To the reviewers of my paper entitled “Knocking on the Stars: The Philosophical Implications of the Search for Extraterrestrial Intelligence”-

Thank you, kindly, for taking the time to review my paper and write up wonderfully insightful comments. Many of your comments were helpful for me in understanding an outside perspective and inspiring points which I had not thought to make. On occasion, it seemed as though these comments were of a very scientific nature and had more to do with the literal sense of things instead of the philosophical side of the picture. I understand that all of you are scientists, and I appreciate the patience you had in reading through a rather long philosophy paper. This being said, my disagreement with some of your points were generally based on subjective material and my intent of the philosophical content. When I could, I would clarify the subjects which were received in a different light than was intended. When I could not, this was merely a possibility of extension on the project and continuation of the research. I would also like to thank you all for your timely reviews seeing as the deadlines were rapidly approaching.

Again, please accept my sincerest thanks for your time and thoughts.

-Danielle Mortensen

Review Response 1

Major Points:

Introduction:

The abstract and intro mention arguing that science and philosophy go hand in hand. However, this is not addressed in the rest of the paper other than for a couple sentences at the end of the conclusion. These sentences should be left out of the paper because they do not seem to contribute to the main argument of the paper.

- I agree. It was meant to address my initial statement from the proposal that this paper would help philosophy and science come together, but I think it takes away from the primary purposes of the paper to address this directly. Now that the research has been completed, it does not seem to fit anymore. I will leave the ending point as a note to finish the paper on, but it will not be part of the abstract or introduction anymore.

The paper uses a lot of colloquialisms and contractions. While this is a stylistic choice, it does make the paper a bit unprofessional and compromises the merit of the paper.

- I disagree. I also believe that this is a matter between philosophical and scientific writing styles. In philosophy, it may be beneficial to use colloquialisms and contractions for the sake of making the paper more accessible to the audience and easier to read and understand. By separating the contractions, I would run the risk of making the paper unnecessarily wordy and lengthening already long sentences.

This paper would benefit from the use of counterarguments to strengthen the main argument. There are a couple places where the author assumes that people agree with their argument. Rather than this, counterarguments should be presented, and the disproven, to persuade the reader to agree.

- I actually do use counterarguments in this paper, though they are not generally explicitly stated as so. One example is mention of the Space Race and how it produced mass amounts of new and beneficial technology. I also mention that the assumptions that we make are necessary because of the current state of our technology and that these are good places to start if anywhere.
- Overall, though, it would seem that you mean a *big* counterargument like “why would people say that we should search for intelligent ET life?” Even this, I mention in the paper at the end of section 3.2. I address the fact that we might gain from contact with these civilizations, however, between the two extremes (extremely friendly and helpful aliens vs. extremely hostile aliens) it is not worth taking that chance and exposing all of humanity to the risk of extinction.

There are a lot of places where citations are needed, for example, when referencing distribution of US dollars or referencing books or movies. Also some of the references are not from academic sources, this detracted from the merit of the paper. Ex: Drake Equation.

- I have added citations for *Galaxy Quest* and *Dune*.
- I also added a citation for the claim that SETI receives millions of dollars in private donations.
- The original source material for the Drake Equation is the *Physics Today* article from 1961. If there is another source for this, I was not able to find it. Citation of academic sources is key in scientific papers, however the addition of non-academic sources in philosophy papers can be used to support one's argument and provide examples which are not necessarily discussed in the academic community.

The Question:

"A definition of 'intelligence' is also quite difficult." Then the author proceeds to define it. This sentence drastically takes away from the integrity of the paper and trust the reader has in the author.

- This is just a statement which addresses the ambiguity and subjectivity of defining intelligence. It is not necessarily "difficult" by means of "hard to define", but difficult by means of being troublesome and lacking a permanent state. Even if it were meant in the sense of "hard to define", I will by no means attempt to undersell the difficultly of trying to define it.

The last paragraph of this section seems to shift the goal of the paper. The abstract talked about demonstrating why humans are not ready to search for ET life, but this paragraph talks about proving that world peace and technological advancement are necessary in order to search for ET life. It seems like this paragraph might need to be rephrased in order to better fit the narrative.

- The explanation that humans are not ready to encounter intelligent extraterrestrial life is supported by my assessment of the shortcomings of humanity in technology and peace. To limit my paper to simply defining why humans are not prepared for this without proposing a path to a solution would be an empty argument. This is a classic Aristotelian argument- Humanity will be prepared to encounter intelligent ET life if they have advanced tech and world peace. Humanity does not have advanced tech or world peace. Therefore, humanity is not prepared to encounter intelligent ET life.

SETI & The Distribution of Resources:

This paper is aiming to show that world peace and technological advancement are necessary for us to be ready to search for ET life. However, the paper talks about seemingly unrelated areas. The only related subsection in Section 3 is "World Peace," and technological advancement is not mentioned. Maybe the paper does not need to be completely rewritten, but the other sections could be restructured into a "Technological Advancement" section.

