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The SETI League congratulates our colleague Kip Thorne, a longtime friend to SETI science, on sharing with Barry Barish and Rainer Weiss the 2017 Nobel Prize in Physics. The following poem by our Executive Director commemorates this well deserved honor.

Thorne in this Side

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A Caltech professor of physics, Kip Thorne,
Was upbeat and cheerful, and never forlorn.
And yet, as a youth, he developed a craving
To gaze into space and see gravity waving.
To understand gravity would give Kip pride,
Though long that would be the great Thorne in his side.

Kip came into prominence early and clearly
By publishing papers on gravity theory.
Hypotheses and mathematics were sound,
Though evidence would not be easily found.
The problem is, no matter how hard he tried,
Detection remained as a Thorne in Kip's side.

Kip wondered if gravity waves he could trace.
They're hard to detect. They can barely displace
An object beyond a molecular scale,
So tests to observe them were certain to fail.
With other researchers he gladly allied,
Though all felt the problem a Thorne in their side.

They dreamed up an instrument – LIGO by name.
To intercept gravitons might bring them fame.
The system was complex, and costly as well,
But scientists pushed on. They thought, "What the hell?
"For if not successful, at least we have tried
"To find and dislodge this great Thorne in our side."

When LIGO hit paydirt, we certainly knew
About what the Nobel Committee must do.
They opted to honor three people, not one
For what they had theorized, all they had done.
And so, Weiss and Barish smiled broadly in pride,
Along with Kip – always the Thorne at their side.

***Guest Editorials**:*

Out With The In Crowd

by Dan Duda

from the August, 2017 issue of Penn Central, the monthly newsletter of Central PA Mensa, used by permission

Most of the great breakthrough discoveries in science are made by outsiders to the fields in which they occur. The theory of heliocentrism, for example, wasn't published until after Copernicus' death. He knew that the existing scientific/religious establishment would have ended him much earlier if he openly claimed that the Earth revolved around the Sun instead of the other way around. Nikola Tesla was a misanthrope whose ideas challenged even the orthodoxy of his boss (Thomas Edison) and the then prevailing views of the emerging technology of electricity. He went his own way and established AC (alternating current) which is the standard even today.

But, perhaps the most compelling proof of the value of being an outsider is the story of our favorite thinker- Albert Einstein. Early in life he was considered a "slow learner". Later, he hardly made it through his courses at university, in part, because he mercilessly challenged his professors, and in part because he focused more on his own ideas rather than the curriculum of his classes.

Being ostracized by the scientific community, he was unable to get a job, or a teaching position in his field. So, as we all know, he spent the first years of his career as a lowly patent office clerk. Even when he began to be recognized as an extraordinary thinker, his outsider status was so ingrained that he was snubbed by the Nobel committee. Although his Theory of Relativity is perhaps the greatest scientific breakthrough in history, that group wouldn't honor the "outsider."

However, Einstein's achievements were so powerful that the "in-crowd" finally had to accept him. Somewhat reluctantly the committee later (1921) relented and awarded him the prize in Physics for his paper on the Photoelectric effect, which helped form the foundation of Quantum Mechanics.

Finally, Einstein became well established as a leading member of the scientific "in-crowd." And with that his incredible momentum in science slowed to a crawl. Ironically, although he was a key founder of Quantum Mechanics, he resisted the new findings that were emerging from that field. Instead he fought for the orthodoxy of the establishment of which he was now a member.

I believe the greatest clashes in scientific history are the Einstein-Bohr debates about the nature of reality. It led to many famous Einstein quotes: "God does not play dice with the universe;" and "I like to believe the Moon is there even if I'm not looking." Niels Bohr and a group of pioneering physicists were uncovering incredible results from their studies. Results that made no sense to the established, in-crowd mind, much like the relativity theories earlier in Einstein's career. But science has since proved that Bohr was right and the insider Einstein was wrong.

As an insider, Einstein even amended his Theory of Relativity to fit the more established, in-crowd view. In its pure form the mathematics suggested that the universe is expanding. However, the established view at the time was "steady state," or a static universe. So, Einstein invented a "fix" to make his math consistent with a static universe. He later admitted that his "Lambda," or Cosmological Constant was his biggest blunder. In fact, if he had accepted his own math he would have been credited with another major discovery in astrophysics—the expanding universe.

