the WINNOWER

What Happened When We Tried To Publish a Real Paper Investigating Time Travel

Nemiroff, R. & Wilson, T. Searching the Internet for evidence of time travelers. The Winnower.

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How is it that a paper that could not get published had the fourth highest reported Altmetric score for all scientific contributions in 2013 (Liu 2014)? This contribution to the Grain has the interesting backstory, written at the request of a Winnower editor. Hang on -- this (long) story includes enthusiastic graduate students, numerous rejection emails, a wife with an encyclopedic knowledge of Doctor Who, a parody by a popular late night talk show host, and an unsolicited offer to buy the movie rights. I could not make this up.

First of all, the topic itself is a controversial one, as made clear immediately by the work's title "Searching the Internet for Evidence of Time Travelers" (Nemiroff & Wilson 2014). It is perhaps accepted common knowledge that people who believe in time travelers are crackpots and their ramblings are not to be believed. For the record, I do not believe that traveling back in time is possible, nor do I believe that time travelers are among us. I never did. However, I was not so absolutely sure that I did not check, with the help of students, in as scientifically a manner as possible.

Next, a little background about me. I am a (full) professor of physics at a state school in the USA, Michigan Technological University to be precise. I would not have gone on this unusual journey -- a journey that ended up probing the limits of science publishing -- if I did not have tenure. Some people might say that trying to publish an article on such an outrageous topic is an abuse of tenure and an indication that tenure is outdated and should be abolished. Others might say that situations like this are exactly the reason why tenure was invented.

THE RESEARCH

It is hard to say when the project really started. Even when I was in grade school I was interested in physics, would read a lot of science fiction, and would sometimes think about the possibility of time travel. I overheard occasional speculation where people would say that if they could travel back in time they would bring back winning lottery numbers, and therefore wondered if some lottery winners were also time travelers. After reading a few accounts, I concluded: generally not. Still, in the back of my mind, I continually wondered if there was any good way to find a real time traveler.

In 2009 I read a brief Facebook exchange on the page of a friend highlighting this same topic -- if people from the future were here, how could we tell? Apparently, other people speculated about this as

well. I wondered "what if a future-person did an Internet search on something they could not have known about at the time?" I had access only to the log files of an astronomy web site that I help write and administer and so I did a quick search through some log files for queries involving comets that were not known about at the time. I found nothing of note. Past that, I mentioned the idea to a graduate student of mine but nothing much more was done. We had plenty or "real" research projects to work on.

During the summers of recent years, I am fortunate enough to have a group of students working with me, including both graduate and undergraduates students. In the summer of 2013, there were five students in all, and at summer's start I tried to come up with projects for each of them. As a group, my students and I would meet twice a week, once at the school and once at my home where we would play poker. The poker was for chips, not money, as pride seems to be a sufficient motivator for students and academics. Part of the idea of meeting over poker-playing was to create a setting where we could all talk about science in an informal setting. At one of these meetings, toward the beginning of the summer, I brought up the question of time travel and challenged my students to come up with ways of searching for time travelers in as scientific and verifiable method as possible.

The students LOVED this topic. Every meeting we would talk in increasing depth about how real scientific searches for time travelers might proceed. It was not so easy as it might seem. As expected, investigating lottery winners came up -- but we quickly agreed that it would be pretty difficult to check on them. Idea after idea was suggested and discarded. Disqualifying attributes included taking too much time to investigate, creating too much expensive travel, requiring private or inaccessible information, or not being easily falsifiable. It was easy to come up with bad ways -- was there any good ways that we could actually try?