- I have changed the premise of "world peace" to "world cooperation" in order to prevent misunderstandings. The first two sections of the argument are meant to address technological advancements and the latter two are meant to discuss world cooperation. This did help me to determine how section 3.3 fits into the paper. While it's important

that we have a First Contact protocol, it was not evident that this fell under the topic of "world peace". But both world peace and the First Contact protocol fall under the topic of world cooperation!

"Our current technology is nowhere near advanced enough to search for every kind of life, in every kind of way, and in every direction of the Universe." Is this saying that, just because our technology is not perfected, we should not pursue searching for ET life? Isn't science about using out current understanding to test and experiment, even (and especially) if that understanding is not perfect? I feel like this creates a really big hole in the argument, unless I am misunderstanding what the author is trying to say.

- No. The goal of this part of the paper is to say that we have no way of addressing all of our assumptions when it comes to the search, so instead of using our money and resources to use the current, insufficient technology to search, we should be using the money and resources for other purposes. Once technology has advanced enough for a reassessment of this idea, we will address it again.

"SETI bases their search on many assumptions." However, the author also made assumptions in defining key terms, such as assuming humans are the only intelligent species on Earth by definition. The search for ET life cannot be considered bad because it is based on assumptions; it is simply based on our current understanding of the universe. For example, scientists assume that the laws of physics work everywhere in the universe, but we cannot prove this, and unless we find a counterexample, we will assume that this is true. This does not make the assumption bad or invalidate all of physics, and definitely does not mean that the study of physics is futile. (This is not to say that the whole paper needs to be rewritten or re-thought, but this argument could be used as a counterargument that the author can expand upon and argue against to strengthen the paper.)

- I never state that assumptions in science are bad, and in fact, I would not agree with this statement. I am simply stating that assumptions in science are purposed with narrowing the field of study, but in the search for extraterrestrial life, this is unhelpful and much more of a shot in the dark because we do not have overwhelming support that our assumptions are probably the case. For the sake of clarifying terms in the paper, I make some assumptions, however, the point of these definitions is twofold- first, to make sure that both the reader and I are on the same page in what these terms mean, and second, to lay the groundwork for demonstrating that these assumptions limit science in later sections of the paper. I have added in a sentence to attest to this before I begin the definitions.

Our Assumptions:

"SETI, in particular, tends to narrow their definition of intelligence." This is a "narrow" definition because the author arbitrarily defined intelligence to be something different earlier. However, if the author decided to define intelligence in the same way that SETI does, then this definition would not be narrow, and the argument would fall apart.

- My earlier definition of intelligence is not different from SETI's definition but encompasses it. This is why I refer to their definition as "narrow". They do not have as wide a view on intelligence as is initially presented in this paper. Additionally, the reason that my own definition is of a similar nature to SETI's is so that I can demonstrate their lack of openness to different interpretations of "intelligence".

Conclusion:

"This can only be answered with more questions which are ultimately up to you to decide." This severely detracts from the merit of the paper and the trust placed in the author. This essentially detracts from the whole point and argument presented in the paper because it does not matter if it is up to the reader to decide.

- I have altered the wording here to introduce the following questions as a recap of the paper. Though I must stress that it *is* ultimately up to the reader and all of humanity to decide whether or not we've addressed these questions. Additionally, the merit of my paper in this sense means little to nothing! Yes, it's important that readers understand my point, but I doubt if a SETI researcher read this paper, they would immediately change their mind about the research they are pursuing. It is up to the reader to decide whether this is important enough to address or if it means nothing because they are part of the humankind which are looking for life in the first place. If I found a star's mass to be 3 solar masses in my research, then it would make sense that I wouldn't tell the reader that it's up to them to decide whether or not the star really is 3 solar masses, but in philosophical terms, I have presented one side of the argument where the other side does not exist. This was a means of opening up the floor to those who may pose counterarguments and begin a debate of the subject, because it is certainly not all one sided.

Minor Points:

Paper should be in AAS format.

- AAS would not accept this paper in any way, shape or form, therefore I will not be using their format to write my philosophy research paper.

The author uses "we" and "us" (plural) when there is only one author on the paper.

- I have fixed these few instances to use "I".

There are a few sentences throughout the paper that are phrased as questions, such as "If there are so many alien life forms, then why don't we see them?" These sentences give the paper a colloquial tone. However, they might be okay in a philosophy setting, I'm not entirely sure.

- Due to the philosophical nature of this paper, colloquialisms and philosophical questions dispersed throughout should be acceptable.

Introduction:

"Will change the course of human philosophy, history, ethics, religion, astronomy, biology, chemistry, technology, and arguably every other aspect…" If all aspects of humanity of affected, there is no need to list these off.

- I would disagree. It is important to emphasize the areas which would be affected the most and allow for the everything else to fall under a different category which can "arguably" be a part of this statement.

