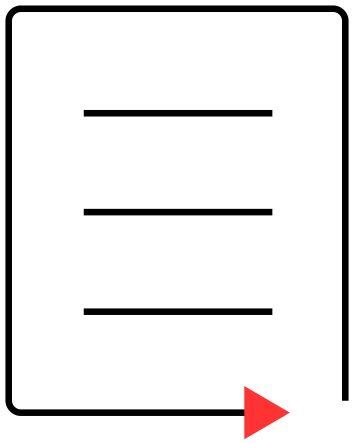


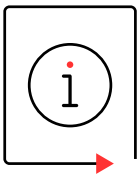
PREREVIEW

OPEN REVIEWERS

REVIEWER GUIDE

WHAT IS IT AND WHO IS IT FOR?

The Reviewer Guide is a comprehensive, step-by-step framework designed to help anyone who is going through the process of writing a manuscript review, whether that be for a journal or a self-organized preprint review.



This Reviewer Guide will guide you through the 6 steps of composing a manuscript review.

We believe this guide can be helpful to a student learning to peer review for the first time, and even to an experienced reviewer looking to gain an additional detailed perspective on how to peer review. Please note that throughout this guide, we refer to reviews of research manuscripts, but many of the same concepts and tips can be applied to the review of research proposals, grants, theses, etc.

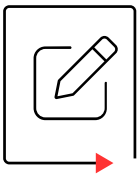
This Reviewer Guide is part of a toolkit developed in the context of **PREreview Open Reviewers**, a cohort-based peer review training and mentoring program that pairs early-career researchers with expert reviewers. It adapts resources from the peer review resources made openly available by the PLOS team via the **PLOS Peer Review Center**, as well as quotes from journal editors gathered via individual conversations or a survey. The other two guides published in the toolkit are the **Bias Reflection Guide** (Foster *et al.*, 2021) and the **Review Assessment Rubric** (Foster *et al.*, 2021). From here on in, we will refer to **"you"**, as the reviewer and reader of this guide.

HOW SHOULD YOU USE IT?

The content of this guide is organized into three sections.

The first section provides you with some example scenarios in which you may find yourself when using this review and prompts you to reflect on the decision you are about to make by accepting to review a research manuscript (**To Review or Not to Review**). It also includes a list of what we think are the top most important traits of a "good" reviewer (**What Makes a Good Reviewer**).

The second section (**Writing a Review: Step-by-Step**) is where we break down the review process into 6 actionable steps. When going through STEPS 1-4, we recommend you focus on reading, observing, then evaluating the manuscript following the suggested actions, trying not to focus too much on the actual writing of the review—however you can use the next section to take notes as you move through the steps. Piecing together the final review will be the main action in STEP 5. STEP 6 is another opportunity to reflect on your review and make adjustments prior to sharing it with an editor, a mentor, a peer, the manuscript's authors, or the world.



For an editable version of the Writing A Review: Print-Out section, you can make a copy of **this document** saved in our shared Google drive.

The third and last section (**Writing a Review: Print-Out**) is a walk-through of the 6 steps, with questions we invite you to reflect on, and space to add notes as you move through the steps. If you are the type of reviewer who prefers paper and pen to jot down ideas and organize them into a coherent piece, we recommend that you print out the section so that you can have it side-by-side with your manuscript as you read through it. Throughout the guide, advice and suggestions we gathered from journal editors will be labeled as Editor Tip. Content adapted from the **PLOS Peer Review Center** be in *red italics* and referenced.

TO REVIEW OR
NOT TO REVIEW

TO REVIEW OR NOT TO REVIEW

This guide applies to any situation that involves you, a researcher, professional, or student called to act as "the expert" to provide feedback to a piece of research in your field of study. Below we list two example scenarios you may find yourself in as a reviewer.

Scenario 1: You have been invited by a journal editor to review a research manuscript for a journal in your field. The first question you want to ask yourself is, should I accept this invitation?

The **PLOS Peer Review Center** provides some useful ideas on what to consider before agreeing to review a manuscript for a journal:

1. Am I the right person to review this manuscript?

You should only review a manuscript if it matches your area of expertise. Even if the topic sounds fascinating, don't agree to review it if you do not have the expertise.

If you are not sure you have the right expertise, or if you think you could provide an expert evaluation of one aspect of the manuscript but not all of it, get in touch with the journal to see what they need. No matter what, it is important that you feel comfortable offering your opinion.

Note: The definition of expertise is rather subjective, and often more tied with prestige and seniority in a given research field rather than with any actual experience in reviewing other people's work constructively. Furthermore, if you are a researcher from an underrepresented group in scholarship and an early-career researcher, you may be less confident in calling yourself an expert. Finally, rarely a reviewer is an expert in every aspect of the study they are asked to review. We invite you to consider these potential internal biases when deciding if you are the right person for the job. If you are in doubt, contact the editor and let them know about your concerns. But be aware that editors themselves are not immune to bias.

The definition of expertise is rather subjective, and often more tied with prestige and seniority in a given research field rather than with any actual experience in reviewing other people's work constructively.

Editor Tip: "You may think that you don't know enough to review someone else's work, but you do! During the course of your studies you have gained a unique understanding of your field and your perspective on another person's work is valid and very welcome and can help improve the work so more people can understand it." – eLife editor

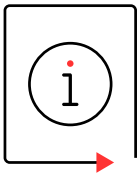
2. Do I have time to do the review by the journal's deadline?

Don't overcommit: make sure you have enough time to provide a thorough review. If you want to review but think you might need extra time to get it done, let the editor know as soon as possible so that they can alert the author or contact another reviewer if necessary.