Drawing on my past experience, I suggested the Internet. This quickly became far and away the most popular method to discuss. One reason is that the modern Internet is a mark of the student's generation, and they knew attributes, sites and search methods that I did not. A good tool, we soon decided, was "prescient information" -- information that could not have been known at the time. For example, say in the year 2010 your neighbor keeps asking you if Pope Francis has been elected yet. Repeatedly. "No", you might say, repeatedly, followed sometimes by "who is Pope Francis?" After a while you might ask your friends if they know anything about a "Pope Francis." Were this to persist, one might tweet a query on Twitter. No one would know. The whole name "Pope Francis" did not exist in the public lexicon before March 2013. This "unknowable at the time knowledge" became the basis for the most scientific set of searches for time travelers that we could afford the time and money to do. And the name "Pope Francis" was indeed a factor.

So we searched. Graduate student Teresa Wilson soon took the lead. It was a lot of fun! We searched with Google and Bing, we searched Facebook, Google Plus, and Twitter -- everywhere we could for "unknowable at the time knowledge". Eventually we narrowed the focus to two well-thought out search terms to keep things manageable: "Pope Francis" and "Comet ISON". I included my old search strategy of looking for prescient searches in the log files of the Astronomy Picture of the Day web site (Nemiroff & Bonnell 1995). We also posted a request for active communication over the Internet -- for time travelers to contact us before the request was given.

We found nothing. We uncovered no "unknowable at the time knowledge" during our limited search of the Internet. Time travel may be discoverable, but we didn't discover it. Still, given the pervasiveness of the Internet and the vastness of the online databases that major web sites like Twitter hold -- ours, it appeared, was the most comprehensive search for time travelers ever. I therefore began writing it up.

Now this paper was fun to write. I had been reading about the science and fiction of time travel for 40 years, and here was a chance to use some of this arcane knowledge. I wasn't sure if the result would be publishable. The manuscript, written mostly in 2013 July and August, turned into a strange fusion of two completely different paradigms -- that of classic knowledge about time from people like Einstein and Godel -- and that of modern knowledge about the fast-changing Internet including sites like Google

and Facebook. I would send versions of the paper to Wilson to add on to and edit. In my opinion, the resulting manuscript was quite well written.

THE SPECTACULAR FAILURE OF EARLY PUBLICATION ATTEMPTS

Our first attempt to publish "Searching the Internet for evidence of time travelers", in late September of 2013, was at a classic physics journal that deals with foundational questions at the heart of physics. I have decided not to mention any journal or editor names involved in the rejection of the manuscript. I uploaded the paper to the journal and waited. A few days later, I received an email saying that the journal would not send the manuscript out for review. There was no specific reason given, but the email included a list of attributes that they require in a paper, with the implication was that our manuscript lacked one or more of these attributes. The email was signed by a very famous physicist. I don't really know if this famous physicist ever really read the manuscript -- this email could have been a form-letter email sent out by someone in the front office. I decided to reply -- an effort to reject their apparent rejection -- by asking the famous editor how (s)he really knew, experimentally, that time travel was not possible. I waited. One week. Two weeks. One month. Nothing. No reply.

Don't worry, I told Teresa, this work can still be published -- there are other opportunities. I have a friend in the physics department who is on the editorial board of a reputable physics journal and he has asked me, on occasion, if I would consider submitting a paper to that journal. Previously, I had not. Now, I considered it. I gave him the manuscript to read. He knew this would be a "hot potato" but did encourage me to submit it. So I did. About a week later, I received a polite email saying that the manuscript was on a topic inappropriate for this journal. They would not send it out for review and would not consider it further. True to form, I again responded with an impassioned email asking them to reconsider. A few weeks later -- a reply -- but no change. My friend speculated that, quite possibly, there was disagreement among the journal editors about how to handle the manuscript, but that in the end they went with the more conservative course of action. A third physics journal geared more toward the philosophy of physics soon responded similarly.

Soon it was December and I had lost hope that the manuscript would be accepted by a journal before Wilson and I presented the main concepts in a poster at the January meeting of the American Astronomical Society (AAS). Possibly because I had attended almost every Winter AAS meeting for the past 20 years and knew so many AAS people, the meeting organizers had accepted the abstract even though it was more physics than astronomy. For this I was grateful. Even though I checked the box indicating that the research was, in my opinion, worthy of press attention, the AAS did not select the paper as a press highlight.