"So far, the search for life seems promising." It should be clarified what this is based on (e.g., probability).

- A probability that we find life is based on several assumptions (as explained in my other sections) in concepts such as the Drake Equation. This statement is based on the rest of this paragraph which identifies the likelihood that there are several billion exoplanets in the Milky Way alone.

Paragraph 3 mentions characteristics of exoplanets necessary for life. All of the characteristics mentioned are explained except for the presence of gases such as methane, ammonia, etc.

- The mention of these gases has been removed for brevity.

The Drake equation should have an equation number.

- This is the only equation in my paper, and it is clearly referred to as "the Drake Equation" throughout the rest of the paper, therefore it is not necessary that it have an equation number.

The first few parameters are about 0.1, but N is about 10,000. Do these values make sense considering all the other parameters in the equation except for L are fractions? Is L sufficiently - large to make N = 10,000?

- Several other variables in this equation are non-fractions, and N = 10,000 is cited back to Drake himself.

"The range varies by opinion." Is this based on opinion, or on observations/estimations?

- The latter half of the variables in the Drake Equation are based on opinion and not observation. This is stated in the paper.

"The presence of Science Fiction in popular literature…" then the paragraph proceeds to mention, TV shows and movies as well as literature.

- Thank you for pointing this out. The term will be corrected to "media".

The Question:

The title of this section does not seem to accurately represent the content. Maybe it should be changed to something like "Definitions"?

- Thank you. This will be changed to “Framing the Question & Defining Terms” to appropriately describe the content.

The first paragraph of this section can be moved to the introduction.

- This section is meant to introduce “The Question”, therefore it will remain where it is.

“There are notable issues with this Darwinian definition of life…” What are these issues?

- As I have said, these issues are explained in Joyce’s paper and are not entirely necessary for this paper. The reason I leave this sentence in is to address any concerns readers may have with the Darwinian definition.

“But the question of intelligence becomes more convoluted when we consider octopi, apes, dolphins, and other rather brainy animals. Do they fall under the definition of intelligence?” The answer to this is almost immediately answered as “no,” so this section is unnecessary.

- This section is necessary for the determent of future arguments against this definition of intelligence. By omitting it, I would not be addressing all possibilities and would therefore be subject to argument over the point of intelligence.

“Humans, we shall say, are the only creatures on Earth under this category of intelligence. Although this cannot be proven.” Why are humans the only intelligent beings? If the author is assuming this to be true, it should be stated that this is an assumption and that humans are taken to be the only intelligent species on earth. Otherwise, this claim needs textual support.

- It is stated as an assumption from the phrase “we shall say” and the precursor to the next sentence “Although this cannot be proven,”. I will clarify that this definition was stated thusly for the purposes of this paper.

“The term ‘First Contact’ was initially made popular in the context of extraterrestrials by Murray Leinster's 1945 Science Fiction book, First Contact. It is used to refer to the initial communication between humanity and extraterrestrial life.” Immediately after, a different definition is given. So, these sentences are unnecessary.

- A different definition is not given, the initial definition is expounded upon, and due credit is given to the author of the term.

The author lists sources of communication that are not considered First Contact, specifically “the physical discovery of evidence of an extinct alien civilization” and “Earth messages intercepted by alien civilizations” Then the author says, “Essentially, if intelligent extraterrestrial life is made known to us somehow, then this is ‘First Contact.’” However, aren’t these examples also ways that intelligent extraterrestrial life can be made known to us?

- This implies the caveat of intelligent life which was *living* when communicating with humanity, but for your second example, no, ET life would not be made known to us if *they* received *our* signal. We would still have no concept of their existence and therefore, this is not considered as First Contact here.

The example from Galaxy Quest is unnecessary. It does not need to be explained why intent is important.

- The example from Galaxy Quest is a means of portraying the influences of science fiction on this argument. And intent is important to this paper because communication without intent may lead to misunderstandings which have the potential of creating issues, like in Galaxy Quest. Additionally, the readers of this paper now have a means of relating to the material through these examples. Nonetheless, I took this section out.

"We are creating a rapidly deteriorating timeline by which we limit humanity through the focus of resources on non-essential projects." This sentence is unclear and should be reworded.

- The wordiness has been addressed.

This section can be placed earlier, after defining key terms, to keep all of the background information together.

- I agree. Thank you for making this recommendation. The section on SETI and resources has been switched with the section on assumptions.

"The range of possibilities for means of communication is just too large for us to cover." Does this really mean that we should not try at all to communicate?

- No. Again, this is meant to point out the fact that we should not be wasting resources and money on every single possibility. Instead we could save time, money, and resources by allowing technology to naturally progress to a point where we can limit our use of assumptions and raise the probability of detecting intelligent alien life.

First Contact Protocol:

"When it comes to the unknown of extraterrestrial life, anything we can imagine is possible, even to the far reaches of Science Fiction." This sentence can be deleted because, once it becomes possible, it is no longer Science Fiction.

