# plan text

The United States federal government should substantially increase the Search for Extraterrestrial Intelligence by increasing radio telescope astronomy.

# advantage 1: before contact

Scenario 1: Competitiveness

U.S Competitiveness declining – high tech trade deficit

**Hersh Et. Al 11** [ Adam Hersh, Christian E. Weller | February 9, 2011, Measuring Future U.S. Competitiveness U.S. Productivity and Innovation Snapshot, Center for American Progress, http://www.americanprogress.org/issues/2011/02/productivity\_snapshot.html]

Productivity growth—the rate at which we increase production with a given amount of work and resources—is critical to our national economic prosperity and competitiveness, and a factor tied closely to the pace of real investment. Investments in equipment and innovation lead to productivity growth, and productivity growth leads to long-run increases in our standard of living. As the U.S. economy continues to pull out of the Great Recession, a number of trends point to clear signs of trouble for present and future U.S. competitiveness. First, investment continues at a slow pace, barely keeping up with capital depreciation. Second, the effects of slow investment can be seen in lagging productivity growth, which is below average for this point in a business cycle. Third, the U.S. high-tech trade deficit is widening once again. Yet a number of ingredients for faster productivity growth in the future do show promise. This is true for private sector-led research-and-development spending, the number of newly trained Ph.Ds now being minted at our universities, and signs of recovery in the venture capital sector providing critical investment to early-stage innovation, especially for clean energy technologies. The data presented here point to substantial challenges ahead to U.S. economic prosperity. The snapshot of U.S. productivity and competitiveness presented here shows that policymakers must give more attention to strengthening the factors that could lead to future productivity growth and rising living standards

Radio astronomy empirically attracts private investment, causes tech spillover, and increases competitiveness

**NRAO 6** [Radio Astronomy Contributing to American Competitiveness October 2006 Compiled by the staff of the National Radio Astronomy Observatory (NRAO). The NRAO is operated by Associated Universities, Inc., under Cooperative Agreement with the National Science Foundation]

Radio astronomy is an exemplary national resource that increases American competitiveness in many ways. It contributes uniquely and significantly to our understanding of the universe, and has been a catalyst for enhanced scientific training and basic research in many fields. Extreme distances, weak signals, and vast amounts of astronomical data require instrumentation and processing that pushes the state of the art to its limits. Radio telescopes, facilities, and instruments are developed on a scale that requires collaborative effort and greater funding than a single organization can provide. These technical innovations lead to private sector investment in research and development that translates fundamental discoveries into the production of useful and marketable technologies, processes, and techniques that effect our lives each day. Technical innovations developed or enhanced for radio astronomy are found in communication antennas, transistor design, cryogenic coolers, medical and scientific imaging, time and frequency standards, atomic clocks and GPS navigation, precision spacecraft navigation, location of cell phone 911 calls, laser rangefinders, and quasi-optical applications. Radio astronomy tracks solar flares that can cause disruption of earth-based communications, damage to orbiting satellites, and destructive surges on power grids. The vast amount of computing capacity required for Searches for Extraterrestrial Intelligence radio signal processing led to a unique grid computing concept that has been expanded to many applications.

COMPETITIVENESS KEY TO HEG.

SEGAL 04. [ADAM, Senior Fellow in China Studies at the Council on Foreign Relations, Foreign Affairs, “Is America Losing Its Edge?” November / December 2004, http://www.foreignaffairs.org/20041101facomment83601/adam-segal/is-america-losing-its-edge.html]

The United States' global primacy depends in large part on its ability to develop new technologies and industries faster than anyone else. For the last five decades, U.S. scientific innovation and technological entrepreneurship have ensured the country's economic prosperity and military power. It was Americans who invented and commercialized the semiconductor, the personal computer, and the Internet; other countries merely followed the U.S. lead. Today, however, this technological edge-so long taken for granted-may be slipping, and the most serious challenge is coming from Asia. Through competitive tax policies, increased investment in research and development (R&D), and preferential policies for science and technology (S&T) personnel, Asian governments are improving the quality of their science and ensuring the exploitation of future innovations. The percentage of patents issued to and science journal articles published by scientists in China, Singapore, South Korea, and Taiwan is rising. Indian companies are quickly becoming the second-largest producers of application services in the world, developing, supplying, and managing database and other types of software for clients around the world. South Korea has rapidly eaten away at the U.S. advantage in the manufacture of computer chips and telecommunications software. And even China has made impressive gains in advanced technologies such as lasers, biotechnology, and advanced materials used in semiconductors, aerospace, and many other types of manufacturing. Although the United States' technical dominance remains solid, the globalization of research and development is exerting considerable pressures on the American system. Indeed, as the United States is learning, globalization cuts both ways: it is both a potent catalyst of U.S. technological innovation and a significant threat to it. The United States will never be able to prevent rivals from developing new technologies; it can remain dominant only by continuing to innovate faster than everyone else. But this won't be easy; to keep its privileged position in the world, the United States must get better at fostering technological entrepreneurship at home.

The impact is global nuclear war

**KAGAN, 7** (Robert, senior fellow at the Carnegie Endowment for International Peace (Robert, “End of Dreams, Return of History”, 7/19, http://www.realclearpolitics.com/articles/2007/07/end\_of\_dreams\_return\_of\_histor.html)

This is a good thing, and it should continue to be a primary goal of American foreign policy to perpetuate this relatively benign international configuration of power. The unipolar order with the United States as the predominant power is unavoidably riddled with flaws and contradictions. It inspires fears and jealousies. The United States is not immune to error, like all other nations, and because of its size and importance in the international system those errors are magnified and take on greater significance than the errors of less powerful nations. Compared to the ideal Kantian international order, in which all the world's powers would be peace-loving equals, conducting themselves wisely, prudently, and in strict obeisance to international law, the unipolar system is both dangerous and unjust. Compared to any plausible alternative in the real world, however, it is relatively stable and less likely to produce a major war between great powers. It is also comparatively benevolent, from a liberal perspective, for it is more conducive to the principles of economic and political liberalism that Americans and many others value. American predominance does not stand in the way of progress toward a better world, therefore. It stands in the way of regression toward a more dangerous world. The choice is not between an American-dominated order and a world that looks like the European Union. The future international order will be shaped by those who have the power to shape it. The leaders of a post-American world will not meet in Brussels but in Beijing, Moscow, and Washington. The return of great powers and great games If the world is marked by the persistence of unipolarity, it is nevertheless also being shaped by the reemergence of competitive national ambitions of the kind that have shaped human affairs from time immemorial. During the Cold War, this historical tendency of great powers to jostle with one another for status and influence as well as for wealth and power was largely suppressed by the two superpowers and their rigid bipolar order. Since the end of the Cold War, the United States has not been powerful enough, and probably could never be powerful enough, to suppress by itself the normal ambitions of nations. This does not mean the world has returned to multipolarity, since none of the large powers is in range of competing with the superpower for global influence. Nevertheless, several large powers are now competing for regional predominance, both with the United States and with each other. National ambition drives China's foreign policy today, and although it is tempered by prudence and the desire to appear as unthreatening as possible to the rest of the world, the Chinese are powerfully motivated to return their nation to what they regard as its traditional position as the preeminent power in East Asia. They do not share a European, postmodern view that power is passé; hence their now two-decades-long military buildup and modernization. Like the Americans, they believe power, including military power, is a good thing to have and that it is better to have more of it than less. Perhaps more significant is the Chinese perception, also shared by Americans, that status and honor, and not just wealth and security, are important for a nation. Japan, meanwhile, which in the past could have been counted as an aspiring postmodern power -- with its pacifist constitution and low defense spending -- now appears embarked on a more traditional national course. Partly this is in reaction to the rising power of China and concerns about North Korea 's nuclear weapons. But it is also driven by Japan's own national ambition to be a leader in East Asia or at least not to play second fiddle or "little brother" to China. China and Japan are now in a competitive quest with each trying to augment its own status and power and to prevent the other 's rise to predominance, and this competition has a military and strategic as well as an economic and political component. Their competition is such that a nation like South Korea, with a long unhappy history as a pawn between the two powers, is once again worrying both about a "greater China" and about the return of Japanese nationalism. As Aaron Friedberg commented, the East Asian future looks more like Europe's past than its present. But it also looks like Asia's past. Russian foreign policy, too, looks more like something from the nineteenth century. It is being driven by a typical, and typically Russian, blend of national resentment and ambition. A postmodern Russia simply seeking integration into the new European order, the Russia of Andrei Kozyrev, would not be troubled by the eastward enlargement of the EU and NATO, would not insist on predominant influence over its "near abroad," and would not use its natural resources as means of gaining geopolitical leverage and enhancing Russia 's international status in an attempt to regain the lost glories of the Soviet empire and Peter the Great. But Russia, like China and Japan, is moved by more traditional great-power considerations, including the pursuit of those valuable if intangible national interests: honor and respect. Although Russian leaders complain about threats to their security from NATO and the United States, the Russian sense of insecurity has more to do with resentment and national identity than with plausible external military threats. 16 Russia's complaint today is not with this or that weapons system. It is the entire post-Cold War settlement of the 1990s that Russia resents and wants to revise. But that does not make insecurity less a factor in Russia 's relations with the world; indeed, it makes finding compromise with the Russians all the more difficult. One could add others to this list of great powers with traditional rather than postmodern aspirations. India 's regional ambitions are more muted, or are focused most intently on Pakistan, but it is clearly engaged in competition with China for dominance in the Indian Ocean and sees itself, correctly, as an emerging great power on the world scene. In the Middle East there is Iran, which mingles religious fervor with a historical sense of superiority and leadership in its region. 17 Its nuclear program is as much about the desire for regional hegemony as about defending Iranian territory from attack by the United States. Even the European Union, in its way, expresses a pan-European national ambition to play a significant role in the world, and it has become the vehicle for channeling German, French, and British ambitions in what Europeans regard as a safe supranational direction. Europeans seek honor and respect, too, but of a postmodern variety. The honor they seek is to occupy the moral high ground in the world, to exercise moral authority, to wield political and economic influence as an antidote to militarism, to be the keeper of the global conscience, and to be recognized and admired by others for playing this role. Islam is not a nation, but many Muslims express a kind of religious nationalism, and the leaders of radical Islam, including al Qaeda, do seek to establish a theocratic nation or confederation of nations that would encompass a wide swath of the Middle East and beyond. Like national movements elsewhere, Islamists have a yearning for respect, including self-respect, and a desire for honor. Their national identity has been molded in defiance against stronger and often oppressive outside powers, and also by memories of ancient superiority over those same powers. China had its "century of humiliation." Islamists have more than a century of humiliation to look back on, a humiliation of which Israel has become the living symbol, which is partly why even Muslims who are neither radical nor fundamentalist proffer their sympathy and even their support to violent extremists who can turn the tables on the dominant liberal West, and particularly on a dominant America which implanted and still feeds the Israeli cancer in their midst. Finally, there is the United States itself. As a matter of national policy stretching back across numerous administrations, Democratic and Republican, liberal and conservative, Americans have insisted on preserving regional predominance in East Asia; the Middle East; the Western Hemisphere; until recently, Europe; and now, increasingly, Central Asia. This was its goal after the Second World War, and since the end of the Cold War, beginning with the first Bush administration and continuing through the Clinton years, the United States did not retract but expanded its influence eastward across Europe and into the Middle East, Central Asia, and the Caucasus. Even as it maintains its position as the predominant global power, it is also engaged in hegemonic competitions in these regions with China in East and Central Asia, with Iran in the Middle East and Central Asia, and with Russia in Eastern Europe, Central Asia, and the Caucasus. The United States, too, is more of a traditional than a postmodern power, and though Americans are loath to acknowledge it, they generally prefer their global place as "No. 1" and are equally loath to relinquish it. Once having entered a region, whether for practical or idealistic reasons, they are remarkably slow to withdraw from it until they believe they have substantially transformed it in their own image. They profess indifference to the world and claim they just want to be left alone even as they seek daily to shape the behavior of billions of people around the globe. The jostling for status and influence among these ambitious nations and would-be nations is a second defining feature of the new post-Cold War international system. Nationalism in all its forms is back, if it ever went away, and so is international competition for power, influence, honor, and status. American predominance prevents these rivalries from intensifying -- its regional as well as its global predominance. Were the United States to diminish its influence in the regions where it is currently the strongest power, the other nations would settle disputes as great and lesser powers have done in the past: sometimes through diplomacy and accommodation but often through confrontation and wars of varying scope, intensity, and destructiveness. One novel aspect of such a multipolar world is that most of these powers would possess nuclear weapons. That could make wars between them less likely, or it could simply make them more catastrophic. It is easy but also dangerous to underestimate the role the United States plays in providing a measure of stability in the world even as it also disrupts stability. For instance, the United States is the dominant naval power everywhere, such that other nations cannot compete with it even in their home waters. They either happily or grudgingly allow the United States Navy to be the guarantor of international waterways and trade routes, of international access to markets and raw materials such as oil. Even when the United States engages in a war, it is able to play its role as guardian of the waterways. In a more genuinely multipolar world, however, it would not. Nations would compete for naval dominance at least in their own regions and possibly beyond. Conflict between nations would involve struggles on the oceans as well as on land. Armed embargos, of the kind used in World War i and other major conflicts, would disrupt trade flows in a way that is now impossible. Such order as exists in the world rests not merely on the goodwill of peoples but on a foundation provided by American power. Even the European Union, that great geopolitical miracle, owes its founding to American power, for without it the European nations after World War ii would never have felt secure enough to reintegrate Germany. Most Europeans recoil at the thought, but even today Europe 's stability depends on the guarantee, however distant and one hopes unnecessary, that the United States could step in to check any dangerous development on the continent. In a genuinely multipolar world, that would not be possible without renewing the danger of **world war.** People who believe greater equality among nations would be preferable to the present American predominance often succumb to a basic logical fallacy. They believe the order the world enjoys today exists independently of American power. They imagine that in a world where American power was diminished, the aspects of international order that they like would remain in place. But that 's not the way it works. International order does not rest on ideas and institutions. It is shaped by configurations of power. The international order we know today reflects the distribution of power in the world since World War ii, and especially since the end of the Cold War. A different configuration of power, a multipolar world in which the poles were Russia, China, the United States, India, and Europe, would produce its own kind of order, with different rules and norms reflecting the interests of the powerful states that would have a hand in shaping it. Would that international order be an improvement? Perhaps for Beijing and Moscow it would. But it is doubtful that it would suit the tastes of enlightenment liberals in the United States and Europe. The current order, of course, is not only far from perfect but also offers no guarantee against major conflict among the world's great powers. Even under the umbrella of unipolarity, regional conflicts involving the large powers may erupt. War could erupt between China and Taiwan and draw in both the United States and Japan. War could erupt between Russia and Georgia, forcing the United States and its European allies to decide whether to intervene or suffer the consequences of a Russian victory. Conflict between India and Pakistan remains possible, as does conflict between Iran and Israel or other Middle Eastern states. These, too, could draw in other great powers, including the United States. Such conflicts may be unavoidable no matter what policies the United States pursues. But they are more likely to erupt if the United States weakens or withdraws from its positions of regional dominance. This is especially true in East Asia, where most nations agree that a reliable American power has a stabilizing and pacific effect on the region. That is certainly the view of most of China 's neighbors. But even China, which seeks gradually to supplant the United States as the dominant power in the region, faces the dilemma that an American withdrawal could unleash an ambitious, independent, nationalist Japan. In Europe, too, the departure of the United States from the scene -- even if it remained the world's most powerful nation -- could be destabilizing. It could tempt Russia to an even more overbearing and potentially forceful approach to unruly nations on its periphery. Although some realist theorists seem to imagine that the disappearance of the Soviet Union put an end to the possibility of confrontation between Russia and the West, and therefore to the need for a permanent American role in Europe, history suggests that conflicts in Europe involving Russia are possible even without Soviet communism. If the United States withdrew from Europe -- if it adopted what some call a strategy of "offshore balancing" -- this could in time increase the likelihood of conflict involving Russia and its near neighbors, which could in turn draw the United States back in under unfavorable circumstances. It is also optimistic to imagine that a retrenchment of the American position in the Middle East and the assumption of a more passive, "offshore" role would lead to greater stability there. The vital interest the United States has in access to oil and the role it plays in keeping access open to other nations in Europe and Asia make it unlikely that American leaders could or would stand back and hope for the best while the powers in the region battle it out. Nor would a more "even-handed" policy toward Israel, which some see as the magic key to unlocking peace, stability, and comity in the Middle East, obviate the need to come to Israel 's aid if its security became threatened. That commitment, paired with the American commitment to protect strategic oil supplies for most of the world, practically ensures a heavy American military presence in the region, both on the seas and on the ground. The subtraction of American power from any region would not end conflict but would simply change the equation. In the Middle East, competition for influence among powers both inside and outside the region has raged for at least two centuries. The rise of Islamic fundamentalism doesn't change this. It only adds a new and more threatening dimension to the competition, which neither a sudden end to the conflict between Israel and the Palestinians nor an immediate American withdrawal from Iraq would change. The alternative to American predominance in the region is not balance and peace. It is further competition. The region and the states within it remain relatively weak. A diminution of American influence would not be followed by a diminution of other external influences. One could expect deeper involvement by both China and Russia, if only to secure their interests. 18 And one could also expect the more powerful states of the region, particularly Iran, to expand and fill the vacuum. It is doubtful that any American administration would voluntarily take actions that could shift the balance of power in the Middle East further toward Russia, China, or Iran. The world hasn 't changed that much. An American withdrawal from Iraq will not return things to "normal" or to a new kind of stability in the region. It will produce a new instability, one likely to draw the United States back in again. The alternative to American regional predominance in the Middle East and elsewhere is not a new regional stability. In an era of burgeoning nationalism, the future is likely to be one of intensified competition among nations and nationalist movements. Difficult as it may be to extend American predominance into the future, no one should imagine that a reduction of American power or a retraction of American influence and global involvement will provide an easier path.

Competiveness key to US economy

Council on Competitiveness 8 [“Rebound: Three Essentials to Get the Economy Back on Track,” November 2008, DA 9/18/10, http://www.compete.org/images/uploads/File/PDF%20Files/COC\_Rebound.pdf]

The balance sheets of many companies remain healthy, but business leaders are reluctant to invest in this uncertain, volatile environment. The net result is that tens of billions of dollars in planned capital investment are sitting idle. Enabling companies to expense immediately the full cost of new capital equipment and facilities investments could unlock corporate balance sheets, stimulating jobs and growth. For many companies, the retirement of older equipment and subsequent investment in more efficient machinery, vehicles and equipment will generate tremendous gains in energy efficiency and cost savings as well. The result is an incentive that expands capital investment while driving a higher level of energy productivity. America needs Next Generation Infrastructure to sustain its economic leadership in the global economy. The nation can fund those projects through a unique savings bond program called CompeteBond—tax-exempt, federally-guaranteed bonds available to any American who wants to contribute to our nation’s economic revitalization while raising the personal saving rate and reducing our dependence of foreign borrowing. The resulting capital would be transparently reinvested into projects that, for example, expand broadband access, provide greener public transportation systems and contribute to the development of a national electric transmission superhighway. These investments will result in greater energy and homeland security and lower carbon emissions—and they will produce hundreds of thousands of high-paying American jobs.

U.S economy key to the world economy

**Weiner 10** [Erica, 11/10/10, AP News, Washington Post, Obama: Strong U.S. economy key to global recovery,http://www.washingtontimes.com/news/2010/nov/10/obama-strong-us-economy-key-global-recovery/]

President Obama said a strong, job-creating economy in the United States would be the country’s most important contribution to a global recovery as he pleaded with world leaders to work together despite sharp differences. Arriving in South Korea on Wednesday for the G-20 summit, Mr. Obama is expected to find himself on the defensive because of plans by the Federal Reserve to buy $600 billion in long-term government bonds to try to drive down interest rates, spur lending and boost the U.S. economy. Some other nations complain that the move will give American goods an unfair advantage. In a letter sent Tuesday to leaders of the Group of 20 major economic powers, Mr. Obama defended the steps his administration and Congress have taken to help the economy. “The United States will do its part to restore strong growth, reduce economic imbalances and calm markets,” he wrote. “A strong recovery that creates jobs, income and spending is the most important contribution the United States can make to the global recovery.” Mr. Obama outlined the work he had done to repair the nation’s financial system and enact reforms after the worst recession in decades. He implored the G-20 leaders to seize the opportunity to ensure a strong and durable recovery. The summit gets under way on Thursday. “When all nations do their part — emerging no less than advanced, surplus no less than deficit — we all benefit from higher growth,” the president said in the letter. The divisions between the economic powers was evident when China’s leading credit rating agency lowered its view of the United States, a response to the Federal Reserve’s decision to buy more Treasury bonds. Major exporting countries such as China and Germany are complaining that the Federal Reserve’s action drives down the dollar’s value and gives U.S. goods an edge in world markets.

Economic slowdown will cause WWIII

Bearden 2k

(Liutenant ColonelBearden, The Unnecessary Energy Crisis: How We Can Solve It, 2000, <http://groups.yahoo.com/group/Big-Medicine/message/642>

Bluntly, we foresee these factors - and others { } not covered - converging to a catastrophic collapse of the world economy in about eight years. As the collapse of the Western economies nears, one may expect catastrophic stress on the 160 developing nations as the developed nations are forced to dramatically curtail orders. International Strategic Threat Aspects History bears out that desperate nations take desperate actions. Prior to the final economic collapse, the stress on nations will have increased the intensity and number of their conflicts, to the point where the arsenals of weapons of mass destruction (WMD) now possessed by some 25 nations, are almost certain to be released. As an example, suppose a starving North Korea launches nuclear weapons upon Japan and South Korea, including U.S. forces there, in a spasmodic suicidal response. Or suppose a desperate China - whose long range nuclear missiles can reach the United States - attacks Taiwan. In addition to immediate responses, the mutual treaties involved in such scenarios will quickly draw other nations into the conflict, escalating it significantly. Strategic nuclear studies have shown for decades that, under such extreme stress conditions, once a few nukes are launched, adversaries and potential adversaries are then compelled to launch on perception of preparations by one's adversary. The real legacy of the MAD concept is his side of the MAD coin that is almost never discussed. Without effective defense, the only chance a nation has to survive at all, is to launch immediate full-bore pre-emptive strikes and try to take out its perceived foes as rapidly and massively as possible. As the studies showed, rapid escalation to full WMD exchange occurs, with a great percent of the WMD arsenals being unleashed . The resulting great Armageddon will destroy civilization as we know it, and perhaps most of the biosphere, at least for many decades.