Although I anticipated some interesting discussions at the AAS, I was now worried that by presenting only a sketchy poster, others might research, write, and publish on this idea themselves before we ourselves could get it into a journal. I therefore decided to upload the manuscript to a standard web site that posts manuscripts and papers both before and after publication, the arXiv at http://arXig.org/. That way, at the AAS poster, I could at least refer to a finished but unpublished manuscript. Now over the course of my career, I routinely submitted manuscripts and papers that I wrote to the arXiv and received only an occasional email in response. I was grateful, again, that my upload of the manuscript to the arXiv was successful (although they reclassified it), since arXiv does reject manuscript that its editors consider unworthy. The manuscript was uploaded to arXiv.org on 2013 December 26 (Nemiroff & Wilson 2013). My wife and I left on a long car trip the very next day from our home in Michigan to the US east cost to visit relatives, honor a standing speaking engagement I had in New York City the next week, and attend the AAS meeting near Washington, DC the week after.

VIRAL EXPLOSION

On the road, I received an unexpected call from a major US news outlet: NBC. I called them back from a rest stop off Interstate 80. They wanted to know about the time travel paper. "What time travel paper?" I asked. The editor had seen our manuscript on arXiv and wanted to interview me. I was surprised that they even knew about the manuscript on arXiv. Hundreds of manuscripts appear on

arXiv daily and it is understood that many of them are not finished works.

I replied that I was presenting a poster on the topic at the AAS meeting in two weeks and asked if I could postpone this interview until then. I was surprised at his reply. He said he couldn't wait until the AAS meeting -- the manuscript is already "all over the Internet." Wow. So I gave the interview (Boyle 2014). And soon after, another. The emails poured in. Now almost every time we stopped, I returned someone's email or phone request. I have never had a published paper become so popular, not even papers accompanied by a press release -- and this manuscript was neither published nor promoted by a press release.

I decided to ride the publicity wave, trying to see this as an unexpected ride on the amusement park of life, and guessing that I would never have this chance again. I set aside about an hour a day during the next few weeks to do phone interviews and answer email about the time travel manuscript. I referred several interviews to Wilson as well. Apparently, much of the public was seeing this in a different light than journal editors. Most of the coverage was quite positive, but possibly the highest profile report -- on the Colbert Report -- appeared to focus on the seeming silliness of expecting a time traveler to tweet about the future (Colbert 2014). Oh well. Several of the write-ups were excellent, with one high point was the front web page of Der Spiegel where the manuscript was a focal point in a discussion about data sharing being limited by web behemoths like Facebook and Google.

At the AAS meeting it turned out that many people who approached our poster already knew about the work. Again, most comments were positive, but then again people with negative comments would be less likely come up and volunteer them. At least three journal editors approached, each separately, and each said that they admired the work but they could never publish something like this in their journal(s). Conversely, one journal editor asked me to submit the manuscript to his journal, but eventually even that journal's editorial board decided the topic was too far afield to send out for review.

The most unexpected email I received was from a movie producer who wanted to buy the movie rights. Neither the producer nor I had ever heard, previously, of a scientific manuscript being optioned for movie rights. I discussed the situation with my wife and we debated whether the request was actually some sort of joke. I called back with some questions and so far as we could tell, the offer seemed legitimate. In fact, a Google search showed that the movie producer had a history of making several low-budget independent films. About a month later, after some haggling, he mailed both Wilson and me each a check for $100. Although few actual options are made into movies, I have been in contact with the producer who relates that he is working on a script.

LAST TRY FOR AN ESTABLISHED JOURNAL

Given encouragement from colleagues, the press, and a movie producer, I decided to try to publish the manuscript in an established journal one last time. Based on some savvy advice from a friend, I agreed to approach a really famous journal that actually had published papers involving the possibility of time travel before. I felt encouraged as I uploaded the manuscript, thinking how cool it would be for this prestigious journal to publish a manuscript that other less prestigious journals had so quickly rejected.

