

## Future Funding Op-Ed

For each opinion essay, you will be answering a question I pose (below). Your essay should be **no more than 2 pages long<sup>1</sup>, 1.5 spaced**. If you can make your point in less space, that's even better. The goal of the essay is not to pick the *right* answer, but to explain why you prefer *your* answer.

A good essay should start by posing the question (and maybe explaining why it's interesting) and giving your answer. The rest of the essay should give reasons for your view, making sure to wrap up with a sentence or two at the end. The best arguments use quantitative reasoning (use actual numbers and avoid weasel words like "many") and also acknowledge their own weaknesses.

I am particularly interested in how you arrived at your answer. Spelling and grammar will count as part of clarity, but minor errors will not cost you points. The goal of this op-ed is for you to learn how to make a good argument based on observations, data, and well-tested theories. This skill is valuable not only in the sciences, but also in many areas of life and is (if I may editorialize a bit) generally lacking in many aspects of our public discourses. Hopefully, you can help change that!

### What makes a good essay?

- Start with facts, not opinion — An argument based entirely on opinion (while valid in many contexts) leaves little room for people to be persuaded. Either they agree with you or they do not. So build a case starting with verified information that everyone can agree and then show your logic going from there to your conclusion. Even if people don't agree with your result, they can appreciate your reasons.
- Be quantitative — Wherever possible, look up numbers to back up your claims. You don't have to find all of the relevant numbers (some might not even exist), but if you can even find a proxy value that often helps. Just be sure to note when you're estimating or using a "close, but not quite" value. Also: avoid "weasel-words" like "many", "most", "lots", and "a few". These words have their place, but if you can easily find numbers to replace them, it strengthens your case. (Conversely, overuse of weasel-words can make you look ill-informed and/or deceitful.)
- State your thesis (in this case, the action you're arguing for) as early as you can. As a reader, I always find it very helpful to know what the writer is trying to say early on. This lets me evaluate the entire piece in context. Be kind and help the reader out.
- Consider your audience — In this case, pretend you're writing for a newspaper, trying to convince your fellow citizens (not necessarily scientists, classmates, or especially not me) of your view.

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<sup>1</sup> You may go into page 3 for endnotes and citations, if you wish. You may also include one figure. However, none of these is required if not called for. (Citations will depend on whether you reference any sources.)

## Question

You have been asked to write an op-ed about where to spend scarce federal research money to maximize the chance of starting the next revolution in physics or astronomy. You don't need to assume that if your recommendation is taken that *all* research dollars will go to your suggested area, just that you will noticeably increase the funding to that area.

Things to think about:

- What areas seem to have the most vexing unanswered questions? In particular, which questions seem to defy our current paradigms the most?
- What areas are most easily attacked with a give amount of funding? Remember: dollars are scarce. You will want to suggesting putting the money available in a place where it will generate the most improvement.