

REVIEW

Fear, pandemonium, equanimity and delight: human responses to extra-terrestrial life

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How will people respond to the discovery of extra-terrestrial life? Potentially useful resources for addressing this question include historical prototypes, disaster studies and survey research. Reactions will depend on the interplay of the characteristics of the newly found life, the unfolding of the discovery, the context and content of the message and human information processing as shaped by biology, culture and psychology. Pre-existing images of extra-terrestrials as god-like, demonic, or artificial will influence first impressions that may prove highly resistant to change. Most probably people will develop comprehensive images based on minimal information and assess extra-terrestrials in the same ways that they assess one another. Although it is easy to develop frightening scenarios, finding microbial life in our Solar System or intercepting a microwave transmission from many light years away are less likely to be met with adverse reactions such as fear and pandemonium than with positive reactions such as equanimity and delight.

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1. Introduction

For approximately 50 years the physical and biological scientists who led the search for extra-terrestrial life (ETL) and intelligence (ETI) have welcomed contributions from behavioural and social scientists to better understand the psychological, social and cultural implications of the search and its consequences. In the case of the search for ETI (SETI) this includes ‘all human thinking about ETI: back to the classical era, the immediate sequelae of detection, and indeed the science and engineering of SETI as set in the context of human activity’ [1, p. 711]. The first microwave search, Project Ozma, influenced a NASA-sponsored report to the US Congress on the peaceful uses of outer space [2, p. 216]. The Committee acknowledged that discovery could occur at any time, viewed the consequences as largely unpredictable, and expected profound variations across

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cultures and people. Over the years representatives of many disciplines have answered the Committee's call for studies to prepare humanity, intellectually and emotionally, for the great discovery [3–9].

Today, the search for ETL proceeds on many fronts. To the extent that methods shape outcomes, the most likely discoveries are of microbial or other non-intelligent life within our Solar System or microwave transmissions from a technologically advanced civilization many light years away. In either case, initial details will be scant and additional information difficult or impossible to obtain. The first verified exobiological specimen or 'Martian microbe' may be a fossil and the first authenticated SETI detection may be as devoid of information as a dial tone on a telephone. The somewhat minimalist nature of such findings has done little to discourage elaborate discussions that assume robust and rapid interactive communication across light years, immediate profound effects of ETI on terrestrial culture and complex patterns of interstellar affairs.

What research tools are available for predicting human responses to ETL? How will people actually react? What strategies could help ease humanity into the post-contact era? As we contemplate such issues we must recognize that psychological and cultural realities are as or more important than physical realities. Anticipatory reactions to ETI are evident not only in scholarly discussions but also at meetings of unidentified flying object (UFO) clubs, science fiction conventions and an endless parade of purported documentaries that rest upon various mixes of science, imagination, and hype. Aliens are replacing government agents and secret police in hallucinations and delusions, and some people who otherwise live normal lives are obsessed by UFOs and alien abductions. Although scientists may prefer to avoid discussions of flying saucers and other paranormal topics, people's pre-existing beliefs will exert a powerful influence on their reactions to the discovery [7]. Together SETI [8] and UFOs [10] capture many people's hopes and fears, and in the process encourage rampant speculation.

2. Sources of data

This problem of predicting reactions to situations that have yet to occur has appeared more than once during the space age, and one solution is to study situations and events that approximate those of interest. Thus, researchers turn to studies of life at polar outposts or on submarines to understand how astronauts will adapt to isolation and confinement, and to studies of volcanic eruptions and other natural hazards to understand the threat to Earth posed by asteroids and comets. In the present case, human reactions to a succession of stunning discoveries (the New World) and amazing technologies (atomic power, space satellites) may provide useful hints, as may instances when different terrestrial cultures have come into contact with one another, physically, or through the spread of ideas [4].

(a) *Lessons from history*

The adventures of Europeans in new lands include some sobering examples of physical encounters. These include the Spanish conquest of Mexico; the relentless westward expansion and suppression of Native Americans in the USA; and

Europeans' scramble for colonies in Africa and throughout the world. Still, images of deceptively friendly colonizers waiting for sufficient military reinforcements to massacre indigenous tribes or getting natives drunk, seducing them and forcing religious conversions should not obscure friendly encounters that lead to sustained mutually beneficial outcomes [11] including long-term gains in technology, education and prosperity [12]. The challenge is to establish conditions that make the difference between domination and long-term mutual accommodation. Lessons from the spread of ideas include the dispersion of Arabian science to the West, the Copernican revolution, the Darwinian revolution, and the flow of religious beliefs throughout the Middle East and then globally [4,12]. Studies of how leaders, governments and organizations respond to surprise discoveries also would be of use.