So the prestigious journal also rejected the manuscript without review. In their borderline-mocking rejection email, the corresponding editor reported that another editor for this journal had said that the idea behind the manuscript was not even new -- a Doctor Who episode had explored this very concept previously. The precise episode was even mentioned.

I was taken aback. Could I have gotten this idea from Doctor Who and not realized it? I could not remember so, and I did not recall even seeing the episode the rejection email referenced. I mentioned this to my wife who surprised me by saying that she herself has seen -- or knew about -- every Dr. Who episode since the modern reboot in 2005, and could say definitively that the main idea of this manuscript was not involved. Still, to be extra sure, we rented the episode in question and watched it in its entirety. My wife was right -- the idea of searching for "unknowable at the time knowledge" over the Internet just was not in this episode. After more thought, my wife gave me the title of the one other

Doctor Who episode that might have something relevant to our search in it. So we also rented that episode as well and nothing in it, from start to finish, was relevant to the time travel manuscript.

I then responded to the prestigious journal's editor relating my Doctor Who investigation and implying that, given my wife's encyclopedic knowledge of Doctor Who, no episodes at all were directly relevant to the search methods of our manuscript. I then asked them, in light of the manuscript's now verified novelty, to reconsider and send the manuscript out for peer review. In a bid for more respect, I also related that not only had I published in this journal before, but I had been a referee for this journal previously as well. In the response, the editor said that (s)he has now sent the article out to another editor, one who is quite famous in this area, but who also agreed that this paper should be rejected without being sent out for peer review. In this reply, the famous editor said:

"I should point out that most stock markets around the planet devote considerable resources to looking for temporally anomalous market behavior --- unusual trading patterns before significant news events. When found, such signals are not typically attributed to time travelers, but more prosaically to insider trading."

I agree! This is one reason why we did not look for evidence of time travel in stock market trading. Early on, our group had discussed (briefly) this idea. On one hand, I was glad that finally we had a real criticism to address, but on the other hand, this famous editor's comment indicated to me, once again, that the journal editors did not fully appreciate the novelty, power, simplicity, and falsifiability of our approach. Instead, they gave straw-man criticisms that really meant, in my view, that they did not want to consider a manuscript so unconventional. In my reply, I argued in detail against this criticism and again asked that the manuscript at least be sent out for formal peer review. Alternatively, I asked for a clear reason that the paper was being rejected. Ultimately, however, these arguments went nowhere. The journal editors would do neither, and eventually asked me to stop emailing them on this topic. So I stopped.

ON TO THE WINNOWER

Soon after the manuscript on arXiv went viral, I received an email from Joshua Nicholson of the Winnower asking if I would write a piece about the manuscript for the web publication's "Grain" section. Apparently, the arXiv manuscript's Altmetric score of over 2,000 had alerted him. I initially replied then that I would but I was still trying to figure out what to do with the manuscript itself. Josh replied that the manuscript could eventually be uploaded to the paper section of the Winnower and opened for public review. I had not heard about the Winnower before, but soon read up on it. Even so, at the time, I tried first for a more established journal. Now that publication in an established journal seemed unlikely, and given that I would not publish this in a "scam" journal even given numerous email advertisements, I took a closer look at the Winnower.

The public review inherent in the Winnower's paper section seemed to me to be an excellent idea. I was somewhat skeptical, though, that many authors would submit their papers to this section. A key reason, in my opinion, was the "prisoner's dilemma". Although it would likely benefit the entire community to adopt a public review, it would tax individual authors primarily because of the lack of current reputation of the Winnower. Papers published on the Winnower would not, at least at first, carry the same weight during promotion and tenure deliberations as papers published in a journal with an established reputation.