3. Can I provide an objective review?

Before you respond to the invitation, check the author list in case you have past or present collaborations with any authors, or any other potentially competing interests. You should decline the invitation if an outside observer might reasonably feel that your review was negatively or positively biased by a competing interest.

If you're not sure if you have a competing interest, or think you have one but it won't compromise your objectivity, get in touch with the journal. The journal might want you to review anyway, depending on the situation.



Be aware of common biases and assumptions that arise when reviewing.

Additionally, we recommend you become aware of other common biases and assumptions that may arise when reviewing. The truth is that being completely objective is virtually impossible. In STEPS 1 and 6 of our **Writing a Review: Step-by-Step** section, we will invite you to think deeply about the ways assumptions or biases may be affecting your assessment of the manuscripts you choose to review.

It is okay to decline the invitation.

You do not have to say yes to everything! If you have doubts about your ability to do the review, it is much better to say no up front than to step down later on. Whether you accept or decline the assignment, try to respond to the invitation as quickly as you can. It's not fair to the authors to keep them waiting.

Note: If you decide to decline, consider providing the editor with names of other suitable reviewers. This is something you may think about even if you do have time and have no competing interests. For example, you may know someone who had fewer opportunities than you to be a reviewer and who may provide a different perspective to the review that you may not be able to provide given your background and experience.

About rejection and "publishable in principle"

If you are reviewing for a journal, you may be asked to reject or recommend the manuscript for publication. Journals may provide various decision criteria and recommendation options, so it is important to determine what your journal-specific recommendation options and criteria are. Generally speaking, recommendations fall into two major categories:

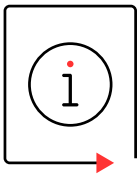
- **Rejection:** You have determined that the authors would need to make substantial changes that are too significant to warrant a revision in the current form of the manuscript.
- **"Publishable in principle":** You have determined that this manuscript is either publishable with no revision, minor revisions, or with major but reasonable revisions.

Note: If you think the manuscript should be rejected, it is still your responsibility as a reviewer to provide a clear explanation of why it is that you are recommending this manuscript for rejection. We suggest that you take the time to go through STEPS 1-4 before you decide if the manuscript should be rejected or not, and use the tips in STEP 4 to write a constructive and clear response to the editor.

Scenario 2: You read a preprint and decide you would like to review it openly on PREreview or any other public preprint commentary service available. Even in this scenario, it is helpful to ask yourself, should I do it?

1. Am I the right person to review this preprint?

Our answer is yes!—in most cases. Constructive feedback from the community provides the authors with insight on how the preprint is received and how it can be improved before submitting for journal-based publication. While it is certainly helpful to be knowledgeable about the field of study and be familiar with the techniques and approaches used in a study, it is not a requirement for you to be an expert on everything. Your contribution to any aspect of the preprint is valuable. In fact, reviewing preprints provides an opportunity to refine your peer review skills, a chance to build your public profile and be recognized as a constructive peer reviewer, and, last but not least, give the authors useful feedback on how to improve their manuscript before it is too late.



Reviewing preprints is an opportunity for you to refine your peer review skills, build your public profile and be recognized as a constructive peer reviewer.

2. Do I have time to do the preprint review?

On the **PREreview preprint review platform**, we offer a rapid PREreview option that provides you with a structured way to quickly capture your feedback on a preprint in 12 simple questions. From there, you can decide whether or not you have time to expand your review into a full PREreview, a longer free-text review of the preprint.

Note: We do not always know if a preprint is posted to a preprint server prior to, at the time of, or after journal submission. So ideally, try to review preprints as close to their posting date as possible to improve the chances of the authors having time to take your constructive feedback into consideration before proceeding further with journal publication. You can also check out the list of preprints that have received a request to be reviewed on PREreview—sort by "recently requested" on the PREreview preprint review website.

3. Can I provide an objective review?

As mentioned above for Scenario 1, being completely objective is a rather difficult, if not impossible task. What you can do is to always check and declare any existing competing interests—for instance if you have collaborated with any of the authors in the past or they are close friends of yours—as well as becoming aware of common biases and assumptions that may arise when reviewing. For the latter, we recommend you check out our **Bias Reflection Guide** (Foster *et al*., 2021), elements of which are also mentioned throughout this Reviewer Guide.

WHAT MAKES A "GOOD" REVIEWER?

The number one attribute editors look for in a reviewer is an appropriate level of expertise within the fields of study referenced by the manuscript. Other traits that we believe are equally important to qualify you as a "good" reviewer are the following:

- **Respectful.** A good reviewer values respect above all and knows not to make their peers feel diminished or personally attacked by disrespectful comments.
- **Constructive.** A good reviewer ensures that their feedback is constructive and actionable so that authors can easily respond to the feedback and possibly integrate the suggestions into the final publication.
- **Honest.** A good reviewer knows that constructive does not mean they need to lie or only bring up positive comments. It means they need to write their suggestions in a way that is not insulting to the authors and that can lead to their easy integration in the manuscript. Constructive negative comments followed by examples and suggestions on how to improve the issue are welcome.
- **Clear.** A good reviewer strives to present suggestions in a clear language, avoiding jargon and, when possible, providing examples and links to additional information that can help the authors make an informed decision on whether or not to integrate such suggestions.
- **Humble.** A good reviewer is willing to be wrong and corrects themselves along the way.
- **Aware.** A good reviewer is self-reflective and takes time to assess their biases and examines how they think and operate in the world.

