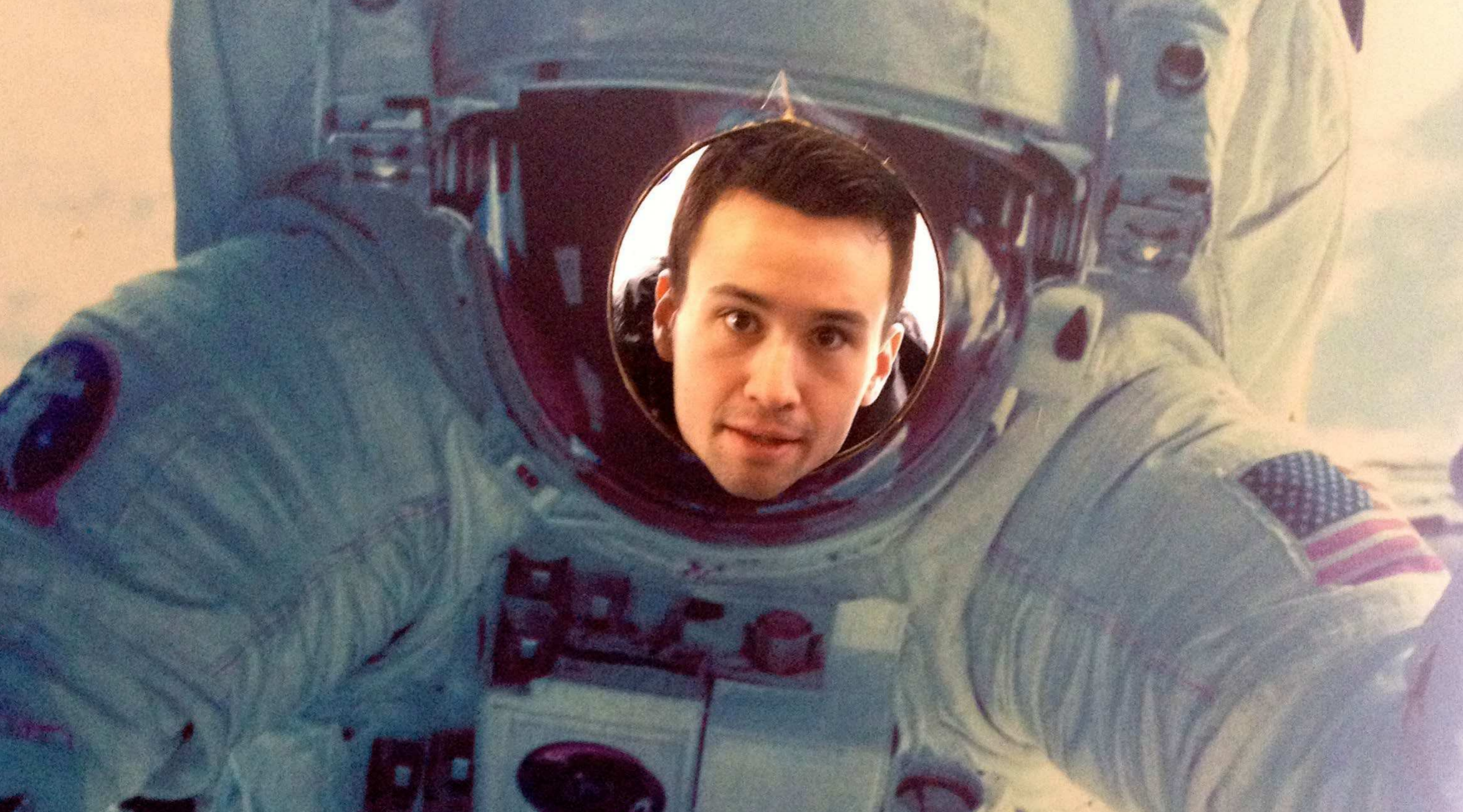
Drones are an apt example of this technological system. Seeing like a drone is a perspective circumscribed by power, secrecy, and bureaucracy. More so, the infrared view it offers of the geopolitical landscape is particular, not that shared by the people below. Neither the Iraqis we see voting nor the “terrorists” seen firing weapons participate in the drone’s vision. And if people on the ground do know of the drones, more often than not, it is because of the buzzing sound they produce. “The Human Condition” calls for a return to a politics situated

within the limits of our planet, one in which spaceflight is viewed not as an escape from or a triumph over earth, but as a practice intertwined with world we make in common. In this way of thinking about space, it is not what is beyond or infinite, but rather, what is intimate that matters. Today what is unmanned and otherworldly is intimate and, as such, should call for our political, and, ethical attention, as what is being enacted through these frameworks is not beyond humans, but the world we share.

