Networking with Our Galactic Neighbors

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ABSTRACT

If we are able to find one extraterrestrial civilization, we should be able to find many. By the year 3000 either we will have abandoned the search for extraterrestrial intelligence, or we will have made progress networking with other civilizations in our galaxy. One alternative is that we will first detect a civilization that, like our own, has not yet confirmed the existence of other distant civilizations. This success will accelerate our search efforts and put us in touch, one by one, with many more extraterrestrial societies. Under this alternative we would be founding members of the Galactic Club, that is the largest network of communicating civilizations within our galaxy. Another alternative is that our initial contact will be with a civilization that is already affiliated with the Galactic Club, with the result that we ourselves are offered membership. Whether we help build the first network of civilizations or are inducted into a pre-existing network could have profound implications for humanity in the year 3000.

Introduction

Growing evidence that principles of physics, chemistry, and biology hold for all times and all places has increased acceptance of the "many worlds" hypothesis.[1,2] A combination of observation, experimentation, and inference suggests that there are many hospitable sites for life in the universe, that the processes that give rise to life are common rather than infrequent, and that there are convergent paths to the evolution of intelligence.[3-5] Even as the improvement of optical telescopes enabled the search for life on neighboring planets during the last decades of the 19th century, the evolution of radio telescopes and information processing technology has encouraged us to seek evidence of life outside of our solar system in the 20th century.[1-5] If the rationale underlying the microwave search is correct, there is a reasonable (50-50) chance of detecting ETI in the next two decades.[6]

A belief that although intelligent life is abundant it is still only sparsely distributed, a conviction that interstellar travel is difficult if not impossible, and devotion to a search strategy intended to detect telltale electromagnetic activity have all led radio astronomers to expect a "minimum detection scenario."[7] According to this orthodoxy, apart from heralding the presence of another civilization in the universe, the first intercept is not likely to be very informative. Either there will be little or nothing to decipher (as in the case of intercepting a navigation beacon), or, because of their advanced nature, we will not be able to understand any information that is superimposed on the carrier wave. If this proves true, then for many years following first contact, all we may know is that we are not alone in our galaxy. This state of relative ignorance could continue for decades, but is unlikely to continue for centuries or millennia.

SETI 3000

Certainly our thinking about contact is influenced by our own life expectancies. But how might our thinking change if we could watch events unfold over the next 50 generations? Undertaking this thought experiment today, we might become more optimistic about the chances of detection. As the years pass we should see vast improvements in our search technology. In slightly over half of the span of one human life we have progressed from monitoring single radio frequencies to monitoring billions of channels at once.[4,5] As we enter year 2000 we anticipate technol-

ogies that will allow us to search for extraterrestrial lasers, identify patterns of energy use that are suggestive of advanced civilizations, image extra-solar planets, and explore other solar systems by means of tiny, inexpensive robot probes.

We could continue for many years without definitive results and still maintain vigorous search efforts. Despite the efficiency of microwave observation, the sky is very large and it will take time to explore it thoroughly. Beyond this, the idea of extraterrestrial companions is heavily if not indelibly ingrained in Earth's cultures and religions and in the popular imagination. Strong beliefs of any type (including those favorable or unfavorable to extraterrestrial life) are notoriously difficult to change. People simply ignore or discount evidence that is inconsistent with their views while embracing evidence that they can interpret as consonant. For a while, the search will be revitalized as we revise our thinking about ET and as new communication and search strategies come on line. Over the long run, however, scientists who are able to maintain a sense of objectivity will lose interest as generations of their predecessors fail to find conclusive evidence. For those of us alive today and perhaps our children and grandchildren, the search will continue, periodically refreshed by new theories, technologies, and hopes. Yet long before 3000, either we will conclude that we were misled by centuries of illusory progress in physics and biology, or we will determine that "we are not alone" in our galaxy.

Contact, if it occurs at all, is likely to occur within the early years of the new millennium. If contact occurs in the near future, then a thousand years from now we will have shifted attention from initial reactions to contact to its long-term effects on people, institutions, and societies. In a thousand years, the minimum detection scenario—if it unfolded at all—would be a chapter in history. The years that SETI scientists anticipate devoting to deciphering and interpreting ET's first message will be long past. If we have found one civilization, we will have found many. Either by a long and circuitous path, or by events that could occur almost overnight, we may become part of a vast interstellar network of civilizations.