Scenario 2: Overview

SETI creates an overview effect that solves human unity

**Tough 98** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]

Cosmic evolution over billions of years has led to our present period, which is characterized by diverse life on Earth and probably throughout the universe. Eric Chaisson calls this period “the Life Era”[2]and Steven Dick calls this view “the biological universe”[3]. The SETI enterprise makes the likelihood of intelligent life throughout the galaxy feel more tangible and real. Instead of just talking or writing about the possibility, someone is actually doing something about it. As a result, humanity is gradually shifting toward a fresh image of who we are as a species. Increasingly we see ourselves as one of the abundantly diverse intelligent species that have arisen in the universe. That is how we fit into the universe. We feel part of the cosmic family; we feel a bond or kinship with others. We are one of the species that have developed a civilization marked by curiosity, inquiry, knowledge, meaning and purpose. We are not alone in the universe. Although we are unique, we may be one of billions of civilizations in the universe (just as each person and each snowflake is unique, but is also one of billions). As they learn about cosmic evolution and SETI activities, more and more people are developing a deeper sense of themselves as citizens of the universe—as part of intelligent life and evolving culture throughout the cosmos. We begin to move from forlorn isolation to a “feeling of genuine biological and spiritual unity with the universe” and that universe feels “friendlier”[4]. We begin to see ourselves within a galactic frame of reference. To use Michael Michaud’s words, we are about to “leave the era of Earth history, and enter an era of cosmic history”[5]. More recently he noted that “many of us are involved in SETI because we hope that detection, and even the search itself, will introduce a new and positive factor in human affairs. We are involved because SETI defines us as a species with shared interests. We are involved because SETI forces humanity to think big”[6]. According to Frank White, SETI may be, at its deepest levels, an effort to achieve a new kind of connection with the universe—to regain an integration or connectedness that has been shattered by standing apart from the cosmos and examining it as something that is not alive, not intelligent, and separate from ourselves[7].

This solves for connectivity, catastrophes, war, overpopulation, and environmental destruction

**Tough 98** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]

Photographs of the whole earth from the early space missions gave us a fresh perspective. A more recent photograph from even further away in our solar system gives us the sense of being a small fragile planet—a pale blue dot surrounded by space[9]. SETI provides a third fresh perspective by encouraging us to think about how extraterrestrials might perceive us. As we view ourselves through the “eyes” of distant extraterrestrials, this fresh perspective leads in turn to a fresh way of looking at our society’s values, goals, priorities and foibles. Three aspects of SETI stimulate this fresh perspective by encouraging us to put ourselves “in the shoes” of remote extraterrestrials. (a) In order to choose search strategies, scientists must first think through the likely characteristics of whoever is out there, and their likely behaviour toward all other civilizations—in particular toward us since they may somehow be aware of our existence or even have some information about us. (b) During the past few years, at astronautics and SETI meetings, some attention has focused on what we should do about sending a reply after we detect a signal. Such thinking inevitably requires attention to how “they” might react to various sorts of replies that we might send. (c) In general, the whole SETI enterprise stimulates a wide variety of people to begin thinking more seriously about who might be out there and how they might view our society. By thinking about how a remote civilization might view us, we gain a fresh perspective on our own civilization. Various specific implications may occur to us. We may wonder why our society places such emphasis on differences among people when, compared with any extraterrestrial species, we are all quite similar and should feel deeply connected. We may see more sharply the importance of such priorities as ensuring our long-term survival and flourishing, caring about future generations, accumulating significant knowledge, protecting that knowledge from potential catastrophes, developing a set of universal goals and laws that might apply throughout the galaxy, and reducing our worst foibles and errors (warfare, population growth, environmental degradation). Surely extraterrestrials would wonder why we have not shifted our attention, resources, and efforts towards these key priorities.

**Tolerating the destruction of this ecosystem saps us of our humanity—it makes nuclear war and human extinction inevitable.**

Murray **Bookchin**, co-founder of the Institute of Social Ecology, **1987** ("An Appeal For Social and Psychological Sanity," *The Modern Crisis*, Published by Black Rose Books Ltd., ISBN 0920057624, p. 106-108)

Industrially and technologically, we are moving at an ever-accelerating pace toward a yawning chasm with our eyes completely blindfolded. From the 1950s onward, we have placed ecological burdens upon our planet that have no precedent in human history. Our impact on our environment has been nothing less than appalling. The problems raised by acid rain alone are striking examples of [end page 106] innumerable problems that appear everywhere on our planet. The concrete-like clay layers, impervious to almost any kind of plant growth, replacing dynamic soils that once supported lush rain forests remain stark witness to a massive erosion of soil in all regions north and south of our equatorial belt. The equator—a cradle not only of our weather like the ice caps but a highly complex network of animal and plant life—is being denuded to a point where vast areas of the region look like a barren moonscape. We no longer "cut" our forests—that celebrated "renewable resource" for fuel, timber, and paper. We sweep them up like dust with a rapidity and "efficiency" that renders any claims to restorative action mere media-hype. Our entire planet is thus becoming simplified, not only polluted. Its soil is turning into sand. Its stately forests are rapidly being replaced by tangled weeds and scrub, that is, where vegetation in any complex form can be sustained at all. Its wildlife ebbs and flows on the edge of extinction, dependent largely on whether one or two nations—or governmental administrations—agree that certain sea and land mammals, bird specie**s**, or, for that matter, magnificent trees are "worth" rescuing as lucrative items on corporate balance sheets. With each such loss, humanity, too, loses a portion of its own character structure: its sensitivity toward life as such, including human life, and its rich wealth of sensibility. If we can learn to ignore the destiny of whales and condors—indeed, turn their fate into chic cliches—we can learn to ignore the destiny of Cambodians in Asia, Salvadorans in Central America, [end page 107] and, finally, the human beings who people our communities. If we reach this degree of degradation, we will then become so spiritually denuded that we will be capable of ignoring the terrors of thermonuclear war. Like the biotic ecosystems we have simplified with our lumbering and slaughtering technologies, we will have simplified the psychic ecosystems that give each of us our personal uniqueness. We will have rendered our internal mileau as homogenized and lifeless as our external milieu—and a biocidal war will merely externalize the deep sleep that will have already claimed our spiritual and moral integrity. The process of simplification, even more significantly than pollution, threatens to destroy the restorative powers of nature and humanity—their common ability to efface the forces of destruction and reclaim the planet for life and fecundity. **A** humanity disempowered of its capacity to change a misbegotten "civilization," ultimately divested of its power to resist, reflects a natural world disempowered of its capacity to reproduce a green and living world.

# advantage 2: Contact

Drake equation indicates that SETI would find ETI within 25 years

**Moskowitz 10** [Clara, Space.com senior staff writer, Proof of Aliens Could Come Within 25 Years, Scientist Says]

SANTA CLARA, Calif. ? Proof of extraterrestrial intelligence could come within 25 years, an astronomer who works on the search said Sunday. "I actually think the chances that we'll find ET are pretty good," said Seth Shostak, senior astronomer at the Search for Extraterrestrial Intelligence Institute in Mountain View, Calif., here at the SETI con convention. "Young people in the audience, I think there's a really good chance you're going to see this happen." Shostak bases this estimation on the Drake Equation, a formula conceived by SETI pioneer Frank Drake to calculate the number (N) of alien civilizations with whom we might be able to communicate. That equation takes into account a variety of factors, including the rate of star formation in the galaxy, the fraction of stars that have planets, the fraction of planets that are habitable, the percent of those that actually develop life, the percent of those that develop intelligent life, the fraction of civilizations that have a technology that can broadcast their presence into space, and the length of time those signals would be broadcasted. Reliable figures for many of those factors are not known, but some of the leaders in the field of SETI have put together their best guesses. Late great astronomer Carl Sagan, another SETI pioneer, estimated that the Drake Equation amounted to N = 1 million. Scientist and science fiction writer Isaac Asimov calculated 670,000. Drake himself estimates a more conservative 10,000. But even if that lower value turns out to be correct, at the rate they're going, it wouldn't take scientists too long to discover an alien signal, Shostak said. "This range, from Sagan's million down to 10,000 ? that's the range of estimates from people who have started and worked on SETI," said Shostak. "These people may know what they're talking about. If they do, then the point is we trip across somebody in the next several dozen or two dozen years." The SETI quest is set to take a leap forward when the Allen Telescope Array, a network of radio dishes under construction in northern California, is fully operational. By 2015, the array should be able to scan hundreds of thousands of stars for signs of extraterrestrial intelligence, Shostak said. But while humans might be able to discover an alien signal within that timeframe, interpreting what ET is trying to tell us could take much, much longer. Shostak admitted such a task would be very difficult. An alien civilization may be as technologically advanced compared to us as Homo sapiens are to our hominid relatives Neanderthals. "We could give our digital television signals to the Neanderthals, and they?ll never figure it out. And they're not stupid," he said. Yet simply having proof that we are not alone in the universe would likely be a world-changing achievement, Shostak added.

ETI would be cooperative if contact were made

**Bauma et al** **10** [Seth D. Bauma, Jacob D. Haqq-Misrab, and Shawn D. Domagal-Goldmanc, Department of Geography, Pennsylvania State University, Department of Meteorology, Pennsylvania State University, NASA Planetary Science Division, Acta Astronautica Volume 68, Issues 11-12, June-July 2011, Pages 2114-2129, Would contact with extraterrestrials benefit or harm humanity? A scenario analysis]

We do not know if ETI would be cooperative, but we have several reasons to suspect that they would be. Noncooperation can be a risky and harmful strategy, and noncooperative civilizations may tend to have shorter lifetimes as their noncooperation eventually leads to their demise. For this reason, a long-lived civilization that explores the galaxy may have transcended any aggressive patterns out of the need to maintain long-term survival [36] and [46]. It is also possible that intelligent civilizations may inevitably develop cooperative tendencies as part of their evolutionary process [44] and [47]. However, there are also reasons to suspect that evolution would proceed along different, less desirable trajectories [48]. Another reason to suspect that ETI would be cooperative follows from the Sustainability Solution to the Fermi paradox. A corollary of the Sustainability Solution is that extant ETI civilizations in the galaxy may be less prone to violence and destruction in the event of contact. This corollary follows from the tendencies of sustainable human populations. On Earth, sustainable human populations tend to be more protective of their ecosystems. This protectiveness can be for either of two reasons. First, humans can protect ecosystems for their own benefit. This protection is known as conservationism and involves humans placing intrinsic value on themselves. Second, humans can protect ecosystems for the ecosystems’ benefit. This protection is known as preservationism and involves humans placing intrinsic value on the ecosystems. (See [49] for a similar approach to environmental ethics in the context of terraforming Mars.) In either case, human populations that follow a sustainable mode of development are less likely to expand for lack of resources, although they may choose to explore out of sheer curiosity. ETI populations may be similar in this regard [50]. Thus, if exponential growth is in fact unsustainable on the galactic scale as Haqq-Misra and Baum [19] suggest, then we are much more likely to encounter a long-lived ETI civilization that follows a sustainable development pattern. Such a civilization may have no need to consume Earth systems (or humans) because they will have already found a way to effectively manage their resources over long timescales. Therefore, the possible unsustainability of long-term rapid expansion decreases the probability that ETI will destroy us. However, there is a scenario in which sustainable ETI would destroy us—specifically if the ETI is expanding at the maximum rate possible given its sustainability constraints. This “maximally expansive” scenario is one of the “harmful to humanity” scenarios discussed below.

Contact terminally solves science innovation, hunger, poverty, and disease

**Bauma et al** **10** [Seth D. Bauma, Jacob D. Haqq-Misrab, and Shawn D. Domagal-Goldmanc, Department of Geography, Pennsylvania State University, Department of Meteorology, Pennsylvania State University, NASA Planetary Science Division, Acta Astronautica Volume 68, Issues 11-12, June-July 2011, Pages 2114-2129, Would contact with extraterrestrials benefit or harm humanity? A scenario analysis]

If contact with ETI involves more than mere detection, then it is possible for humanity to receive additional benefits by cooperating with the ETI. The nature of these benefits depends on the degree of ETI cooperation—that is, it is unlikely that uncooperative ETI would benefit humanity. This is because ETI are likely to be much more advanced than humanity and would therefore be capable of dictating the terms of contact. Thus cooperative ETI would have the ability to bring benefits to humanity, just as uncooperative ETI would likely harm humanity. An initial scenario of cooperative ETI involves friendly and informative communication between our respective civilizations. Assuming ETI are sufficiently interested in humanity (which is not guaranteed, given that they would likely be much more advanced), they may choose to maintain communication at length to discuss mathematics, physics, and chemistry [29] and to learn more about Earth life. It is reasonable to assume that the general principles of physics and chemistry apply everywhere in the galaxy, even if mathematical descriptions of these physical phenomenon differ among intelligent civilizations. This type of dialog with ETI may require that we first develop a common mathematical language using physical observables that are known by both civilizations (such as properties of neutral hydrogen). In a more remarkable and unlikely case, we may learn that ETI occupy some region of space where different or unknown physical principles apply, which would certainly be a unique discovery for humanity. Thus through such a conversation we may come to acquire a deeper understanding of mathematics or science, and we may also discover specifics about the ETI home world or ETI biology. As with mere detection, such contact would have considerable intellectual benefits, though here the benefits would be larger—potentially much larger. Depending on the nature of information shared through communication with ETI, there could also be more in the way of practical, non-intellectual benefits. An advanced ETI may be capable of solving a great many of humanity’s problems, such as world hunger, poverty, or disease. Benevolent ETI may even design their first message to contain information on how to avoid technological catastrophe in order to help less developed civilizations succeed [45]. From humanity’s perspective, this is the best-case scenario for ETI contact. However, while we suspect that the basic principles of physics and chemistry apply across the universe, it is somewhat less likely that ETI knowledge would be useful in addressing social issues on Earth. The usefulness of ETI knowledge, combined with the willingness of ETI to employ it on our behalf, plays an important role in the benefits that a cooperative ETI would bring to humanity

Disease causes extinction

South China Morning Post 96

(Avi Mensa, 1-4-1996, “Leading the way to a cure for AIDS,” P. Lexis)

Despite the importance of the discovery of the "facilitating" cell, it is not what Dr Ben-Abraham wants to talk about. There is a much more pressing medical crisis at hand - one he believes the world must be alerted to: the possibility of a virus deadlier than HIV. If this makes Dr Ben-Abraham sound like a prophet of doom, then he makes no apology for it. AIDS, the Ebola outbreak which killed more than 100 people in Africa last year, the flu epidemic that has now affected 200,000 in the former Soviet Union - they are all, according to Dr Ben-Abraham, the "tip of the iceberg". Two decades of intensive study and research in the field of virology have convinced him of one thing: in place of natural and man-made disasters or nuclear warfare, humanity could face extinction because of a single virus, deadlier than HIV. "An airborne virus is a lively, complex and dangerous organism," he said. "It can come from a rare animal or from anywhere and can mutate constantly. If there is no cure, it affects one person and then there is a chain reaction and it is unstoppable. It is a tragedy waiting to happen."That may sound like a far-fetched plot for a Hollywood film, but Dr Ben -Abraham said history has already proven his theory. Fifteen years ago, few could have predicted the impact of AIDS on the world. Ebola has had sporadic outbreaks over the past 20 years and the only way the deadly virus - which turns internal organs into liquid - could be contained was because it was killed before it had a chance to spread. Imagine, he says, if it was closer to home: an outbreak of that scale in London, New York or Hong Kong. It could happen anytime in the next 20 years - theoretically, it could happen tomorrow.The shock of the AIDS epidemic has prompted virus experts to admit "that something new is indeed happening and that the threat of a deadly viral outbreak is imminent", said Joshua Lederberg of the Rockefeller University in New York, at a recent conference. He added that the problem was "very serious and is getting worse". Dr Ben-Abraham said: "Nature isn't benign. The survival of the human species is not a preordained evolutionary programme. Abundant sources of genetic variation exist for viruses to learn how to mutate and evade the immune system." He cites the 1968 Hong Kong flu outbreak as an example of how viruses have outsmarted human intelligence. And as new "mega-cities" are being developed in the Third World and rainforests are destroyed, disease-carrying animals and insects are forced into areas of human habitation. "This raises the very real possibility that lethal, mysterious viruses would, for the first time, infect humanity at a large scale and imperil the survival of the human race," he said.

Ongoing global poverty outweighs nuclear war- only our ev is comparative

Spina 2k

(Stephanie Urso, Ph.D. candidate in social/personality psychology at the Graduate School of the City University of New York, Smoke and Mirrors: The Hidden Context of Violence in Schools and Society, p. 201)

This sad fact is not limited to the United States. Globally , 18 million deaths a year are caused by structural violence, compared to 100,000 deaths per year from armed conflict. That is, approximately every five years, as many people die because of relative poverty as would be killed in a nuclear war that caused 232 million deaths, and every single year, two to three times as many people die from poverty throughout the world as were killed by the Nazi genocide of the Jews over a six-year period. This is, in effect, the equivalent of an ongoing, unending, in fact accelerating, thermonuclear war or genocide, perpetuated on the weak and the poor every year of every decade, throughout the world.

Contact leads to crazy awesome technology

**Tough 06** [Allen, April 21, 2006, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, How to Achieve Contact: Five Promising Strategies, http://ieti.org/tough/articles/strategy.htm]

Extraterrestrial intelligence, however, is not just one century ahead of our technology, but more likely a thousand centuries ahead. Such an intelligence may have created some means of exploration and communication that goes far beyond our current conceptions of super-smart probes. This is particularly likely after machine intelligence takes over its own evolution, designing artificial intelligence that is more and more advanced. Each machine may be so knowledgeable and intelligent (and wise, ethical, and altruistic?) that it far surpasses any human individual or organization. These super smart machines may somehow be integrated with biological beings, or they may not. But for convenience in this paper I will simply use the word "probe" to cover all of these possibilities for advanced intelligence. Our galaxy and universe may be filled with diverse forms of intelligence with extraordinary capacities. Incredibly diverse even in their widespread origins, various streams of intelligence may have evolved into new forms far beyond what human scientists envisage. For instance, they may be actively monitoring and studying fledgling civilizations (such as ours), even providing useful information at some appropriate stage. And they may be busily interacting with intelligence near their own level of development in order to exchange information, discuss societal and galactic goals, help one another to evolve in appropriate directions, build up a galactic storehouse of scientific and philosophical knowledge, and cooperate on other grand science and engineering projects. Their harmonious cooperation and Encyclopedia Galactica may have already evolved even beyond the Life Era described by Eric Chaisson (1987) and and the biological universe described by Steven Dick (1996). Intelligence may eventually become so advanced and widespread that it will prove more powerful than the big impersonal forces of the universe. "The laws of physics are not repealed by intelligence, but they effectively evaporate in its presence.... [Even] the fate of the Universe is a decision yet to be made, one which we will intelligently consider when the time is right" (Kurzweil 1999, page 260). Such possibilities point up just how inspiring, awesome, and transcendent our SETI enterprise really is. After all, we are trying to tap into a wisdom, understanding, and knowledge held by a deeply alien intelligence that is 100,000 years beyond us. In the SETI field we often get wrapped up in technical details, internal politics, strategic maneuvering, funding, equipment, the "Rare Earth" ideology versus the abundant intelligence ideology, the ultraconservative traditionalists versus the bold innovative explorers. But SETI is a much deeper quest than this. Ultimately, today's SETI efforts may be a major step toward a scientific and spiritual dialogue with some ancient intelligence about such topics as cosmology, philosophy, theology, music, art, and the purpose of life.

Preparation solves negative impacts of contact

**Bauma et al** **10** [Seth D. Bauma, Jacob D. Haqq-Misrab, and Shawn D. Domagal-Goldmanc, Department of Geography, Pennsylvania State University, Department of Meteorology, Pennsylvania State University, NASA Planetary Science Division, Acta Astronautica Volume 68, Issues 11-12, June-July 2011, Pages 2114-2129, Would contact with extraterrestrials benefit or harm humanity? A scenario analysis]

A final recommendation is that preparations for ETI encounter, whether through METI, SETI, human explorations of space, or any other form, should consider the full breadth of possible encounter scenarios. Indeed, perhaps the central conclusion of the analysis presented here is that ETI contact could proceed in a wide range of ways. It is inappropriate and inadequate to blindly assume that any one specific scenario would result from contact. Until such contact occurs, we simply do not know what would happen. Given the uncertainty, the broad scenario analysis presented here is an important step towards helping us think through and prepare for possible contact. Despite its merits, our scenario analysis remains fundamentally limited in several important ways. As is common with scenario analysis in general, we offer no quantification scheme for the probabilities of specific scenarios. We also do not quantify the magnitude of the impacts (benefit or harm) of specific scenarios. The result of this is that we are unable to produce a cumulative analysis of the risks and rewards of contact with ETI or attempting to do so with METI. Such a quantitative risk analysis would be of tremendous value for decision making purposes. Indeed, the need has been acknowledged for such analysis in order to inform decisions about METI and other SETI activities [89]. However, the effort required for such an analysis is far beyond the scope of what we can accomplish in a single paper and thus must be left for future work. The scenario analysis presented here is an important step towards a quantitative risk analysis, but it is not a complete risk analysis on its own.