WORKS RESEARCHED

- Alexander, G. et al. *Aquila Remotely Piloted Vehicle System Technology Demonstration (RPV-STD)*. Sunnyvale, CA: Lockheed Missiles & Space Company, 1977.
- Arendt, H. *The Human Condition: A Study of the Central Dilemmas Facing Modern Man*. New York: Double Day Anchor Books, 1959.
- Bennett, J. *Vibrant Matter: A Political Ecology of Things*. Chapel Hill, NC: Duke University Press, 2010.
- Bijker, W. “How is Technology Made? – That is the Question.” *Cambridge Journal of Economics*. 82, no. 1: 63-76.
- Botzum, R. A. *50 Years of Target Drone Aircraft*. Hawthorne, CA: Northrop, 1985.
- Bowman, N. *The Handbook of Rockets and Guided Missiles*. Chicago, IL: Perastadion Press, 1963.
- Butler, J. *Precarious Life*. London and New York, NY: Verso. 2006.
- Coons, B. *Shoot Only at the Red Airplane*. Raleigh, NC: Lulu Press, 2007.
- Edwards, P. *The Closed World: Computers and the Politics of Discourse in Cold War America*. Cambridge, MA: The MIT Press, 1997.
- Ehrhard, T. P. “Air Force UAVs: The Secret History.” A Mitchell Institute Study, July 2010.
- Foucault, M. *Security, Territory, Population: Lectures at the College de France 1977—1978*. London: Picador, 2009.
- Galison, P. “Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision.” *Critical Inquiry*. 21, no 1: 228-266.
- Goebel, G. “Unmanned Aerial Vehicles: USA.” (2010). accessed 5 May 2012 <www.vesctorsite.net>
- Gregory, D. “From a View to a Kill: Drones and Late Modern War.” *Theory, Culture, & Society*. 28.7-8 (2011): 188-215
- Haraway, D. *Simians, Cyborgs, and Women: The Reinvention of Nature*. New York: Routledge. 1990.
- Jasanoff, S., Ed. *States of Knowledge: The Co-Production of Science and the Social Order*. New York: Routledge, 2004.
- Kant, Immanuel. *Practical Philosophy*. Cambridge: Cambridge University Press, 1996.
- Latour, B. *Science in Action: How to Follow Scientists and Engineers Through Society*. Cambridge, MA: Harvard University Press, 1987.
- Mackenzie, D. A. *Inventing Accuracy: An Historical Sociology of Nuclear Missile Guidance*. Cambridge, MA: MIT Press, 1990.
- & Wajcman, Judy. *The Social Shaping of Technology*. Buckingham: Open University Press, 1999.
- Macrakis, K. “Technophilic Hubris and Espionage Styles during the Cold War.” *Isis*. 101, No. 2 (June 2010): 378-385.
- McDaid, H. and D. Oliver. *Smart Weapons: Top Secret History of Remote Controlled Airborne Weapons*. London: Orion Media, 1997.

- Mindell, D. A. *Between Human and Machine: Feedback, Control, and Computing Before Cybernetics*. Baltimore: Johns Hopkins University Press, 2002.
- Mirzoeff, N. "The Right to Look." *Critical Inquiry*. 37.3 (2011): 473-496.
- Parsch, A. *Directory of U.S. Military Missiles and Rockets*. (2002-2003) accessed 27 June 2011 <<http://www.designation-systems.net> >
- Pickering, A. *The Mangle of Practice: Time, Agency, and Science*. Chicago, IL: University of Chicago Press, 1995.
- Roscini, M. "Targeting and Contemporary Aerial Bombardment." *The International and Comparative Law Quarterly*. 54, no. 2 (April 2005): 411-443.
- Schmitt, C. *The Nomos of the Earth In the International Law of Jus Publicum Europaeum*. New York: Telos Press, 2006.
- Singer, P. *Wired for War: The Robotics Revolution and Conflict in the 21st Century*. New York: Penguin Press, 2009.
- Slayton, R. "From Death Rays to Light Sabers: Making Laser Weapons Surgically Precise." *Technology and Culture*. 52:1 (2011): 1-30.
- Slotten, H. "Satellite Communications, Globalization and the Cold War." *Technology and Culture*. 43:2 (2002). pp. 315 – 350.
- Zaloga, S. *Unmanned Aerial Vehicles: Robotic Air Warfare 1917-2007*. Oxford: Osprey Publishing, 2008.