Late in life Einstein teamed up with two colleagues: Boris Podolsky and Nathan Rosen to mount another challenge against quantum mechanics. To prove the theory could not possibly be true they developed another thought experiment. The essence of their idea is that, if quantum concepts were true, entangled particles could communicate with each other instantly no matter how great the separation. Since the logic was solid and the technology for testing the idea didn't exist at the time, this threw quantum science a curve that lasted for decades. However, technology finally caught up and, in the 70s "spooky action at a distance" was proven to be reality.

It is a testament to Einstein's incredible genius that even in his attempt to discredit a theory he unintentionally created a breakthrough concept—particle entanglement. In the words of Soren Kierkegaard, "The paradox is really the pathos of intellectual life, and just as only great souls are exposed to passions, it is only the great thinker who is exposed to what I call paradoxes, which are nothing else than grandiose thoughts in embryo."

Imperfect But Not Meaningless

by H. Paul Shuch
Executive Dierector Emeritus

Our friend and colleague John Traphagan favored us with a recent guest editorial titled "SETI and the Meaningless Rio Scale" (*SearchLites* Vol 23 No 4, Autumn 2017, pp. 4-5). I find much with which to agree in John's analysis of the Rio Sale, an analytical tool developed nearly two decades ago to quantify the significance of purported SETI detections. I respectfully take issue, however, with his title. Just because a tool has room for improvement doesn't necessarily mean that it has no value. Allow me to respond to some of John's specific criticisms.

(1) The Rio Scale is subjective.

Absolutely true. If you ask two SETI scientists to assign a Rio value to a given observation, they will give you three different solutions. SETI is a highly interdisciplinary endeavor. Its practitioners are diverse in training, skill sets, and specialization. The subjective nature of detection analysis is a healthy thing. It triggers discussion (and sometimes lively debate) within the SETI community, from which a consensus generally emerges.

(2) The Rio Scale is speculative.

Absolutely true. That is the nature of SETI science. Until an intelligent extraterrestrial walks up to me, extends its tentacle, shakes my hand, and says "take me to your leader," anything I say about its existence is mere speculation. None of us speaks in absolutes, until solid evidence is available for all to evaluate.

(3) The Rio Scale is imprecise.

Absolutely true. An integer scale of zero to ten produces a result expressed to but one significant figure. Greater precision, though appealing to mathematicians, can be misleading. Take, as a case in point, the widely accepted value of "normal" for human body temperature: 98.6 degrees Fahrenheit. That soulds pretty precise. If a child's temperature measures 98.9, or maybe 98.3, might not a new parent be inclined to call the pediatrician in alarm?

Variations from "normal" are normal. In fact, the original study into "normal" body temperature was performed on the Celsius scale, and produced an average value of 37 -- that is, only two significant figures. Arithmetic conversion to different units resulted in the expression of a value in three digits, implying a misleading level of precision. And, since the span of a Celsius degree is almost twice that of a Fahrenheit degree, there's bound to be even more variation from patient to patient, hour to hour, and day to day, which the implied precision of the stated Fahrenheit norm completely obscures. So would it be with more Rio Scale digits.

(4) The Rio Scale is variable

Absolutely true. When an initial detection is made, we have but a single data point from which to draw a preliminary conclusion. As follow-up research is performed, and other observers brought into the analysis, opinions change. Variability is in fact a major strength of the Rio Scale -- it allows us to plot solutions over time, as more information is gathered, ultimately settling down to a value which we can generally accept as reasonable.

(5) The Rio Scale is ordinal.

Absolutely true. The difference in impact between a Rio 7 and a Rio 8 detection is likely quite different from the difference between a Rio 2 and a Rio 3. Doesn't matter. The only numbers we can really hang our hat on are the extremes. That is to say, nothing ever scores a Rio 10 until it's believed to be absolutely world-changing. And, once something is scored a Rio 0, it's believed to be meaningless. Anything in between is just tinkering at the margins.

(6) The Rio Scale trivializes the social consequences of contact.

