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PASSIVE VOICE IN SCIENTIFIC WRITING

Few topics engender such heated debates as that of active vs. passive voice. This argument is relevant to writing in general, but I think it's particularly so to scientific writing. Some writers speak out in vehement opposition to passive voice, others claim it should be used liberally. What is one to do?

Everyone will have to make his own decision. I think the most important thing is that you've thought about it and you make the decision consciously. At the risk adding to an already saturated debate, I'll present my opinion in hopes that this summary of the issues will be useful. I hope this will help you reach your own conclusion.

As usual, I think the right answer lies somewhere between the extremes. It's true that active voice is generally shorter and clearer, but passive voice is also useful. If I sound like I'm generally on the side of preferring active voice where possible, it's because I believe many scientists habitually abuse the passive voice. The problem isn't with the passive voice per se, it's that scientists don't use it well.

Here's a list of articles I've found over the years that address the debate particular to scientific writing. There are many more articles arguing against passive voice than for it; this might be partially my bias. The articles that argue for the passive voice are usually suggesting certain, limited use cases. After the list of articles you'll find my summary of arguments in both directions, along with my opinion as to whether or not the arguments have merit.

Articles arguing against the passive

Title	Author	Source
Passive Voice (Science editorial)	R.V. Ormes	Science, 1957
Passive Voice and Personal Pronouns (Science letter)	Jane J. Robinson	Science, 1957
Instructions for Contributors (Science)	Editors of Science	Science, 1963
That pernicious passive voice	J Kirkman	Physics in Technology, 1975
How we write about biology	Randy Moore	The American Biology Teacher, 1991
Write to Reply (Nature correspondence)	Leon Avery	Nature, 1996
Passive voice (Nature correspondence)	Alan M. Perlman	Nature, 1996
Writing a clear and engaging paper for all astronomers	Leslie Sage	2003
Are we active? Or should the passive be used?	Rupert Sheldrake	School Science Review, 2004
Writing intelligible English prose for biomedical journals	John Ludbrook	Clinical and Experimental Pharm. and Phys., 2007
What does scientific language prove?	Elise Langdon-Neuner	Journal of the European Medical Writers Association, 2007

How to write (Nature style guide)	Nature editors	Nature, 2011
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Most scientists use passive voice either out of habit or to make themselves seem scholarly, objective or sophisticated. Scientists have not always written in passive voice. First-person pronouns such as *I* and *we* began to disappear from scientific writing in the United States in the 1920s when active voice was replaced by today's inflexible, impersonal and often boring style of scientific writing. (Randy Moore, editor, *The American biology teacher*, [here](#)).

Articles defending or encouraging the passive

Title	Author	Source
Passive Voice (Science editorial)	R.V. Ormes	Science, 1957
Passive Voice and Personal Pronouns (Science letter)	Jane J. Robinson	Science, 1957
The Science of Scientific Writing	George Gopen and Judith Swan	American Scientist, 1990
The case for the passive voice (Nature correspondence)	Simon R. Leather	Nature, 1996
Clear as Mud (Nature news)	Jonathan Knight	Nature, 2003
Using the Passive Voice in Scientific Writing	Charlene Sorenson and Tonya Johnson	Gallaudet University Web Page, 2004-2011

Arguments for the active

To start with, lets consider all the arguments that can be made for the active voice.

1. Length

Active voice is shorter than passive voice (usually only slightly). It's hard to argue with this one. It may not seem important to you, but if you can write more concisely, you should.

2. Dangling modifiers

Our chief objection to the passive voice is that it sometimes seems to make authors forget to watch for dangling modifiers. Such oversights can lead to something more undesirable than lack of grammatical exactness; they can also lead to scientific inexactness.

If you aren't already familiar with why this is, read a bit more about [dangling modifiers](#). If you're careful, you can use passive and avoid dangling modifiers, but it takes discipline that many lack.

3. Passive sounds pompous or impersonal

"The test tube was carefully smelled." I was astonished to read this sentence in my 11-year-old son's science notebook. At primary school his science reports had been lively and vivid. But when he moved to secondary school they became stilted and artificial. -Rupert Sheldrake

Writing can be pompous in either active or passive voice; impersonality is definitely more the purview of the passive.

4. Passive voice leads to ambiguous actors

One of the key problems with passive voice is that it is easy to leave actor ambiguity. It may be the case that the actor is completely obvious, in which case it is fine to leave her out. However, in many cases, it's not so easy to figure out, and if you leave out the actor, your reader may get it wrong.

5. Passive voice encourages nominalizations

A major problem with passive is that it makes it **easier to use abusive nominalizations**. I'll assume you've been through the lesson that discusses nominalizations ([lesson 1](#))...if not, go read that first!

I've read lots of papers with some variation of the phrase "the DNA was then subjected to qPCR analysis" or something like that. I rarely read the active counterpart, "we subjected the DNA to qPCR analysis". Somehow the first (which is even worse than the second) seems acceptable. The main problem with this sentence isn't that it's passive, it's that it has nominalized the action of the sentence into "qPCR analysis." As such, you can fix the problem by fixing the nominalization while retaining the passive: "the DNA was then analyzed using qPCR." Nevertheless, somehow awkward phrases like these seem more abundant in passive sentences.