The Galactic Club

James Grier Miller's Living Systems Theory applies common principles to analyze biosocial entities at seven hierarchical systems levels.[8] In ascending order these are the cell, organ, individual, group, organization, community, society, and supranational system. Each of these system levels is successively higher in the sense that it encompasses systems at all lower levels (for example, an individual is composed of cells and organs) and is characterized by distinctive emergent properties (for example, consciousness or personality). On Earth, communities and societies evolved slowly over time, and supranational systems have appeared only recently. Supranational systems consist of networked societies that agree to accept decisions from an echelon that is higher than that of any individual member state—for example, individual nations submitting to the decisions of the United Nations or the European Union. Contemporary terrestrial supranational systems tend to be piecemeal and exert only fragmented control over their constituents. The higher echelon may influence only a limited number of activities (for example, mutual defense, international trade, and environmental protection) and participation may require nothing more than abiding by mutually agreed-upon rules. A tight alliance of all of the civilizations in our galaxy would constitute a supranational system, but so would a cluster of neighboring societies that agreed to reserve certain radio frequencies for interstellar communication.

Ronald Bracewell coined the term *Galactic Club* to describe a vast but possibly sparse network of civilizations.[9] A Galactic Club would begin when two technologically advanced societies made contact with one another. More members would be added as each civilization continued to search. In some cases the Club would acquire individual societies, and in other cases it would add clusters of societies that had previously found one another. Some members, perhaps within the same solar system, might be able to visit one another and engage in direct trade, but most members would be bound together by radio or some other efficient communication technology. If, as some theorists surmise, there are many civilizations that are millions of years older than our own,[6] we might expect that there are already one or more incipient Galactic Clubs within the reach of our radiotelescopes. The smallest originating Galactic Club would consist of two members and a mature Galactic Club could have an almost endless membership roster. Quite possibly, interstellar distances would limit size, and even a mature Galactic Club might influence only a part of any given galaxy. A Galactic Club might begin as a loose network of communicating civilizations, develop common

interests and cooperative themes, and eventually evolve into a powerful supranational system. As a supranational system, the Galactic Club would differ from empires and similar arrangements where one member dominates others. As a supranational system, the Galactic Club's decisions would be made at an organizational level higher than that of any individual participating member state.

Drawing from Living Systems Theory[8] and other sources we can make some educated guesses about the characteristics of a Galactic Club.[10,11] First, we might expect a mature Galactic Club to be of immense size. For example, if, in a galaxy the size of the Milky Way, eligible societies were, on the whole, a mere 30 light-years apart, there would be 300 million potential members.[9] Second, we would expect that the Galactic Club would be very stable. Even a major disaster, such as the death of a solar system, would leave most members untouched. Third, we would expect a slow pace of political and social change. Generally, the larger the biological or social entity, the slower its tempo. Because a Galactic Club would be one of the largest social systems imaginable, its processes are likely to be the slowest of all, if for no other reason than because of the time required for interstellar communication. Most likely, authority will be maintained by the control of information, that is, through releasing useful information to members in good standing and withholding information from civilizations that choose not to cooperate. If some members of the Galactic Club have overcome difficulties of interstellar travel, then economic or military sanctions could be available.

The galaxy is old enough that there has been plenty of time for a Galactic Club to form. Why have we seen no evidence of its existence? There are many possibilities here, including failure to conduct a thorough search and inability to recognize (or accept) signs of extraterrestrial intelligence. A Galactic Club does not imply that one civilization (or collection of civilizations) will occupy the entire galaxy, either in person or by means of clunky, self-replicating robots that would have seemed right at home in a 1950s-era science fiction movie. Advanced civilizations may use communications systems that are currently beyond our imagination, or infiltrate the galaxy with nanoprobes, perhaps no larger than a grain of sand, that are not found easily.