WRITING A REVIEW:
STEP-BY-STEP

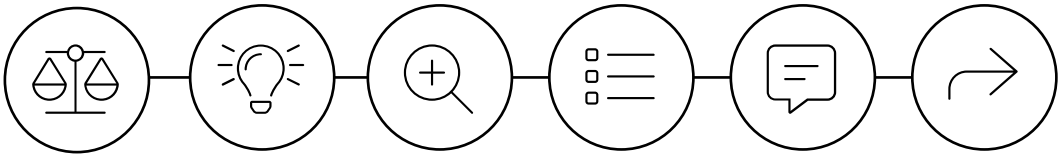
WRITING A REVIEW: STEP-BY-STEP

This is all great, but in practice, you may be wondering, *how do I go about writing a review?*

> **Editor Tip:** "See the review as a multi-step process with the goal of objectively assessing the merit of the work and providing positive input, where necessary (instead of tearing it apart)." –Anonymous editor

We cannot agree more. Writing a review, especially for the first few times, can feel like a daunting task. But almost everything gets easier when it is broken down into smaller, manageable steps.

Below is our attempt to break down the process of writing a review into **6 STEPS**:



1	2	3	4	5	6
Check your biases and assumptions	Gain a conceptual understanding	Identify major and minor issues	Make your feedback clear, constructive and actionable	Put it all together into a coherent narrative	Check your review and share it

STEP 1: CHECK YOUR BIASES AND ASSUMPTIONS

Before beginning to read and assess the research manuscript you are set to review, we recommend reading through the **Bias Reflection Guide** (Foster *et al*., 2021) to help you identify and mitigate biases or assumptions that may arise. This exercise is not intended to be judgmental of your personal approach to reviewing or tell you if you have or do not have biases. It is an opportunity for you to take a moment to reflect and set your mind on what the main goal of reviewing is: Provide objective and constructive feedback to the authors to improve the quality of the research study.

ACTION: *Read* through the **Bias Reflection Guide** and *observe* your thoughts without judgment. Consider using the space allocated to this step in the **Writing a Review: Print-Out** to take notes so that you can revisit these thoughts in STEP 6.

STEP 2: GAIN A **CONCEPTUAL UNDERSTANDING**

Before diving into the details of your review, it is good practice to read the whole manuscript at once to gain an overall understanding of what the research is about, what the hypotheses or main questions, claims, and conclusions of the study are. Doing this will help you write what is usually the first paragraph of a review, a summary of the research and your overall impression. Note that you will be guided into the writing of the summary paragraph in STEP 5, but notes from this step can help you piece that out later.

ACTION: *Read* through the manuscript once with your "big picture" hat on, making sure you focus on understanding rather than evaluating. Consider using the space allocated to this step in the **Writing a Review: Print-Out** section to answer some guiding questions.

Note: Evaluation thoughts will inevitably pop up during this time, but understanding *before* evaluating can help us avoid bias.

The **PLOS Peer Review Center** lists some questions you may find useful to keep in mind during this first read-through (these are repeated in the **Writing a Review: Print-out** section to guide you through this step):

- ***What is the study about?*** *What is the main research question?*
- ***What is the approach?*** *What did the authors do to address their research question?*
- ***What is the context?*** *How does the study relate to published literature on this topic?*
- ***What are the conclusions?*** *What are the authors' main findings and what evidence do they provide for these conclusions?*

A useful approach to help you gain a first conceptual understanding of the study is to read the manuscript out of order. The **PLOS Peer Review Center** details this approach:

- *Read the **abstract and introduction** to get a sense of the overall context and approach (if the abstract and introduction do not do a good job summarizing the findings, you might need to read further to get this information).*
- *Look at the **figures and tables** carefully in conjunction with the results.*
- *Read the **conclusions**.*
- *Then read the **whole thing** from beginning to end.*

Editor Tip: "During the review, first read the whole manuscript and note down the terms or methods that you are not familiar with, find the possible strength and limitations of the study. Then spend time to know about the terms or methods you are not familiar with. Then read the manuscript again in depth and try to help the authors by finding the scopes to improve the quality and readability of the manuscript." –PLOS ONE editor

STEP 3: IDENTIFY MAJOR AND MINOR ISSUES

Now that you have checked your biases and assumptions and gained a conceptual understanding of the research manuscript, it is time to *evaluate* the work in more depth. The outcome of this step is a list of major and minor issues that, together with the constructive, clear and actionable feedback (STEP 4), will make up the bulk of your final review (STEP 5).

ACTION: *Re-read* the manuscript and *identify* issues you may have with the study. You may choose to simply *highlight* these in the manuscript itself and then list and categorize them as major or minor issues. Consider using the space allocated to this step in the **Writing a Review: Print-Out** section to answer some guiding questions.

Once again, the **PLOS Peer Review Center** has some helpful suggestions for distinguishing major from minor issues.

***Major issues** should consist of the essential points the authors need to address before the manuscript can proceed.* They are issues that if left unaddressed could compromise the interpretation of the study.

Major issues include:

- Conclusions that are not supported by the data
- Contradictory conclusions
- Not accounting for major confounding variables that can affect the conclusion
- Issues with experimental design including insufficient sample sizes or data, improper controls, inappropriate methodology and/or statistical analyses

***Minor issues** are still important but typically will not affect the overall conclusions of the manuscript.*

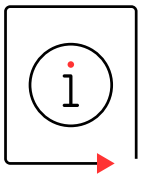
Minor issues include:

- *Missing references (but depending on what is missing, this could also be a major issue)*
- *Technical clarifications (e.g., the authors should clarify how a reagent works)*
- *Data presentation (e.g., the authors should present p-values differently)*
- *Typos, spelling, grammar, and phrasing issues*

About evaluating references

As stated above, missing references is usually a minor issue, but it can be a major issue if you think the references missing are key to the interpretation of the results, or if you think several references have been made out of context.