J Kirkman summarizes this argument fantastically:

If we accept the premise that all scientific papers must be passive and impersonal, inevitably we find ourselves tempted to use these 'carrier verbs'. If we will not write:

'we sampled the ions from the plasma by'

'I removed the coating with alcohol'

'we did not inspect the burners regularly'

we can write in simple passive form:

'the ions from the plasma were sampled by'

'the coating was removed with alcohol'

'the burners were not inspected regularly'.

But it is tempting to take a further step and expand these statements to:

'ion sampling from the plasma was achieved by'

'removal of the coating was effected by the application of alcohol'

'regular inspections of the burners were not carried out'.

In taking this extra step we not only change the verb forms from active to passive, but also introduce colourless 'general purpose' verbs 'carrying' abstract nouns. We no longer sample, remove and inspect; we achieve, effect and carry out. -J Kirkman

This is a serious, serious problem in scientific writing.

6. Active is more direct and clear

This argument is a summary of 3 of the preceding arguments: dangling modifiers, ambiguous subjects, and abusive nominalizations. These three things contribute to confusion often associated with passive voice. Accordingly, it's possible to write direct and clear passive sentences. It's just harder.

[Passive voice,] when used correctly can generate as much passion and stimulation as the skilled use of the active voice. -

Simon R. Leather

Since I believe it's *difficult* for most writers to use it "correctly," this argument still holds.

7. Active voice appropriately describes science, which is actively done by scientists.

A matter of opinion -- which camp do you belong to? The "scientists are an integral part of the research" camp, or the "remove the actor to increase objectivity" camp? I subscribe to the former, but maybe this ends in an opinion.

After all, human agents are responsible for designing experiments...writing awkward phrases to avoid admitting their responsibility and their presence is an odd way of being objective. -Jane J. Robinson

8. Journals prefer active voice

It may not have always been this way, but currently, the survey says:

Nature journals like authors to write in the active voice ("we performed the experiment...") as experience has shown that readers find concepts and results to be conveyed more clearly if written directly. *Nature*

Choose the active voice more often than you choose the passive, for the passive voice usually requires more words and often obscures the agent of action. Use first person, not third; do not use first person plural when singular is appropriate. *Science*, vol. 141 [here](#)).

Arguments for the passive

1. Passive stresses what was done

It makes sense to use passive to stress what was done if that is the purpose of the writing. However, it must always be clear who the actor was. Sometimes I find that using the passive voice in the methods section leaves ambiguity. Personally, I find it easier to read active methods sections because I never wonder who did what. Not everyone agrees that it is appropriate to remove actors in order to stress the action:

Passive voice is usually unconvincing because it suggests that scientists were acted upon rather than that scientists acted. - Randy Moore

2. Active leads to personal pronouns

But what's wrong with personal pronouns? Some scientists overuse passive because they are reluctant to use first-person pronouns (*we* or *I*). I do not share this reluctance, and neither did Watson and Crick.

Expressions such as 'was performed', 'were conducted', 'were experienced', 'were carried out', 'was achieved', 'was shown', 'were effected', 'were observed', 'resulted' and 'occurred' are desperately overworked in scientific writing because scientists are reluctant to write directly and personally... So the writer who wants to say 'We calculated the yield and found that' pauses, and contorts his thought into the clumsier expression

'Calculations of the yield were performed which revealed that'. -J Kirkman

The hackneyed argument against using personal pronouns revolves around samples of writing that begin every sentence with "We...", and, accordingly, sound terrible. That problem is not with active voice, it's with the repetitive writing style.

3. Passive is more objective and scientific

Some people claim that passive voice is inherently more scientific than active voice:

[T]he use of the passive voice encourages precision and probity. -Simon R. Leather

Why use passive voice? 1. Let the facts stand on their own! 2. Removes some accusations of bias (who did it, how many did it.) 3. Presents an "air" or feeling of logic. -Gallaudet University English Department

I suppose this argument comes down to opinion; I agree with these editors:

Validity of results remains the same regardless of whether they are reported in the active or passive voice. -Elise Langdon-Neuner

Objectivity is a personal trait unrelated to writing - Randy Moore

[W]riters should write naturally and economically, without affectation of a special 'scientific style'. -J Kirkman

4. Passive voice provides structure control

The passive is not only acceptable but a necessary tool if a writer is to have complete control over the structuring of sentences. (George Gopen, *Expectations*, p. 17).

With this argument I wholeheartedly agree. The key use of passive voice is to switch the order of the subject and object. It is important to have the correct backwards-linking information at the beginning of the sentence. This may require passive voice.

Conclusion

Generally, I prefer active voice, but I think the passive voice has its place in scientific writing. The best thing to do is use a mix of the two. Use passive when necessary to maintain cohesion. When you do, make sure the actor is not ambiguous, be careful to check for dangling modifiers, and avoid abusive nominalizations. Make sure your passive sentences are intentional and not habitual. More important than the active vs. passive debate is the structure of your writing. Make your writing flow, connecting one sentence to the next, and it will be understandable.