Disaster research, with its rich history of studies of people under stress offers potentially useful pointers. Disaster research views disruption as a part of a larger sequence of events that also include adaptations. Any disruption posed by finding ETL or ETI is likely to be followed by processes that either restore the status quo or establish a new equilibrium that soon seems normal. Both disruptions and adaptations can be assessed quantitatively in terms of strength or intensity, breadth or scope and duration [13]. Disaster research certainly acknowledges human vulnerabilities, but also recognizes that most people are hardy and well equipped to fend for themselves. Hazards and vulnerabilities are but one part of the equation; these are offset by individual and community strengths. Problem-solving skills and ego-defences protect people from being overwhelmed by stress.

Oftentimes accounts of disasters include stereotypes or 'myths' that are widely assumed to be true but are not supported by the evidence. Three such myths are: (i) people panic in times of catastrophe; (ii) there is a sharp increase in antisocial and criminal behaviour; and (iii) people within a disaster area helplessly await rescue from the outside. These myths have been refuted again and again [14]. In fact, panic is rare. Many people associate widespread 'panic' with Orson Welles' Invasion from Mars broadcast in 1937 [15]. Yet, the vast preponderance of the radio audience was not fooled, and many of the people who took the reports at face value reacted in ways that make sense: setting out by car to retrieve a fiancé from behind Martian lines, stuffing rags around windowsills to retard the entry of poison gas, and reporting to armouries for duty. In times of disaster civility is likely to increase, and rather than awaiting rescue from the outside people respond with appropriate self-protective and mutually supportive behaviours [13,14]. Misinterpretation of useful vigorous behaviours (for example, fleeing a burning building), loose historical accounts, fiction, and inaccurate media reports help account for disaster myths. Furthermore, disaster research alerts us to the dangers of self-fulfilling prophecies that authorities inadvertently set in motion. Reassigning troops from humanitarian to police duties on the basis of rumours can incite an otherwise peaceful group. Scientists who predict adverse reactions to a discovery should avoid doing so in ways that bring the undesirable reactions about.

Both before and after Welles' infamous broadcast people believed that ETL had had been discovered [6,16,17]. In the 1840s readers of the widely circulated *New York Sun* accepted detailed reports that an astronomer had discovered 'batmen' on the Moon, and, a few decades later, there was widespread fascination with

claims that astronomers had found evidence of a dying civilization on Mars. From the mid-1940s on, people have been inundated with reports of UFOs including a 1947 news release (soon retracted) that the US Air Force retrieved an occupied crashed spacecraft in Roswell, NM. Reactions to purported fossil evidence of life on Mars presented by NASA in 1996 bear a certain resemblance to reactions to UFO reports including fierce defendants and sharp critics, heated discussions of personalities and circumstances and rapid disappearance from the news.

In the 1960s, scientists suspected that quasars and pulsars might be intelligently controlled, and in the mid-1990s a false microwave detection report remained in the news several days before it was properly refuted [18–20]. Because the latter episode resembled a real SETI detection, it is tempting to take the public's nonchalant response as an approximation of reactions to a valid claim.

As Billingham *et al.* [3, p. 34] point out: 'analogies drawn from history are best considered as prompts for thinking about the future, not as reliable guides to its course'. Lists of likenesses and differences between analogies and target event should help keep us on track, as should clear separation of givens and uncertainties. Today's world of high technology, instant communication and modern political systems differs tremendously from the times that Europeans sailed to the Americas, or the *New York Sun* reported bat men on the Moon. Superficial resemblances between analogy and target create the illusion that we are drawing on experience, but give rise to 'fantasy documents'—plans that fail when put to the test [21].

(b) Survey research

Survey research yields quantitative estimates of the prevalence and strength of people's attitudes and beliefs, and these are linked, sometimes tenuously, with future behaviours. Useful results depend on asking the right questions; drawing representative samples rather than relying on convenience or self-selection; high response rates; and proper statistical analysis. International polls require even more challenging sampling techniques and procedures such as translation followed by back translation to make sure that questions retain their meaning in different languages.