Increased radio telescope scanning SETI solves best

**Cohen and Hohlfeld 01** [Sky and Telescope, Smarter SETI Strategy, Nathan Cohen and Robert Hohlfeld are professors at Boston University in telecommunications and computational science, respectively. Both have their roots in SETI at Cornell University during the era of Frank Drake and Carl Sagan, where they received their astronomy doctorates]

Any search for intelligent radio signals from the stars faces a choice between two opposite strategies. "Targeted" searches examine individual nearby stars with high sensitivity. This was the approach taken by the SETI Institute's Project Phoenix, and it is the main strategy announced for the institute's Allen Telescope Array (ATA), now under construction. "Wide-sky surveys," on the other hand, scan large areas of the celestial sphere and vast numbers of stars, though at lower sensitivity. This is the strategy of Projects BETA, SERENDIP (including SETI@home), Southern SERENDIP, and others. Which strategy is best? Deep scrutiny of a few stars, or a shallow scan of many? Given our ignorance about alien civilizations and their technologies, the two approaches are often described as complementary and equally valid. They are not. Recent work confirms long-standing suspicions that star-by-star targeting should be abandoned in favor of scanning the richest star fields to encompass very large numbers of stars, even if most of them are very far away. To see why, we flash back 30 years to when Frank Drake did the basic mathematics that still governs the field. He showed that finding an ET signal is similar to certain problems in surveying natural radio sources. Some sources are intrinsically strong; a greater number are intrinsically weak. The steepness of the ratio between them determines which category will dominate our sky. For example, many of the first sources found by early, primitive radio telescopes are at extreme, cosmological distances. This is because inherently strong radio sources (such as quasars and radio galaxies) are powerful enough to more than make up for their scarcity compared to the abundant weak sources (such as the coronas of stars). Similarly, it was clear that if even just a few rare, very distant alien radio beacons are very powerful, they will dominate the detectable population in our sky, and a wide-sky survey will succeed first. If, on the other hand, ET transmitters are common and all of them are relatively weak and similar to each other, a star-by-star targeted survey starting nearby will work best. Recently we revisited this 30-year-old problem with the advantage of more sophisticated mathematical models (and computers capable of running them!) covering all reasonable scenarios. The outcome is clear, surprising, and overwhelming. Unless ETs truly infest the stars like flies (very unlikely), the first signals we detect will come from the very rare, very powerful transmitters very far away. The 1971 model, which lent too much weight to nearby stars, turns out to be a naive case, the best that could be calculated at the time. In practical terms, this means that SETI searchers should use their limited resources to scan great numbers of stars first and worry about sensitivity per star second. Given real radio telescopes under the real sky, the best use of SETI time actually turns out to be a "hybrid," semi-targeted strategy: one that targets the richest star fields. These might include selected parts of the Milky Way's plane, certain star clusters, and even nearby galaxies. The idea is to fill the radio telescope's beam (listening area) with many stars, then dwell on this spot long enough to build up sensitivity. With, say, just 100 carefully selected patches of sky on the list, millions of Milky Way stars and many billions in other galaxies can be scrutinized in significant depth. It makes no sense to dwell on nearby stars one by one if they have sparse backgrounds. We need to look deep and long and bet on the numbers. Thus it was heartening to hear SETI Institute chair Frank Drake say that such thinking should carry the day and that the strategy for the ATA should emphasize searches near the galactic plane.

\*\*\*AFF CARDS: CASE MECHANICS

# Inherency: SETI has been cut – this devastates the program

SETI has gone into hibernation. It hasn’t been killed, but its facing a funding crisis

**Holm 11** [Carl, April 27, ABC News, SETI will survive cuts says astronomer, http://www.abc.net.au/science/articles/2011/04/27/3201466.htm]

A top astronomer searching for extra-terrestrial intelligence is optimistic SETI will survive, despite its main telescope being shut down. The University of California Berkeley's Allen Telescope Array (ATA) has been placed in hibernation due to funding cuts, according to an announcement on the SETI Institute's website. The SETI (Search for Extraterrestrial Intelligence) Institute, a private organisation, built the radio telescope array at the UC Berkeley observatory site at Hat Creek. SETI operates the array in partnership with the university, and the project relies on ongoing federal and state government funding. Dr Seth Shostak, SETI senior astronomer, says that funding cuts have hit radio astronomy particularly hard, and that the SETI project is a part of the radio astronomy research being done at the UC Berkeley observatory site. "It's certainly not the end of SETI," says Shostak, "but it is an unfortunate development because while our telescope is on hold, we're not moving forward with it unless we can find some money to operate it."

SETI not functioning now

**LA Times 6/18** [Funding cut to the Search for Extraterrestrial Intelligence and the death of curiosity, Christopher Cokinos, 6/18/11, http://articles.latimes.com/2011/jun/18/opinion/la-oe-cokinos-seti-20110618]

News that the Allen Telescope Array is "hibernating" — a curiously biological term for shutting down 42 radio telescopes designed to listen for signs of life from other worlds — raises questions about our true commitment to the search for extraterrestrial intelligence. The National Science Foundation recently slashed the University of California's budgets for the Allen array by 90%. This, along with state cuts, has left UC Berkeley, which operates the Hat Creek, Calif., array in the Cascade Mountains, and the private SETI Institute, which conducts searches, in the lurch. For now, the phone is off the hook — as it was in 1994 when Sen. Richard Bryan (D-Nev.) derided NASA's "Martian chase" and successfully shut down its SETI — "Search for Extraterrestrial Intelligence" — program. It would cost each U.S. taxpayer just 3 cents a year to fund the Allen array, according to SETI Institute Senior Astronomer Seth Shostak. But in this political environment, direct taxpayer support is unlikely, so the SETI Institute is trying to raise $5 million to reboot the array.

SETI is poised to search in multifaceted ways. Lack of public contribution is all that is holding it back

**Penny 11** [Alan, Jan 19, Journal of Astronomy and Geophysics, University of St. Andrews, SETI: peering into the future, http://onlinelibrary.wiley.com/doi/10.1111/j.1468-4004.2011.52121.x/full#]

Different searches have different aims, usually based on some sort of premise of the nature of ETIs. The most obvious choice is of nearby long-lived stars, where ETIs on planets have had time to evolve. Such searches range from Drake's observation of two such stars in 1960, to the million stars planned for ATA. Since stars can differ in ages by billions of years, and ETIs take an unknown time to emerge, a search of a million stars gives a chance of picking up an ETI radiating for a thousand years, which may be a reasonable estimate of the time until an ETI changes into a fundamentally different mode. Then there are the all-sky surveys and surveys of areas of the sky, such as the galactic centre, where no presumption is made of where ETI is – on or off planets, near or far. These necessarily have shorter integrations per pointing, so are sensitive to rarer but brighter sources. The extreme of this is surveys of other galaxies, looking for extremely bright sources, but sources so rare that there is not one in our own Milky Way. There are also specialized searches. A recent proposal is for a search on the ecliptic plane, where an ETI would have been aware for a long time, using the radial velocity and transit planet detection methods, that there is an Earth in orbit around the Sun. Perhaps this would prompt them to signal to us. Searches have also been done looking for artefacts of an ETI civilization. The most famous of these are Dyson spheres, where an ETI surrounds a star with solar panels, probably on many discrete mounts, to tap a significant fraction of the star's energy. The outsides of these panels will be cool, shining in the infrared. Each new infrared catalogue that comes out is scanned for objects of strange non-natural looking colours. There have been searches for strange colours in the asteroid belt objects which might indicate an artificial nature, and for objects in the unstable Earth–Moon L4 and L5 Lagrangian points. There are notoriously many “sightings” of UFOs, which all have either been explained or have not contained enough information to determine their natures. The most interesting ongoing scientific investigation is the Norwegian Hessdalen Valley Project where there have been repeated sightings. The main limit on these searches is funding. There are almost no public funds. Very little sustained work is done outside the US, and within the US the main work is done through private funding and the efforts of determined individuals at Berkeley and Harvard. The SETI Institute, which grew out of the NASA work of the 1970s and 80s, is privately funded and the Berkeley and Harvard projects are done from within radio astronomy and electronics groups with university funding and private support. Outside radio and optical searches there is almost no concerted academic work on the other areas of ETI phase space such as solar system searches or catalogue analysis. Theoretical work depends on the intermittent interest of individuals. There is a lack of resources to fund fresh blood.

SETI Institute no longer operating its telescopes, but desire for search high

**PRI 6/16** [Public Radio International, 6/16/11, Keeping SETI's hunt for extraterrestrial life alive, http://www.pri.org/science/seti-keeping-the-hunt-for-extraterrestrial-life-alive4440.html]

The SETI Institute in California is dedicated to searching the skies for extraterrestrial intelligence. It's also facing a budget crisis. This story was originally covered by PRI's The World. For more, listen to the audio above. A scientific quest for life elsewhere in the universe is facing some down-to-earth problems. The SETI Institute in California, considered the world's premiere organization when it comes to scanning the skies for signs of extraterrestrial life, recently mothballed a powerful radio telescope it had been using to search for signals from alien civilizations. The effort has been put on hold due to a lack of money. But the Americans aren't the only ones involved in SETI, which stands for the Search for Extraterrestrial Intelligence.\* Armed with a new kind of radio telescope, Europe's Low Frequency Array, or LOFAR, hopes to complement the SETI work that was being done in the United States. "SETI's suffered a severe financial blow," says Alan Penny, a British astronomer working with LOFAR. Penny, who has spent much of his career searching for signs of life in the universe and who spent a year at the SETI Institute maintains that the field has not suffered, though, in terms of the science or the reason for doing the work. "And it's certainly not suffered a severe blow in terms of the enthusiasm of the people, like me, who want to do it. It's all part of the struggle," says Penny.

SETI doesn’t have any funding now but an increase in funding by ½ percent would transform the program

Penny 1/19/11 [Alan, astronomer, “SETI: Peering into the Future”, http://onlinelibrary.wiley.com/doi/10.1111/j.1468-4004.2011.52121.x/full]

Presently we are limited by the almost total lack of public funding. When I speak to the public about SETI and tell them that almost none of their taxes supporting astronomy goes to SETI they are amazed that such an interesting field is being ignored. If the panels of the astronomy funding agencies were to decide to fund SETI at a level of just one half of one percent of their budgets, SETI would be transformed, and much more powerful and wide-ranging searches could be done. That would be an inspiring thought for us all – that we were taking the search seriously and in this journey into the unknown the human race is truly looking outward. ●

SETI programs continue to get cut – resurrection necessary to find ET

Grossman 6/21/11 [Lisa, science journalist, “Help Bring Back Alien-Hunting SETI Telescopes”, http://www.wired.com/wiredscience/2011/06/setistars/]

The world’s only [telescopes devoted to searching for aliens](http://www.wired.com/wiredscience/2011/04/seti-telescope-shutdown/) went dark two months ago because of a lack of funds. Now you can help bring them back. This morning, SETI launched a website called [SETIstars](https://setistars.org/) to try to gather funds to resurrect the [Allen Telescope Array](http://www.seti.org/ata) (ATA), which some astronomers call [our greatest hope](http://www.wired.com/wiredscience/2011/02/geoff-marcy-qa/) for finding ET. The ATA, a joint project between the non-profit SETI Institute and the University of California, Berkeley, has been scanning the skies for signs of life (among other things) since 2007. The original plan was to build 350 dishes in a specific pattern over the volcanic plains of the Hat Creek Radio Observatory in Northern California, which could cover more of the sky more efficiently than a single dedicated dish. To date, only 42 dishes have been built — and right now they’re lying dormant.

Funding cuts have put SETI operations on hold

Peralta 6/22/11 [Eyder, National Public Radio researcher, “Budget Cuts Shut Down SETI’s Alien-Seeking Telescopes”, <http://www.npr.org/blogs/thetwo-way/2011/04/27/135746059/budget-cuts-shutdown-setis-alien-seeking-telescopes>]

If aliens come calling, we might not hear them. The San Jose Mercury News reports that the SETI Institute — the one made famous by the movie Contact — has put its program to find alien life on hold. In an [April 22 letter](http://archive.seti.org/pdfs/ATA-hibernation.pdf) SETI sent to significant supporters, Tom Pierson, SETI's CEO announced that beginning this week, the Allen Telescope Array "has been placed into hibernation due to funding shortfalls for operations of the Hat Creek Radio Observatory (HCRO) where the ATA is located.

The ATA is a significant part of the SETI observation program – budget cuts hurt attempts to find aliens

Atkinson 4/25/11 [Nancy, Researcher for Universe Today, “Budget Woes Put SETI’s Allen Telescope Array into ‘Hibernation’”, <http://www.universetoday.com/85121/budget-woes-put-setis-allen-telescope-array-into-hibernation/>]

[SETI](http://www.universetoday.com/67810/seti-chile-interview/), the Search for Extraterrestrial Intelligence has suffered a big blow. The primary alien search [engine](http://www.universetoday.com/33054/ion-engine/) –the Allen Telescope Array (ATA) in northern California — has been shut down due to budget woes. In a letter last week, the CEO of the SETI Institute, Tom Pierson told donors that in the ATA has been put into “hibernation,” — a safe mode of sorts, where “the equipment is unavailable for normal observations and is being maintained in a safe state by a significantly reduced staff.” The ATA has been in hibernation since April 15, with the equipment put in a safe configuration so that it stays ready to be turned back on should the SETI Institute find new sources of funding. While the ATA is not the only radio telescope that can be used for SETI searches, it was the observatory that was primarily used for that task, and now SETI researchers will have to borrow time on telescopes where “competition for observing time can be fierce or piggyback their searches on other ongoing observations,” according to [John Matson, writing for Scientific American.](http://www.scientificamerican.com/blog/post.cfm?id=budget-crunch-mothballs-telescopes-2011-04-24)

SETI has suffered setbacks in research from budget cuts since 2007

Atkinson 4/25/11 [Nancy, Researcher for Universe Today, “Budget Woes Put SETI’s Allen Telescope Array into ‘Hibernation’”, <http://www.universetoday.com/85121/budget-woes-put-setis-allen-telescope-array-into-hibernation/>]

The ATA was operating with 42 antennas, and was scheduled to expand gradually to 350 six-meter radio antennas to listen for possible radio emissions from any faraway civilizations that might exist elsewhere in the galaxy. But after the first $50 million phase was completed in 2007, additions to the array were delayed due to lack of funding. NASA had funded some of the early SETI projects, but Congress canceled any NASA contributions in 1993. The nonprofit SETI Institute, founded in 1984, relies mainly on private donations to support its research. Microsoft co-founder Paul Allen, had contributed $25 million to the first phase, with donations and grants funding the rest.

NASA’s budget cut strongly influences the existence of SETI programs

Berger 10/23/11 [Brian, Staff Writer, “With NASA Budget Cuts Looming, SETI eyes private funding”, <http://www.space.com/3031-nasa-budget-cuts-looming-seti-eyes-private-funding.html>]

NASA's astrobiology budget, the source of most of that grant money, is facing a steep decline. Under NASA's 2007 budget proposal, currently before Congress, the U.S. space agency would spend $32.5 billion on astrobiology in the year ahead--half of what it spent on astrobiology in 2005. Hubbard said in an interview that if NASA goes through with the proposed cut, SETI would expect to see its NASA grant funding reduced by about 20 percent--making it impossible to sustain without outside help the nearly 50 astrobiology researchers it has on staff.

# increase in radio telescopes solves

Kepler has found many potential candidates for ETI. ATA key to search them

**Spiegel 11** [Feb 4, Lee Spiegel, AOLNews, Hey ET, Are You Out There? Kepler Helps SETI Tune In, http://www.aolnews.com/2011/02/24/hey-et-are-you-out-there-kepler-helps-seti-tune-in/]

The needle-in-a-haystack search for extraterrestrial signals has narrowed a bit, thanks to NASA's Kepler spacecraft. Scientists announced that, of the 1,235 candidate planets discovered by Kepler, 54 of them were in what's known as the Goldilocks zone, a region close enough to its home sun where a planet may harbor life. When NASA informed the SETI Institute (Search for Extraterrestrial Intelligence) of these possibilities, the California-based institute turned the Allen Telescope Array in the location of those planets and began listening for any signs or signals of intelligent life.. Planets so close to their stars with such short orbital periods are called "hot Jupiters." These are considered "candidate" exoplanets -- planets that orbit stars other than our own. SETI senior astronomer Seth Shostak says he and his colleagues were thrilled about the prospect of 54 possible habitable planets. "Well, that is obviously great! Although we've known about planets, the big question is always how many of those planets are, in fact, possibly cousins of Earth, that could support life? "It's nice to know that they're not extraordinarily rare. If you'd asked this question 50 years ago -- and it was asked -- they had to sort of guess at whether planets like Earth were common or otherwise," Shostak told AOL News. All of the data gathered from the Kepler mission suggests that Earth-like planets are not as rare as once thought. Shostak explains that the candidate numbers are pretty huge. "It's the percentage of star systems that might have a world something like Earth. It's not one in a million, it's not one in 100,000, it's not even one in 1,000. Every 100 star systems are going to have a couple of these guys, and maybe more."

Increased radio telescope scanning SETI solves best – most number of stars outweighs more likely stars

**Cohen and Hohlfeld 01**[Sky and Telescope, Smarter SETI Strategy, Nathan Cohen and Robert Hohlfeld are professors at Boston University in telecommunications and computational science, respectively. Both have their roots in SETI at Cornell University during the era of Frank Drake and Carl Sagan, where they received their astronomy doctorates]

Any search for intelligent radio signals from the stars faces a choice between two opposite strategies. "Targeted" searches examine individual nearby stars with high sensitivity. This was the approach taken by the SETI Institute's Project Phoenix, and it is the main strategy announced for the institute's Allen Telescope Array (ATA), now under construction. "Wide-sky surveys," on the other hand, scan large areas of the celestial sphere and vast numbers of stars, though at lower sensitivity. This is the strategy of Projects BETA, SERENDIP (including SETI@home), Southern SERENDIP, and others. Which strategy is best? Deep scrutiny of a few stars, or a shallow scan of many? Given our ignorance about alien civilizations and their technologies, the two approaches are often described as complementary and equally valid. They are not. Recent work confirms long-standing suspicions that star-by-star targeting should be abandoned in favor of scanning the richest star fields to encompass very large numbers of stars, even if most of them are very far away. To see why, we flash back 30 years to when Frank Drake did the basic mathematics that still governs the field. He showed that finding an ET signal is similar to certain problems in surveying natural radio sources. Some sources are intrinsically strong; a greater number are intrinsically weak. The steepness of the ratio between them determines which category will dominate our sky. For example, many of the first sources found by early, primitive radio telescopes are at extreme, cosmological distances. This is because inherently strong radio sources (such as quasars and radio galaxies) are powerful enough to more than make up for their scarcity compared to the abundant weak sources (such as the coronas of stars). Similarly, it was clear that if even just a few rare, very distant alien radio beacons are very powerful, they will dominate the detectable population in our sky, and a wide-sky survey will succeed first. If, on the other hand, ET transmitters are common and all of them are relatively weak and similar to each other, a star-by-star targeted survey starting nearby will work best. Recently we revisited this 30-year-old problem with the advantage of more sophisticated mathematical models (and computers capable of running them!) covering all reasonable scenarios. The outcome is clear, surprising, and overwhelming. Unless ETs truly infest the stars like flies (very unlikely), the first signals we detect will come from the very rare, very powerful transmitters very far away. The 1971 model, which lent too much weight to nearby stars, turns out to be a naive case, the best that could be calculated at the time. In practical terms, this means that SETI searchers should use their limited resources to scan great numbers of stars first and worry about sensitivity per star second. Given real radio telescopes under the real sky, the best use of SETI time actually turns out to be a "hybrid," semi-targeted strategy: one that targets the richest star fields. These might include selected parts of the Milky Way's plane, certain star clusters, and even nearby galaxies. The idea is to fill the radio telescope's beam (listening area) with many stars, then dwell on this spot long enough to build up sensitivity. With, say, just 100 carefully selected patches of sky on the list, millions of Milky Way stars and many billions in other galaxies can be scrutinized in significant depth. It makes no sense to dwell on nearby stars one by one if they have sparse backgrounds. We need to look deep and long and bet on the numbers. Thus it was heartening to hear SETI Institute chair Frank Drake say that such thinking should carry the day and that the strategy for the ATA should emphasize searches near the galactic plane.

Increased radio telescope surveying solves

**Tarter 04** [Jill, Advancing the Search for Extraterrestrial Intelligence, SETI institute, Director of Research, http://www.seti.org/page.aspx?pid=462]

Another way to achieve a multiplexing advantage to speed up SETI searches is being demonstrated by the Allen Telescope Array (ATA), now under construction as a joint project between the SETI Institute and the University of California, Berkeley’s Radio Astronomy Lab. By phasing up the array to observe as many as sixteen pencil beams (each targeted on a different star) within the array’s large field of view (enabled by the small 6m array antennas) and by simultaneously using two polarizations and four frequency bands selected from the 10 GHz of available spectrum, the speed of searching increases. Since the SETI equipment on the ATA will do this at the same time that the array is conducting large radio surveys that are key to finding answers to more traditional astronomical questions, substantial and prolonged access to the sky is expected. The primary SETI project for the ATA will be a survey of one million stellar targets over the range of 1 to 10 GHz with sensitivity adequate to detect an Arecibo radar out to 300 pc. There will also be an initial experiment to scrutinize 155 exoplanetary systems currently known to be accessible to this instrument, and repeated surveys of 20 square degrees along

# USFG KEY: solves

Federal action is key to coordinate SETI

**Dominik and Zarnecki 11**[Martin and John C., consequences for science and society and The detection of extra-terrestrial life, Philosophical Transactions of the Royal Society, http://ejscontent.ebsco.com/ContentServer.aspx?target=http%3A%2F%2Frsta%2Eroyalsocietypublishing%2Eorg%2Fcontent%2F369%2F1936%2F499%2Efull%2Epdf%3F%26UCI\_FMT%3DKEV%26UCI%2EUserIP%3D141%2E161%2E8%2E93%26UCI%2EPID%3D00101990]

While scientists are obliged to assess benefits and risks that relate to their research, the political responsibility for decisions arising following the detection of extra-terrestrial life cannot and should not rest with them. Any such decision will require a broad societal dialogue and a proper political mandate. If extraterrestrial life happens to be detected, a coordinated response that takes into account all the related sensitivities should already be in place. In 1989, the International Academy of Astronautics (IAA) approved a SETI post-detection protocol [51], which was developed by one of its committees. Despite the fact that it has subsequently been endorsed by the International Institute of Space Law (IISL), the Committee on Space Research (COSPAR) of the International Council for Science (ICSU), the International Astronomical Union (IAU) and the International Union of Radio Science (URSI), the procedures laid out in that document are not legally enforcible. If it remains a voluntary code of practice, it will probably be ignored in the event to which it should apply. Will a suitable process based on expert advice from proper and responsible scientists arise at all, or will interests of power and opportunism more probably set the scene (cf. [52])? A lack of coordination can be avoided by creating an overarching framework in a truly global effort governed by an international politically legitimated body. The United Nations fora constitute a ready-made mechanism for coordination. Member States of the Committee on the Peaceful Uses of Outer Space (COPUOS) will need to place ‘supra-Earth affairs’ on the agenda in order to take it further to the General Assembly, with the goal of establishing structures similar to those created for dealing with threats arising from potentially impacting near-Earth objects [53].