APPENDIX



FELLOWS



National Radio Astronomy Observatory

HEIDI NEILSON

Heidi Neilson is an artist working in printmaking, artists' books, and public projects concerning topics such as weather, fake snow, and the debris in earth's orbit. She has participated in residencies at the Center for Book Arts, I-Park, Visual Studies Workshop, the Lower Manhattan Cultural Council, Kala Art Institute, the Lower East Side Printshop, and Women's Studio Workshop. She has exhibited widely, including at the Queens Museum of Art, the International Center for Prints New York, the Bronx Museum of the Arts, the Islip Art Museum, and The Drawing Center, and her work is included in over 50 museum and university collections. Originally from Oregon, Heidi received a BA in biology from Reed College and an MFA in painting from Pratt Institute, and lives and works in New York. (<http://www.heidineilson.com/>)

HUONG NGÔ

Huong Ngô is an artist and educator, born in Hong Kong, and based in Brooklyn, NY. Her work, often collaborative and performance-based, has been supported by the New Museum, Rhizome, LMCC, The Kitchen, EFA Project Space, Tate Modern, Vox Populi, The Aldrich Contemporary Art Museum, The Museum of Contemporary Art in Chicago, the Madison Museum of Contemporary Art, and the National Museum in Prague. She is a part of the collective Fantastic Futures, a recent Whitney Independent Study Program Fellow, and has a MFA from the School of the Art Institute of Chicago. Current and upcoming works can be viewed at Smackmellon (Brooklyn), Quartair (The Hague), and with Fantastic Futures at Eyebeam Art & Technology Center (NY) and through the 2013 iLAB Residency Program. (<http://www.huongngo.com/>)

CASSIE THORNTON

Cassie Thornton is currently developing a body of work based in research about the substance of debt. This work began when she was a graduate student at California College of the Arts (2010-1012) within the Social Practice Workshop. Her current work engages with the student debt of her peers at CCA as psychological and financial material. Before graduate school she co-developed the Teaching Artist Union (2009 - ongoing) in New York City after five years as an art educator in public schools. She is the founder and co-director for the School of the Future, a 24 hour, one-month intergenerational outdoor free school designed for and by teaching artists. In 2011 she built a house in India with a team of Indian art students, home 'experts', and construction workers who lived in it until it transformed into a home. This summer she will begin research into the relationship between debt and labor as artist in residence at the labor archives at SF State University.

(<http://www.cassiethornton.com/>)

KATHERINE CHANDLER

Katherine Chandler (Washington DC) creates work that transects social theory, art practice, and new media studies. She explores how images and sensory information intertwine with ways of making value, highlighting the political-ethical dimensions of how people see, sense and act. Currently, she is working on a project about the United States Military's "unmanned" systems or drones, as they are more commonly called. A starting point is the word unmanned, which points to ambivalence about what is human (or man?) within the system and what is not. Who or what is this negated being that is becoming increasingly important to local, national, and global politics?

THANKS

COUNCIL

Harold Geller, George Mason University, Department of Physics

Lauren Dickens, Corcoran Gallery of Art

Greg Newman, Independent Space Historian

Elizabeth Robinson, White House Office of Science and Technology Policy

Bert Ulrich, NASA

CURATORIAL TEAM

Donald Russell, Executive Director, Provisions Library

Stephanie Sherman, Director of Research, Provisions Library

FUNDERS AND SUPPORTERS

George Mason University School of Art

Andy Warhol Foundation

Nathan Cummings Foundation

Open Society Foundation

Comet Ping Pong

BeBerlin

German Historical Institute

AN OVERVIEW OF SPACE- AFFILIATED DISCIPLINES

1. Space exploration, which was historically conducted only by government space agencies, but which is increasingly being pursued by the private sector. This includes both manned space exploration (the Mercury, Gemini, Apollo, Space Shuttle, Vostok Soyouz, etc. programs and today, the International Space Station) and robotic probes and satellites that go to other planets/moons/asteroids or orbit and study our own planet.