More than a few surveys that touch on ETI are geared towards UFOs but some are geared to astrobiology and SETI. For example, Vakoch & Yee [22] developed an experimental survey with good psychometric properties to explore cultural and personality differences in attitudes towards SETI. More recently, Swami and his associates constructed scales to separate paranormal beliefs ('The government of this country is covering-up the existence of extra-terrestrial life') from non-paranormal beliefs about SETI ('The search for extra-terrestrial life is a serious and important scientific endeavor') and the general hypothesis that life may exist elsewhere in the universe ('Given the size and age of the universe it is very likely that extra-terrestrial life must exist'). The British and Austrian research subjects were the most likely to endorse the general idea of ETL, showed some scepticism towards SETI, and were the least accepting of paranormal views [23,24]. Openness (a characteristic associated with interest in science) was associated with support for SETI while religiosity was linked to less positive views, reflecting, the authors surmise, a presumed false choice between ETI and God.

Gallup Poll results suggest that between 1966 and 1987 belief in the existence of ETI increased steadily from 34 to 50 per cent while the percentage of people who were ‘unsure’ hovered around 17 per cent [3, p. 63]. An unpublished review of newspaper summaries by Schuessler [25] suggests that the 50 per cent figure either held or increased slightly during the 1990s. More recently, 56 per cent of the respondents to a 2008 Scripps Howard Poll thought that ETI was likely, and 31 per cent thought that Earth had already been visited by alien beings [26].

A Roper Poll commissioned by the National Institute of Discovery Science (NIDS) [27] and based on in-person interviews at the respondents’ places of residence asked ‘If you personally believed an announcement that ETI had been discovered, to what extent would it change your lifestyle?’ Of the respondents, 25 per cent stated it would make no difference, 42 per cent thought they would be slightly affected (follow the story but get on with life), 11 per cent expected to be moderately affected (forced to rethink philosophical and religious issues) and 3 per cent severely affected (quit their jobs, take up arms or hide). Over 60 per cent of the respondents considered themselves either invulnerable or fully able to adapt. They were less confident that most other people would match their high levels of self-confidence and adaptability. Only 13 per cent expected others to react in a calm and rational manner and 25 per cent expected others to panic. Recently, Peters [28] confirmed that respondents considered themselves as better equipped (in this study in terms of their religious beliefs) than other people to weather the discovery.

3. Critical contingencies

Reactions to the discovery will be contingent (dependent) upon the nature of the ‘other’, the way the discovery comes about, and the content (if any) and context of the message. Reactions will depend also on human information processing as shaped by biology, culture, and personal experience.

(a) *Characteristics of extra-terrestrial intelligence*

Although the first authenticated discovery of any type of ETL will have profound consequences philosophically and scientifically, it is the prospects of engaging alien minds that generates the most excitement. In the absence of detailed information at the time of the discovery, reactions will be based on images, ideas, and preconceptions. Some of these views are captured in three archetypal ‘image repertoires’ or mental models of ETI [3, p. 72]. The roots of the first two models extend back to antiquity, while the third is of more recent vintage. Each model has elite variants that circulate in academic discussions and journal articles, and popular versions found in New Age publications and the entertainment media. Despite differences in assumptions, standards of proof, and credibility, high brow and low brow versions of a given model give rise to comparable images of ETI.

The *millennial model* portrays wise, kind and friendly forms of ETI and implies that communication would lead to a glorious rebirth of terrestrial societies. ETI civilizations are ancient utopian societies where wise and well-intentioned

near-immortals live under conditions of peace and prosperity awaiting the opportunity to share their insights into philosophy, science, technology and morality with less evolved civilizations such as our own. Early versions of this model appeared in the 1950s, when writers noted resemblances between God and the angels and ETI. By 1956, beliefs that ETI came from 'utopian societies which are free of war, death, disease or any other problems of mid-twentieth century problems' and could 'help mankind overcome its problems, to stop nuclear testing, and prevent the destruction of the human race' were firmly entrenched in popular culture [10, p. 107]. Carl Jung [29] proposed that beliefs in UFOs represented a substitute for religion in a time of need (the Cold War) and ascendant science, and Peters [28] argues persuasively that even the scholarly versions of this model rest on religious myths. Alternatively, we might infer most of these virtues based on the problem-solving strategies, values and policies that are likely to confer great age on societies so that they are likely to overlap us in time [6,30,31]. Over the centuries terrestrial societies have become more inclusive, more democratic, more peaceful and altruistic. Societies following these trends endure while autocratic, egotistic and controlling societies given to the use of bluff and force succumb to internal dissention and external threat. Of course, unjustified optimism could have disastrous consequences. This was true when a crusade was sent forth to join the powerful (but non-existent) army of a glorious and perfectly parallel (but also non-existent) Christian empire led by Prester John, and later on when Montezuma mistook the explorer Hernando Cortez for the lost god Quetzalcoatl and delivered his civilization to the Spanish conquistadors [32].