We should not be too quick to dismiss sociological explanations of the lack of evidence. As I point out in *After Contact: The Human Response to Extraterrestrial Life*, sociological explanations have been eliminated categorically on the basis that there should be exceptions to any sociological rule.[11] For instance, although there might be an almost overwhelming tendency for maturing civilizations to shift from outward expansion to inner contemplation, there must be at least one civilization interested in colonizing the galaxy. Or, even if 99 percent of the civilizations that arise find it too expensive to migrate to our solar system, at least one civilization should have the resources to do this.

These analyses rest on the shaky assumption that societies are free agents. In fact, societies impose obligations and constraints on one another. Societies run into opposition from other societies, from alliances and coalitions, and from supranational systems. Despite enormous wealth and power, a society might not be free to make itself evident within our solar system, because other societies, alone or in combination, prevent this from happening. For example, among the approximately 180 nations on Earth, at least one would want to take over a small, rich society like Kuwait. In fact, Iraq tried this, but was thwarted by a coalition of other nations. Analogously, it is not necessary for all extraterrestrial societies to voluntarily refrain from entering our solar system. All that is required is a policy on the part of a dominant coalition that exerts control over events in our part of the galactic neighborhood. Could one particularly powerful society subordinate all others? On Earth, societies that have attempted to do this soon run afoul of internal flaws and concerted efforts on the part of alliances and coalitions. Despite some dazzling successes, none has succeeded in imposing its will on our entire planet.

Charter Member or Inductee?

Understandably, current speculation centers on first contact. Where will they be located, and what will they "be like"? How will we react as we learn about their society, and, if our presence becomes known to them, how will they react to us? It is difficult to look beyond first contact, but if and when it does occur it is likely to be only the first contact of many. At some point, Earth itself will become a part of an immense interstellar network. Would our entry into the Galactic Club be a slow and gradual process, or could it occur very rapidly?

If we are charter members, our initial contact will be with another isolated society. Even if we glean very little information about this society, the discovery

will have the salutary effect of accelerating the search. The promise of more information will be the driving force and will spawn an extensive mythology on ETI. No longer will investigators be forced to "pass the hat" to obtain minimal levels of funding, or fight to share valuable telescope time. The first unequivocal proof of extraterrestrial life will trigger an infusion of government and corporate money, lead to the rapid growth of radio telescope farms, and accelerate the development of alternative search strategies. Expanded efforts will lead to other detections. Some of these may be enigmatic, but others will be informative. Depending on distance, technology, longevity, and patience, some discoveries may lead to two-way communication. As a charter member we would gradually accumulate many contacts and would ourselves help found the Galactic Club.

Alternatively, our first detection could be of a society that is already a member of the Galactic Club. From this first contact we may learn about other societies within the Club and Earth itself could be invited to join. These two scenarios—charter membership versus inductee—could have profoundly different consequences for the management of the initial contact and for our adaptation to the post-contact world.

First Contact

As a charter member of the Galactic Club we would first encounter another civilization that, like us, had no prior experience dealing with off-world civilizations. While each society may have given advance thought to finding another society, each would have to look to its own indigenous theories and analogues for guidance—sources of information that may or may not work well when applied to radically different species and cultures. Neither society would be able to draw on past experience with interstellar affairs. It is in the case of contacting another isolate that the problems we fear are likely to appear full blown: poor communication, terrible misunderstandings, or cascading gaffes that threaten to destroy the relationship before it achieves stability.

If we are a potential inductee into a preestablished network, contact could unfold in a very different fashion. An affiliated civilization will have given sustained and in-depth thought to interstellar contact, and it will have evolved theories and developed analogues based on radically different species and cultures. It will be able to draw on the experiences not only of itself but also on the experiences of other members of the Galactic Club, experiences that could number in the thousands or millions. If so, the "other" will be versed in managing interstellar contacts. Constructing communications that are easy to understand, deciphering messages from other species, managing first impressions, developing working relationships, guaranteeing mutual security, exploring the possibilities of trade and commerce—activities that fall within *terra incognita* for us will be routine for them. Under this scenario, many of the problems that preoccupy us today could be bypassed, at least if we choose to participate and are willing to look to another society for leadership.