Tools you may find useful to evaluate references are **Scite.ai** (Nicholson *et al*., 2021), a tool that will help you understand how the studies cited in the manuscript were cited by others and whether those citations were offered supporting or contrasting evidence of the cited claims, and **"Self-Review of Citational Practice"**, a useful guide developed to help authors note patterns in their citation list in terms of publication venues, diversity of sources, where the authors are from geographically, institutionally, intellectual genealogy, categories of race, gender, other intersectional categories (Okune, 2019).



Interpreting language mistakes as lack of overall quality constitutes a common bias among reviewers.

About typos and grammatical errors

While it may be tempting to focus on grammatical errors, sentence structure, and choice of words, try to make general language-related suggestions and only if you think they may help with the understanding of the concept presented. If you are reviewing for a journal, there will be professional copy editors whose job is to identify those mistakes. This is particularly important to keep in mind if you are reviewing a manuscript authored by researchers whose English is not their first language, as interpreting language mistakes as lack of overall quality constitutes a common bias among reviewers.

About plagiarism

As **PLOS Peer Review Center** reminds us, if you are reviewing for a journal and you have reasons to believe the authors might have plagiarized, contact the journal immediately. If there are confidential comments to the editor section of the reviewer report add your concerns there.

Editor Tips: "Major flaws indicate that results/analyses presented do not necessarily support the claims based on the work done. Sometimes, only clarifications are needed, but in other cases, adjustments may involve more extensive analysis or additional experiments and data collection that were not addressed initially. Minor flaws reflect adjustments and clarifications that should be easy to address in order to improve the clarity and rigor of the work. This may require including missing information or doing small changes to the text that do not require extensive reanalysis or additional experiments." –Anonymous editor

"Major comments will potentially change the main results or the interpretation of the results. Minor comments are mostly clarifications/elaborations or other more superficial issues that are important to get right, but wouldn't fundamentally change the claims of the paper." –eLife editor

STEP 4: MAKE YOUR FEEDBACK CLEAR, CONSTRUCTIVE, AND ACTIONABLE

Now that you have read through the manuscript in depth and identified major and minor issues of the study, it is time to begin thinking about how you will want to present those issues and how to suggest revisions in your review. Your feedback should be clear, constructive, and actionable. That way the authors will not only be more likely to understand your feedback and to integrate it efficiently into their work, but will also appreciate it without feeling defensive or personally attacked.

This is arguably the most important and time consuming step of the review process.

Editor Tip: "Don't think of reviewing as a means to find what is wrong with a manuscript but as a chance to improve the presented work. Don't just highlight shortcomings but state how these can be overcome." –PLOS ONE editor

ACTION: *Read* through your list of major and minor issues and *identify* ways to suggest improvements that are clear, constructive, and actionable. Consider using the space allocated to this step in the **Writing a Review: Print-Out** section.

Here is an example.

Let's say you disagree with the use of a statistical test for a given analysis. This would fall into the category of weaknesses of the study, possibly a major issue the authors need to address or the conclusions will be compromised. How would you go about writing up this negative feedback in your review?

Unclear, disruptive, an unactionable feedback:

"The authors have no idea of what they are doing and should go back to statistics 101."

Compared to,

Clear, constructive, actionable feedback:

*"Statistical [test X] is typically used for data that is distributed normally. **The data presented in this manuscript appear to be highly skewed to the left. This type of distribution requires a non-parametric version of [test X], which makes no assumption on the parameters of the distribution of the data. I suggest the use of [test Y] or possibly [text Z].** If **the choice** of [test X] is motivated by a particular strategy or other non-obvious analytical constraints, **I recommend to explicitly mention that in the Methods section justifying the choice accordingly."***

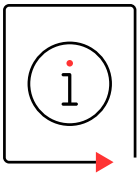
In this last example language, the reviewer states their ***interpretation of the issue*** (remember it may be that we are misinterpreting something so it is good practice to phrase your opinion accordingly), followed by the ***reason*** they think it is an issue, followed by their ***recommendations*** on how to go about addressing it. Also note that oftentimes it is helpful to avoid referring to the authors directly and keep the focus on the choice or the research, as ***depersonalizing*** your feedback can make the authors feel respected and less defensive.

Note: This example shows that constructive feedback does not equal positive feedback. Your feedback can be honest and respectful at the same time.

About positive feedback

Even though thus far we asked you to focus on the issues, highlighting positive feedback, things you thought were done well in the manuscript, is also a key aspect of a good review as it reinforces good practices we wish the authors will continue adopting. Examples of positive feedback can include spotlighting novel contributions to the field, mentioning points of inspiration for your own future research or manuscript layout, and emphasizing aspects of the work that fascinated you.

Importantly, data shows that overly-harsh or unprofessional peer reviews disportionately harm underrepresented researchers (Silbiger NJ *et al.*, 2019). Therefore, remember to strike a good balance between positive and negative feedback, keeping it all clear, constructive, and actionable.



Remember to strike a good balance between positive and negative feedback, keeping it all clear, constructive, and actionable.

Editor Tip: "Put yourself in the author's shoes. Be compassionate - emphasise positive feedback. Be clear and constructive. But at the same time, don't be too picky - remember, it's not your own work. Always justify the need for your suggestions for revisions. Always use a clear citation if you are referring to other relevant research." –eLife editor

"Don't punish the authors for the data - if the study is well designed, adequately powered and carefully analysed, then it is your responsibility as a reviewer to make sure it is adequately interpreted. You shouldn't push the authors to p-hack or give them a poor review because the results are not as you expected them to be." – eLife editor

About suggesting additional experiments and/or analyses

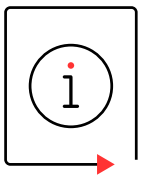
If your suggestion on how to address one or more of the major issues is for the authors to perform additional experiments and/or analyses, it is important to stop and think if what you are suggesting is:

- Essential to support the existing claims and conclusions
- Feasible for this research group
- Within the scope of the study

It can be tempting to suggest experiments that may be interesting and further expand upon the findings in the manuscript, but are not essential for the authors to make the claims or conclusions they have stated in the manuscript. It is okay to share this type of information in your review; however it is important to be clear about whether the recommended additions are essential to support the major conclusions of the manuscript, or simply interesting.