The *catastrophic model* portrays ETI as menacing, imperialistic and oriented towards the use of threat, bluff and force. If they discover us (perhaps by intercepting our transmissions), we would be candidates for exploitation, colonization or annihilation. If the millennial model hints of angels, the catastrophic model reminds us of demons. The scientific or high brow version rests in part on widespread notions of survival of the fittest, not adjusted to accommodate the different survival requirements of wild animals and political states. The catastrophic model is not entirely bleak—this common enemy might unite many nations and battling a real Darth Vader could help us expiate guilt and confer glory, if only posthumously. It appears that more of us are prepared for the best, rather than the worst. In a Marist Institute survey 86 per cent of the respondents expected our galactic neighbours to be friendly rather than hostile (*Denver Post*, 16 December 1997, cited in [25]). Unjustified pessimism can also have disastrous effects, as illustrated in trigger-happy military responses to friendly extra-terrestrials that manage to visit Earth.

Billingham *et al.* [3] mention cyborgs, but biological/machine intelligence may be salient for only a brief sliver of time in the overall course of cultural evolution. Thus, the third or *postbiological model* builds on artificial intelligence, bioengineering and robotics and proposes that artificial rather than biological intelligence predominates [20,33–35]. Most ETI exists in the reverberating circuits of computers that have unlimited brainpower and intelligence free from biological wants and needs. ETI could 'live' anywhere, not just on a habitable planet or a well-provisioned spacecraft, and barring accident could exist if not forever then until the collapse of the universe. Postbiological intelligence is driven by the intelligence principle: 'the maintenance, improvement and perpetuation of

intelligence is the central driving force of cultural evolution, and to the extent that intelligence can be improved it will be improved' [34, p. 579]. Because of the potential for immense intellect postbiological intelligence may be very difficult to find and score high on a 'strangeness' dimension. Perhaps the idea that flying saucers are not *driven by* ETI, they *are* ETI is a low brow version of this model.

These images or models are important because they give rise to expectations that are likely to influence our perceptions and interpretations of actual ETI. People seek and generally find evidence that supports their initial hypotheses and beliefs, and ignore contradictory evidence or subject it to extensive analysis for refutation [36]. Because of this, more than one model can survive even as new evidence accumulates.

(b) *The discovery process*

More contingencies reside in the many possible ways that ETI could be discovered. In theory, at least, in addition to intercepting a transmission these include finding or reinterpreting ancient artefacts and documents; encountering ETI on Earth (perhaps through a website); spotting an extra-terrestrial spaceship or probe; and discovering a distant mega-engineering project. The immediacy of the discovery will count—meeting their emissaries on Earth would be far more intimate than detecting a laser beacon from several light years away. The site of the discovery will matter (Brazil, Sweden, North Korea) as will the agents of discovery (scientists, military technicians, entrepreneurs) and the timing of the discovery (during peace or war).

Discovery could take the form of a sudden insight that immediately follows a demarcated event, or a gradual awareness based on a slow accumulation of evidence. At present we are on a slow trajectory that may temper reactions to unambiguous proof. Traces of past life on Mars, the discovery of habitable planets and even occasional false alarms help condition us for an authenticated finding. As more evidence is accumulated, as alternative explanations are tried and discarded, as one person after another concludes the balance of evidence shows that we are not alone we will ease ourselves into a new era. It could take decades or centuries before we fathom the full impact of the discovery on our science, philosophy, religion and culture.

(c) *The message*

We will be affected by our knowledge of the senders (governments, scientists, religious proselytizers, military personnel, pranksters), whether it is information-poor or information-rich and the ease and speed of interpretation as well as by the content of the message itself. Messages that have travelled many light years will be obsolete, unless they convey deep values (such as the Golden Rule) that are highly resistant to change. Content could be nothing or anything. Our own interstellar transmissions reflect science, entrepreneurship and entertainment. Earthlings have sent classical and popular musical selections, personal essays, photographs and pictures, fan mail and gossip, digital DNA, even snack food commercials. How would we interpret a glut of messages superficially intended for us while actually constructed to amuse the senders?