2. Astronomy, cosmology and other space-related sciences. This includes (among others) professional astronomers who work at telescopes (eg, the Very Large Array or the Keck Observatory), theoretical astrophysicists, geologists, exobiologists and amateur astronomers. Amateur astronomy is a misleading term, since

doing it properly requires decades of work and tens of thousands of dollars of personal investment, and amateur astronomers are responsible for a huge portion of what we know about the sky.

Surprisingly little astronomy and cosmology is carried out by space agencies. NASA employs astrophysicists to construct and work with the data from space-based telescopes and radio observatories, but a lot of the analysis is done after the fact by unaffiliated astronomers working at universities or research institutes. In fact, much of the observing time of these space-based observatories is dedicated to specific image capture requests by these unaffiliated astronomers. Most of the funding for land-based observatories and cosmology comes from places like the National Science Foundation or the Department of Energy's Office of Science, not NASA.

3. Military/corporate use of space. The Air Force Space Command has a budget that's nearly twice the size of NASA's. That covers (much of) the funding for things like intercontinental ballistic missiles and spy satellites and the Air Force's mini-space shuttle, but also a significant portion of the GPS and communications satellite system and some genuine scientific work. Then there are corporate satellites that make up the rest of our communications system.

REFERENCE

COSMOLOGY/ GEOLOGICAL/ ASTRONOMICAL TIME:

- Sagan, Carl. 1980. *Cosmos*. Random House. (Television series is also recommended)
- Liebes, S., E. Sahtouris, and B. Swimme. 1998. *A Walk Through Time: From Stardust to Us, the Evolution of Life on Earth*. John Wiley and Sons.
- Turney, Chris. 2006. *Bones, Rocks, and the Stars: The Science of When Things Happened*. Palgrave/Macmillan.
- Levi, Primo. 1984. "Carbon." *The Periodic Table*. Schoken Books. Pp. 224-233. (The story of a single carbon atom through billions of years). Understanding scale, from molecular to astronomical levels:
- Huang, Cary and Michael. 2012. *The Scale of the Universe*. <http://htwins.net/scale2/>
- Eames, Charles and Ray. 1968. *Powers of Ten*. <http://powersof10.com/film>

STELLAR NUCLEOSYNTHESIS

- Burbidge, E.M., G.R. Burbidge, W.A. Fowler, and F. Hoyle. 1957. "Synthesis of the Elements in Stars." *Reviews of Modern Physics*, 29, pp. 547-650. http://rmp.aps.org/abstract/RMP/v29/i4/p547_1 (Seminal scientific paper that explains the creation of the elements inside stars, with the exception of helium and hydrogen)
- Fred Hoyle Online Exhibition, University of Cambridge: http://www.joh.cam.ac.uk/library/special_collections/hoyle/exhibition/notebook

ARTISTIC INTERPRETATIONS OF CELESTIAL AND TERRESTRIAL EXPLORATIONS:

- Solnit, Rebecca. 2007. "Excavating the sky" and "Drawing the constellations." In *Storming the Gates of Paradise: Landscapes for Politics*. University of California Press, pp. 143-164, 165-167. (An essay that describes how astronomy developed in Western civilization with Galileo Galilei, and how his scientific derivations in cartography led to population

expansion in the American West).