# USFG KEY: international co-op

Detection by government=International Cooperation

**Michaud 98** [Michael A.G. Michaud, Space Policy Volume 14, Issue 3, August 1998, Pages 173-178, Policy issues in communicating with ETI]

Principle Eight of the Declaration of Principles states that “No response to a signal or other evidence of extraterrestrial intelligence will be sent until appropriate international consultations have taken place.” While this statement was not intended to be a test of people’s attitudes on the question, it has proved to be one. Most of those involved in the debate have actively or passively endorsed Principle 8, believing that Humankind should respond in a coordinated way. However, a significant minority objects to this principle, arguing that separate individuals and groups should have the right to send their own communications to ETI, reflecting the diversity of Humankind. Others argue that Principle 8 cannot be enforced, as governments do not control all the means of sending radio signals toward ETI. Some predict that humans will send a barrage of signals once the detection has been made; the process will be out of control. But local radio stations and amateur radio operators are not the issue. Sending a comprehensible message over interstellar distances will require a powerful transmitter of a type that only governments are likely to fund. The real issue may be whether governments will adopt the policy expressed in Principle 8. At present, the Declaration of Principles has no legal standing; it is not law or regulation, and governments can ignore it if they choose to. But governments are likely to involve themselves in the process if a confirmed detection is made.

# USFG KEY: inspires private investment/anchor tenant

SETI empirically draws private funds

**Garber 99**[Stephen J Garber, 1999, NASA Department of History, Journal of the British Interplanetary Society, Searching for Good Science: The Cancellation of NASA’s SETI program, Vol 52, p.3-12]

While greatly disappointed. programme personnel moved quickly and with resolve to continue SET I with private funding. Bttmcy Oliver successfully led an active campaign to raise money from a number of wealthy Californians in Silicon Valley he knew from his days at Hewlett-Packard. A number of scientists moved over to the non-proﬁt SETI Institute. which had acted as a NASA contractor for a number of years. The SETI Institute raised $7.5 million to cover costs of operating only a targeted search through June I995 [I3] and began the appropriately titled “Project Phoenix” which continues today. The all-sky survey. which had used NASA JPL‘s equipment, was discontinued, as was the ten-year l-IRMS plan and was replaced by the less comprehensive observations that the SETI Institute could make contingent upon the vagaries of continued private fundraising. While the cancellation of NASA‘s SETI programme did not end all research in this area. it signiﬁcantly limited the amount of science that researchers could accomplish.

\*\*\*ET CONTACT GOOD ADVANTAGE

# SETI -> contact

Proof of ETI within 25 years if funded – Drake equation

**Moskowitz 10** [Clara, Space.com senior staff writer, Proof of Aliens Could Come Within 25 Years, Scientist Says]

SANTA CLARA, Calif. ? Proof of extraterrestrial intelligence could come within 25 years, an astronomer who works on the search said Sunday. "I actually think the chances that we'll find ET are pretty good," said Seth Shostak, senior astronomer at the Search for Extraterrestrial Intelligence Institute in Mountain View, Calif., here at the SETI con convention. "Young people in the audience, I think there's a really good chance you're going to see this happen." Shostak bases this estimation on the Drake Equation, a formula conceived by SETI pioneer Frank Drake to calculate the number (N) of alien civilizations with whom we might be able to communicate. That equation takes into account a variety of factors, including the rate of star formation in the galaxy, the fraction of stars that have planets, the fraction of planets that are habitable, the percent of those that actually develop life, the percent of those that develop intelligent life, the fraction of civilizations that have a technology that can broadcast their presence into space, and the length of time those signals would be broadcasted. Reliable figures for many of those factors are not known, but some of the leaders in the field of SETI have put together their best guesses. Late great astronomer Carl Sagan, another SETI pioneer, estimated that the Drake Equation amounted to N = 1 million. Scientist and science fiction writer Isaac Asimov calculated 670,000. Drake himself estimates a more conservative 10,000. But even if that lower value turns out to be correct, at the rate they're going, it wouldn't take scientists too long to discover an alien signal, Shostak said. "This range, from Sagan's million down to 10,000 ? that's the range of estimates from people who have started and worked on SETI," said Shostak. "These people may know what they're talking about. If they do, then the point is we trip across somebody in the next several dozen or two dozen years." The SETI quest is set to take a leap forward when the Allen Telescope Array, a network of radio dishes under construction in northern California, is fully operational. By 2015, the array should be able to scan hundreds of thousands of stars for signs of extraterrestrial intelligence, Shostak said. But while humans might be able to discover an alien signal within that timeframe, interpreting what ET is trying to tell us could take much, much longer. Shostak admitted such a task would be very difficult. An alien civilization may be as technologically advanced compared to us as Homo sapiens are to our hominid relatives Neanderthals. "We could give our digital television signals to the Neanderthals, and they?ll never figure it out. And they're not stupid," he said. Yet simply having proof that we are not alone in the universe would likely be a world-changing achievement, Shostak added.

SETA can use ATA to find evidence of ET

**Zeitlin 06** [Gerry Zeitlin, openseti.org, graduate of Cornell University (B.E.E. 1960) and the University of Colorado (M.S.E.E. 1969). He pursued further graduate studies in physics, astronomy, and astrophysics at the University of California, Berkeley, New Search Strategies, http://openseti.org/NewSearches.html]

A strategy for searching for evidence of robotic ETI-based probes within the solar system was detailed by Bruce Cornet and Scot Stride in an important paper, Solar System SETI Using Radio Telescope Arrays, presented at the SETI League's SETICon03 symposium (2003). Their paper attempts to identify all likely observable emissions and physical signs of probes' operations. Some of these manifestations, the authors argue, would in principle be detectable by means of ground-based instruments. The subset of these manifestations that consist of microwave energies would be the subject of their proposed search, which they call Solar System SETI, or S3ETI. The S3ETI search volume is a heliocentric sphere of radius 50 AU, which roughly includes the orbit of Pluto. The SETI League provides an appropriate forum for proposals of this sort. Although its literature conforms to the views promulgated by The SETI Institute and The Planetary Society, etc. ("ETs cannot travel here or at least we have no evidence that they ever did; life evolves independently on suitable planets"), the League is a much more democratic organization, supporting innovation and creative engineering projects among its membership of amateur and professional scientists. Thus no one objected when Cornet and Stride bent the rules a bit, and argued that even if no living ETs could ever reach our solar system, perhaps their instruments could be here. In fact the paper received the conference Best Ideas Award. For the purposes of their proposal, Cornet and Stride argued that if the resources of ET societies were stretched to the limit when sending probes here, they would likely need to adopt various strategies for enhancing their communications channels - strategies that the authors attempt to anticipate in designing a search program. Were it possible for ETI to travel "in the flesh" and colonize large regions of the universe, the approach of Cornet and Stride would seem less than optimal. But the possibility that we could be a colony is dismissed by the authors, who refer to a "very strong case against it" made by SETI League member Al Harrison (1997). What actually is Harrison's "very strong case"? His discussion (pp. 188-192) is no more than a musing on Fermi's Paradox ("Where are they?"). Since "they" are apparently not here, why aren't they, if they exist? And his suggestions: resource limitations; lack of motivation due to abundant sources near wherever "they" are; no need for more knowledge than they already have; they just happened to miss us; we are not worthy of their interest; we are a natural preserve; advanced societies prefer inner contemplation; they would have found enough to interest them before reaching our planet. Some may feel that by dreaming up more and more of these explanations, eventually the case is made. At any rate, given their assumptions, the authors pack into their paper a great deal of engineering data, calculations of possible orbits, and other technical information that will be invaluable for anyone intending to conduct a S3ETI program. In fact, this paper could evolve into a handbook for carrying out searches of this sort. The paper also outlines a proposal for employing the Allen Telescope Array in a solar system search, making reference to specific features of that instrument. Returning for the moment to the possibility that our solar system is in fact a colony, what would be the implications for S3ETI? In such a case, searching and monitoring by whatever means possible would seem to be an excellent idea, but programs to accomplish this must already be underway by various human agencies, contact has already been made, and some sort of relationship exists. Then the proposal of Cornet and Stride would be encroaching on areas that have not been approved for public access. In fact, even without any ETI in the solar system, defense organizations might have reason to object to civilians conducting S3ETI.47

SETV is the best strategy to confirm ETI

**Teodorani 02** [Massimo, PhD and Astrophysicist, March 8-9, THE PHYSICAL STUDY OF ATMOSPHERIC LUMINOUS ANOMALIES

AND THE SETV HYPOTHESIS, http://openseti.org/Docs/EuroSETI2002\_OSI.htm]

In the general context of the SETI project a new branch named SETV (Search for Extraterrestrial Visitation) was born and recently developed. This research is aimed at studying, by using the well-experimented methods of official physical science, the possible evidence of the visitation of probes, probably of robotic type, of exogenous origin inside our solar system [1, 15, 17, 19, 20, 24]. The SETV strategy is devoted to the monitoring of the entire solar system inside a sphere with a radius of 50 astronomical units with Earth in its center [17]. The use of space satellites equipped with specific detectors such as high-sensitivity infrared CCD cameras, coupled with ground-based stations such as radars and radiotelescopes connected with multichannel spectrum analyzers, wide-field and low-aperture optical telescopes (for search) and high-aperture optical telescopes (for analysis), may allow researchers to establish the possible evidence of anomalies associated with low-luminosity exogenous probes, possibly of the “Dyson sphere” type too, which are presumably located, according to predictions, in energetically favourables zones such as the Earth-Moon libration points, the asteroidal belt, the Moon and the circumlunar and circumterrestrial orbits [2, 3, 5, 10, 12]. This specific aspect of the research, already known as SETA (Search for Extraterrestrial Artifacts) is justified by statistical calculations of “galactic migration” which, based on the addition of a new parameter to the Drake formula, predict that our galaxy may have been colonized in a time lapse of the order of one million years and that the Earth itself may have been visited numerous times since the arrival of homo sapiens [11, 25]. On the basis of physical theories derived from general relativity it is also possible that ET civilizations of superior level may be able to use space-time tunnels such as “wormholes” [9]: this would shorten a lot the time of travel.

# SETI -> better contact prep

Preparation solves negative impacts of contact

**Bauma et al** **10** [Seth D. Bauma, Jacob D. Haqq-Misrab, and Shawn D. Domagal-Goldmanc, Department of Geography, Pennsylvania State University, Department of Meteorology, Pennsylvania State University, NASA Planetary Science Division, Acta Astronautica Volume 68, Issues 11-12, June-July 2011, Pages 2114-2129, Would contact with extraterrestrials benefit or harm humanity? A scenario analysis]

A final recommendation is that preparations for ETI encounter, whether through METI, SETI, human explorations of space, or any other form, should consider the full breadth of possible encounter scenarios. Indeed, perhaps the central conclusion of the analysis presented here is that ETI contact could proceed in a wide range of ways. It is inappropriate and inadequate to blindly assume that any one specific scenario would result from contact. Until such contact occurs, we simply do not know what would happen. Given the uncertainty, the broad scenario analysis presented here is an important step towards helping us think through and prepare for possible contact. Despite its merits, our scenario analysis remains fundamentally limited in several important ways. As is common with scenario analysis in general, we offer no quantification scheme for the probabilities of specific scenarios. We also do not quantify the magnitude of the impacts (benefit or harm) of specific scenarios. The result of this is that we are unable to produce a cumulative analysis of the risks and rewards of contact with ETI or attempting to do so with METI. Such a quantitative risk analysis would be of tremendous value for decision making purposes. Indeed, the need has been acknowledged for such analysis in order to inform decisions about METI and other SETI activities [89]. However, the effort required for such an analysis is far beyond the scope of what we can accomplish in a single paper and thus must be left for future work. The scenario analysis presented here is an important step towards a quantitative risk analysis, but it is not a complete risk analysis on its own.

# contact inevitable

Contact inevitable

**Vinay 98** [Menon, Vinay. “Alien contact inevitable, researcher says ‘I think someday we will have an answer.’” The Toronto Star 10 Mar. 1998: B5. On-line. Lexis-Nexis. 24 Apr. 1998]

The truth is out there - it's just hard to find. That was one message conveyed last night by Jill Tarter, director of California's Project Phoenix with the Search for Extraterrestrial Intelligence (SETI). Tarter, who addressed hundreds of hushed and attentive earthlings at the University of Toronto's Convocation Hall, called contact with extraterrestrial intelligence inevitable. But she said it was impossible to estimate when such an event might occur. "I don't have an answer tonight . . . but I think someday we will have an answer," said Tarter, on whom Jodie Foster's character in last year's sci-fi movie Contact was based. Researchers began scanning the heavens for an alien beacon in 1960, after physicists discovered radio signals could travel interstellar distances. Over the next three decades, Tarter and many others analyzed static and noise from hundreds of stars. She said SETI has identified 1,000 stars to observe, all of which are at least 3 billion years old. Tarter said with the electro-magnetic energy and man-made signals engendered on Earth, it may be necessary to someday "listen" for alien signals on the dark side of the moon - a galactic area that remains free of terrestrial noise. "There are signals everywhere that are generated by our own technologies," she explained. "But (setting up on the moon) would not happen tomorrow," she added, referring to financial and political considerations, including a 1979 treaty protecting that lunar area from experimentation. Calling evolution "episodic," she told the audience that an alien civilization might consist of algae-like, single-cell organisms or even intelligent but technologically inept creatures like dolphins. Four hundred of the 1,000 targeted stars have been observed with radio telescopes, Tarter said, adding that technology is making the search easier with each passing day.

# Contact good: tech

Contact solves science innovation, hunger, poverty, and disease

**Bauma et al** **10** [Seth D. Bauma, Jacob D. Haqq-Misrab, and Shawn D. Domagal-Goldmanc, Department of Geography, Pennsylvania State University, Department of Meteorology, Pennsylvania State University, NASA Planetary Science Division, Acta Astronautica Volume 68, Issues 11-12, June-July 2011, Pages 2114-2129, Would contact with extraterrestrials benefit or harm humanity? A scenario analysis]

If contact with ETI involves more than mere detection, then it is possible for humanity to receive additional benefits by cooperating with the ETI. The nature of these benefits depends on the degree of ETI cooperation—that is, it is unlikely that uncooperative ETI would benefit humanity. This is because ETI are likely to be much more advanced than humanity and would therefore be capable of dictating the terms of contact. Thus cooperative ETI would have the ability to bring benefits to humanity, just as uncooperative ETI would likely harm humanity. An initial scenario of cooperative ETI involves friendly and informative communication between our respective civilizations. Assuming ETI are sufficiently interested in humanity (which is not guaranteed, given that they would likely be much more advanced), they may choose to maintain communication at length to discuss mathematics, physics, and chemistry [29] and to learn more about Earth life. It is reasonable to assume that the general principles of physics and chemistry apply everywhere in the galaxy, even if mathematical descriptions of these physical phenomenon differ among intelligent civilizations. This type of dialog with ETI may require that we first develop a common mathematical language using physical observables that are known by both civilizations (such as properties of neutral hydrogen). In a more remarkable and unlikely case, we may learn that ETI occupy some region of space where different or unknown physical principles apply, which would certainly be a unique discovery for humanity. Thus through such a conversation we may come to acquire a deeper understanding of mathematics or science, and we may also discover specifics about the ETI home world or ETI biology. As with mere detection, such contact would have considerable intellectual benefits, though here the benefits would be larger—potentially much larger. Depending on the nature of information shared through communication with ETI, there could also be more in the way of practical, non-intellectual benefits. An advanced ETI may be capable of solving a great many of humanity’s problems, such as world hunger, poverty, or disease. Benevolent ETI may even design their first message to contain information on how to avoid technological catastrophe in order to help less developed civilizations succeed [45]. From humanity’s perspective, this is the best-case scenario for ETI contact. However, while we suspect that the basic principles of physics and chemistry apply across the universe, it is somewhat less likely that ETI knowledge would be useful in addressing social issues on Earth. The usefulness of ETI knowledge, combined with the willingness of ETI to employ it on our behalf, plays an important role in the benefits that a cooperative ETI would bring to humanity

Interaction causes massive tech innovation

**Tough 00** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, When SETI Succeeds: The Impact of High-Information Contact, file:///C:/Users/Administrator/Downloads/10.1.1.107.3086%20(1).pdf]

Tough’s respondents hoped that through communicating with advanced extraterrestrial societies we will gain practical information that will help us solve contemporary problems, improve the quality of human life, and secure our own future as a species. We imagine ETI as having made technological advances that we seek in our own future: increasingly miniaturized and powerful information processing devices; cheap and inexhaustible sources of power; gentle chemical procedures that replace the surgeon’s scalpel; workable means for interstellar travel; prolonged life; and cyborgs endowed with near-immortality. Perhaps we will be coached in faster-than-light communication, interstellar travel, and other technologies that appear at the cusp between science and science ﬁction. If contact leads to the transfer of technology, and if we understand how to use this technology and are able to cope with the full range of environmental, social, and psychological consequences, we may become empowered to solve some of our biggest problem , improve the quality of human life, and accelerate our own evolution. Interaction with many ETI societies would expose us to unprecedented levels of diversity and stimulation. Over time, knowledge gained from an extraterrestrial civilization could shape human leisure-tim or recreational activities. For example, at some point people may embrace extraterrestrial costumes ,dances, foodstuff, and customs. At ﬁrst, these might be mimicked at “trendy” social events. Theme parks or museums could convey a sense of what it might belike to live within ETI society. Amusement park rides could be based on ETI conveyances (even as imagined spaceships shape many amusement park rides today). And, if interstellar travel proves to be muchless daunting than it appears right now, then it is conceivable that in a thousand years extraterrestrial societies could become desirable tourist destinations. Already, there are energetic efforts to develop space tourism, including suborbital and orbital ﬂights, space hotels, and luxury cruises around the moon.

Contact = crazy awesome technology

**Tough 06** [Allen, April 21, 2006, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, How to Achieve Contact: Five Promising Strategies, http://ieti.org/tough/articles/strategy.htm]

Extraterrestrial intelligence, however, is not just one century ahead of our technology, but more likely a thousand centuries ahead. Such an intelligence may have created some means of exploration and communication that goes far beyond our current conceptions of super-smart probes. This is particularly likely after machine intelligence takes over its own evolution, designing artificial intelligence that is more and more advanced. Each machine may be so knowledgeable and intelligent (and wise, ethical, and altruistic?) that it far surpasses any human individual or organization. These super smart machines may somehow be integrated with biological beings, or they may not. But for convenience in this paper I will simply use the word "probe" to cover all of these possibilities for advanced intelligence. Our galaxy and universe may be filled with diverse forms of intelligence with extraordinary capacities. Incredibly diverse even in their widespread origins, various streams of intelligence may have evolved into new forms far beyond what human scientists envisage. For instance, they may be actively monitoring and studying fledgling civilizations (such as ours), even providing useful information at some appropriate stage. And they may be busily interacting with intelligence near their own level of development in order to exchange information, discuss societal and galactic goals, help one another to evolve in appropriate directions, build up a galactic storehouse of scientific and philosophical knowledge, and cooperate on other grand science and engineering projects. Their harmonious cooperation and Encyclopedia Galactica may have already evolved even beyond the Life Era described by Eric Chaisson (1987) and and the biological universe described by Steven Dick (1996). Intelligence may eventually become so advanced and widespread that it will prove more powerful than the big impersonal forces of the universe. "The laws of physics are not repealed by intelligence, but they effectively evaporate in its presence.... [Even] the fate of the Universe is a decision yet to be made, one which we will intelligently consider when the time is right" (Kurzweil 1999, page 260). Such possibilities point up just how inspiring, awesome, and transcendent our SETI enterprise really is. After all, we are trying to tap into a wisdom, understanding, and knowledge held by a deeply alien intelligence that is 100,000 years beyond us. In the SETI field we often get wrapped up in technical details, internal politics, strategic maneuvering, funding, equipment, the "Rare Earth" ideology versus the abundant intelligence ideology, the ultraconservative traditionalists versus the bold innovative explorers. But SETI is a much deeper quest than this. Ultimately, today's SETI efforts may be a major step toward a scientific and spiritual dialogue with some ancient intelligence about such topics as cosmology, philosophy, theology, music, art, and the purpose of life.