Let's say, for example, you are reviewing a manuscript in which all experiments are *in vitro* experiments, and what you are suggesting as an additional experiment requires an *in vivo* setup with which the laboratory is not equipped. As a general practice, you should not request that experiment as a condition for the manuscript to be published. To conduct this additional experiment the author would not only likely need several more years, but also resources they may not currently have. You can suggest that experiment as a follow-up study for the authors to undertake themselves or in collaboration with a laboratory that is appropriately equipped to do so. You may also suggest for the conclusions to be reworded to better align with the existing evidence without performing this additional experiment, which perhaps can be presented as a future direction.

However, if you believe that the conclusions as they currently stand would depend on the addition of this experiment and cannot be simply reworded to better reflect the results, the manuscript may not be quite ready for publication.



Consider carefully if the additional experiments or analyses you are suggesting are essential, feasible, and within the scope of the current study.

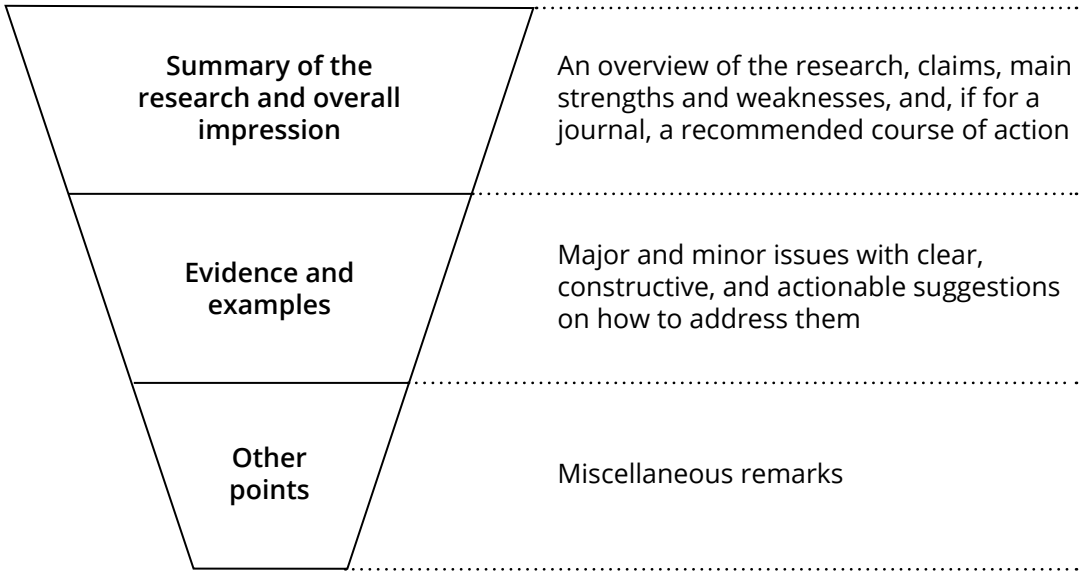
Editor Tip: "I think [reviewers should] review papers from others as if they were reviewing their own papers. It is easy to propose more experiments, extra controls, and ideas to continue the research present. These are all nice, and I think it is good to pass this information to the authors, in case they had not thought about that." –eLife editor

STEP 5: PUT IT ALL TOGETHER INTO A COHERENT NARRATIVE

It is now time to combine all that you have done up to this point into a coherent narrative that will make up your final review. Even though there is not one universal type of review format, it is useful to have a format in mind to help guide the writing. Here, we will use the review format proposed in the **PLOS Peer Review Center** as we find it easy to follow and comprehensive of the most important components of a review.

In addition to the information below, we also recommend you refer to the **Writing a Review: Print-Out** section which contains questions and prompts to guide you through the process of crafting your final review.

Review Format



Schematic representation of a typical review format modified from *PLOS Peer Review Template: A quick guide for new peer reviewers*.

This review format includes three main sections. Let's take a look at each one of them.

1. Summary of the research and overall impression

Beginning your review with a summary paragraph helps the reader gain an overview of your perspective on the manuscript and primes them for what comes next in the review. The reader being the authors, the journal editor, and/or anyone reading your review if it is posted publicly.

ACTION: *Write* a short summary paragraph to contextualize the work and prime the reader to the rest of the review. The summary paragraph may include the following components:

- A sentence or two summarizing the **manuscript's main question and approach**;
- A brief overview of the study's **main strengths and weaknesses**;
- Your perspective on where the study sits in the **context of the broader research field**;
- Your perspective on how the study may **push the field forward or lead to future work**;
- If the review is for a journal and the journal does not provide any other way for reviewers to express it, a **recommendation for the course of action** (rejection vs. publishable with revisions, as we saw in **About Rejection and "Publishable in Principle"**).

An example summary paragraph may look something like this:

The study/manuscript attempts to determine whether and how two known behavior-related variables—variable A and variable B—differently and orthogonally influence activity in two stages of the visual neuraxis, area X and area Y. To this aim, the authors combine in vivo electrophysiological techniques, awake behaving protocols, and predictive coding analytical approaches. One of their main findings is that previous reports of variable B-related effects may in fact be attributed to variable C. I particularly appreciated the clarity of the research questions and the complementary use of experimental approaches and theoretical modeling to answer those questions. Although I believe this work is of significant interest in the field and will certainly lead to further discovery in how the visual brain works in relation to other brain functions, there are some questions and concerns, particularly related to the interpretation of the models, that will need to be addressed prior to its final publication. *These concerns as well as my suggestions on how to address them are presented below. Major and minor issues are presented separately.*

This example summary paragraph is perhaps a bit long, but it includes a couple of sentences describing the ***research question and approach***, ***the main finding***, ***a strength*** or an aspect of the work that was particularly well-done in the reviewer's opinion, a sentence ***contextualizing the work in the field***, and a sentence on ***weaknesses or potential concerns*** that the reviewer will detail in the next section. It also contains information about the reviewer's point of view with regard to publication, as it suggests they think the manuscript should be published with revisions.