4. Human information processing

Biology and culture, organizations, social groups and individual psychology shape human thoughts, feelings and actions. Neural wiring lets us organize raw sensory input into coherent perceptions; store, access and retrieve information; and solve problems. Since these processes permeate our existence we rarely reflect on them. They may make it difficult to comprehend intelligence that evolved elsewhere. We may readily understand how a squat stature and powerful legs would evolve on a planet with high gravity, but how easily could we come to grips with enormous intellectual and emotional differences? Their true nature (as defined by themselves) may remain forever opaque or only slowly become known to us.

Culture is an organizing concept devised by anthropologists to describe the human characteristics of a group, organization or society and encompasses technology, symbols, values, laws, customs and habits that accompany membership. Culture transcends individuals and creates commonalities within groups and differences between groups. It is also embodied in individuals. Just as no two persons speak their first language alike or perfectly, as embodied in the individual culture is the best approximation of the external culture shaped by a lifetime of personal experience [37]. Well researched cultural dimensions [38] that are likely to influence impressions of ETI include hierarchy or power distance (equality of power distribution within the group) individualism–collectivism (exaltation of the individual versus pre-eminence of the group), masculinity–femininity (overlap of traditional male instrumental and female expressive roles), uncertainty avoidance (aversion to ambiguity, unpredictability, and improvisation) and time orientation (short term and long term). Capitalist and socialist cultures might react differently to extra-terrestrial communes, and in comparison with impatient Americans, Japanese may react more favourably to ETI's long-term projects or objectives.

Organizations including political institutions (congresses, parliaments), administrative agencies (departments of state, regulatory commissions), the military, intelligence agencies, professional societies, churches, and many others that think that they have a stake in the discovery will play important roles [39]. Many of these will be dependent on one another for analysis and advice. Processed information from an intelligence gathering organization may be a prerequisite for a military or security organization to take action. Effective responding will be difficult for organizations that are hampered by rigid bureaucratic structures, operating under a paucity or glut of reliable information, experience intense time pressures or are more interested in maintaining their own image and prestige than in getting the job done. Organizations are constrained by broad sociopolitical considerations as well as each others' activities. The challenge for leadership is staying the course in a sea of false reports, suppositions, opinion, and flawed advice.

Most probably we will think of ETI the same way that we think of people, and this leads us to the person perception literature in social psychology [36]. We maintain implicit theories of personality positing that certain characteristics or traits go together, so on discovering evidence suggestive of one trait we are likely to infer others. These theories allow us to develop comprehensive but

oftentimes flawed pictures on the basis of very little information, and we should expect greater error when we apply these theories, based on experiences with humans, to radically different entities that we may never even meet. If the information available to us is mixed—some positive, some negative—we will give the negative information disproportionate weight. We will view the first ETI that we encounter as typical of their species or civilization as a whole, a tendency that is likely to persist despite growing evidence to the contrary. As we try to interpret their behaviour, we are likely to overestimate the role of their personality, motives and other internal causes while underrating the influence of situational constraints, social roles and other external forces. We will believe that they do what they do because that is how they are, not because of necessity, demand or pre-existing treaty.

And of course, reactions will vary from person to person. Vakoch & Yee [22] mention anthropocentrism, depth of religious belief and religious orientation, and alienation from society as important considerations. A small sampling of other potentially interesting psychological variables might include openness to experience, conscientiousness, neuroticism, thrill seeking, affectivity (upbeat or downcast), tolerance for ambiguity, problem solving and coping skills, self-esteem, proneness to anxiety or to fantasy, emotional stability and defensiveness [24,36].

5. Contact management strategies

Policy development and advocacy, science education and information control are among the strategies proposed for guiding humanity through the search process and its aftermath. Over the years, SETI committees of the International Academy of Astronautics, along with other groups, have developed policies intended to prevent false alarms (by insisting on careful verification) and to release information to benefit all humankind. Logsdon & Anderson [40, p. 89] hoped to frame the initial announcement in such a way as ‘to minimize confusion, anxiety, fear, and perceptions of threat among the general population’. They sought precedents in strategies for announcing earthquakes, nuclear accidents and other disasters. They found that actual announcements (as in the case of the Chernobyl nuclear meltdown) tended to fall short from the ideal.

Other policy efforts have called for widespread consultation before sending a reply from Earth, and recent debate has focused on active SETI or METI (messaging extra-terrestrial intelligence). Discussions are useful for airing issues, but lack the force of law. New policy will not go far in the absence of endorsement by legislative groups and support from enforcement agencies. Apart from the problem of contamination from an exobiological specimen brought to Earth there is little in the way of identifiable policy that directly applies to non-SETI detection scenarios.