# Terminal impacts

Disease causes extinction

**South China Morning Post 96**

(Avi Mensa, 1-4-1996, “Leading the way to a cure for AIDS,” P. Lexis)

Despite the importance of the discovery of the "facilitating" cell, it is not what Dr Ben-Abraham wants to talk about. There is a much more pressing medical crisis at hand - one he believes the world must be alerted to: the possibility of a virus deadlier than HIV. If this makes Dr Ben-Abraham sound like a prophet of doom, then he makes no apology for it. AIDS, the Ebola outbreak which killed more than 100 people in Africa last year, the flu epidemic that has now affected 200,000 in the former Soviet Union - they are all, according to Dr Ben-Abraham, the "tip of the iceberg". Two decades of intensive study and research in the field of virology have convinced him of one thing: in place of natural and man-made disasters or nuclear warfare, humanity could face extinction because of a single virus, deadlier than HIV. "An airborne virus is a lively, complex and dangerous organism," he said. "It can come from a rare animal or from anywhere and can mutate constantly. If there is no cure, it affects one person and then there is a chain reaction and it is unstoppable. It is a tragedy waiting to happen."That may sound like a far-fetched plot for a Hollywood film, but Dr Ben -Abraham said history has already proven his theory. Fifteen years ago, few could have predicted the impact of AIDS on the world. Ebola has had sporadic outbreaks over the past 20 years and the only way the deadly virus - which turns internal organs into liquid - could be contained was because it was killed before it had a chance to spread. Imagine, he says, if it was closer to home: an outbreak of that scale in London, New York or Hong Kong. It could happen anytime in the next 20 years - theoretically, it could happen tomorrow.The shock of the AIDS epidemic has prompted virus experts to admit "that something new is indeed happening and that the threat of a deadly viral outbreak is imminent", said Joshua Lederberg of the Rockefeller University in New York, at a recent conference. He added that the problem was "very serious and is getting worse". Dr Ben-Abraham said: "Nature isn't benign. The survival of the human species is not a preordained evolutionary programme. Abundant sources of genetic variation exist for viruses to learn how to mutate and evade the immune system." He cites the 1968 Hong Kong flu outbreak as an example of how viruses have outsmarted human intelligence. And as new "mega-cities" are being developed in the Third World and rainforests are destroyed, disease-carrying animals and insects are forced into areas of human habitation. "This raises the very real possibility that lethal, mysterious viruses would, for the first time, infect humanity at a large scale and imperil the survival of the human race," he said.

Ongoing global poverty outweighs nuclear war- only our ev is comparative

Spina 2k

(Stephanie Urso, Ph.D. candidate in social/personality psychology at the Graduate School of the City University of New York, Smoke and Mirrors: The Hidden Context of Violence in Schools and Society, p. 201)

This sad fact is not limited to the United States. Globally , 18 million deaths a year are caused by structural violence, compared to 100,000 deaths per year from armed conflict. That is, approximately every five years, as many people die because of relative poverty as would be killed in a nuclear war that caused 232 million deaths, and every single year, two to three times as many people die from poverty throughout the world as were killed by the Nazi genocide of the Jews over a six-year period. This is, in effect, the equivalent of an ongoing, unending, in fact accelerating, thermonuclear war or genocide, perpetuated on the weak and the poor every year of every decade, throughout the world.

# international co-operation

SETI=International Cooperation

**Billingham 98** [J, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 711-719, Billingham joined the NASA Ames Research Center becoming vice-chair of the SETI institute board of trustees. He is currently Senior Scientist of the SETI Institute, Cultural aspects of the search for extraterrestrial intelligence]

At the present time SETI is too small to have any significant impact in these areas. If a signal is detected, this will change. There is likely to be a major increase in funding for further SETI activities, since it will then be virtually certain that there are many other civilizations to detect. The level of interest will be enormous, and will pervade all aspects of our society. The degree of national activity will depend in some measure on the policies of the nation which makes the discovery. However, this in itself may become diffuse because many nations may be involved in signal verification and other post-detection activities. There will obviously be intensive study, scholarly and otherwise, by individuals and institutions in many nations. One SETI Institute already exists in Northern California. There will be a need for some coordination of such efforts. International societies will expand to embrace activities related to ETI. Two professional societies already address SETI questions. The International Academy of Astronautics has had a SETI Committee and SETI Review Session for twenty years. More recently Commission 51 (Bioastronomy) of the International Astronomical Union has been formed. It has become the largest of all the IAU Commissions. A few papers have been written on the legal aspects of SETI, the most significant by Kopal[23]. The present body of space law has been claimed to be adequate to cover SETI. Many others feel that it needs greatly to be expanded, since it was not formulated with SETI in mind. Perhaps a separate body of law is needed, as has been argued by Haley[24]. There will surely be agreements and treaties between nations having to do with SETI. But the existence of ETI is surely a matter for all mankind, and could therefore be focused within the United Nations structure.

# ETS exist

ET life is likely, and ETI would present as comparable intelligence

**Dominik and Zarnecki 11**[Martin and John C., consequences for science and society and The detection of extra-terrestrial life, Philosophical Transactions of the Royal Society, http://ejscontent.ebsco.com/ContentServer.aspx?target=http%3A%2F%2Frsta%2Eroyalsocietypublishing%2Eorg%2Fcontent%2F369%2F1936%2F499%2Efull%2Epdf%3F%26UCI\_FMT%3DKEV%26UCI%2EUserIP%3D141%2E161%2E8%2E93%26UCI%2EPID%3D00101990]

We readily accept that the concepts of physics and chemistry apply throughout the cosmos and are valid for all time, but should this not make us wonder whether biology is universal as well [22], and not just a special feature that only applies to planet Earth? There is actually no lack of the building blocks of life; the number of molecules fundamental to Earth’s biochemistry that have already been found in the interstellar medium, planetary atmospheres and on the surfaces of comets, asteroids, meteorites and interplanetary dust particles is surprisingly rather large. Giant ‘factories’, where complex molecules are being synthesized, appear to make carbonaceous compounds ubiquitous in the Universe (cf. [23]). We are however left with a fundamental gap in understanding just at the point where molecules become ‘alive’. Nevertheless, it has been conjectured that life resembling that on Earth in its biochemistry is a cosmic imperative [24,25], following from the deterministic and reproducible nature of chemistry under given environment conditions, and the reproducibility of optimization by selection [26] from a large number of variants. The latter is strongly supported by the observed evolutionary convergence in the biological history on Earth, but it cannot be ruled out with certainty that our existence is a fluke arising from a highly improbable chance event (cf. [27]). A strong case for the genesis of life being a ‘cosmic imperative’ would arise from the detection of a ‘shadow biosphere’ on Earth with a distinct ‘tree of life’ [28–30]. So if there are alien civilizations at a comparable stage of evolution, one might expect that they do not differ that much from our own (cf. [27]). However, with the Sun just about half-way through its lifetime as a main-sequence star, with about 4.5 billion years remaining, that ‘comparable stage’ might constitute a rather short transient episode, and advanced extra-terrestrial life might be inconceivable to us in its complexity, just as human life is to amoebae.

ETI exists – the neg is just anthropocentric narcissists

**Sagan 83** [Carl, 1983, The solipsistic approach to extraterrestrial intelligence, Laboratory for Planetary Studies, Cornell University, http://articles.adsabs.harvard.edu/full/1983QJRAS..24..113S]

One of the distinctions and triumphs of the advance of science has been the deprovincialization of our world view. In the sixteenth century there were battles over whether the Earth is at the centre of the Solar System; in the seventeenth century about whether the stars are other suns; in the nineteenth century, about whether the Barth is much older than real or mythical human history; in the eighteenth to twentieth centuries about whether the spiral nebulae are other galaxies something like the Milky Way, and about whether the Sun is at the centre of the Milky Way; and in the nineteenth and twentieth centuries about whether human beings have arisen and evolved as an integral part of the biological world, and whether there are privileged dynamical frames of reference. These deep questions have generated some of the major scientific advances since the Renaissance. Every one of them has been settled decisively in favour of the proposition that there is nothing special about us: we are not at the centre of the Solar System; our planet is one of many; it is vastly older than the human species; the Sun is just another star, obscurely located, one among some 400 billion others in the Milky Way, which in turn is one galaxy among perhaps hundreds of billions. We humans have emerged from a common evolutionary process with all the other plants and animals on Earth. We do not possess any uniquely valid locale, epoch, velocity, acceleration, or means of measuring space and time. The latest issue in this long series of controversies on our place in the Universe properly concerns the existence of extraterrestrial intelligence. Despite the utter mediocrity of our position in space and time, it is occasionally asserted, with no sense of irony, that our intelligence and technology are unparalleled in the history of the cosmos. It seems to us more likely that this is merely the laetst in the long series of anthropocentric and self congratulatory pronouncements on scientific issues that dates back to well before the time of Claudius Ptolemy. The history of deprovincialization of course does not demonstrate that there are intelligent beings elsewhere. But, at the very least, it urges great caution in accepting the arguments of those who assert that no extraterrestrial intelligence exists. The only valid approach to this question is experimental.

# ETS exist: drake equation

ETI exist – Drake equation

**Alexander No Date Given** [Amir Alexander, The Planetary Society, Space Topics: Search for Extraterrestrial Intelligence, http://planetary.org/explore/topics/search\_for\_life/seti/drake\_equation.html]

The Drake equation was SETI pioneer Frank Drake's roadmap for answering SETI's ultimate riddle: how many communicating civilizations are there in our galaxy? This grand question, Drake thought, could be reduced to seven more manageable ones: The rate of star formation in our galaxy at the time our Solar System was formed (R\*); The fraction of stars that have planets around them (fp); The number of planets per star that are capable of sustaining life (ne); The fraction of planets in ne where life evolves (fl); The fraction of fl where intelligent life evolves (fi); The fraction of fi that communicate (fc); The lifetime of a communicating civilization (L); The product of these seven factors should provides a good estimate of total number of communicating civilization (N). In mathematical shorthand this gives the classical Drake equation: N= R\* fp ne fl fi fc L Drake formulated his equation in 1960 in preparation for the Green Bank meeting that established SETI as a scientific discipline. The historic meeting, whose participants became known as the "Order of the Dolphin," brought together leading astronomers, physicists, biologists, social scientists, and industry leaders to discuss the possibility of detecting intelligent life among the stars. To bring some order and coherence to such an eclectic gathering, Drake came up with the equation. It was a way to order the different issues to be discussed, and bring them to bear on the central question of intelligent life in the galaxy. The equation served well at the Green Bank conference, but soon it became much more than an organizational tool. To Drake's amazement, it proved irresistible to SETI promoters. The short mathematical formula reduced a huge and almost unmanageable speculative question to a neat series of seemingly specific questions. While the larger question seemed too large and speculative, its seven components appeared to lend themselves to scientific inquiry. And so, what for Drake was essentially an organizational tool, became a shorthand for the entire scientific field of the Search for Extraterrestrial Intelligence.

The best estimates put the number of extraterrestrial civilizations at 10,000

Drake, Chairman of the SETI Institute, 02 (Frank, “Odds of Complex Life: Great Debates Part III,” <http://www.astrobio.net/news/article239.html>)

**Frank Drake:** Only about 5% of the stars that have been studied sufficiently have [hot Jupiters](http://www.aas.org/publications/baas/v32n3/dps2000/565.htm) or Jupiters in elliptical orbits. The other 95% of the stars studied do not have hot Jupiters, and just what they have is still an open question. The latest discoveries, which depend on observations over a decade or more, are finding solar system analogs. This suggests that 95% of the stars - for which the answers are not yet in - could be similar to our own system. This is reason for optimism among those who expect solar system analogs to be abundant.

Drake equation key to find extraterrestrials – one of the few quantitative tools

Richards 4/22/04 [Diane, Marketing and Communications Officer at the SETI Institute, “Unlocking Language in Space and on Earth”, http://www.seti.org/page.aspx?pid=1088]

He also works with biologists Brenda McCowan and Sean Hauser, of the University of California, Davis, studying non-human communication systems to better understand the nature of language and intelligence, which in turn has direct relevance to the search for extraterrestrial intelligence (SETI). Quantitative tools for intelligence studies are and few and far between, making the Drake Equation term **Fi** (fraction of planets on which intelligence develops) one of the most elusive facets of SETI research.

# ets exist: planetary discoveries

ETI exist – Kepler planet discoveries

**SpaceNews Daily, 5/18** [5/18/11, New SETI survey focuses on Kepler's top Earth-like planets, http://www.spacedaily.com/reports/New\_SETI\_survey\_focuses\_on\_Kepler\_top\_Earth\_like\_planets\_999.html]

Now that NASA's Kepler space telescope has identified 1,235 possible planets around stars in our galaxy, astronomers at the University of California, Berkeley, are aiming a radio telescope at the most Earth-like of these worlds to see if they can detect signals from an advanced civilization. The search began on Saturday, May 8, when the Robert C. Byrd Green Bank Telescope - the largest steerable radio telescope in the world - dedicated an hour to eight stars with possible planets. Once UC Berkeley astronomers acquire 24 hours of data on a total of 86 Earth-like planets, they'll initiate a coarse analysis and then, in about two months, ask an estimated 1 million SETI@home users to conduct a more detailed analysis on their home computers. "It's not absolutely certain that all of these stars have habitable planetary systems, but they're very good places to look for ET," said UC Berkeley graduate student Andrew Siemion. The Green Bank telescope will stare for about five minutes at stars in the Kepler survey that have a candidate planet in the star's habitable zone - that is, the planet has a surface temperature at which liquid water could be maintained. "We've picked out the planets with nice temperatures - between zero and 100 degrees Celsius - because they are a lot more likely to harbor life," said physicist Dan Werthimer, chief scientist for SETI@home and a veteran SETI researcher. Werthimer leads a 30-year-old SETI project on the world's largest radio telescope, the Arecibo receiver in Puerto Rico, which feeds data to SETI@home for a detailed analysis that could only be done on the world's largest distributed computer. He was involved in an early SETI project with the previous Green Bank telescope, which collapsed in 1988, as well as with the Allen Telescope Array (ATA) , which also conducted a broader search for intelligent signals from space run by the SETI Institute of Mountain View, Calif. The ATA went into hibernation mode last month after the SETI Institute and UC Berkeley ran out of money to operate it. "With Arecibo, we focus on stars like our sun, hoping that they have planets around them that emit intelligent signals," Werthimer said. "But we've never had a list of planets like this before."

Discovery of thousands of Earth-like planets with water suggest alien life

Sagan 95 [Carl, American space scientist, “The Abundance of Life-Bearing Planets”, <http://www.planetary.org/explore/topics/search_for_life/seti/sagan.html>]

The best current estimates of the number and spacing of Earth-mass planets in newly forming planetary systems (as George Wetherill reported at the first international conference on circumstellar habitable zones [Doyle, 1995]) combined with the best current estimates of the long-term stability of oceans on a variety of planets (as James Kasting reported at that same meeting [Doyle, 1995]) suggest one to two blue worlds around every Sun-like star. Stars much more massive than the Sun are comparatively rare and age quickly. Stars comparatively less massive than the Sun are expected to have Earth-like planets, but the planets that are warm enough for life are probably tidally locked so that one side always faces the local sun. However, winds may redistribute heat from one hemisphere to another on such worlds, and there has been very little work on their potential habitability. Nevertheless, the bulk of the current evidence suggests a vast number of planets distributed through the Milky Way with abundant liquid water stable over lifetimes of billions of years. Some will be suitable for life--our kind of carbon and water life--for billions of years less than Earth, some for billions of years more. And, of course, the Milky Way is one of an enormous number, perhaps a hundred billion, other galaxies.

# ets exist: water discovery

Aliens exist – Water in the universe and the Drake equation proves.

Siddiqui (nqa) 1999 [Munazza, “Do aliens exist?” online @ http://www.netowne.com/ufos/important/]

Frank Drake, in the early 1960s, came up with an equation (called the "Drake Equation") that calculated the possibility of extraterrestrial life. He determined that there was a possibility of 100,000 to 1,000,000 extraterrestrial civilizations in our galaxy (the Milky Way) alone. With so many complex and huge solar systems across the galaxy, the Earth cannot be the centre of the universe. Because if it is then what is the purpose of the rest of the huge universe? Water is the main source of life on Earth. Taking a clue from this, European scientists, using ultra cold orbiting telescopes, have discovered unimaginable volumes of water in inter-stellar space. This discovery raises questions about life elsewhere in the universe. Scientists were astounded to find water in the freezing atmosphere of Jupiter, Uranus, Neptune and Saturn (and its moon Titan). They have even identified a cloud of water, less than a light year across, in the constellation Orion.

# ets exist: at fermi/von neumann paradox

Fermi paradox doesn’t rule out ET – infinite universe means they exist

**Wesson 90**[Title: Cosmology, extraterrestrial intelligence, and a resolution of the Fermi-Hart paradox Authors: Wesson, P. S. Journal: Royal Astronomical Society, Quarterly Journal (ISSN 0035-8738), vol. 31, June 1990, p. 161-170. Research supported by NSERC. Bibliographic Code: 1990QJRAS..31..161W ]

This case can be made more cogent by adding a numerical side to it. Consider the following statement: an optimistic estimate of how many habitable planets there may be in our own galaxy is I0^10", but to order of magnitude the number of other galaxies from which we can in principle receive light signals is also 10^10"’. This will be shown below as an incidental fact in another calculation. But for now, it can be noted that it makes just as much sense numerically to look for signals from galaxies as from stars. (Indeed, it makes more sense insofar as one galaxy in the ﬁeld of view of a telescope might contain 10^10 civilizations, and only one of them would need to be very advanced to make itself heard over intergalactic distances.) This argument can be carried further if the Universe is inﬁnite in extent, since it then contains an inﬁnite number of galaxies and habitable planets. An interesting study of the coiisequences of this, and in particular the inevitability of there being other creatures as similar to us as one cares to consider, has been made by Ellis 8: Brundrit (I979; see also Barrow & Tipler I986). Perhaps the most important consequence is that in an inﬁnite Universe there must perforce be some extraterrestrial: somewhere even if the probability of their evolution is tiny. This brings the discussion back to the Ferrni—Hart paradox: even if life in the Universe is sparse, as some biophysical data indicate (see below), it is still necessary to explain whv we see no evidence of it.

We haven’t encountered aliens yet because the universe is too big

CNN 2/25/09 “Galaxy may be Full of ‘Earths,’ Alien Life” www.cnn.com/2009/TECH/space/02/25/galaxy.planets.kepler/index.html

Finding intelligent life is a very different matter. For all the speculation about the possibility of other civilizations in the universe, the question remains: If the rise of life on Earth isn't unique and aliens are common, why haven't they shown up or contacted us? The contradiction was famously summed up by the physicist Enrico Fermi in 1950 in what became known as the Fermi paradox: "Where is everybody?" The answer may be the vastness of time and space, scientists explained. "Civilizations come and go," Boss said. "Chances are, if you do happen to find a planet which is going to have intelligent life, it's not going to be in [the same] phase of us. It may have formed a billion years ago, or maybe it's not going to form for another billion years." Even if intelligent civilizations did exist at the same time, they probably would be be separated by tens of thousands of light years, Forgan said. If aliens have just switched on their transmitter to communicate, it could take us hundreds of centuries to receive their message, he added.

\*\*\*NON CONTACT ADVANTAGES

# human unity

SETI solves human unity

**Tough 98** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]

Cosmic evolution over billions of years has led to our present period, which is characterized by diverse life on Earth and probably throughout the universe. Eric Chaisson calls this period “the Life Era”[2]and Steven Dick calls this view “the biological universe”[3]. The SETI enterprise makes the likelihood of intelligent life throughout the galaxy feel more tangible and real. Instead of just talking or writing about the possibility, someone is actually doing something about it. As a result, humanity is gradually shifting toward a fresh image of who we are as a species. Increasingly we see ourselves as one of the abundantly diverse intelligent species that have arisen in the universe. That is how we fit into the universe. We feel part of the cosmic family; we feel a bond or kinship with others. We are one of the species that have developed a civilization marked by curiosity, inquiry, knowledge, meaning and purpose. We are not alone in the universe. Although we are unique, we may be one of billions of civilizations in the universe (just as each person and each snowflake is unique, but is also one of billions). As they learn about cosmic evolution and SETI activities, more and more people are developing a deeper sense of themselves as citizens of the universe—as part of intelligent life and evolving culture throughout the cosmos. We begin to move from forlorn isolation to a “feeling of genuine biological and spiritual unity with the universe” and that universe feels “friendlier”[4]. We begin to see ourselves within a galactic frame of reference. To use Michael Michaud’s words, we are about to “leave the era of Earth history, and enter an era of cosmic history”[5]. More recently he noted that “many of us are involved in SETI because we hope that detection, and even the search itself, will introduce a new and positive factor in human affairs. We are involved because SETI defines us as a species with shared interests. We are involved because SETI forces humanity to think big”[6]. According to Frank White, SETI may be, at its deepest levels, an effort to achieve a new kind of connection with the universe—to regain an integration or connectedness that has been shattered by standing apart from the cosmos and examining it as something that is not alive, not intelligent, and separate from ourselves[7].

SETI solves for connectivity, catastrophes, war, overpopulation, and environmental degragation

**Tough 98** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]

Photographs of the whole earth from the early space missions gave us a fresh perspective. A more recent photograph from even further away in our solar system gives us the sense of being a small fragile planet—a pale blue dot surrounded by space[9]. SETI provides a third fresh perspective by encouraging us to think about how extraterrestrials might perceive us. As we view ourselves through the “eyes” of distant extraterrestrials, this fresh perspective leads in turn to a fresh way of looking at our society’s values, goals, priorities and foibles. Three aspects of SETI stimulate this fresh perspective by encouraging us to put ourselves “in the shoes” of remote extraterrestrials. (a) In order to choose search strategies, scientists must first think through the likely characteristics of whoever is out there, and their likely behaviour toward all other civilizations—in particular toward us since they may somehow be aware of our existence or even have some information about us. (b) During the past few years, at astronautics and SETI meetings, some attention has focused on what we should do about sending a reply after we detect a signal. Such thinking inevitably requires attention to how “they” might react to various sorts of replies that we might send. (c) In general, the whole SETI enterprise stimulates a wide variety of people to begin thinking more seriously about who might be out there and how they might view our society. By thinking about how a remote civilization might view us, we gain a fresh perspective on our own civilization. Various specific implications may occur to us. We may wonder why our society places such emphasis on differences among people when, compared with any extraterrestrial species, we are all quite similar and should feel deeply connected. We may see more sharply the importance of such priorities as ensuring our long-term survival and flourishing, caring about future generations, accumulating significant knowledge, protecting that knowledge from potential catastrophes, developing a set of universal goals and laws that might apply throughout the galaxy, and reducing our worst foibles and errors (warfare, population growth, environmental degradation). Surely extraterrestrials would wonder why we have not shifted our attention, resources, and efforts towards these key priorities.