My opinion on this draws on a similar situation that I found myself in several years ago. In 1999, along with a colleague, I started the Astrophysics Source Code Libary (ASCL: Nemiroff & Wallin 1999) based on the idea that opening up the source codes behind peer-reviewed papers would increase falsifiability and benefit the astrophysics community. Since a more healthy astrophysics community is in everyone's interest, I hoped that the ASCL would become quickly popular. I was wrong. In reality, few people contributed their codes, at least at first. I did not appreciate that the extra work and the possibility of revealing poorly written code led to a "prisoner's dilemma" for code authors. Only after a new ASCL

editor solicited codes, a new editorial board created policy, and new submission perks were added including having each code appear as a separate citation -- effectively a separate paper that could be cited and included in a publication list -- did the ASCL become popular (Allen et al. 2013). Even now, however, many scientists who would agree that it is a good idea to release paper-enabling source codes still do not submit their own codes to the ASCL.

Nevertheless, Wilson and I were out of options, and so if we wanted our manuscript published anywhere besides the arXiv, it would be on the Winnower -- or nothing. Therefore Wilson took the last version of our paper that we submitted to the above-unmentioned prestigious journal and reformatted it for the Winnower. I uploaded the paper in early May of 2014. I might add that we have always welcomed peer review -- now including open peer review -- as evidenced by our pleading with journal editor after journal editor to send our paper out for review. That our manuscript might help advance a more open and healthy system of peer review as deployed on the Winnower was an unexpected perk. If the reader would like to read and even review the paper, please feel free to do so -- this opportunity can be found at the reference at the end of this contribution: Nemiroff & Wilson (2014).

WHY DID THE MANUSCRIPT GO VIRAL?

We did not know, before hand, that the original manuscript would become so popular. There are several reasons, in retrospect, that likely contributed to its popularity. First, the manuscript incorporates two attractive topics -- time travel and the Internet. Interesting papers on each topic are typically popular in their own right -- but a good paper combining the two -- possibly even more so. By coincidence, however, the manuscript actually touched on a third popular topic -- religion -- by using the search term "Pope Francis". Reporting on a paper that convolved time travel, the Internet, and religion, it turned out, created an irresistible opportunity for many editors and bloggers.

On the negative side, the manuscript appears to some, at first sight, like watching a train wreck. It portrays that scientists -- who claim to be worthy of respect -- think that a ludicrous concept like time travel is real. It therefore draws in a reader possibly wondering things like "are the authors crazy?" or "do they also believe in the Easter Bunny and leprechauns?" or "are scientists (again) wasting taxpayer money?" Such readers might be disappointed that no evidence of time travelers was reported, as reading about the self-destruction of haughty scientists might have been more gratifying. On the money-wasted angle, when doing a Reddit interview about the manuscript, I respond to a question about how this research was funded with the fake answer that we used money left over from our study "Does Tax Payer Money Burn Any Better Than Regular Money?" (Nemiroff & Wilson 2014). In reality, this was an unfunded project.

I'd like to think, however, that the most important factor in the manuscript's popularity was that it portrayed a really cool idea that was fun to think about. To quote Will Oremus on Slate "[authors] had me at the first line of the abstract: 'Time travel has captured the public imagination for much of the past century, but little has been done to actually search for time travelers. Say, that's a good point!" (Oremus 2014).

Although surprised by the degree, I did think the paper would garner some public attention. That is because the paper was motivated by aspects of science that interest the public rather than funding agencies. After the paper's initial submission, I engaged in a short email exchange with Fraser Cain, the publisher of the Universe Today web site. We considered the idea that perhaps there is room in the world of publishing for science motivated primarily BY public interest, instead of IN THE public interest. Such a journal would involve serious peer-reviewed papers about what science really has to say about time-travel, warp drives, and creating black holes in the lab, to mention three ideas that deal with astrophysics. Conversely, the journal could also include some hard science fiction that draws from very modern science discoveries into short fiction pieces as realistically as possible. Other areas of science and engineering should also be included. Possibly publication could be coupled with a small amount of Kickstarter-like funding. Cain and I have not discussed the idea further -- we are both too busy -- but if anyone out there on the Internet wants to explore this idea further, consider me a supporter.

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