- Guzmán, Patricio. 2011. Nostalgia for the Light. Icarus Films. (Specific link between astronomical and forensic investigations in northern Chile)

FROM CASSIE

Animal Spirits by Robert Shiller and George A. Akerlof

Debt, the first 5000 Years by David Graeber

Cosmos: A Personal Voyage by Carl Sagan

A Thousand Years of Nonlinear History by Manuel DeLanda

FROM HEIDI

[Space resources](#)

FROM PROVISIONS

http://www.washingtonpost.com/lifestyle/food/martian-menu-planned-2030-mission-to-mars-may-give-astronauts-the-chance-to-cook-in-space/2012/07/17/gJQAVoPQqW_story_1.html

[We are on the Fucking Moon \(via the Onion\)](#)

[Economic Case For Space \(via Slate\)](#)

[Put Whitey on the Moon!](#)

<http://jacobinmag.com/2012/09/put-whitey-back-on-the-moon/>

[How to off an Astroid](#)

[Buzz Aldrin to NASA: U.S. Space Policy Is on the Wrong Track - Popular Mechanic](#)

[Photos for Aliens after we're gone \(via slate\)](#)

<http://airandspace.si.edu/explore-and-learn/topics/women/>, DC

<http://www.womeninaerospace.org/>, DC

<http://www.dtm.ciw.edu/neighborhood-lecture-series-2012-2013>

Space Oddities: Women and Outer Space in Popular Film and Culture, 1960-2000

http://www.huffingtonpost.com/jerry-l-ross/spacewalking_b_2744797.html

SIMILAR EXHIBITIONS

Free Enterprise: The Art of Citizen

January 19-May 18

ARTSblock University California Riverside

<http://artsblock.ucr.edu/exhibitions/Free-Enterprise>

Joana Hadjithomas and Khalil Joreige

“On the Lebanese Rocket Society”

February 28-April 20

CRG Gallery

548 West 22nd Street

New York, NY 10011

BOOKS

<http://www.amazon.com/NASA-Trek-Popular-Science-America/dp/0860916170>

<http://www.amazon.com/Cultures-Orbit-Satellites-Televiual-Console-ing/dp/0822334976>

Starman: The Truth Behind the Legend of Yuri Gagarin, by Jamie Doran and Piers Bizony

Flight: My life in Mission Control by Chris Kraft (who was the lead flight director for the Mercury program)

Lost Moon: The Perilous Voyage of Apollo 13 (renamed simply “Apollo 13” after the movie came out) by Jim Lovell and Jeffrey Kluger

Failure is Not an Option: Mission Control from Mercury to

Apollo 13 and Beyond by Gene Kranz (lead flight director for the Apollo program)

Beyond the Atmosphere: Early Years of Space Science by Homer E. Newell

Apollo: The Behind-The-Scenes Story of one of Humankind’s Greatest Achievements by Charles Murray and Catherine Bly Cox

SPACESUITS

[The Origins and Technology of the Advanced Extra-Vehicular Space Suit, History of Rocketry and Astronautics](#), by Gary Harris

[Russian Spacesuits and U.S. Spacesuits](#)

[Dressing for Altitude: US Aviation Pressure Suits, Wiley Post to Space Shuttle](#), by Dennis R. Jenkins PDF online for free.

LOCAL RESOURCES

[NASA History Office](#)

[Goddard Space Flight Center](#)

>[list of missions](#)

>[awesome solar flare video](#)

[National Capital Astronomers](#)

[Department of Terrestrial Magnetism](#)

[US Naval Observatory](#)

[Dextre](#)
[GW's Space Policy Institute](#)

MULTIMEDIA

Neil DeGrasse Tyson youtube channel

[Radio Lab podcast](#)

[apod.nasa.gov](#)

Though the archive (<http://apod.nasa.gov/apod/archivepix.html>) is the really cool thing.

They've been doing it since June 16th, 1995: <http://apod.nasa.gov/apod/ap950616.html>

There was actually an incredibly fascinating program out of Vandenberg in the 60s (I think) before there was a spy satellite network, where obsolete ICBMs were mounted with cameras and shot over Soviet territory. But of course, it was before radio-telemetry-capable cameras were a thing, so they had to both program the cameras in advance to take the pictures when the rocket was over the right place on the earth, and then physically recover the cameras to process the film. They did this by having the camera drop off of the rocket once it got over international waters, and open a parachute that an air force plane could catch in mid-air. Took them a number of tries to get

it right, as you can imagine. Unfortunately, I haven't been able to find any more information at all on this online – it was just something that the tour guide mentioned (and maybe wasn't supposed to mention? Or maybe the rest of the world finds this less fascinating than I do).

<http://diverseworks.org/2012/first-woman-on-the-moon/>

FILMS

http://en.wikipedia.org/wiki/List_of_films_about_outer_space