Human unity

**Tough 00** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, When SETI Succeeds: The Impact of High-Information Contact, file:///C:/Users/Administrator/Downloads/10.1.1.107.3086%20(1).pdf]

Post-contact society is likely to affect our views of ourselves in at least three ways. First, it will speed awareness that we are part of the biological universe (Dick, 1996). Contact, even under minimum detection scenarios, is likely to accelerate our views of our selves as a part of a larger, interstellar humanity,” to extend the terminology of Olaf Stapleton’s “ interplanetary man” (Dick, this volum ) . Many other factors—such as our progress in spacefaring—will contribute to our consciousness of the cosmos. Second, knowledge of relationships among extraterrestrial subpopulations could help us gain insight into intergroup relations on Earth. We may learn, for example, from how ETI societies treat different societies as well as their own subpopulations. This discovery could cause us to reﬂect on how we ourselves treat people from different cultures and subcultures. By seeing how ETI manages diversity, we may learn new models for group relations on Earth. Almost a century of work in psychology and sociology shows that other people’s treatment of us shapes our views of ourselves. People who are treated as competent and worthwhile individuals tend to develop high self-conﬁdence and perform well. Selfconﬁdence and success tend to feed upon each other and generate an upward spiral of events. People who are treated as inferior and incompetent lose self-conﬁdence and motivation, and perform poorly. Low self-conﬁdence and poor performance also feed on each other, in this case creating a downward spiral.

SETI solves for tech spillover and global unity

**Morrison, Billingham, and Wolfe 77**[Philip Morrison, Massachusetts Institute of Technology John Billingham and John Wolfe, NASA Ames Research Center, The Search for Extraterrestrial Intelligence, p.7]

Whether the search for extraterrestrial intelligence succeeds or fails, its consequences will be extraordinary. If we make a long dedicated search that fails, we will not have wasted our time. We will have developed important technology, with applications to many other aspects of our own civilization. We will surely have added greatly to our knowledge of the physical Universe. The global organization of a search for interstellar radio messages, quite apart from its outcome, can have a cohesive and constructive influence upon our view of the human condition. But above all, we will have strengthened belief in the near uniqueness of our species, our civilization and our planet. Lacking any detection, the conviction of our uniqueness would hardly ever reach certainty; it would form over a long time, less into sharp conclusions than into a kind of substructure of human thought, a ruling consensus of attitudes. If intelligent, technological life is rare or absent elsewhere, we will have learned how precious is our human culture, how unique our biological patrimony, painstakingly evolved over three or four thousand million years of tortuous evolutionary history .Even a growing possibility of such a finding will stress, as perhaps nothing else can, our lonely responsibilities to the human dangers of our time

SETI benefits science even before detection of signals – 6 reasons

Tough 98 [Allen, Professor whose contributed to the fields of Adult Education, Future Studies, and SETI, “Positive Consequences of SETI before Detection” http://www.astrosociology.com/Library/PDF/Positive%20Consequences%20of%20SETI%20Before%20Detection.pdf]

Even before a signal is detected, six positive consequences will result from the scientific search for extraterrestrial intelligence, usually called SETI. (1) Humanity's self-image. SETI has enlarged our view of ourselves and enhanced our sense of meaning. Increasingly, we feel a kinship with the civilizations whose signals we are trying to detect. (2) A fresh perspective. SETI forces us to think about how extraterrestrials might perceive us. This gives us a fresh perspective on our society's values, priorities, laws, and foibles. (3) Questions. SETI is stimulating thought and discussion about several fundamental questions. (4) Education. Some broad-gauge educational programs have already been centered around SETI. (5) Tangible spin-offs. In addition to providing jobs for some people, SETI provides various spin-offs, such as search methods, computer software, data, and international scientific cooperation. (6) Future scenarios. SETI will increasingly stimulate us to think carefully about possible detection scenarios and their consequences, about our reply, and generally about the role of extraterrestrial communication in our long-term future. Such thinking leads, in turn, to fresh perspectives on the SETI enterprise itself.

Detection of an alien signal would force humanity to unite as Earthlings

Tarter 11 [Jill, director of research at the SETI Institute, “Exoplanets, Extremophiles, and the Search for Extraterrestrial Intelligence”, <http://www.sunypress.edu/pdf/62267.pdf>]

In addition to Phillip Morrison’s hopeful characterization of SETI as the archeology of the future, I think that SETI is extraordinarily important because it provides an opportunity to change the perspective of every person on this planet. The successful detection of a signal, or even the serious discussion of that possibility, would have the effect of holding up a mirror to the Earth. In this mirror we, all of us, would be forced to see ourselves as Earthlings, all the same when compared to the detected extraterrestrials. SETI can help to trivialize the differences among humans that we find so divisive today. This is why, when I got to make a wish to change the worlds as part of my TED prize (<http://www.tedprize.org/jill-tarter/>) (Tarter et al. 2011), I said, “I wish that you would empower Earthlings everywhere to become active participants in the ultimate search for cosmic company.”

SETI creates an overview effect – humanity sees life on Earth from a fresh perspective

Tough 98 [Allen, Professor whose contributed to the fields of Adult Education, Future Studies, and SETI, “Positive Consequences of SETI before Detection” http://www.astrosociology.com/Library/PDF/Positive%20Consequences%20of%20SETI%20Before%20Detection.pdf]

Photographs of the whole earth from the early space missions gave us a fresh perspective. A more recent photograph from even further away in our solar system gives us the sense of being a small fragile planet--a pale blue dot surrounded by space. SETI provides a third fresh perspective by encouraging us to think about how extraterrestrials might perceive us. As we view ourselves through the "eyes" of distant extraterrestrials, this fresh perspective leads in turn to a fresh way of looking at our society's values, goals, priorities, and foibles. Three aspects of SETI stimulate this fresh perspective by encouraging us to put ourselves "in the shoes" of remote extraterrestrials. (a) In order to choose search strategies, scientists must first think through the likely characteristics of whoever is out there, and their likely behaviour toward all other civilizations--in particular toward us since they may somehow be aware of our existence or even have some information about us. (b) During the past few years, at astronautics and SETI meetings, some attention has focused on what we should do about sending a reply after we detect a signal. Such thinking inevitably requires attention to how "they" might react to various sorts of replies that we might send. (c) In general, the whole SETI enterprise stimulates a wide variety of people to begin thinking more seriously about who might be out there and how they might view our society. By thinking about how a remote civilization might view us, we gain a fresh perspective on our own civilization. Various specific implications may occur to us. We may wonder why our society places such emphasis on differences among people when, compared to any extraterrestrial species, we are all quite similar and should feel deeply connected. We may see more sharply the importance of such priorities as ensuring our long-term survival and flourishing, caring about future generations, accumulating significant knowledge, protecting that knowledge from potential catastrophes, developing a set of universal goals and laws that might apply throughout the galaxy, and reducing our worst foibles and errors (warfare, population growth, environmental degradation). Surely extraterrestrial would wonder why we have not shifted our attention, resources, and efforts toward these key priorities.

SETI programs will start up with renewed enthusiasm – aiming at uniting the world

Grossman 6/21/11 [Lisa, science journalist, “Help Bring Back Alien-Hunting SETI Telescopes”, http://www.wired.com/wiredscience/2011/06/setistars/]

Once the ATA is up and running again, it also has a clear goal: Aim directly at potentially habitable planets to see if anyone’s there. Just before the telescope shut down, SETI laid out plans for a two-year program to observe exoplanets discovered by [NASA’s Kepler spacecraft](http://www.wired.com/wiredscience/2011/02/kepler-data-dump/) that could support liquid water, and maybe life. Future SETIstars projects may involve buying data processing time by the minute, and watching the data stream in on your phone, Tarter said. But ultimately, the project is aimed at uniting the worldwide community of people who care about the search for extraterrestrial intelligence.“We imagine it as their own version of Facebook, to connect and discuss these sorts of things,” Tarter said. “People are always asking me how they can help. Here’s a way. We’re serious about changing the world, changing the way we do SETI, allowing the world to participate. This is a piece of it.”

# seti -> open attitude to other/levinas

Even if ETs don’t exist, simply the search for alternate forms of sentient life allows acceptance of the other and an inclusive politics

**Regis 87** [Edward, 1987, Department of Philosophy, Howard University,  He specializes in books and articles about science, philosophy and intelligence. His topics have included nanotechnology, [transhumanism](http://en.wikipedia.org/wiki/Transhumanism) and [biological warfare](http://en.wikipedia.org/wiki/Biological_warfare), Extraterrestrials: science and alien intelligence, p.14-15]

Thinking about and even hoping to find extraterrestrial civilizations, however, sharpen our search for and appreciation of the peculiar virtues and vices of the only form of life we know. Exobiology and other exo-sciences cannot proceed merely by generalization from terrestrial experience; they must construct models of a more abstract nature of which terrestrial life and society are specifications. In that way hypotheses about extraterrestrial situations may throw light on the terrestrial, while the illumination of the extraterrestrial by hard facts about life on earth is at best dim and wavering. What Peter Winch has said about anthropology, we may say about exo-sociology: ‘Seriously to study another way of life is necessarily to seek to extend our own - not simply to bring the other way within the already existing boundaries of our own .... ”' Even if the exo-sciences fail to attain their prime goal, here is a valuable by-product. The quest for other. and better, forms of life, society, technology, ethics, and law may not reveal that they are actual elsewhere; but it may in the long run help us to make some of them actual on earth. Yet after all there is some glimmer of hope for an answer. As long as it exists - and I think it will exist as long as we do - it would be a mistake to let niggardliness. skepticism, and despair inhibit the search. Many more harmful things can be done with our technology than listening for another civilization. lf it should be successful. probably nothing is more worth using it for. So we have to ask. how should we proceed, and what shall we do if we succeed? To the first, there are two simple and prudent answers. Let us give more thought to possible worlds so as to prepare ourselves to interpret any evidence we get that they are actual. Here is work for disciplined science-fiction writers, astronomers. biologists, psychologists, sociologists. and linguisticians. l venture to believe that even philosophers might be of some help. Second. let there be world-wide sharing of resources of radio observatories. If all appropriate observatories devote some time to a systematic project of this kind. the costs in other more efficient research can be equitably spread.” But it must be remembered that the search is not worth undertaking unless it is planned to last decades, centuries, or even forever. Such cooperation would be a small stop in bringing about the discovery of how much enlightened intelligence there is on one planet at least, our own.

ETI enables humans to understand their relative insignificance: we are like oysters compared to more advanced lifeforms

**Ball 4** [John Ball is an epistemologist-arrant who works as a radio astronomer at MIT

Haystack Observatory, Dec 14, Extraterrestrial Intelligence: Where is Everybody?, http://www.haystack.mit.edu/hay/staff/jball/etiy.pdf]

The human mind presented with diÆcult new concepts and problems usually needs to work with an analogy based on experience. Electromagnetic radiation, for example, is something like a particle and something like a wave but is really neither particle nor wave. We might b e able to say that our relationship with ETI is similar to some other relationship that we understand. I suggest that we try this analogy: The relationship of mankind with ETI is similar to the relationship of some form of primitive Earth life (PEL) with mankind. But which PEL? And how useful is this analogy? An argument based on relative time scales suggests that the appropriate PEL is an animal such as those in our Ordovician geological epoch, namely mollusks and trilobites. Now I can imagine talking with mammals and birds; indeed I've done it, although the conversation was on a pretty low intellectual level. But oysters? The p oint is that if this analogy is good for anything, then our relationship with typical ETI is probably nothing like the relationship of a primitive human tribe with technological man, which analogy seems to be in the minds of many who propose ETI searches, but instead is more like the relationship of an animal|a rather primitive animal|with mankind. The idea that we shall be welcomed as new memb ers into the galactic community is as unlikely as the idea that oysters will b e welcome**d** as new members into the human community. We're probably not even edible. Mankind should be able to take over our galaxy in a fairly short time| say a few hundred-thousand years|unless somebody else already has. But I think that there are many other civilizations, much older than ours, who might have taken over the galaxy eons ago. Where are they? Where is everybody? Why are we unaware of ETI? As you've probably guessed by now, I don't know either

ETI can expand our understanding of life and pave the way to a better civilization

**Kardashev 79**[N. S., Institute for Space Research, Academy of Sciences, U.S.S.R., Strategy for the search for extraterrestrial intelligence, http://www.sciencedirect.com/science/article/pii/0094576579901449]

The problem of detection and investigation of extraterrestrial intelligence is exceptionally important for mankind from a practical standpoint, for its culture and philosophy. Its importance can even be compared to the importance of the main problems confronting our civilization at the present time, since the information obtained as a result of the discovery of intelligence in the Universe will probably furnish a practical proof of the possibility of further progress and point to ways in which our civilization could be developed over astronomically long periods of time. The use of this information could radically alter our entire concept of life and activity. Interest in solving such a superproblem is growing with each successive year while drawing on the skills of an increasing number of highly competent specialists working in different branches of natural science. At the same time, the basic initial premises as to what we intend to conduct a search for and how to go about it are still controversial and contradictory. The purpose of this article is to attempt a formulation and critical analysis of the basic concepts and research strategies proposed by various scientists

SETI represents the final frontier of anthropocentrism – ETI can finally end dominant understandings of humanity and its relationship to the universe

**Dick 93**[Steven, U.S Naval Observatory, Space Science Reviews, Peer Reviewed Journal, The Search for Extraterrestrial Intelligence and the Nasa High Resolution Microwave Survey (HRMS): Historical perspectives, http://www.springerlink.com/content/m862ww373v388075/]

In the context of the history of science, SETI stands in the tradition of one of the most persistent and elusive problems in the history of Homo sapiens: the quest for humanity’s place in the Universe. For two millennia after Aristotle (4th century BC), that place was defined by the geocentric cosmology of heavenly spheres. This concept of a Universe with the Earth at its center was superseded in the 16th century by the Copernican theory that the Sun was central in the planetary system. Until the twentieth century, anthropocentrists could still harbor hope that at least our solar system was central in the Galaxy of stars of which our Sun is a part, and indeed at the turn of the century many eminent scientists, including Kapteyn (1908) and Wallace (1904), still held such a view (E-igure 1) based on empirical argument. But by 1918 Shapley (1918) had shown that our solar system was at the periphery of the Milky Way galaxy, and was an insignificant conglomeration of matter by comparison to the billions of other suns that composed the Galaxy (Berenzden et al., 1976; Bok, 1974; Smith, 1982). The Galaxy in turn was soon dwarfed by the billions of other galaxies subsequently discovered surrounding it. In physical terms the Earth and the solar system have been successively decentralized since the scientific revolution initiated by Copernicus, leaving no doubt of our unexceptional location in the geography of the Universe. Photographs of M31 (Figure 2), a galaxy similar to our own, symbolically represent the new universe, and are often used in SETI literature to depict graphically the insignificant nature and peripheral position of our solar system. The concept of extraterrestrial life represents, in its broadest sense, the biological dimension to the debate over the status of humanity in the Universe. Even if the Earth were not physically central, the question remains whether it is in any sense biologically central. Science since the 17th century had demonstrated that physical law was universal; the question remained whether ‘biological law' might also be universal. In the broad context of intellectual history, it is imponant to understand that the extraterrestrial life debate - especially the Search for Extraterrestrial Intelligence - represents the last battle over anthropocentrism. It is this aspect that both confers its universal interest and incites such passionate arguments by proponents and opponents.

ETI expands our understanding of humanity

**White 90** [Frank, 1990, The SETI factor, p. 1-2]

What is at stake in the search for SETI is nothing less than our understanding of what it means to be human. SETI challenges us to come to terms with our identity and purpose in this vast universe of which we are a small but impotent part. Human beings learn and grow by asking questions about the nature of things and then setting out to find the answers. The questioning begins with the small child asking, “Why?”; and, for the truly curious adult, the process never ends. The questions are at the heart of science and exploration. The bigger the question, the harder it is to find the answer, and the greater the payoff. It’s like a diving competition – competitors get points for how well they perform the dives, but there is also a degree-of-difficulty rating. The harder the dive, the more points are awarded. We form our identities by comparing ourselves to other people and societies. Without an idea of others, there can be no image of ourselves. “I” am everything that isn’t the “other,” which can be another person, society, the universe, extraterrestrials, or God. The more comprehensive our idea of others, the more we can learn about ourselves, and the greater the expansion of our identity. For example, if I ask myself, “What is my role as a citizen of my country?{ that is a significant question and it makes me think deeply about myself. If I ask, “What is my role as a citizen of planet Earth?” the stakes are higher, and the questioning more profound. But if I ask, “What is my role as a citizen of the universe?” the question has become as broad as it can be, and I’ll have to think long and hard to come up with an answer

Prefer an inclusive understanding of intelligence to attempts to absolutely “know” the natural world

**Zeitlin 06** [Gerry Zeitlin, openseti.org, graduate of Cornell University (B.E.E. 1960) and the University of Colorado (M.S.E.E. 1969). He pursued further graduate studies in physics, astronomy, and astrophysics at the University of California, Berkeley, New Search Strategies, http://openseti.org/NewSearches.html]

Let us return briefly to a high-level view of the ways in which society describes its cosmic situation. I have discussed various myths: the myths of ancient and/or non-western societies, and the myth of the UFO, and said that the scientific myth is one of the presentations of reality that are available. The scientific myth is the description of information gained through application of the scientific method. But there are other methods. In fact the scientific method is not necessarily the most suitable to the topic. On this page I will touch on several other systems of understanding and then return to science, because the scientific institution most visibly and actively claims the right to resolve for society its questions concerning ETI. Don Donderi (2000), Associate Professor of Psychology at McGill University, compares the scientific method with two other routes to an understanding of the world: military intelligence and the rules of legal evidence. In his characterization, the goal of science is "to develop a consistent understanding of the inanimate and the animate world." Drawing on Kuhn, he points out that science constructs and continually modifies a picture of nature that is never complete. The process often requires scientists to ignore evidence that does not fit current paradigms or new developing paradigms. In contrast, legal evidence must be relevant to a theory or fact that is to be proved, material to a question at issue in the case, and admissible in that it has been obtained according to procedures that eliminate, for example, hearsay testimony. The theory or fact is related to a case being tried in court, which could be any question or issue needing to be resolved in that manner. Military intelligence will consider any information relevant to its mission, collecting and collating facts from multiple sources without preconceptions. After all, the analyst's job is to "protect us from surprise attack from enemies we may not have suspected, and by weapons we may not have imagined."50 Which of these three approaches would you think the best suited for learning the truth about ETI? Donderi, in the context of UFOs, which we might consider a special part of our larger question of ETI existence, finds military intelligence the profession best suited to observe, analyze, and recommend action. This reminds us of Jacques Vallee's (1979) encounter with a retired counter-intelligence agent:

# space debris add-on

SETI telescopes key to tracking space debris

Vincent 4/27/11 [Alice, writes for WiredUK, “Budget Cuts Shutter SETI’s Search for Aliens”, <http://www.wired.com/wiredscience/2011/04/seti-telescope-shutdown/>]

Although the ATA isn’t the only radio telescope facility which is capable of searching for alien life, it’s the only one dedicated almost wholly to the task. The SETI Institute had plans to use the ATA to listen out for radio emissions from the [extrasolar planets discovered by NASA’s Kepler spacecraft](http://www.wired.co.uk/news/archive/2011-01/11/nasa-kepler-exoplanet). The project is attempting to source new funds, along with new uses for the array. SETI has offered up the ATA’s abilities to help the [U.S. Air Force](http://www.wired.co.uk/news/archive/2010-10/04/aeroplane-upgrades-could-futureproof-us-air-force-fleet) track orbiting debris that could be harmful to defense [satellites](http://www.wired.co.uk/tags/satellites). Pierson says that he’s hopeful that these other uses “will help provide future operating funds”.

\*\*\*TECH SPINOFFS

# competitiveness

**US Competitiveness is on the brink – we’ve dropped in global rankings, but now is key to promote economic growth.**

Allen 10 [Patrick, CNBC Senior News Editor, “US Falls Down Competitiveness League Table,” CNBC, 9/9/10, DA 9/30/10]

The United States fell two places to fourth position behind Switzerland, Sweden and Singapore in this year's World Economic Forum's "Global Competitiveness Report." The US fell further in the competitiveness table, after losing the top spot last year. Having been knocked off top spot by the Swiss last year, a number of factors are making the US less competitive, according to the WEF. "In addition to the macroeconomic imbalances that have been building up over time, there has been a weakening of the United States' public and private institutions, as well as lingering concerns about the state of its financial markets," the report said. All the uncertainty is making life very difficult for governments and central banks, Klaus Schwab, the founder of the World Economic Forum which hosts its annual meeting in Davos every January, said. "Policy-makers are struggling with ways of managing the present economic challenges while preparing their economies to perform well in a future economic landscape characterized by uncertainty and shifting balances," Schwab said. "In such a global economic environment, it is more important than ever for countries to put into place the fundamentals underpinning economic growth and development," he said. Following the election of David Cameron's coalition government, the UK has gained one place to 12th and the major emerging markets continue to rise up the rankings. "The People's Republic of China at 27th continues to lead the way among large developing economies, improving by two more places this year, and solidifying its place among the top 30," the report said. Among the three other BRIC economies, Brazil (58th), India (51st) and Russia (63rd) remain stable. Politicians must not lose sight of competitiveness following three years of crisis, Xavier Sala-i-Martin, a professor of economics at Columbia University and a co-author of the report, warned. "For economies to remain competitive, they must ensure that they have in place those factors driving the productivity enhancements on which their present and future prosperity is built," Sala-i-Martin wrote. "A competitiveness-supporting economic environment can help national economies to weather business cycle downturns and ensure that the mechanisms enabling solid economic performance going into the future are in place," he said.