Encountering a member of the Galactic Club could pose less of a threat to our security than encountering a fellow isolate. Despite frightening images of alien invaders, my guess is that most advanced civilizations are peaceful rather than belligerent.[12] Availability of almost limitless resources coupled with high technology will eliminate some of the traditional causes of war. Despite the struggle and violence reported in our news media, evidence suggests that we ourselves are moving towards a world where the large and powerful societies do not go to war with one another. John Mueller notes that many countries exist side by side without going to war, that traditionally antagonistic nations have become less quarrelsome over the years, and that more and more industrialized countries have formally renounced war.[13] Each generation, says Mueller, an increasing proportion of people reject war as morally repugnant and methodologically ineffective. John Keegan, the British military historian, draws a similar conclusion and suggests that after 5,000 years or so, warfare as we know it is about to disappear.[14] The rise of liberal democracies is another encouraging sign.[15] Internal politics influence foreign affairs in such a way that liberal democracies steer away from war.[16] As the proportion of liberal democracies goes up, the risk of war decreases.[16]

Computer simulations allow political scientists to control variables and explore many different "what if" scenarios. They enable us, for example, to compare the views of the "realists," who believe that it is in the best interests of large and powerful societies to take what they can from their smaller, weaker neighbors, with the views of the "idealists," who counter that in the long run, a society's interests are best served by refraining from aggression and entering into defensive pacts. Results of simulation studies show that states that do not initiate war but do enter

into defensive alliances survive longer than opportunistic, belligerent, self-serving states.[17] These findings, which are based on abstract models of broad applicability, free us from the idiosyncrasies of world history. They suggest that if paranoid, berserk, or selfish societies last long enough to make contact with other civilizations (probably they do not), their foreign policies may put them out of business.

A recent analysis by Freeman Dyson also implies that interstellar warfare should be a rare occurrence.[18] Territoriality, he notes, was useful and harmless in the early days of humankind when populations were small and space was ample. As Earth's population grew, different groups of people began butting-up against one another, and this led to conflict. As we move into space, which still has ample room for everybody, territoriality once again becomes harmless. In a sense, we live in a narrow window of time where we are filling up our planet but before we can tap the immense resources of space. It is during this interlude that we have become engrossed in playing dangerous zero-sum territorial games.

This does not mean that we could never encounter a troublesome or even dangerous extraterrestrial society. This does mean that SETI should be a "low risk" activity. Nonetheless, in comparison to forming an association with a fellow isolate, connecting with the Galactic Club may be less of a security risk. This is because the affiliated society will have already worked through the insecurities that we associate with initial contact and will have already developed stable relationships with radically different societies. If the Galactic Club has evolved into a supranational system it will operate within a preexisting framework of interstellar law and cooperation, a framework that we, too, might find congenial.

Post-Contact Humanity

What might we learn from our newfound acquaintances? If communication is possible, will they be eager to share their scientific and cultural insights? Will they tell us about their social organization, their political forms, and the nuances of their culture?[19] Here we might note that all living systems, biological and social, have reproductive subsystems intended to replicate and perpetuate themselves.[8, 10, 11] One way that this could be accomplished on an interstellar scale is through disseminating information. Even as many nations on Earth have powerful broadcasting stations to export elements of their culture and build support among outsiders, alien civilizations may broadcast information to herald their achievements and perpetuate their views. And it will be these "gregarious" or "talkative" societies, not the reclusive or silent ones, that will be the easiest for us to find. However, before we attempt to drink too deeply from the wellsprings of interstellar wisdom, we should address five potential problems: gate keeping, information overload, culture lag, unanticipated consequences, and threat to human initiative.

Gate keeping refers to regulating the information that is released. For example, the sending society might be quite selective about the information that it transmits. Whereas this may be a benevolent act—for example, gearing their transmissions to their perceptions of our "readiness"—we have to be open to the possibility that they are sending self-serving information that maintains their power or serves covert political ends. Or, our own society could anoint "gate keepers" who decide whether or not information should be released to the public. This, too, could serve varied purposes. Information that challenges the political or religious status quo could be suppressed or given a particular type of "spin" while information that supports establishment views is released instantly. This may have happened as the contents of the Dead Sea Scrolls were slowly revealed to the public.