With this one, I must disagree. Over its first three decades, SETI science made observations with no attempt to quantify their consequences. I believe *that* trivialized the social impact of contact. For the last two decades, we've been developing, and tweaking, an analytical tool for impact analysis. Any attempt at quantification, no matter how flawed, is a step in the right direction. I invite John Traphagan to join my colleagues and myself in the ongoing process of refining and perfecting the Rio Scale, so that it will ultimately shed more meaningful light on (in John's own words) "the social consequences of a very complicated potential event in the future of humanity that will represent a challenge from a social policy perspective."

What do *you* think? Please share your thoughts at facebook.com/setileague.

Rio Scale Re-think

By Richard J Legault
richardjlegault@gmail.com

In 2003 the SETI Permanent Committee (SPC) of the International Academy of Astronautics (IAA) adopted the Rio Scale as a work-in-progress targeting several strategic objectives:

> Almar and Tarter […] proposed a scale […] to *convey to the public both the credibility and potential impact of claimed detections*. […] The proposed Rio Scale […] is intended to give the media and the public some *indication* from the science community of *how seriously to regard* such claims of detected ETI. (Shostak and Almar 2002, my emphasis)
>
> The Rio Scale is […] an ordinal scale between zero and ten, used to *quantify the impact of any public announcement* regarding evidence of extraterrestrial intelligence. (IAA 2017, my emphasis)

The utility of the Rio Scale to achieve these social impact objectives has been prematurely assessed as utterly meaningless (Traphagan 2015 and 2017) even though the SPC has only adopted the Rio Scale as a work-in-progress undergoing further consideration and improvement:

> The Rio Scale remains a work in progress. […] Users should expect that this Rio Scale […] will change from time to time, at the discretion of IAA SETI Permanent Study Group. (IAA 2017)

Half Full or Half Empty – Two scathing reviews of the Rio Scale by John Traphagan are good examples of what happens when glazed-eyed academics prematurely trash good ideas based on naïve and poor understanding of the strategic objectives of a worthwhile scientific enterprise. The reviews only look at the empty half of the glass. The view, for instance, that the scale is utterly meaningless as a measurement of broad social impact, is, let's be honest, accurate and unimpeachable. However, this one-sided view can leave a reader prematurely persuaded that the Rio Scale belongs in the trash bin of bad ideas, along with the likes of palm reading, astrology, and prognostication by reading the entrails of dead chickens. While Traphagan's reasoning is powerful, I will not be persuaded that the Rio Scale is utterly and totally meaningless. It truly is a glass that is half full that only an unapologetic pessimist could see as totally empty. Traphagan's book and *Huffington Post* editorial fail to acknowledge that such a scale could have substantial value as a decision making tool to assess worthiness or merit and as an informed basis for resource allocation, public outreach and education.

Strategic Decision Making – I suggest the IAA consider a strategic re-purposing and re-working of the Rio Scale by discarding the objective of using it as an index of broad social impact, writ large. Instead the IAA should consider using an improved Rio Scale as an index for ranking and comparing the relative merit or worthiness of SETI cases (claims, discoveries, research proposals and so-on). This would help with making better informed decisions for selecting among the relative prospects of cases competing for further research effort, funding and public attention. A quantitative index based on a set of evidential factors can help assess whether or not any given SETI discovery or claim is worthy of either dismissal or further support by assessing them against a checklist of scientific tests, evidence factors and standards of proof, to either confirm, refute or rank them on a spectrum of relative merit.

I see a Rio Scale type index as a testing guide and decision making tool. After all, what is SETI Science all about, if is it not the assessment, testing and ranking of SETI findings, claims and proposals as the top priority? Surely, an openly transparent reporting mechanism of the Rio Scale kind is essential for comparative publishing, sharing, explaining and promoting assessed results or prospects. A re-purposed Rio Scale could act as a sort of report card to rank the comparative success or performance (or lack thereof) of SETI efforts to provide guidance for better informed endorsement/rejection decisions.