- Well then, science fiction wouldn't exist. Science fiction has always been an exploration of the possible.

One parallel that could strengthen this section would be colonization. If we were analogous to the Europeans in this case, it could be argued that the Europeans weren't ready to colonize America, hence all the issues that arose. Conversely, if we were analogous to the Native Americans, contact between the Europeans and Native Americans resulted in a lot of harm done to the Native Americans, like what could happen to us.

- This is a great suggestion! If I knew more about the situation involving Native Americans and European colonization and had time to research the topic I think it would be an excellent addition to the paper. Unfortunately, I do not have the time to add this in, but thank you for suggesting it!

World Peace:

The term "peace" might be best defined in the "The Question" section.

- Considering the rather brief nature of this definition, I will leave it in the "World Peace" section instead of adding another paragraph along with the other definitions.

To offer another counterargument, the Space Race resulted in a lot of technological advancements that benefited society. It did not necessarily result in the detriment of humanity, but maybe had some good outcomes. (Note that I am not too well versed on the history of this and could be wrong.)

- This is less about the trade-in of disastrous consequences for technological advancements (and I do mention the fact that this allowed for a plethora of advancements) and more about the intent behind the Space Race and the trade-ins that we allowed at the time without understanding the significance of the impacts this new technology would make in the future.

"They learned the concept of war and destruction from us." Just because we teach this civilization about nuclear weapons, does not mean we teach them what war is. War was a concept and quite prevalent on earth before nuclear weapons were introduced. In fact, nuclear weapons were only used in war once, and its purpose was to end a war.

- This is a fair point. I have reworded this sentence to address only the transfer of knowledge about nuclear weapons.

Conclusion:

A summary of the thesis and arguments presented should be given.

- Done and done.

The questions listed could be stated as "future work" to be investigated in later research.

- These questions are a review of the topics which were discussed in the paper. They are not considered future works but philosophical ponderings which need to be considered in order to answer the proposed question "Should we be searching for intelligent extraterrestrial life?"

The mention of the Mount Everest Effect is not necessary to the conclusion. No new concepts should be introduced here.

- Yes… I agree. This was supposed to be a more or less fancy ending to the paper, but it just made it more convoluted. The conclusion ended up being more fancy than practical. I removed the paragraph.

Review Response 2

Major Points:

Introduction: the 21 cm wavelength does not come from the change in energy between the excited state and the ground state, but rather from the change in energy between two types of spin configuration within hydrogen atom.

- Yes. The reviewer is correct. This was poorly explained on my part. The 21 cm wavelength is a result of the spin flip in a neutral hydrogen atom. My original writing was meant to address the fact that the entire atom (not just the electron) goes from an excited (or non-stable) state to a ground (or stable state) when the spin-flip occurs.

World Peace: Part seems to discuss more on "war on other civilization" rather than "world peace". The author should rephrase the paragraph to link these two concepts together. For example, if our First contact is with an aggressive civilization, humanity may not have enough weapons or resources to go against it because humanity is not even united at this moment. I think the author should include/ consider this point in her argument.

- I see what is meant by this point, but the discussion of alien war was used as an example to show that humanity must be at peace before First Contact. The example was just turned around so that we understand the other perspective (if the aliens had not attained peace amongst themselves).

Minor Points:

Introduction:

There are more things that are necessary for life, sch as the need for terrestrial planets or oceans, being far away from any dangerous irradiative sources, etc. Thus, I suggest the reader to put the phrase "including but not limited to" to cover a wider range of requirements for life.

- Thank you. I will accept this suggested change for purposes of clarification.

The Sun (which I think can be considered a stable star in this context regarding life) also has coronal mass ejections and flares. Thus, I think the more important point is the distance between the plants and the star to avoid such activities, or those activities need not to be too frequent.

- I have added the phrase "excessively violent" in front of this phrase to clarify the difference between very active and very stable stars.

Need citation "Many suggestions have been made to estimate N…"

- The citation is already present in this sentence. It is from the same source as states that Drake believes N = 10,000.

How is this a form of communication of intelligent life? Organic matter can be observed in non-intelligent life, or even interstellar medium.

- I agree. The source for this was not clear on this distinction, so I have removed it from the paper. Now the only two forms of communication are light and direct presence.

Need citation "…but it has generally been concluded that … in the 21 cm wavelength"

- A citation has been added here.

The Question:

What are "brainy animals"? Instead of introducing more undefined terms, I think the author should only list octopi, apes, and dolphins.

- The wording here was changed to "smart" rather than "brainy".

Who or what are "some referring to? "According to some, death cannot be taught"

- There is a citation already present (Yun 2011) which is where this idea comes from in academic literature.

SETI & The Distribution of Resources:

If possible, the exact value of donation to SETI should be included, or at least a citation is needed for the claim that it is "millions of dollars".