Specifically science and technology determine polarity

**Galama Et al 8** [ Titus Galama, James Hosek, RAND Corporation, The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world., http://www.rand.org/pubs/monographs/2008/RAND\_MG674.pdf]

Concern has grown that the United States is losing its position as a global leader in science and technology (S&T). The factors driving this concern include the globalization of S&T, the rise of science centers in developing countries such as China and India, and the perception that the United States is not investing enough in its future given the existing pressures on its S&T enterprise. A loss of leadership in **S&**T could hurt the U.S. economy, living standards, and national security. he Under Secretary of Defense for Personnel and Readiness asked the National Defense Research Institute (NDRI) at the RAND Corporation to convene a meeting to review the evidence and hear the views of experts with relevant knowledge on the perception that the United States is losing its edge in S&T and on the potential implications for national security. he meeting was held on November 8, 2006, in Washington, D.C. Papers prepared for the meeting have been published in a companion volume, Perspectives on U.S. Competitiveness in Science and Technology (Galama and Hosek, 2007), and are available online through the RAND Web site. he present volume, which draws on and adds to the papers prepared for the November 8 meeting, aims to provide an overview of facts, challenges, and questions posed by the possible erosion of U.S. S&T leadership and to discuss policy implications and provide recommendations

Technological innovation key to maintain military dominance

**Galama Et al 8** [ Titus Galama, James Hosek, RAND Corporation, The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world., http://www.rand.org/pubs/monographs/2008/RAND\_MG674.pdf]

In this report, we have focused primarily on U.S. competitiveness in S&T, without considering the implications for national security. Past research indicates that globalization of S&T complicates national security: he United States is less capable of denying other nations access to advanced technology to maintain a wide military capability gap between itself and potential adversaries. Technological capability is more widely diﬀused to potential competitors and may provide adversaries with capability to pursue nontraditional strategies and tactics on the battleﬁeld or through insurgency and terrorism. Nevertheless, past research concludes that attempts to regulate or limit the diﬀusion of some (but not all) sensitive defense technology might have harmful long-term consequences and might not even be beneﬁcial in the short term.

Competitiveness key to heg

**Galama Et al 8** [ Titus Galama, James Hosek, RAND Corporation, The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world., http://www.rand.org/pubs/monographs/2008/RAND\_MG674.pdf]

On October 20, 2005, House Science Committee Chairman Sherwood Boehlert took to the podium before his committee colleagues and made a dramatic pronouncement: “Complacency will kill us. If the United States rests on its withering laurels in this competitive world, we will witness the slow erosion of our pre-eminence, our security, and our standard of living. It’s a sobering message” (Boehlert, 2005). Boehlert was opening a hearing of the House Science Committee, titled “Science, Technology, and Global Economic Competitiveness.” He drew his grim warning from a report by the National Academy of Sciences (NAS) being unveiled that day titled Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Future (NAS, 2006). his document came to be the most well known of a wave of reports that had preceded—and which followed—it, all cautioning that the United States is at grave risk of being unable to compete in the 21stcentury global marketplace because of its steadily declining leadership in science and technology (S&T). Addressing their opening letter “To Leaders Who Care About America’s Future,” the authors of a 2005 Business Roundtable document warn: Today . . . [o]ne of the pillars of American economic prosperity— our scientiﬁc and technological superiority—is beginning to atrophy even as other nations are developing their own human capital If we wait for a dramatic event—a 21st-century version of Sputnik—it will be too late. here may be no attack, no moment of epiphany, no catastrophe that will suddenly demonstrate the threat. Rather, there will be a slow withering, a gradual decline, a widening gap between a complacent America and countries with the drive, commitment and vision to take our place.” (Business Roundtable, 2005) Other reports bear such disquieting titles as Tough Choices or Tough Times (he New Commission on the Skills of the American Workforce, 2007), he Looming Workforce Crisis (National Association of Manufacturers, 2005), he Knowledge Economy: Is the United States Losing Its Competitive Edge? (Task Force on the Future of American Innovation, 2005), and Oﬀshore Outsourcing and America’s Competitive Edge: Losing Out in the High Technology R&D and Services Sector (Oﬃce of Senator Joseph I. Liebermann, 2004). Coming from multiple corners—the private sector, academia, government, and policy think tanks—they provide an abundance of data all pointing to the same conclusion: the eﬀects of globalization, 1 combined with an erosion of the nation’s domestic S&T enterprise, may spell serious trouble for the United States.

# General links

SETI leads to spin off tech – 10 dollar return for every dollar spent

**Zax 4/16** [Jacob, Science Writer for the Atlantic, Smithsonian, and Moment, 4/26/11, Why Searching For Aliens Is Good For Business, http://www.fastcompany.com/1749917/why-searching-for-aliens-is-good-for-business]

The SETI Institute has stopped listening for aliens, a casualty of government budget cuts. The business community and private donors should pony up. Here's why it's not as crazy as it sounds. Nerds everywhere today are in mourning. Funding for the SETI Institute in Mountain View, Calif., has dried up, meaning the search for extraterrestrial intelligence lost one of its champions. In an letter dated April 22nd, reports the San Jose Mercury News, SETI Institute's CEO, Tom Pierson, reported that the array had to be put into "hibernation." The equipment will be maintained, but won't be able to operate--the government funding simply isn't there. After choking back our tears and shaking our heads in remembrance of Carl Sagan, we began to wonder what the implications were for technology. Would the SETI@home project, which we've covered numerous times in the past, be disrupted, and if so, what of the general project of distributed computing? Seth Shostak, Senior Astronomer at the SETI Institute, says that the Institute never contributed data to SETI@home, which is pretty much exculsively a UC Berkeley initiative, so distributed computing won't feel any repercussions from the recent news. But that doesn't mean that high technology, and the economy, didn't arguably sustain a real blow today, along with the hopes of making contact anytime soon. The economy and businesses did stand to benefit from SETI, and not just because of trading opportunities with denizens of the Orion Belt. "I think it would be a bit of an exaggeration to say that SETI enterprise is going to create vast new markets," Shostak tells Fast Company. "But there is this: the kind of tech that is developed for SETI, these antenna arrays, monitor 100 million channels simultaneously. There's no commercial application for that now, but the lesson of history is that whenever you develop a new technical capability, you often find an interesting market for it." The shuttering of the SETI Institute should provide a reminder that basic research, while often a hard sell in the face of budget cuts and social problems, should not be neglected. "Basic research eventually does have spinoffs," says Shostak, citing studies to the effect that even long before commercial space travel became a thing, NASA was returning an estimated 10 dollars for every dollar that was spent on it "simply because of the technology that was developed," says Shostak. "That's the general lesson of basic research, just done for curiosity--it usually returns on the order of 10 times the expenditures. Cancer will probably be cured by the basic research, not the applied research." Shostak says that the Institute is hoping for alternative funding streams. The U.S. Air Force had used the array as a test bed, and there's some hope they might revive it; the Institute is also reaching out to private donors. The dearth of funding comes just as SETI was becoming truly exciting; astronomers have recently been able to identify candidates for planets that might have liquid oceans, says Shostak. As he put it to the Mercury News, this is like having "the Niña, Pinta and Santa Maria being put into dry dock." But remember, if you're going to pony up for SETI, you don't even have to do it for the sake of exploration, or science, or knowledge, or cosmic connectedness. Do it for the American economy, or for something even more selfish--your gadget lust. The entire gadget industry, Shostak added, more or less rests on the shoulders of a handful of men and women who just wanted to ask some basic questions about the universe. The modern semiconductor industry relies on quantum mechanics, a field that seemed so oddball over a hundred years ago that even Einstein found it too wacky. "The people doing this, they weren't thinking of products," says Shostak. And yet that's what resulted; the vacuum tube gave way to the transistor. "You wouldn't have that if it weren't for a few people just being curious about why hydrogen labs were misbehaving in the lab 100 years ago," says Shostak.

SETI spills over into multiple areas of scientific knowledge

**Tough 98** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]

Some universities and schools offer single courses on SETI or “Life in the Universe”. Courses on cosmic evolution can include life in the universe and SETI. In addition, some broad-gauge educational programs begin with SETI or are centered around SETI. This focus then leads to the necessity of understanding many scientific concepts from a wide range of disciplines. The broad appeal of extraterrestrial life attracts students to educational programs that then teach them about astronomy, geology, biology, and linguistics. At the 1993 Bioastronomy Symposium, specific educational projects were described by Thomas Pierson[10](the SETI Institute’s “Life in the Universe” guidebooks for grades 3–9), Andrew Fraknoi[11](classroom and teachers’ materials from the Astronomical Society of the Pacific), Roberta Vaile[12](a course at the University of Western Sydney, Macarthur), and Carl Helmers[13](the educational role of a periodical such as his own SETIQuest™). And of course the Planetary Society and other organizations might also be viewed as highly effective educational efforts whose influence reaches far beyond schools and universities. Fraknoi also mentioned the annual CONTACT meeting founded by Jim Funaro several years ago. That meeting includes not only papers and symposia, but also a portion called “Cultures of the Imagination”. Long before the conference, an alien planet and culture are meticulously developed. The conference itself often involves contact on the third day between the alien team and a human team. The CONTACT group is also exploring how to foster similar exercises of the imagination in schools.

Tech spinoff

**Tough 98** [Allen, University of Toronto, Prof. Allen Tough is a noted social scientist, author, educator, and futurist, Positive consequences of SETI before detection, Acta Astronautica Volume 42, Issues 10-12, May-June 1998, Pages 745-748]

Like any scientific enterprise, SETI provides jobs for dozens of people. In addition, SETI provides various spin-offs, such as search methods, highly sophisticated computer programs, uniquely capable signal detection hardware (possibly useful in medical diagnosis), and a remarkable degree of international scientific cooperation. Also, the search for extraterrestrial life is often used as a justification for other scientific projects, such as the search for planets beyond the solar system and the investigation of star and planet formation.

Funding solves tech innovation, and risk of ETI outweighs cost

**Penny 11** [Alan, Jan 19, Journal of Astronomy and Geophysics, University of St. Andrews, SETI: peering into the future, http://onlinelibrary.wiley.com/doi/10.1111/j.1468-4004.2011.52121.x/full#]

Given the negative results so far, is it worth going on? We do not know what ETIs are like, so we cannot say how large the phase space of possible ETIs is and thus we neither know if we are looking in the best way nor what our chances of success are. Many SETI searchers remain optimistic. The quotation from Cocconi and Morrison's 1959 foundational paper that “The probability of success is difficult to estimate; but if we never search, the chance of success is zero” has many supporters. However, without knowing the nature of ETIs we cannot estimate by how much we improve our chances by any particular SETI search. Within the next decade we should be able to rule out (or discover) leakage radiation similar to our own from nearby habitable Earths – but the chance of hitting the perhaps thousand-year window for such radiation for a planet millions or billions older or younger than us must be very small. The author's personal opinion is that although we cannot know what our chances are it would be a failure of nerve not to go on looking, as long as each new search does cover significant new phase space at a reasonably modest cost. Planned radio searches will get more powerful, from the privately funded ATA array partly dedicated to SETI searches, to the use of new telescopes such as the European LOw Frequency ARray (LOFAR), for which the author is PI on a SETI Pilot Programme, and the South African 64-dish MeerKAT array, which has recently announced that it wishes to “explore further the potential for SETI”. And there is the giant Square Kilometre Array (SKA), on which funding decisions are imminent, to come. With advanced receivers, electronics and software we are poised for another giant step forward. A major present limitation is in the electronics and computing and so Moore's Law predicts an exponential growth in capabilities, especially with wide-band receivers and telescope aperture arrays that lead to simultaneous part- and all-sky coverage. Included with growth in the other types of searches, such as the nanosecond-pulse optical surveys, new solar system surveys, searches of new catalogues, and investigations into unexplained phenomena, the next decade is poised with possibilities to greatly extend the ETI phase space exploration. Presently we are limited by the almost total lack of public funding. When I speak to the public about SETI and tell them that almost none of their taxes supporting astronomy goes to SETI they are amazed that such an interesting field is being ignored. If the panels of the astronomy funding agencies were to decide to fund SETI at a level of just one half of one percent of their budgets, SETI would be transformed, and much more powerful and wide-ranging searches could be done. That would be an inspiring thought for us all – that we were taking the search seriously and in this journey into the unknown the human race is truly looking outward.

SETI spills over into breakthroughs in all other areas of science

**Morrison, Billingham, and Wolfe 77**[Philip Morrison, Massachusetts Institute of Technology John Billingham and John Wolfe, NASA Ames Research Center, The Search for Extraterrestrial Intelligence, p.8-9]

Other imaginative and enthusiastic speculators foresee big technological gains, hints and leads of extraordinary value. They imagine too all sorts of scientific results, ranging from a valid picture of the past and the future of the Universe through theories of the fundamental particles to whole new biologies. Some conjecture that we might hear from near-immortals the views of distant and venerable thinkers on the deepest values of conscious beings and their societies! Perhaps we will forever become linked with a chain of rich cultures, a vast galactic network. Who can say? If it is true that such signals might give us, so to speak, a view of one future for human history, they would take on even greater importance. Judging that importance lies quite outside the competence of the members of this committee, chosen mainly from natural scientists and engineers. We sought some advice from a group of persons trained in history and the evolution of culture, but it is plain that such broad issues of the human future go beyond what any small committee can usefully outline in a few days. The question deserves rather the serious and prolonged attention of many professionals from a wide range of disciplines anthropologists, artists, lawyers, politicians, philosophers, theologians even more than that, the concern of all thoughtful persons, whether specialists or not. We must, all of us, consider the outcome of the search. That search, we believe, is feasible; its outcome is truly important, either way. Dare we begin? For us who write here that question has step by step become instead: Dare we delay?

# radio astronomy links

Radio astronomy empirically attracts private investment, causes tech spillover, and increases competitiveness

**NRAO 6** [Radio Astronomy Contributing to American Competitiveness October 2006 Compiled by the staff of the National Radio Astronomy Observatory (NRAO). The NRAO is operated by Associated Universities, Inc., under Cooperative Agreement with the National Science Foundation]

Radio astronomy is an exemplary national resource that increases American competitiveness in many ways. It contributes uniquely and significantly to our understanding of the universe, and has been a catalyst for enhanced scientific training and basic research in many fields. Extreme distances, weak signals, and vast amounts of astronomical data require instrumentation and processing that pushes the state of the art to its limits. Radio telescopes, facilities, and instruments are developed on a scale that requires collaborative effort and greater funding than a single organization can provide. These technical innovations lead to private sector investment in research and development that translates fundamental discoveries into the production of useful and marketable technologies, processes, and techniques that effect our lives each day. Technical innovations developed or enhanced for radio astronomy are found in communication antennas, transistor design, cryogenic coolers, medical and scientific imaging, time and frequency standards, atomic clocks and GPS navigation, precision spacecraft navigation, location of cell phone 911 calls, laser rangefinders, and quasi-optical applications. Radio astronomy tracks solar flares that can cause disruption of earth-based communications, damage to orbiting satellites, and destructive surges on power grids. The vast amount of computing capacity required for Searches for Extraterrestrial Intelligence radio signal processing led to a unique grid computing concept that has been expanded to many applications.

Tech goes to the private sector and the military – GPS

**NRAO 6** [Radio Astronomy Contributing to American Competitiveness October 2006 Compiled by the staff of the National Radio Astronomy Observatory (NRAO). The NRAO is operated by Associated Universities, Inc., under Cooperative Agreement with the National Science Foundation]

Radio astronomers developed very long baseline interferometry (VLBI) to achieve resolutions of celestial objects that are more than a hundred times better than the Hubble Space Telescope. VLBI stations require exceptional frequency stability and time synchronization. At the present time, only active hydrogen masers can provide this required long-term stability. Hydrogen masers, which produce the 1420-MHz hyperfine transition of atomic hydrogen as their fundamental output, were developed as an experimental time standard at the National Bureau of Standards. Prior to the time when their use became necessary in VLBI work, there was no commercial source for this laboratory device. Reliable, field-ready, hydrogen masers were subsequently developed by the Smithsonian Astrophysical Observatory and at NASA/Johns Hopkins Applied Physics Laboratory in order to provide each individual VLBI antenna with its own hydrogen maser frequency standard. These designs have been developed into commercial products that are used today for space communications, satellite navigation, and defense applications. For thousands of years the rotation of the Earth was the fundamental clock to which all time keeping was synchronized. However, the Earth’s rotation rate is quite variable. Since 1950 there has been a gradual migration of time standards to atomic time, as defined by the fundamental oscillation frequencies of atoms, including the simplest one, hydrogen. Precise navigation requires an extremely accurate connection between Earth rotation rate and atomic time, and a key element of this synchronization is VLBI. The most stable reference frame is formed by the positions of extremely distant radio galaxies and quasars. VLBI antennas are fixed to Earth, and thus they can measure Earth’s rotation with respect to distant objects with great precision. Using this precision technology, the International VLBI Service (IVS) was established as an international collaboration of organizations that supports geodetic, geophysical, and astrometric research. Some of its products are a terrestrial reference frame, the international celestial reference frame, and Earth orientation parameters. All IVS data and products are archived in data centers and are publicly available for research in related areas of geodesy, geophysics and astrometry. The GPS satellite system, used by everyone from astronauts and pilots to motorists and hikers, has its time and position system tied to Earth and the cosmos by the IVS. Each GPS satellite has four small atomic clocks that use either rubidium or cesium atoms to send precise time information to GPS navigation systems. The rubidium and cesium atomic clocks are very accurate, but are not as accurate as larger hydrogen maser atomic clocks that are located at ground stations around the earth and are used to reset the satellite clocks when they drift in time.

# radio astronomy impacts

Solves competitiveness

**NRAO 6** [Radio Astronomy Contributing to American Competitiveness October 2006 Compiled by the staff of the National Radio Astronomy Observatory (NRAO). The NRAO is operated by Associated Universities, Inc., under Cooperative Agreement with the National Science Foundation]

New radio astronomy initiatives have the potential for dramatic increases in American competitiveness in multiple sectors. Radio astronomy is entering a new phase of its development which requires unprecedented increases in the sensitivity of its instruments. Development of low cost components may have direct benefits to several commercial markets, such as the construction of smaller and less costly satellites that require smaller and less expensive rocket boosters. Cryogenic refrigerators required for low noise radio astronomy receivers may have application in the high-performance semiconductor industry. Integration of wideband receivers with data transmission electronics has the potential for expanding the reach of data services to underserved regions of the country and the world. It is clear that radio astronomy is a valuable national resource that not only increases our fundamental knowledge of the universe, but also contributes significantly to American competitiveness. Only a few endeavors lead to a wide variety of useful and marketable technologies, processes, and techniques, and at the same time, stir the imagination of young and old minds alike. Radio astronomy is one of them

Competitiveness key to heg

Zalmay **Khalilzad**, policy analyst at RAND, The Washington Quarterly, Spring ‘**95**

The United States is unlikely to preserve its military and technological dominance if the U.S. economy declines seriously. In such an environment, the domestic economic and political base for global leadership would diminish and the United States would probably incrementally withdraw from the world, become inward-looking, and abandon more and more of its external interests. As the United States weakened, others would try to fill the Vacuum. To sustain and improve its economic strength, the United States must maintain its technological lead in the economic realm. Its success will depend on the choices it makes. In the past, developments such as the agricultural and industrial revolutions produced fundamental changes positively affecting the relative position of those who were able to take advantage of them and negatively affecting those who did not. Some argue that the world may be at the beginning of another such transformation, which will shift the sources of wealth and the relative position of classes and nations. If the United States fails to recognize the change and adapt its institutions, its relative position will necessarily worsen. To remain the preponderant world power, U.S. economic strength must be enhanced by further improvements in productivity, thus increasing real per capita income; by strengthening education and training; and by generating and using superior science and technology.

# computational linguistics -> AI

SETI solves evolution of intelligence

**Penny 11** [Alan, Jan 19, Journal of Astronomy and Geophysics, University of St. Andrews, SETI: peering into the future, http://onlinelibrary.wiley.com/doi/10.1111/j.1468-4004.2011.52121.x/full#]

Over the past 50 years there have been hundreds of papers describing the capabilities of searches and suggesting new methods. There have been as many speculating about the existence, origins, lifetimes and natures of ETIs, about composing and decoding messages, the prospects for interstellar travel and many allied matters. There has been much cross-fertilization with other fields including biology, philosophy, spaceship propulsion, linguistics and planetary science. Is intelligence a convergent property, etc? Some pointers to this extensive body of literature are given in the “Further reading”. An important field for SETI is the evolution of intelligence. Once life is started, does it then always evolve to intelligence? Intelligence seems such a useful attribute that evolution would home in on it, but for two billion years bacteria reigned alone. Since then there have been millions of species on Earth, out of which only one, us, has evolved advanced technology. Were we inevitable? Is evolution convergent? And then there is the “Man from Mars” problem, as it is known in linguistic studies. Can there be ways of communication that are so fundamentally different from our own that the message may be incomprehensible? Concepts such as “signs” and “signifiers” may not be present. How would a communication system based on smells be coded into a radio message?

\*\*\*NEGATIVE

# et don’t exist

ET doesn’t exist

**Tipler 80**[Title: Extraterrestrial intelligent beings do not exist Authors: Tipler, F. J. Journal: Royal Astronomical Society, Quarterly Journal, vol. 21, Sept. 1980, p. 267-281.]

One of the most interesting scientiﬁc questions is whether or not extraterrestrial intelligent beings exist. This question is not new; in one form or another it has been debated for thousands of years (1). The contemporary advocates for the existence of such beings seem to be primarily astronomers and physicists, such as Sagan (2), Drake (3), and Morrison (4), while most leading experts in evolutionary biology, such as Dobzhanslry (5), Simpson (6), Francois (7), Ayala er al. (8) and Mayr (9), contend that the Earth is probably unique in harbouring intelligence, at least amongst the planets of our Galaxy. The biologists argue that the number of evolutionary pathways leading from one-celled organisms to intelligent beings is minuscule when compared with the total number of evolutionary pathways, and thus even if we grant the existence of life on to’ to to" planets in our Galaxy, the probability that intelligence has arisen in our Galaxy on any planet but our own is still very small. I agree with the biologists; I shall argue in this paper that the probability of the evolution of creatures with the technological capability of interstellar communication within ﬁve billion years aﬁer the development of life on an Earth-like planet is less than to-1°, and thus we are the only intelligent species now existing in this Galaxy. The basic idea of my argument is straightforward and indeed has led other authors, such as Fermi (re), Dyson (n), Hart (rs), Simpson (6), and Kuiper & Morris (I3), to conclude that extraterrestrial intelligent beings do not exist: if they did exist and possessed the technology for interstellar communication, they would also have developed interstellar travel and thus would already be present in our solar system. Since they are not here (14,15), it follows that they do not exist. Although this argument has been expressed before, its force does not seem to have been appreciated. I shall t.ry to rectify this situation by showing that an intelligent species with the technology for interstellar communication would necessarily develop the technology for interstellar travel, and this would automatically lead to the exploration and/or colonization of the Galaxy in less than 300 million years.