Merit Ranking - This is not rocket science. Look around. Merit ranking is used all over the place for strategic decision making and to manage risk taking. Consider:

- Job applicant ranking using tests and merit principles to select the best candidates,
- Capital investment using cost-benefit and rate of return tests to select best prospects,
- Insurance premium pricing schemes based on assessments and rankings of risk,
- Academic graduation and award decisions using tests and Grade Point Average rankings,
- Employee compensation schemes using performance testing and rankings,

- Product comparisons based on tests and rankings of price, performance and safety,
- Battlefield casualty triage based on medical risk priority ranking of injury and trauma types, and
- Sentencing hearings to rank a given crime on severity scales supporting decisions for longer, shorter or suspended prison terms.

A re-purposed merit ranking Rio Scale can inform a variety of strategic decisions. It could help to discriminate and select more objectively between competing SETI claims or research proposals by comparatively testing and ranking them as more or less credible or promising. It could help producers, publishers, journalists and other media decision makers to select cases on the basis of merit for production of TV and Radio shows, documentaries, magazine and newspaper articles. Quantified merit rankings could help identify and debunk the fakery of charlatans, sensationalists and dishonest profit seekers to help prevent them from exploiting the more vulnerable, gullible and naïve. It could also help educators in selecting a better range of materials for lectures and courses involving SETI issues. It could even help inform novice SETI researchers contemplating strategic career choices.

Improved Metrics - I also think the metrics of an improved Rio Scale could be enhanced by adding several more factors drawn from SETI literature on criteria of artificiality and standards of proof. Under this kind of index, the greater the number of authenticity criteria that are satisfied and standards of proof that are met, the higher the merit of the case. The metrics should be sufficiently general and flexible to give adequate and respectful consideration to the widest possible range of possible types of SETI cases, from electromagnetic phenomena, exoplanet and exobiology anomalies to hard artifacts, UFO sightings, abduction claims, and mythological curiosities. Why leave any stone unturned?

As a business school graduate and financial management practitioner, my interests lay squarely in the domain of applied Social Science. Moreover, I consider that Commerce is to Social Science, as Engineering is to Physical Science. Accordingly, and in collegiality with my engineer cousins, I think it is better to build things rather than demolish them. And so it is that, Editor Almighty willing, I hope to suggest, in a future contribution to these pages, a few metrical improvements from which a re-purposed Rio Scale could benefit following the strategic decision making approach I've outlined here.

Parting Shot – Chasing the concept of broad social impact is admittedly just too vague and ill-defined a line of business for SETI. Let's abandon it to the pollsters, the political parties, the historians, the movie critics, the trend spotters and the inordinately twitterpated fashionistas who make it their duty to predict for us whether it is burgundy or crimson that is poised to be next season's new black. Finally, let me quantify shedding the social impact concept as the one and only square foot of common ground worth sharing in the wasteland of the creatively bankrupt pessimists who take more satisfaction from demolition than from construction.

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Event Horizon

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February 16 - 18, 2018: *Boskone 55* Science Fiction Convention, Boston MA.

April 22, 2018, 1300 EDT: Twenty-Fourth SETI League Annual Membership Meeting, Little Ferry, NJ.

May 25 - 28, 2018: *Balticon 52* Baltimore Science Fiction society Annual Convention, Baltimore MD.

July 22 - 25, 2018: Society of Amateur Radio Astronomers Conference, NRAO Green Bank, WV.

August 16 - 20, 2018: *76th World Science Fiction Convention*, San Jose CA.

October 1 - 5, 2018: *69th International Astronautical Congress*, Bremen, Germany

November 16 - 18, 2018: *Philcon*, Cherry Hill, NJ.

April 28, 2019, 1300 EDT: Twenty-Fifth SETI League Annual Membership Meeting, Little Ferry, NJ.

May 24 - 27, 2019: *Balticon 53* Baltimore Science Fiction society Annual Convention, Baltimore MD.

August 15 - 19, 2019: *77th World Science Fiction Convention*, Dublin, Ireland

October 21 - 25, 2019: *70th International Astronautical Congress*, Washington DC

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Members' Photos

Winter comes to North America, as illustrated by the snow now barely visible on the Project Argus dish at VE3CGN.

Caltech students, faculty, and friends gathered on campus in October, to honor Physics professors emeritus Barry Barish (just left of center) and Kip Thorne (right of center) on sharing with MIT professor emeritus Rainer Weiss the 2017 Nobel Prize in Physics. Photo by Andrew Howard.

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