- Citation is now included. The exact values are likely withheld by SETI.

The citation seems to be put in a wrong direction (right now, it seems to support the statement that "such prominent world issues could be addressed with this money". Should it come in the middle of the sentence?

- Yes, it should have been referring to the SETI budget here. Thank you.

This should be the author's first and more important point in the section. I think there are always social problems that need to be addressed. Therefore, if we follow the author's argument in the first paragraph of the section, it seems like we should never put money in the search. Rather, I think the more important point is that if we decide to put money in, we should know what we are doing and that the technology is advanced enough. Thus, I think this point should come first, and the argument about spending money on other social problems can come second.

- The two go hand in hand, and I think that this sentence explains the punchline of the section. I also address the fact that I don't think we should never search for extraterrestrial life. I simply state that perhaps now is not the time.

I don't think the argument in this paragraph needs an example from movie to illustrate. The logic in the following sentences is enough.

- I would like to leave the example of Dune in the paper in order to address the connection made between this topic and the influences of science fiction. I believe it also provides

relatable content for the reader and creates a very specific yet simple example to base the argument on.

Our Assumptions:

The author should make the title of this section clearer. For example, it can be "our assumption about technology and life".

- It has been changed to "Assumptions About Extraterrestrial Life"

I think that we have some reasons, because nothing travels faster than light. This claim is too definitive for me.

- Well, this is an assumption that we make based off our understanding of the Universe. But we can't know what we don't know. Maybe intelligent extraterrestrials know it though!

First Contact Protocol:

I think this sentence distracts from the discussion about the need of the First Contact Protocol. Also, the term "limitless possibilities" in the following sentence should be enough to convey the idea of this sentence.

- I think this sentence broadens the example to include the potential possibilities of First Contact and remind the reader that a protocol would be difficult to produce.

The author should explain why it is difficult, or what prevents the laws from being agreed among nations.

- They're just not enforceable. There is not any one group of people that can tell the rest of the world what to do. Even the UN is not this powerful.

World Peace:

Is it reasonable for humanity to keep weapons of mass destruction to defend ourselves with aggressive extraterrestrial life? I think the answer to this question can be helpful, or else the term "no need" may be too definitive.

- I have removed this premise from the argument. Thank you.

Conclusion:

The author should address "us" or "humanity" rather than "you".

- This sentence has been rephrased.

Review Response 3

Major Points:

There needs to be an affiliation added for the author.

- An affiliation with Villanova University has been added.

In section 2, it states "Humans, we shall say, are the only creatures on Earth under this category of intelligence", in reference to humans being the only species which have a concept of mortality. This needs a citation.

- This is not stating a fact. This is stating a definition upon which the paper will build. By the phrase "we shall say" I am making it known that while this may not be the case, we will consider it to be for this paper. I also mention the fact that we do not know if this is true, but, again, we are making this assumption. And the fact that it is an assumption comes up later in the paper.

Some of the scenarios seem outlandish. For example, in section 3.3, it is described how there are no laws preventing an individual from convincing an advanced alien species to wage war on the rest of Earth. This assumes first contact comes in the form of an alien race coming to Earth with advanced weaponry. It seems more reasonable that first contact comes in the form of detection of an alien race located very far away. Throughout the paper, there is reference to disastrous scenarios presented in science fiction books and films. In my opinion, using real world examples makes a better argument. The Notre Dame comparison was very effective compared to theoretical sci-fi plots. Examples pertaining to the colonizing nature of humanity would be a good addition instead of focusing on sci-fi stories depicting alien domination.

- These examples are important in pointing out the effects that science fiction have on our ideas of extraterrestrial life. The concept of colonization was brought up by another reviewer, and I agree that this would make a wonderful example in this case. However, I do not have the time to become an expert on colonization history and research the subject to present it in the paper. In addition, there would, no doubt, be someone to challenge this argument based on the comparisons I make with real-world examples. By simplifying things to my own sci-fi stories, I eliminate the possibility of someone clouding the purpose of the example with details from history.

There needs to be a better formulation of the argument for advanced technology. There needs to a definition of what advanced technology is. What do we need to advance to become ready for first contact? Also, it is unclear where the argument for advanced technology is in the paper. There is not a separate section for this topic. It is mentioned in section 3.1, but the discussion seems covered with mention of Dune and theoretical water-loving aliens. There needs to be a better formulation of this argument and it needs to be clear to the reader where the advanced technology argument is. Compared to the world peace argument, there was nice flow from

section 3.3 into section 3.4 which develops the world peace argument. This needs to be done for the advanced technology topic.

- I did not define advanced technology because I do not know what it will look like. The definition that I do give is: technology which will allow us to let go of our assumptions about intelligent extraterrestrial life. The advancements are hardly conceivable though.
- I have changed things so that the argument for technological advancements is clearer throughout the first two subsections of The Argument.