If rapid communication is possible, the rate of incoming information could far exceed our ability to process it. Confronted with excess information, individuals, organizations, and societies respond in similar ways: first, by "speeding up," and then by shifting to processing strategies that alleviate the pressure but reduce the quality of the processing. Strategies for coping with information overload include accepting delays, selectively processing only some of the information, or becoming more tolerant of error.[8] Thus, under pressure, we may overlook important ideas while acting on ideas that are relatively inconsequential, ignore important warnings and qualifications, rush forward without following due procedures, and neglect insights that under less lavish conditions would rivet our attention. That is, exactly when we should be alert, thorough, and careful, we may be blasé, wasteful, and sloppy.

We might expect the highest potential for overload if we first encounter a member of the Galactic Club, since this type of society would be positioned to forward information from many other societies, not just its own. It could offer us information about

societies that we could not begin to comprehend if we tried to communicate with them directly, but that we could understand given the interpretive services of an intermediary or "third-party" society. However, because a member of the Galactic Club will already be versed in working with beginners, it may do a better job of making the information useful and understandable, and releasing it at a pace we find manageable.

Culture lag refers to the temporal gap between the introduction of a new technology and its proper and comfortable use by people. It can take decades for the evolution of laws, customs, and attitudes that support rather than clash with new technology. The current rapid rate of technological change could increase many times over following a massive infusion of extraterrestrial knowledge. The Galactic Club may have accumulated the wisdom to reduce risks such as this.

All of us have heard stories about people who are granted wishes but, because they were unable to think things through or were inarticulate, ended up worse-off than before their wish was granted. There was, for the example, the English couple, described in the short story "The Monkey's Paw." Their wish for extra money was promptly followed by the arrival of their son's boss with the announcement of their son's accidental death on the job and a small amount of monetary compensation. Likewise, when we make wishes for our society or for humanity as a whole we must be sensitive to the possibility of unanticipated consequences: results, usually undesirable, that were not foreseen before the change was adopted. Who would have imagined (before the fact) that an influx of silver and gold from the New World would spark runaway inflation that would diminish Spain's power?

If we make clumsy attempts to apply alien insights or technology to solve one problem, we could create another problem of equal or greater magnitude. Technologies that dramatically increase individual life span could put the family under new forms of stress, add to our population problems, and devastate retirement plans. Technologies that relieve social and medical ills or ease our labors could put entire categories of human service workers out of business. The introduction of new power sources could eliminate fortunes based on petroleum and coal holdings. Tracing the implications of a new idea is not easy because some consequences may rest upon very intricate chains of events or not appear until the distant future. The more alternatives we are offered, the more difficult it will be to trace their myriad implications.

Then there is the threat to human curiosity and ingenuity. Could the ready availability of new technology transform into passive users those of us who like to discover and invent new technologies? Could we lose our curiosity and our status as "exploring animals"? Indeed, SETI-Australia astronomer Ray Norris suggests that after detection, science, as we know it, may cease to exist.[6] Fortunately, our curiosity appears to be hard-wired. Once humankind has found the answer to one question, it moves on to another. Perhaps, as Norris suggests, if science ceases to exist, we may rephrase our questions in terms of theology. Let us hope that, as has happened so often in the past, greater knowledge will expand, not contract, our intellectual horizons.

Following contact, would humanity lose its distinctiveness? Would our post-contact culture make us almost indistinguishable from extraterrestrial societies? Certainly, as Seth Shostak points out, when more technologically advanced societies meet less technologically advanced societies, it is the less technologically advanced societies that are the most likely to change.[19] For those of us who prize diversity and tradition, a loss of identity is a high price to pay for possible new insights.

Allen Tough paints a more optimistic picture. He notes that terrestrial examples of culture contact have involved physical contact rather than radio contact. If the aim of the dominant culture is expansion, the lesser society may be overwhelmed, but when contact occurs without aggression, the lesser society may prosper. "We might very well adopt portions of the alien culture," states Tough, "without being overwhelmed by it."[20] Perhaps the fate of Japan after Commodore Perry's visit during the mid-1800s should fuel optimism. The Japanese embraced Western technology, but at the same time gave it a Japanese flavor. This is evident when we compare Japanese and American management styles.