Drake’s equation hasn’t found anything out there – ETIs don’t exist

Schneiderman 10 [Ron, signal processor, “SETI – Are we (still) alone?” <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5438954&tag=1>]

Dr. Frank Drake (formerly the board chair of the SETI Institute, and still involved in SETI activities) was a young astronomer working at the National Radio Astronomy Observatory in Green Bank, Virginia, when he estimated the number of technical civilizations that may exist in the galaxy. It quickly became known as the Drake equation, and identifies specific factors thought to play a role in the development of these civilizations although, after years of searching, some SETI scientists aren’t as comfortable with Drake’s thinking as they used to be. The equation, first presented by Drake in 1961, was originally written as N 5 R\* **.** fp **.** ne **.** fl **.** fi **.** fc **.** L, where ■ N 5 is the number of civilizations in the Milky Way Galaxy whose electromagnetic emissions are detectable. ■ R\* is the rate of formation of stars suitable for the development of intelligent life. ■ fp is the fraction of those stars with planetary systems. ■ ne equals the number of planets, per solar system, with an environment suitable for life. ■ fl is the fraction of life-bearing planets on which intelligent life emerges. ■ fi equals the fraction of life-bearing planets on which intelligent life emerges. ■ fc is the fraction of civilizations that develop a technology that releases detectable signs of their existence into space. ■ L is the length of time such civilizations release detectable signals into space.

# politics: popular

Plan popular – public

**Oliver 4** [ Bernard, Member, Editorial Board of COSMIC SEARCH Magazine, Cosmic Search Vol. 1, No. 2 Editorial: Let's Get SETI Through Congress, http://www.bigear.org/vol1no2/edit.htm]

SETI has enormous popular appeal. Its inclusion as a NASA program would be hailed by the voting taxpaying public who, in general, care little about the scientific discoveries space has produced, but who are enormously interested in the prospect of other intelligent life. Unscientific motion pictures and fraudulent books about extraterrestrial life enjoy unprecedented popularity today. Surely a soundly based, scientific program would be accepted. In fact, most laymen assume that a SETI program is already going on. Isn't it time NASA lived up to this popular belief?

SETI bipartisan

**Cowing 01** [Keith, July 17, Biologist and Editor of NASA Watch, This website is read regularly within NASA, Congress, and the global space community. Is there Intelligent Life in Washington?: Congress holds hearings on 'Life in the Universe', http://www.spaceref.com/news/viewnews.html?id=373]

Subcommittee chairman **Rep. Dana Rohrabacher** (R-CA) **opened the hearings by reading** from a prepared statement: "I have always enjoyed Hollywood movies like "War of the Worlds", "Independence day", and "The Day the Earth Stood Still". Unfortunately, the popularity of such movies changed our expectations regarding the search for extraterrestrial life in the universe." "I don't know if little green men exist. I do know that the science community is attempting to determine the existence of basic life on planets neighboring Earth, as well as planets beyond our solar system. With the help of scientific methods, we are just now beginning to answer a question that has existed since the dawn of humankind: are we alone? Today's hearing will review real efforts concerning the search for life elsewhere in the universe. I want to thank the distinguished member from Texas, Lamar Smith, for suggesting that the Subcommittee review this topic." "Unlike Hollywood movies, Viking and Mars Pathfinder space probes allowed us to actually view the real Martian landscape, consider the possibility of water for supporting basic life forms on Mars, and search for intelligent life across the universe. Indeed, Earth itself has provided us with valuable insight as to the possible nature of extraterrestrial life. Today we look to our panel of experts to explain how science will help us sort fact from fiction." Rep. Lamar Smith (R-TX) then spoke. Echoing Rohrabacher's comments about the influence of science fiction movies on the public's perception of alien life he said "every summer it seems we have a blockbuster movie about this topic." He went on to suggest that "were we to discover life elsewhere in the universe it would be one of the most profound discoveries ever made." Lamar then quoted the beginning of T.S. Elliot's "Four Quartets": "We shall not cease from exploration And the end of all out exploring Will be to arrive where we started And know the place for the first time." Smith added that author Timothy Ferris has said that the fourth line of this poem is "cosmology's credo." Smith said "We should search the sky for evidence fog intelligent life. Not listening relinquishes hope that life exists elsewhere in the universe. We need to search for life elsewhere - this is a centuries old quest. He went on to praise the square kilometer array as well as the Terrestrial Planet Finder (TPF) and the Next Generation Space Telescope (NGST) saying that "these tools give us the power to move forward in asking the centuries old question "are we alone." Ranking Minority member Bart Gordon (D-TN) spoke briefly echoing previous statements that asking "Whether or not there is life beyond Earth is a fundamental question facing humanity." He posed a general question for the witnesses " What are the assumptions underlying your research and why are they valid?" Rep. Nick Lampson (D-TX) added his voice noting that the recent launch of the MAP mission "will explore the distant past of the universe allowing us to learn things that will make a difference both

# politics: unpopular

Plan unpopular

AP 01 [Associated Press, 7/14/01, Congress welcomes testimony on search for alien life, http://chronicle.augusta.com/stories/2001/07/14/tec\_318757.shtml]

In 1994, some members of Congress ridiculed the SETI Institute and its efforts to detect radio signals from alien civilizations, calling the effort "a search for little green men." The SETI concept fell so far out of favor that the National Science Foundation put a notation on its Web site that proposals for SETI research were not welcome. Christopher F. Chyba, a leader of the SETI Institute in California, said that since losing its congressional funding, the program has been supported by private donations, has about 120 employees, and is regularly searching for signals on two million radio channels using a major radio telescope in Puerto Rico. Chyba said SETI, in partnership with the University of California, Berkeley, is now building a $30 million radio telescope array that will be able to listen to signals from the nearest one million stars in many channels.

The public doesn’t have confidence in the SETI research – funding has been cut

Cokinos 6/18/11 [Christopher, LA Times Reporter, “Funding Cut to the Search for Extraterrestrial Intelligence and the Death of Curiosity”, <http://articles.latimes.com/2011/jun/18/opinion/la-oe-cokinos-seti-20110618>]

Certainly we don't cotton to the idea of being alone. We yearn for the big signal from the stars, the cosmic hail. When Stephen Hawking warns us against contacting E.T. because we might end up invaded by Klingons, we argue about it around the water cooler. We thrill to "Contact" and "District 9" and play video games featuring tentacled aliens. We tune in when Carl Sagan and Timothy Ferris explain outer space on TV. Yet we're surprisingly unwilling to put our money where our imaginations want to roam. News that the Allen Telescope Array is "hibernating" — a curiously biological term for shutting down 42 radio telescopes designed to listen for signs of life from other worlds — raises questions about our true commitment to the search for extraterrestrial intelligence. The National Science Foundation recently slashed the University of California's budgets for the Allen array by 90%. This, along with state cuts, has left UC Berkeley, which operates the Hat Creek, Calif., array in the Cascade Mountains, and the private SETI Institute, which conducts searches, in the lurch.

# PRIVATES CAN DO IT

SETI’s only hope for the future lies with the private sector

Cokinos 6/18/11 [Christopher, LA Times Reporter, “Funding Cut to the Search for Extraterrestrial Intelligence and the Death of Curiosity”, <http://articles.latimes.com/2011/jun/18/opinion/la-oe-cokinos-seti-20110618>]

For now, the phone is off the hook — as it was in 1994 when Sen. Richard Bryan (D-Nev.) derided NASA's "Martian chase" and successfully shut down its SETI — "Search for Extraterrestrial Intelligence" — program. It would cost each U.S. taxpayer just 3 cents a year to fund the Allen array, according to SETI Institute Senior Astronomer Seth Shostak. But in this political environment, direct taxpayer support is unlikely, so the SETI Institute is trying to raise $5 million to reboot the array. Donors such as Microsoft's Paul Allen stepped up after NASA's project died; it's for him that the array is named. In fact, SETI's best hope may be the private sector. Privately financed astronomy is nothing new. In the 18th and 19th centuries — the heyday of private observatory building — such work was in part spurred by interest in alien life.

Funding for SETI programs have been cut so privates are taking over

Penny 1/19/11 [Alan, astronomer, “SETI: Peering into the Future”, http://onlinelibrary.wiley.com/doi/10.1111/j.1468-4004.2011.52121.x/full]

The main limit on these searches is funding. There are almost no public funds. Very little sustained work is done outside the US, and within the US the main work is done through private funding and the efforts of determined individuals at Berkeley and Harvard. The SETI Institute, which grew out of the NASA work of the 1970s and 80s, is privately funded and the Berkeley and Harvard projects are done from within radio astronomy and electronics groups with university funding and private support. Outside radio and optical searches there is almost no concerted academic work on the other areas of ETI phase space such as solar system searches or catalogue analysis. Theoretical work depends on the intermittent interest of individuals. There is a lack of resources to fund fresh blood

# alien contact is bad

The expectation of a savior from outerspace just punts our problems here on earth and creates policy paralysis

**Regis 87** [Edward, 1987, Department of Philosophy, Howard University,  He specializes in books and articles about science, philosophy and intelligence. His topics have included nanotechnology, [transhumanism](http://en.wikipedia.org/wiki/Transhumanism) and [biological warfare](http://en.wikipedia.org/wiki/Biological_warfare), Extraterrestrials: science and alien intelligence, p.13-14]

Myth, religion, and now Science-fiction with their tales of benevolent and malevolent extraterrestrial beings are commentaries on the human condition. I believe even responsible scientific speculation and expensive technology of space exploration in search for other life are the peculiarly modem equivalent of angelology and Utopia 'or of demonology and apocalypse. ln the sixteenth and seventeenth centuries there was a deep pessimism about the decline of nature, polluted by the sins of man.” Nature was redeemed if there were higher beings in the universe. so all was not lost even though man and earth were corrupt. There was the silence of infinite space which frightened Pascal; he suffered a ‘Brunonian shock” upon moving out of a friendly sphere into a lifeless infinite mechanism. This shock could be ameliorated by seeing the stars as other homes and the universe as friendly to life after all. We are now suffering from technological shock, destroying by radiological and chemical, if not moral, pollution the only abode of life we know. Are we not enough like our ancestors to respond with the same desperate hope they did? Exobiology recapitulates eschatology. The eschatological hope of help from heaven revives when the heavens of modern astronomy replace the Heaven of religion. That we can learn from more advanced societies in the skies the secret of survival is the eschatological hope which motivates, or at least is used to justify, the work of exobiologists.” But somewhat like people who object to spending money needed in the ghettoes on exploring the moon, I think the best hope for our survival is to be based on understanding human predicaments here on earth, not expecting a saving message from super-human beings in the skies.

History proves – clash of civilizations is always bloody

**Shuch 11**[Paul, Searching for Extraterrestrial Intelligence, A retired professor of physics, astronomy, and engineering, H. Paul Shuch is credited with the design of the first commercial home satellite TV receiver. Executive director (now emeritus) of the grass-roots nonprofit SETI League since 1994. p.434]

Interstellar space may hold only the wise, grandfather types predicted by Cornell-based SETI founders Frank Drake and Carl Sagan. Kindly ancient ones may welcome us into their advanced, pacific civilization. On the other hand, consider our own practical experience over the last 6000 years, when various human cultures have collided with each other here on Earth. In history, “first contact” has seldom been gentle and benign. At best, cultural values were shaken, requiring painful readjustments. At worst, the outcome was often genocide. In other words, altruism appears to have been as rare for intra-human firstcontact experiences as it is between animal species. Yes, that may change. We may yet become a civilization that lives and works under codes such as the famous “Prime Directive”. Even if this is not now in our nature, we may choose to change that nature, turning ourselves into truly noble beings. This is our ambition and hope for the future. Still, it is wise to remember our context and our past. Bearing this history in mind, SETI pioneer Phil Morrison said: “I share the idea of caution before any reply.

ETI contact results in alien conflict and extinction

**Moskowitz 10** [Clara, Space.com senior staff writer, Do We Dare Let Aliens Know We're Here?, Scientist Says, http://www.space.com/8955-aliens.html]

SANTA CLARA, Calif. ? Even if humanity could reach out to an intelligent alien civilization, scientists are polarized over whether we should. Famed astrophysicist Stephen Hawking has argued that the extraterrestrials we contacted would be likely to harm us, a view that divided the experts here at the SETIcon convention. "No one can say that there is no risk to transmitting," John Billingham, former chairman of the SETI (Search for Extraterrestrial Intelligence) Committee of the International Academy of Astronautics, said via a statement read at the convention Sunday. "Personally, I agree with Hawking and think it may be unwise to transmit." However, Douglas Vakoch, director of interstellar message composition at the SETI Institute, said of aliens: "Even if they tend to be hateful, awful folks, can they do us any harm at interstellar distances?"? Up to now, the efforts of SETI have concentrated on receiving and recognizing signals from non-natural sources in space. Hawking, 68, claimed that any civilization with which humanity could communicate is likely to be much older and more technologically advanced than ours. So they would probably have the ability, and possibly the motive, to eradicate humanity and strip-mine our planet for parts. It would be safer not to actively broadcast our presence, he said.

Contact bad – human enslavement

**Bauma et al** **10** [Seth D. Bauma, Jacob D. Haqq-Misrab, and Shawn D. Domagal-Goldmanc, Department of Geography, Pennsylvania State University, Department of Meteorology, Pennsylvania State University, NASA Planetary Science Division, Acta Astronautica Volume 68, Issues 11-12, June-July 2011, Pages 2114-2129, Would contact with extraterrestrials benefit or harm humanity? A scenario analysis]

A selfish ETI is one that places intrinsic value only on properties of itself: its lives, its welfare, etc. The idea of a selfish ETI is quite prominent in discussions of ETI. For example, geographer Jared Diamond [73], drawing from his expertise in encounters between different intelligent populations on Earth, argues that astronomers are often overly optimistic about ETI encounters: The astronomers and others hope that the extraterrestrials, delighted to discover fellow intelligent beings, will sit down for a friendly chat. Perhaps the astronomers are right; that is the best-case scenario. A less pleasant prospect is that the extraterrestrials might behave the way we intelligent beings have behaved whenever we have discovered other previously unknown intelligent beings on earth, like unfamiliar humans or chimpanzees and gorillas. Just as we did to those beings, the extraterrestrials might proceed to kill, infect, dissect, conquer, displace or enslave us, stuff us as specimens for their museums or pickle our skulls and use us for medical research. My own view is that those astronomers now preparing again to beam radio signals out to hoped-for extraterrestrials are naïve, even dangerous. While Diamond is correct in noting that many astronomers neglect the potential perils of an ETI encounter, it would be a mistake to assume that astronomers are uniformly naïve in this regard. For example, Nobel Laureate astronomer Sir Martin Ryle opposes active efforts to communicate with ETI due to concern that humans would be attacked [36], [74] and [75]. Similar concerns have been raised by several others [26], [43], [76] and [77]. Even Carl Sagan, who is usually quite optimistic about ETI encounters, has expressed concern regarding ETI risks [14]. A common theme underlying the pessimism of these various commentators is the likelihood that ETI would be more advanced than humanity. A core concern is that ETI will learn of our presence and quickly travel to Earth to eat or enslave us. Predation is common among life forms on Earth because it can be more efficient to prey upon other biota than it is to independently utilize autotrophy for energy, carbon fixation, and other nutrients for cellular material [78]. This may be less of a concern if the chirality of organics on Earth is poorly suited as a universal food source [78]. Additionally, an advanced society capable of interstellar travel may be less likely to turn to humans as a source of food or labor because they should have already solved these problems through some combination of machine labor, artificial synthesis, and conservation [14]. Nevertheless, other selfish motives may cause ETI to harm us, such as their drive to spread their beliefs through evangelism (akin to the spread of Christianity or Islam) or their desire to use humans for entertainment purposes. As Shklovskii and Sagan [14] discuss: Or perhaps human beings have some relatively uncommon talent, of which they are themselves entirely unaware. J.B.S. Haldane once pointed out to me that sea lions and seals have a remarkable ability to balance a rubber ball on their noses, which is part of the reason we maintain them in captivity. Thus in one ETI contact scenario, the ETI use humanity for entertainment purposes just as we use sea lions and seals for this. Shklovskii and Sagan [14] continue to point out that ETI may desire to be the sole galactic power and will eliminate other life forms when they start to get in the way. Similarly, an ETI may simply be interested in using us as a means for growth of their economy. On an individual level they may not be interested in killing us, but may be interested in incorporating us into their civilization so they can sell us their products, keep us as pets, or have us mine raw materials for them. Such a scenario could be harmful or beneficial to us, depending on the methods they use to bring us into their society.

Contact causes ET disease spread – extinction

**Bauma et al** **10** [Seth D. Bauma, Jacob D. Haqq-Misrab, and Shawn D. Domagal-Goldmanc, Department of Geography, Pennsylvania State University, Department of Meteorology, Pennsylvania State University, NASA Planetary Science Division, Acta Astronautica Volume 68, Issues 11-12, June-July 2011, Pages 2114-2129, Would contact with extraterrestrials benefit or harm humanity? A scenario analysis]

If humanity comes into direct physical contact with either ETI themselves or some ETI artifact, then it may be possible for humanity to be unintentionally harmed. One of the most prominent scenarios of this kind is the transmission of disease to humanity. This scenario is inspired by the many instances in which humans and other species on Earth have suffered severely from diseases introduced from other regions of the planet. Such diseases are spread via the global travels of humans and our cargo and also through certain other disease vectors. Introduced diseases have been extremely potent because the population receiving the disease has no prior exposure to it and thus no build-up of immunity. Indeed, disease introductions are blamed for loss of human life so widespread as to have altered the broadest contours of human history [83]. If ETI could introduce disease to humanity, then the impacts could be – but would not necessarily be – devastating. The disease could quite easily be significantly different from anything our immune systems have ever encountered before. The disease could also be entirely unfamiliar to our medical knowledge, and it could potentially be highly contagious and highly lethal. This combination of contagiousness (i.e. high R0 [84]) and lethality (i.e. high mortality rate) is unlikely in existing pathogens because such pathogens would quickly kill their host population and then die out themselves. Furthermore, if we had already encountered such a disease on Earth, then we likely would not be here anymore. However, a disease from ETI would be new to us. It presumably would not be highly contagious and lethal to the ETI themselves or to the other organisms in their biosphere, but it could be devastating to humans and the Earth system. Then again, ETI biology may be so vastly different from Earth biology that no significant interactions between organisms occur. ETI may have their own contagious diseases that are unable to infect humans or Earth-life because we are not useful hosts for ETI pathogens. After all, the ETI diseases would have evolved separately from Earth biota and thus be incompatible. So while there are reasons to believe that an ETI disease which affected humanity would be devastating, there are also reasons to believe that an ETI disease would not affect humanity. It is worth noting that a disease brought by an ETI could harm us without infecting us. This would occur if the disease infects other organisms of interest to us. For example, ETI could infect organisms important to our food supply, such as crop plants or livestock animals. A non-human infection would be less likely to destroy humanity and more likely to only harm us by wiping out some potentially significant portion of our food supply. In a more extreme case, ETI disease could cause widespread extinction of multiple species on Earth, even if humans remain uninfected.

Contact bad – accidental mechanical harm

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One non-biological physical hazard that we could face from direct contact with ETI is unintentional mechanical harm. For example, ETI might accidentally crush us while attempting an unrelated maneuver. This scenario parallels instances on Earth in which humans inadvertently destroy the ecosystems of species that then go extinct. All else equal, humanity would generally prefer not causing the extinction of species, but we often prioritize other matters. Indeed, in many cases we may not have even realized that an endangered species was present until after extinction has occurred. Perhaps ETI could inadvertently destroy humanity under analogous circumstances. In a similar class of scenarios, ETI could inadvertently unleash some harmful force into the galaxy through some act of incompetence, quite possibly harming itself in the process. For example, an otherwise benevolent extraterrestrial civilization could accidentally unleash the extraterrestrial equivalent of an “unFriendly Artificial Intelligence” (uFAI [86]). This ET uFAI would be out of the control of its (benevolent) makers and would likely destroy humanity as it attempted to fulfill whatever objective function it happened to have. The odds that this objective function will happen to benefit humans seems extremely small. Indeed, it may be difficult for humans to create such an objective function even with considerable dedicated effort [86]. In another example, ETI that explore the galaxy using automated self-replicating probes (also known as von Neumann probes) may inadvertently unleash a catastrophic colonization wave that rapidly spreads throughout the galaxy and destroys other civilizations [10] and [26]. Such a scenario may arise either from faulty design of automated probes or from the malicious intent of artificially intelligent probes. Bostrom [48] suggests that such undesirable outcomes could be the result of evolutionary dynamics in which the undesirables are the strong which survive evolutionary pressures. Finally, it is possible that ETI could render some portion of the galaxy uninhabitable via an accident in a physics experiment, just as there are concerns that certain human physics experiments with particle accelerators could be accidentally destructive [87]. Any of these scenarios would involve the ETI accidentally harming humanity and probably also itself

Contact bad – cultural collapse

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There is one final information hazard scenario to consider. In this scenario, contact with ETI serves as a demoralizing force to humanity, with strong negative consequences. In human history, contact between modern society and stone age culture usually leads to the demise of the more primitive society. Likewise, in the event of contact with ETI, humanity may be driven toward global cultural collapse when confronted with ETI technology, beliefs, and lifestyle [88]. Even if the ETI are friendly toward us and give us the choice to accept or reject their knowledge, the vast differences between our respective societies may force the more primitive one (ours) into a demoralizing state of societal collapse. For this reason, if ETI do already know of our presence and if they wish to preserve the integrity of our civilization, then they may choose to reveal themselves to us slowly and gradually in order to avoid a calamitous response [23].