Minor Points:

In the introduction, the scientific reason for potential life in the solar system should be explained. There is a good explanation into the science behind the conditions for life on exoplanets, an explanation like this should be given for the solar system as well.

- This one is not as important to the context of this paper as extra-solar system conditions because we've all but ruled out the possibility of intelligent life residing within the Solar System. I don't think any more time should be spent on that subject in the introduction.

When discussing the definitions in Section 2, do other philosophical text adopt the same definitions? It would add merit to the use of these definitions if other studies also adopted them.

- There really isn't much literature out there which takes the time to define these exact terms in the same ways. But, the already referenced articles in the introduction are places where these definitions have been adopted, so yes, they have merit.

There should be more in-depth discussion of what SETI does and how it uses donations in the beginning of section 3. Therefore, the reader can appropriately gauge whether all these donations to SETI are deserved or not. It should also be mentioned how much SETI receives in donations.

- The mere name of SETI (Search for ExtraTerrestrial Intelligence) assumes what the money is going toward, and this is what the entire paper argues against. While a breakdown of the money SETI receives would be ideal, there isn't much question as to what it's going toward.
- Also, the actual amount that SETI receives is in the range of millions of dollars, however this information is not disclosed in full. So, I do not know what the budget breakdown is.

In section 3.2, it is stated that "there is no reason to believe that light is the best way of sending signal at all!" This should be elaborated on. Our current understanding of physics seems to refute this statement as light is the fastest moving thing in the universe. Does this statement assume our current knowledge of physics is incorrect or incomplete?

- Well, this is an assumption that we make based off our understanding of the Universe. But we can't know what we don't know. Maybe intelligent extraterrestrials know it though! So, yes, I'm insinuating that our current knowledge of physics is incomplete. I do

not believe that we will ever know the full extent of what the Universe is and how it works.

In Section 3.4, the space race was technically between the U.S. and the Soviet Union, Russia was a part of the Soviet Union.

- Thank you! I will make this correction.

Review Response 5

Minor Points:

§2 does not seem to be addressing a question. Mostly seems to be definitions. Could be renamed or restructure.

- It is also introducing and framing the question: Should we be searching for extraterrestrial intelligence. But I have renamed it to also reflect the discussion of definitions and moved the last paragraph into The Argument section.

§3.3¶2 might not be a good idea to be explicitly calling out certain groups (Russia) in a scientific paper.

- While I agree, I phrased this section as delicately as possible and while attempting to remind the reader that this is a mere example out of many other misdemeanors. The reason that I used this example was because it was the latest happening in the news. By relating the content back to current events (instead of a similar situation like China's ASAT in 2007(?)), then I hope to convey the fact that this is *still* a major world issue which must be resolved before First Contact is initiated.

Elements of life are talked about in the introduction but are not referenced in the broader paper.

- They have been removed from the introduction.

Conclusion does not address how paper worked to say we are not prepared to encounter intelligent life. Rather it asks questions for the reader to determine on their own. A restatement of the author's stance would be useful here.

- The conclusion has been rewritten to summarize the paper and address the question.

Review Response 6

Major Points:

The arguments made throughout the paper could be strengthened by more evidence, such as statistical studies. For example, section 3.1 states that "many people have given up on the idea of saving the Earth and have turned to the alternative of space as an end-all solution to our problems." Are there any statistics or references available to back up this claim?

- I have added a citation to this, though there is no statistical evidence to back it up. I also rephrased it to say that the hope of off-Earth colonization has an effect on our thoughts of sustainability, not necessarily that it detracts from the want or need to save Earth.

Other necessary clarifications include:

  - *Is the assumption that most people would answer "yes" (to the question stated in the first paragraph of section 3.1) representative of real life, or is it an assumption made for the sake of strengthening the authors argument?*
    - You're correct. It's wrong to assume that answer. I have reworded it to say that *if* the answer is yes, then we can proceed to ask the next question. But in general, I think if you gave a person the option of funding meals for starving children or funding the search for intelligent extraterrestrial life, their moral compass would likely point toward the former.
  - *In section 3.3, the author states that many nations (in addition to Russia) are guilty of misdemeanors related to local space travel then does not provide an explanation or references to support this claim.*
    - I have added other instances and references to the paper including China, the US, and India's ASAT tests.
  - *It is unclear if the definition of world peace in section 3.4 is the author's own definition or one based on other philosophical papers.*
    - It is my own definition. I would include a reference if it had not been.

An important question seems to be: what would make us ready for First Contact? Then, a large portion of the paper focuses on our insufficient technology. By asking about our readiness for First Contact, does that already imply that we have successfully made first contact? The abstract and the last portion of the introduction set up the paper as though the author plans to tackle what would happen assuming First Contact did occur.

- I do not understand the comment about implying that First Contact has already happened, and I do not believe that this is implied anywhere in the paper. But yes, the abstract and the introduction correctly set up the paper to tackle what would happen if First Contact occurred. By tackling this problem we can then infer that we are not prepared for it. Without these inferences, I would be making an empty argument that we should not be searching for intelligent extraterrestrial life.