Contact with an affiliate of the Galactic Club may pose less of a threat than contact with an isolate. The reason is that we might expect considerable diversity within the Galactic Club itself, simply because the number of member states and their dispersal over many solar systems would work against a high level of uniformity. Clearly, we would forever be changed and once entering the Galactic Club we would adopt many of the ways of the "other." But given the diffi-

culties of social organization over interstellar distances, the Club may be less of a "melting pot" than a "mosaic" with individual member states retaining much of their identities.

Discussion

As we enter the new millennium, large elements of both the scientific and lay communities are sensitive to the possibility of intelligent life elsewhere. Whereas it is sensible to be cautious as to when unmistakable evidence of ETI will be acquired, some searchers expect this discovery to occur in the near future. From the perspective of our descendants a thousand years hence, initial contact will be part of history and their attention will be directed somewhere else. At that time, any difficulties or dislocations that occurred during first contact will be long past. Interacting with other civilizations will be no more unusual than interacting with human space settlements that will be sprinkled throughout, if not beyond, our solar system. One thousand years from now people will be quite different than they are today. Human interaction with ET could account for only some of these differences.

Right now, we are alone in the universe. Our guesses about extraterrestrial intelligence rest upon a blend of theories and analogues that are indigenous to our planet coupled with varying degrees of imagination. My own guess is that as we anticipate first contact we must be more aware of the possibility that we will first meet an affiliate of the Galactic Club rather than a fellow isolate. Right now we struggle with the idea of coming to grips with one other civilization. We may have to come to grips with relating to many societies simultaneously.

Among the galaxies that are well populated with technologically advanced civilizations, we might expect epochs or ages of social networking. The first of these, the Age of Isolation, would be marked by civilizations that live in ignorance of one another. As they develop and apply interstellar communication technology, they would begin to find other isolates. If we are living in this first epoch, then we should expect to discover a civilization that, like ours, has no previous experience with intelligent life elsewhere. During the second epoch, the Age of Contact, most civilizations will have discovered a small handful of neighbors. There would still be some isolates, but by virtue of such factors as proximity and luck, some societies may have formed networks with many others. In a sense, the Age of Contact would be characterized by "subassemblies" for a future Galactic Club. If our search first succeeds during this second epoch, the odds shift in favor of encountering a civilization that has already undergone "first contact," but this civilization would have had only a tiny taste of the diversity of life forms and cultures in the galaxy. During the third epoch, the Age of Intragalactic Networking, most pairs and subassemblies will have joined together to create a network that is larger than the others and that may evolve in the direction of a mutually beneficial supranational system. Even at this late date, we could still make our first contact with an isolate or a small cluster of societies, but the odds shift in favor of our first contact leading to direct induction into a large network of civilizations. Eventually there could be a fourth epoch, the Age of Intergalactic Networking, when civilizations or clubs from different galaxies begin discovering one another.

Perhaps our galaxy has already entered the third epoch. This follows from a simple analysis of the time interval between the interest and ability to undertake a search and the first success. The civilizations that we expect to encounter are very old—according to some calculations, 2.8 billion years older than ours.[6] If these civilizations have the interest and technological means, many will have begun their searches hundreds of thousands, perhaps millions of years ago. By now, there may be many clusters of civilizations and some of these clusters may have reached enormous size. Of course we should be prepared for the difficulties of contacting an inexperienced civilization, but rather than assume that we will be stymied by an unprepared partner we should be open to the possibility that we might first encounter a member of the Galactic Club.

According to my analysis, rapid induction into the Galactic Club offers both greater promise and greater challenges. On the one hand, if it is privy to the accumulated wisdom of many societies, an affiliate should have more ideas to share. Furthermore, due to its experience in interstellar communication, it should be better able to explain them. On the other hand, this relative abundance of information increases the risk that we will be inundated with more information than we can handle, increase the distance between technology and its human users, and make it more difficult to predict all of the consequences of our choices. Yet, at the same time, despite the greater potential of damage from the wholesale availability of new ideas, the Galactic Club may have

evolved safeguards based on past experiences of sharing information with newcomers.

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