We might expect that a scientifically literate public that understands SETI and is resistant to rumours, pseudoscience and alternative history will be better prepared for the discovery than a poorly informed and gullible public. As Carol Oliver [18] points out, from its inception, SETI has maintained strong programmes of education and outreach. The SETI Institute takes a multi-pronged approach including a website, publications, teacher education materials and

public appearances in person and in the media. NASA Ames Research Center is among the organizations that sponsors education and outreach efforts in the broader field of astrobiology. SETI@Home captured public interest and informed thousands of people who volunteered their home computers to help analyse mounds of raw data.

Oliver notes that the public learns about science from many different sources: the mass media, to be sure, but also from textbooks and college courses, art, literature, music, co-workers, family and friends and the Internet. Long ago communications experts shifted from targeting 'the audience' to targeting multiple audiences, each with its characteristic belief systems, motives, and level of attentiveness. Thus, different strategies or campaigns are needed to inform different audiences and this rests on sensitivity to demographic and cultural differences.

Almost 50 years ago the Committee on Science and Astronautics [2] assumed that the government would restrict the information made available to the public. Now, in our era of cell phones and e-mails it will be difficult to maintain secrecy. The SETI protocols describe the search as 'open' but require waiting for verification before announcing the discovery to the public. In an accidental test of this protocol, a news story of an unconfirmed detection 'leaked' to the *New York Times* before the verification procedure demonstrated that the call was not from extra-terrestrials [19]. Even if they choose candour and full disclosure governmental spokespersons will have difficulties convincing the public that they are being told the truth. The NIDS poll mentioned earlier found that 48 per cent of the respondents believed that following the discovery of ETI government would classify the information and not allow it to be released to the public and 23 per cent believed that government would classify all aspects and move to suppress civilian sources from obtaining or disseminating information about the discovery. Suspiciousness was higher among the respondents identified as 'influential' with 51 and 29 per cent endorsing one of the two cover-up options. Citizens' lack of trust in their own government has reached crisis proportions and is one of the great challenges for political leaders today [41].

6. Are we prepared?

Times have changed dramatically since the 1961 US Congress was warned of adverse reactions to the discovery of ETL. The report that they received could not anticipate microwave searches scanning millions of channels at once, optical SETI, planet imaging, searches for chemical evidence of extrasolar biological or industrial activity or small smart spaceships. Who among the public in 1961 could conceive of home computers, the Internet, twitter or iPods? The discovery of ETI may be far less startling for generations that have been brought up with word processors, electronic calculators, avatars and cell phones as compared with earlier generations used to typewriters, slide rules, pay phones and rag dolls.

Almost all of the research conducted so far was based in North America, Europe, and the UK, so it is extremely difficult to gauge global response. Still, the patchwork findings that are currently available suggest that half of the people surveyed believe that ETI exists and a substantial proportion are

convinced that alien spacecraft and astronauts have already visited Earth. Less abundant evidence suggests that people expect a millennial rather than catastrophic event, and feel prepared for the discovery. Society has been unfazed by batmen on the Moon, the canals of Mars, discoveries of quasars and pulsars, claims that a fossil arrived from Mars, and bogus announcements of SETI detections. Any discovery of ETI is likely to produce a mix of emotions including fear, pandemonium, equanimity and delight but in North America and Europe neither the retrieval of an exobiological specimen nor detection of a dial tone at a distance are likely to lead to widespread psychological disintegration and social collapse. Perhaps we should not worry too much about people who protect their belief systems by denying scientific findings (or recasting them as theory), and it seems unlikely that a 'dial tone at a distance' will shock people who are embroiled in civil war, caught up in genocide, or wracked by AIDS and starvation. People conditioned by years of participation in UFO clubs, science fiction and an endless parade of purported documentaries may find the discovery anti-climactic.

Of course, this expectation is based on searches that are currently under way. Typically there is a temporal gap or lag between a discovery or invention and cultural adaptation to it. In discussions of the human response to ETL the imbalance seems to be in the opposite direction. Discussions of cultural adaptations are outrunning present-day science.

Faster than light travel, quantum communication, interstellar Rosetta stones and other possible developments that may or may not become available do much to enliven discussions. Piled on one after another in endless combinations these ideas make it difficult to stay focused on what present day searches can yield. In truth, we do not know if and when ETL will be revealed, so we need to be open to many different possibilities. But planning for discoveries that are the most compatible with present day science—an exobiological specimen, a dial tone at a distance—should be the most useful place to start.

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