Editor Tip: "[As] someone who can be handling 40 manuscripts at a time, I need [the summary paragraph(s) to tell me the good and the bad. What are the main strengths and what are the major weaknesses? Is there any issue of plagiarism, falsification, incorrect numbers, or anything which may draw major media attention? It doesn't need to be long, just needs to be honest…" –PLOS ONE editor

"The first paragraph needs to give a summary of the work you are reviewing, both to make sure you understand it and to show the editor and the authors that you gave their work the attention it deserves. In my opinion, if this first paragraph isn't clear then the rest of the critique loses credibility." –eLife editor

2. Evidence and Examples

This is the core of your review, the section where you present the issues or concerns you identified in the manuscript and back it up with evidence and examples to best explain why you think those are issues and suggest how to address them as clearly, constructively, and actionably as possible. If you took notes during STEPS 3 and 4, this is the time to use them.

For this section, the **PLOS Peer Review Center** offers the following advice:

It's helpful to divide this section into two parts: one for major issues and one for minor issues. Within each section, you can talk about the biggest issues first or go systematically figure-by-figure or claim-by-claim. Number each item so that your points are easy to follow (this will also make it easier for the authors to respond to each point). Refer to specific lines, pages, sections, or figure and table numbers so the authors (and editors) know exactly what you're talking about.

Let's look at an example format for this section:

Major issues

1. ***A major concern is the use of a continuous readout of variable A with a binary readout of variable B. Could variable B be explained more rigorously as a continuous rather than binary variable? In my experience, when training and testing animals on appetitive behaviors, variable B can change significantly within a single behavior session, across an experimental recording session, or across days of behavioral testing. Such changes in engagement can be inferred, for example, as strings of (seemingly) easy trials in which the animal does not answer correctly. My suggestion is to quantify through behavioral analysis (running lapse rate, lick latency, etc) whether and how variable B may be changing within and across behavior sessions. Alternatively, the authors could clearly explain that their binary encoding of variable B has limitations and may not actually describe the animal's engagement at any given moment.***
2. ***Issue #2 …***

In this example, the major issue presented first is an important one that the reviewer feels strongly about having addressed as it may affect the interpretation of the major finding of the manuscript. The reviewer ***states the issue,*** asks a ***question that suggests a change,*** provides ***evidence and examples*** to back up the suggestion, and then gives ***additional information*** on the possible approaches to address the issue.

The example continues with minor issues:

Minor issues

3. Figure 2: In panel A, please provide a scale for pupil size. In panel B, it is not clear what is the difference between the first and second PSTH in each of the (active and passive) blocks. Importantly, consider showing an example from V4, perhaps as a supplementary figure.
4. In line 182, state whether this applies to brain area X or to brain area Y neurons.
5. Correct typo in line 516: 'show'.

As we saw, in STEP 3, minor issues are often suggestions on how to make a figure or a concept more clear, or report a small typo. This is a good place to remind you that if the manuscript presents several typos and/or problems with sentence structure that you think undermine a reader's understanding of the manuscript, you may consider simply stating that the manuscript would benefit from copy editing rather than listing all of them in your review.

Editor Tip: "In clearly articulated and concise numbered points, present your concerns, separating them into major and minor. Throughout the entire process, put yourself in the shoes of the authors and try to provide them guidance on how they could improve the experiments and the presentation to make the work stronger. After you are done, reread the review at least once and then sleep on it and reread the review the next day and edit for clarity and to make sure the criticisms are conveyed as constructively as possible (even if you think the work is awful and completely flawed)." –eLife editor

3. Other points

If you made it here, congratulations! You are most of the way done! This last section is not strictly necessary, but it can provide a nice way to conclude your review and communicate any relevant information to the reader.

For this section, the **PLOS Peer Review Center** offers the following advice which mostly applies to a journal-organized review process:

If applicable, add confidential comments for the editors. Raise any concerns about the manuscript that they may need to consider further, such as concerns about ethics. Do not use this section for your overall critique. Also mention whether you might be available to look at a revised version.

Other things you may consider adding to this last paragraph of the review are information about potential Competing Interests (unless there is a separate, dedicated field in the review submission form), your expertise, and any aspects of the manuscript you did not feel confident about making suggestions because they lay outside of that expertise. You may even consider adding a sentence about something you learned by reading and reviewing this manuscript and will now consider adopting into your own research practice.

About confidential comments to the editor

If you are reviewing for a journal, you may want to write a confidential comment to the editor. **PLOS Peer Review Center's** advice on this is as follows:

Some journals have a space for reviewers to enter confidential comments about the manuscript. Use this space to mention concerns about the submission that you'd want the editors to consider before sharing your feedback with the authors, such as concerns about ethical guidelines or language quality. Any serious issues should be raised directly and immediately with the journal as well.

Do not use this space to critique the manuscript, since comments entered here will not be passed along to the authors. *If you're not sure what should go in the confidential comments, read the reviewer instructions or check with the journal first before submitting your review. If you are reviewing for a journal that does not offer a space for confidential comments, consider writing to the editorial office directly with your concerns.*

About formatting: no one format fits it all

The review format proposed above is just one example. Reviews can be formatted in a variety of ways according to your preferred style or to the journal's guidelines, if they are provided.