Minor Points:

The author thoroughly explains the Drake Equation, but she could include an explanation of possible answers to Fermi's paradox.

- Limited time and the primary importance of the Drake Equation over the Fermi paradox have limited my ability to address this. But I do include a possible solution- the fact that intelligent extraterrestrials may not use technology and/or communicate with it.

The author references the SETI post-detection protocol without providing any description of what that protocol entails or why that protocol is not legally enforceable.

- What it entails is not very important. The point is that some semblance of a plan exists, but we do not have any means of enforcing it across all nations. This may be topic for a later paper, but is much to large a concept to put in here.

Section 3.4 states that Russia and the U.S. raced each other to get to space and the moon for the "purpose of expressing power, control, and superiority" rather than "technological advancements and growth of humanity." The author does not provide a reference to support this claim.

- A citation has been added.

The author concludes the paper with a quote about science and philosophy without any source for the quote. It is unclear whether the quote is the author's original quote or from another source.

- It is unknown who said this quote exactly, but it is an altered version of a quote from Einstein.

Review Response 8

Major Points:

It seems like the idea that science and philosophy are linked is a big part of this paper. However, I am confused about how this is related to the author's main question of if we should be searching for ET life. Do we need to actually bridge science and philosophy in order to search for ET life? Why are these two topics connected? Also, this idea is not really mentioned at all in the paper besides twice in the beginning and once in the conclusion, so I am unclear regarding how big of a part of the essay it is supposed to be.

- While this is an important point, it has been removed as a central purpose of the paper.

There are many instances where I think there is a lot of fluff in the paragraphs that is not necessary. For example, are the numerous extensive paragraphs defining all those key terms necessary? Or, can they just be briefly defined as the author goes along explaining her main argument? Another example is the description of De Anima by Aristotle. I think the description of the soul is not necessary and that she could just mention rational thought and have the reader have the same understanding. Fixing some of these parts might make the paper more concise.

- I am of the opinion that this fluff is necessary in order to address possible concerns with the paper. If I had not defined these important terms in the beginning, there could be numerous arguments posed against my own on the subject of term definitions alone.
- De Anima was a means of describing the capability of pondering one's own mortality, namely the ability to rationalize.

I am not sure about what the point of the My Assumptions section is. I do not understand how it contributes to the main argument about how we should not be searching for ET life. I believe that it is talking about the assumptions of the Drake Equation, and while that is interesting, I do not see how it plays a role in the argument.

- I have clarified how advanced technology would assist us in the department of limiting the amount of assumptions we make in the search for extraterrestrial life.

In the first paragraph of World Peace, the author says that "Maybe if world peace were the case, we could get on with discussing options for First Contact protocol." This is just one example of many in this paper of the fact that even though it is an interesting thought, a thought is all it seems to be. Many points need to have additional explanation so that the paper seems like it is more researched-based rather than something which is pondered.

- The research part of the paper are these things which are "pondered". This is what makes it a philosophy paper.

Regarding the Conclusion, I am not sure if that is the best way to end a paper, no matter what category it falls under (scientific or philosophical). A research paper is supposed to convince the

reader of something with evidence. I don't think that telling the reader that they need to decide on their own what to believe is very convincing of the argument.

- I have altered the wording here to introduce the following questions as a recap of the paper. Though I must stress that it *is* ultimately up to the reader and all of humanity to decide whether or not we've addressed these questions. Yes, it's important that readers understand my point, but I doubt if a SETI researcher read this paper, they would immediately change their mind about the research they are pursuing. It is up to the reader to decide whether this is important enough to address or if it means nothing because they are part of the humankind which are looking for life in the first place. If I found a star's mass to be 3 solar masses in my research, then it would make sense that I wouldn't tell the reader that it's up to them to decide whether or not the star really is 3 solar masses, but in philosophical terms, I have presented one side of the argument where the other side does not exist. This was a means of opening up the floor to those who may pose counterarguments and begin a debate of the subject, because it is certainly not all one sided.

Minor Points:

I am not quite sure about if the citation format is standard for research papers.

- The citation format has been changed.

There are a few instances throughout the paper where I think citing literature is necessary. For example, the author states that "the presence of certain molecules like H2O are important because water is a universal solvent which aids in life processes on Earth, and elements like carbon have a large and strong structure which is also ideal for life." Where did this information come from?

- These sources are mentioned above that sentence where I listed the various requirements for life.

When talking about the Drake Equation, the author says that observing the presence of organic matter is a form of communication, but I do not understand how this is the case.

- I have removed this statement from the paper and altered the remaining claim.

At the end of page two, the author says that "it is assumed that other intelligent life will come to the same conclusions and also tune their instruments to 21 cm." This is a rather large assumption and I think it should be explained more.