Besides the examples above, it may be useful to look at some other review examples available online. For example, **F1000 Research**, an open research publishing platform, offers a curated list of openly available peer reviews as an open resource not only for their reviewers but for everyone. **Sciety**, a preprint review aggregator, curates lists of public reviews from different sources, including PREreview.

By scrolling through these examples, you can see that some reviewers chose to separate major and minor issues into separate sections, some reviewers wrote in full paragraphs, and others separated each point using a numbered list. If there are no journal requirements on the structure, the decision is really up to you. If you only have a few things to convey—which may be the case if you are writing a preprint review and only have time for a few comments, writing full paragraphs may work well to communicate your thoughts. If you have a lot of feedback, separating your points by numeric lists or by sections may be the best approach.

STEP 6: CHECK YOUR REVIEW **AND SHARE IT**

Congratulations on making it thus far! You should now have a fully written review that is ready for the final check before it is shared with others.

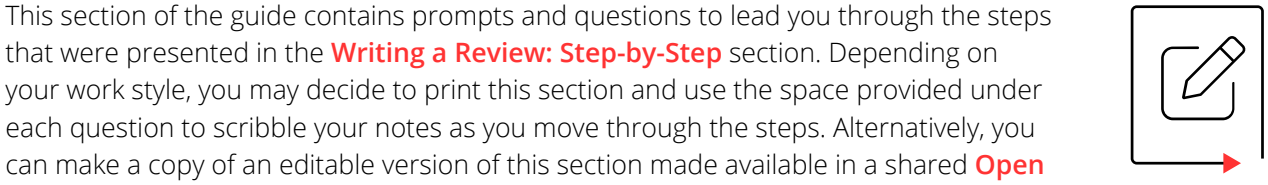
ACTION: *Read* through your review all at once to make sure your language is clear, your feedback is constructive and actionable, and *correct* any typos. For this step, consider using the **Review Assessment Rubric** (Foster *et al*., 2021) tool as a checklist to make sure you are not missing anything important. Finally, we recommend that you revisit your notes from STEP 1 and the **Bias Reflection Guide** (Foster *et al*., 2021) to make sure your review is as objective and unbiased as it can be.

Once you have your final review, it is time to share it with others. If you are reviewing for a journal, follow the journal guidelines on where and how to submit your review. If you are reviewing a preprint, you may want to share your review with the authors directly by emailing the corresponding author—you should be able to find their email address in the preprint server that hosts the manuscript under Author Information—and/or you may consider sharing it with the world on **PREreview.org**.

WRITING A REVIEW
PRINT-OUT

WRITING A REVIEW: PRINT-OUT

This section of the guide contains prompts and questions to lead you through the steps that were presented in the **Writing a Review: Step-by-Step** section. Depending on your work style, you may decide to print this section and use the space provided under each question to scribble your notes as you move through the steps. Alternatively, you can make a copy of an editable version of this section made available in a shared **Open Reviewers Google Drive**.



For an editable version of this section, you can make a copy of **this document** saved in our shared Google drive.

STEP 1: CHECK YOUR BIASES AND ASSUMPTIONS

ACTION: *Read* through the **Bias Reflection Guide** (Foster *et al*., 2021) and *observe* your thoughts without judgment. Use the space below to take notes as you go about this process.

STEP 2: GAIN A **CONCEPTUAL UNDERSTANDING**

ACTION: *Read* through the manuscript once with your "big picture" hat on, making sure you focus on "understanding" rather than "evaluating". Answering the questions below, which are presented as listed in the **PLOS Peer Review Center**, may help you gain a conceptual understanding of the manuscript and help you craft the summary paragraph of your final review (STEP 5).

What is the study about? What is the main research question?

What is the approach? What did the authors do to address their research question?

What is the context? How does the study relate to published literature on this topic? How would the results lead to future research?

What are the conclusions? What are the authors' main findings and what evidence do they provide for these conclusions?

What did you find most interesting about the research?

STEP 3: IDENTIFY MAJOR AND MINOR ISSUES

ACTION: *Re-read* the manuscript and *identify* issues you may have with the study. The questions below are meant to help you guide through identifying issues in each section of the manuscript (e.g., Title, Abstract, Introduction, Materials & Methods, Figures and Tables, Results, Discussion and Conclusions).

You may find it easier to first identify the issues in each section and then categorize them as major and minor using any notation you wish—e.g., "M" for major issues and "m" for minor issues.

Title

The *Title* should convey in one sentence key information about what was discovered, the study design, and important keywords so that interested readers can more easily find the work. The Title should not sensationalize the research or overreach in representing the findings.

Does the *Title* appropriately reflect the content of the manuscript?

Abstract

The *Abstract* is a summary of the whole manuscript and should contain information about the research background, the research question and study objectives, the approach, key findings, and conclusions. It should not sensationalize the research or speculate about how the research may lead to future work.

Does the abstract clearly state the research question?

Does the abstract clearly state the approach and the key findings?

Introduction

The *Introduction* should put the manuscript's research question and findings into context, containing information about why the study matters and how it fits into the broader scheme of the field.

Are the research question and key findings summarized?

Is related literature on the topic appropriately referenced and used to contextualize the research question?

Use the space below to list any missing references. Remember not to use this as an opportunity to gain citations of your own work.

Methods

The methods section is a key element of the manuscript as it helps establish the credibility of the research and ensure the study is replicable by others.

Are the techniques/analyses appropriate to best address the research question(s)?

Are suitable controls in place?

Were the data interpreted accurately?