- The point of addressing this is that it is a large assumption. Through this assumption I am basing my argument that large assumptions detract from the search for extraterrestrial life and add to its price tag.

There is a lot of language that takes away from the professionalism of the paper. It almost seems like the author is trying to add an element of humor, but I do not believe that is the right move

for a research paper of any type. It makes it sound more conversational than professional. For example, the author uses: "brainy," "laymen terms," "suss out," and "sexy."

- I have changed a few of these words, but some remain as I see no issue with them.

There is a lot of language that makes me think the author is not completely sure of her argument, which causes me to not have a lot of confidence in it as well. For example, the author uses the word "maybe" quite often.

- The use of "maybe" and "perhaps" allow for philosophical interpretations of the arguments. I am also unable to assert that these event will happen, therefore, I am suggesting the possibility of their happening.

I have one concern about the intelligent life definition. The author defines what intelligent life is, but how do we actually know if it is intelligent? How do we know if the life we find is aware of its own morality? It is highly unlikely that we can simply ask them this.

- This is true. Which means that intelligence is based on our own opinion and assumptions. This is why this definition is useful to my argument that our perception of intelligence is narrow and does not necessarily encompass all meanings of the word.

Regarding all the references to the movies, like Galaxy Quest or Star Trek, is it acceptable to assume that the readers have seen the movies that are being referenced? Also, is the whole movie explanation even necessary? I haven't seen any of the movies that are referenced in the paper and I understood the point the author is trying to make just the same, so I think that it is possible to get right to the point without wasting sentences on the movies.

- No, it is not acceptable to assume that the reader has seen or read these which is why I provide a quick summary of the relevant information. The point of the references is to provide a relatable example which connects the information back to science fiction and allows for a clearer picture of the possibilities involved in the search for extraterrestrial intelligence.

I think the last paragraph of The Question section would be a good introduction paragraph to The Argument section.

- I agree. The last paragraph has been moved to The Argument section.

Why would most people answer yes to the question about if money would have more return for the human race if it was put into far more pressing issues than the search for alien life?

- I have rephrased this to simply suppose that the answer is "yes" instead of asserting that most people would answer "yes".

Why have many people given up on the idea of saving Earth?

- I have removed this sentence.

The author talks about how people who donate to SETI are not donating to the right place because the technology does not yet exist to search for intelligent life. However, unless we throw money at these projects, how will the technology ever become advanced enough?

- The point here is that we let technology advance by itself, and when it becomes prevalent enough to adapt to the search for extraterrestrial life without an excess of money, then this would be the time to revisit the search.

In the paragraph right before the Our Assumptions section, the author talks about gaining or losing resources. She says that between the best and worst case scenarios, we should avoid First Contact so that we do not cause harm to humanity. How does the author know what the odds are of either the best or worst case scenarios occurring? Is the author trying to say that even though the odds of the worst case scenario happening are very low, its effects would be so drastic that we shouldn't risk anything at all? I think that this argument should definitely be developed a little more.

- I do not know, nor state, the odds of best vs. worst case scenarios. However, if there is any chance at all that we encounter hostile aliens, then I think it better not to take that chance. If you had a choice of pressing 100 red buttons and most of them did nothing, a few of them did something good, and one of them ended the Universe (and I acknowledge that this is greatly exaggerated) then would you press a button? Just because the chances are low that you destroy the Universe, this doesn't mean that you wouldn't rethink pressing any buttons at all.

There is a certain sentence in My Assumptions that says: "This is not so outrageous an idea-that a civilization, perhaps millions of years older than us, has found meaning in life through the abandonment of technology." I think that this cannot be a standalone statement and that it should be explained more. There is so much to unpack with this idea and the author should not just gloss over it if she wants to include it.

- I elaborated some on this topic.

In the last paragraph on page 5, there are many separate ideas that seem to be quite vague. I understand what is trying to be said, but in getting the point across, the author is presenting many new ideas that should be backed up by evidence or additional explanation.

- The point of this paragraph is to barrage the reader with several possibilities in the interest of getting them to think about more than what they've assumed to be true through their experiences with science, SETI, and science fiction. These examples are a means of widening the view on scientific assumptions and the impact that they would cause on a search for intelligent life.

In the last paragraph before the World Peace section, the author says that we cannot search for ET life because we have not even handled discrepancies amongst ourselves yet. But, who is to say that this won't happen soon? Maybe to make a stronger argument, the author should talk about how she has no confidence that the world will come to an agreement any time soon or before the time comes where we make first contact, no matter how far in the future that is.

- This is not the point. The point is that right *now* we are not prepared. It doesn't matter how long it will take for us to be prepared.

Regarding the World Peace section, what if we achieve world peace but then with First Contact it is ruined? What happens then? Is that another point we must consider?

- No. No additional points must be considered here because we are talking about our current state of unpreparedness and what it would take for us to be prepared. If world peace was ruined by First Contact then this would not affect the argument because it was not a premise that world peace needed to be maintained post-contact.