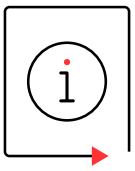
Are the statistical methods robust?*

Does the study conform to ethical guidelines?

Is sufficient detail provided to allow the reproduction and validation of the study?

Does the manuscript include new data? Are the data used in the manuscript openly available? If so, is the link to the data repository included in the manuscript?

Is the source code for the analyses openly available? If so, is the link to the code included in the manuscript?



*A robust statistic is resistant to errors in the results, produced by deviations from assumptions (e.g., of normality). Source: Wikipedia.

Figures, Tables, and Results

Figures and Tables should be used to help the reader understand and trust the results. The captions should include an explanation of the figures and any statistical analyses reported. The Results section should explain the approach and present the findings without including their interpretations. Figures and tables should be properly referenced in the Results section text.

Are the data displayed in a way that makes it easy for the reader to validate the results?

Does the text in the Results section support the data shown in the Figures and Tables?

Discussion and Conclusions

The Discussion section is where the results are restated in a way that makes it clear what the main findings are and how they relate to other studies in the field. It is also where readers are informed about the larger implications of the study with regard to future work. These implications should not be overstated or sensationalized.

Are the conclusions supported by the data or do they overreach?

Have the authors adequately discussed ethical concerns?

Are limitations to the approach discussed?

STEP 4: MAKE YOUR FEEDBACK CLEAR, CONSTRUCTIVE, AND ACTIONABLE

ACTION: *Read* through your above notes with your categorized major and minor issues and *identify* ways to suggest improvements that are clear, constructive, and actionable.

Use the space below to list the **major issues** identified in STEP 3 and, for each one, suggest clear, constructive, and actionable ways to address it.

Use the space below to list the **minor issues** identified in STEP 3 and, for each one, suggest clear, constructive, and actionable ways to address it.

STEP 5: PUT IT ALL TOGETHER INTO **A COHERENT NARRATIVE**

If you took notes up to this point, most of your work is done and it should be about copying, pasting, and reorganizing text to make up your final review.

ACTION: Using your notes from STEP 2 and the following prompts, first *write* a short summary paragraph to contextualize the work and prime the reader to the rest of the review. Then use your notes from STEPS 3 and 4 to *present* your concerns, explanations on why there are issues, and recommendations on how to address those issues.

What are the main strengths of the manuscript?

What are the main weaknesses of the manuscript?

Use the space below to assemble your **Summary paragraph** pulling sentences from your notes in STEP 2 and your answers to the above questions.

Use the space below to assemble your **Evidence and Example** section, drawing from the list of major and minor concerns and the relative suggestions on how to address them from STEP 4.

Use the space below to write your **Other points** section. Answering the following questions may guide you through writing this section.

What one thing from this work have you learned?

Any final positive remarks?

Would you recommend this manuscript to others to read?

Would you recommend this manuscript for journal publication?

STEP 6: CHECK YOUR REVIEW **AND SHARE IT**

ACTION: *Read* through your above review draft all at once to make sure the language is clear, the feedback is constructive and actionable, and *correct* any typos. For this step, consider using the **Review Assessment Rubric** (Foster *et al*., 2021) tool as a checklist to make sure you are not missing anything important. Finally, we recommend that you revisit your notes from STEP 1 and the **Bias Assessment Guide** (Foster *et al*., 2021) to make sure your review is as objective and unbiased as it can be.

REFERENCES

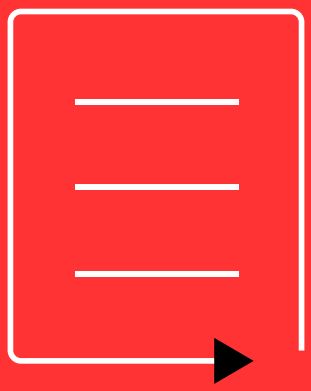
Foster, A., Hindle, S., Murphy, K. M., Saderi, D. (2021). Open Reviewers Bias Reflection Guide. *Zenodo.* https://doi.org/10.5281/zenodo.5484052

Foster, A., Hindle, S., Murphy, K. M., Saderi, D. (2021). Open Reviewers Review Assessment Rubric. *Zenodo.* https://doi.org/10.5281/zenodo.5484072

Nicholson, J. M., Mordaunt, M., Lopez, P., Uppala, A., Rosati, D., Rodrigues, N.P., Grabitz, P., Rife, S.C. (2021). Scite: a smart citation index that displays the context of citations and classifies their intent using deep learning. *Quantitative Science Studies.* https://doi.org/10.1162/qss_a_00146

Okune, A. (2019). Self-Review of Citational Practice. *Zenodo.* https://doi.org/10.5281/zenodo.3066861

Silbiger, N.J., Stubler, A.D. (2019). Unprofessional peer reviews disproportionately harm underrepresented groups in STEM. *PeerJ* 7:e8247 https://doi.org/10.7717/peerj.8247



PREREVIEW

A NOTE FOR THE READER

Do you have constructive feedback on this tool? Do you want to talk about your experience using/reading through it? Do you have suggestions on how to improve it? We want to hear it all and engage the community in content creation! So please, if you have the time, consider emailing us at **mentoring@prereview.org.** Thank you so much!

AUTHOR CONTRIBUTION

Conceptualization	Antoinette Foster
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Writing and Editing	Antoinette Foster, Samantha Hindle, Katrina M. Murphy, Daniela Saderi

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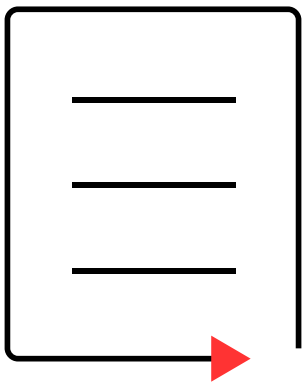

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