Verb tense in scientific manuscripts

Choosing the correct verb tense for each section of a scientific manuscript can be challenging, but it is worth the effort. Editorials in several journals have noted that proper verb tense is an important aspect of a well written manuscript,[1,2,3] and some journals and publishers specifically mention verb tense in their style guides.[4,5] Here, we suggest the appropriate verb tenses to use when writing your next manuscript.

First, some background about the verb tenses discussed below. In general terms, the tense of a verb reflects the timing of the action: the **past** tense indicates that an action already occurred, the **present** tense indicates that the action is currently occurring, and the **future** tense indicates that the event has not yet occurred. Verbs can also be conjugated into a past, present, or future **perfect** tense, in which the action is defined relative to another point in time (see the examples below).

Title: For many journals, the manuscript title does not need to be a complete sentence, and no verb is necessary. In cases where a complete sentence is appropriate, use the **simple present tense** to describe a conclusion that the manuscript supports (e.g., "Gene X is required for intestinal cell differentiation" or "Frameshift mutations in gene X cause abnormal notochord development in zebrafish").

Introduction: The introduction often includes several verb tenses, each providing a different context for the statement that is accompanies. First, **when stating a fact that is widely accepted, the present tense is appropriate**. Examples of such a statement include "DNA is composed of four nucleotides" or "trypanosomes exhibit global trans-splicing of RNA transcripts." Use of the present tense signifies that the statement reflects the current understanding of the matter at hand.

Most introductions also include references to previous research. **When referring to a previous study with results that are still relevant**, **use the present perfect tense** (a form of the verb 'have' plus a past participle, such as "have shown" or "has been shown"). This tense demonstrates that the action occurred in the past but still applies in the present. Phrases like "Johnson *et al.* have shown that gene X is part of an operon" or "unusual glycosylation events have been observed in these cells" are appropriate because the research or observation was made in the past, but the results are still valid. This tense is also used when the event began in the past but continues in the present ("patients with XYZ syndrome have been surveyed for the past ten years"). **Please note that the present tense is used when a specific result, figure, or paper is the subject of a sentence.** Like a movie or book, published research is still available for readers to examine, and a paper therefore continues to express its conclusions. Examples of statements about previous research using the present tense include "the results of their study indicate that the drug is highly effective" or "a landmark paper from Smith's lab describes the discovery of this new organelle."

In some other parts of an introduction, the past tense is needed. **When referring specifically to the methods used in a previous paper, the past tense is best**. For example, it is correct to say "Smith and Anderson sampled 96 swamps and found 156 distinct dragonfly species" or "gene X was first cloned into a shuttle vector in 2003." Likewise, **statements that are no longer considered true should remain in the past tense**: for instance, "bacteria were believed to lack introns" or "early physicists thought that electrons traveled in defined orbits." At times, a combination of tenses is necessary: "Robert Corey suggested [*past*] that DNA contained three helices, but subsequent work has proved *[present perfect]* the existence of a double-helix structure."

Methods: **The methods section should use the past tense** because it is a report of what was done during the course of the study. For example, the methods should be written in the form of descriptions such as "we tested independently derived cultures for resistance to trimethoprim" or "cells were transfected, irradiated, and assayed for DNA damage."

When one action occurred before another, the past perfect tense can be used to indicate the earlier action, with the subsequent action in the simple past tense. The past perfect tense is formed by combining the word 'had' with the past participle (typically the '-ed' or '-en' form) of a verb. Examples combining the past and past perfect tenses include "the cells that had been irradiated [*past perfect*] were assayed [*past*] for DNA damage" and "patients who had elected [*past perfect*] to undergo surgery completed [*past*] questionnaires." **In rare cases in which one action occurred while another was ongoing, the past progressive is used** (e.g., "while the cells were incubating [*past progressive*], the temperature was raised [*past*] 1°C per hour" or "while patients were preparing [*past progressive*] for surgery, nurses collected [*past*] baseline samples"). The past progressive is a combination of the verb 'was' or 'were' and the present participle ('-ing' form) of the verb.

Results: Because the experiments described in the text were completed before the paper was written, **the results section of a manuscript is also largely written using the past tense** (for example, "we detected no fluorescence in the control sample" or "all participants reported a significant reduction in pain"). **In certain cases, however, the present tense is needed.** As described above for the introduction section, the present tense is appropriate when referring to the entire paper or to individual elements of the manuscript (e.g., figures, tables, sections, results, or data). Examples of statements for which the present tense is best include "our results demonstrate that magnesium is essential for enzymatic function," "Figure 1 shows our fluorescence data," and "in this study, we report the discovery of a new species of frog." Note that sometimes two tenses can be found within the same sentence: "because no enzymatic activity was detected [*past tense*] in the absence of magnesium, our results indicate [*present tense*] that magnesium is [*present tense*] absolutely required." The present tense is appropriate for the last verb because the observation extends beyond the specific experiment referenced in the first part of the sentence; it is now considered a statement of fact based on the results.

Discussion: **The discussion section follows the same rules as the previous sections of the manuscript.** When referring to specific results or methods, use the past tense, but use the present when presenting conclusions ("we conclude that gene X is dispensable for ornithine synthesis"). However, **the discussion may include the future tense** if directions for additional research or scholarship are brought up (e.g., "the methods reported here will allow for rapid screening in the field" or "we will publish the full results of our screen as part of another study").

Abstract: **The verb tense chosen for the abstract should be based on the section of the text to which each sentence corresponds.** For example, introductory statements describing the current understanding of the issue should use the present tense, references to previous research should use the present perfect, and descriptions of the methods and results should use the past tense. Indeed, one study of verb tense in English medical abstracts has revealed that the three most commonly used tenses are past, present, and present perfect,[6] in line with the conventions described here.

In this paper, we have offered some advice for choosing verb tense in a scientific manuscript. Please note that these suggestions are not absolute rules, but following these guidelines will help your text conform to the conventions of scientific writing. Above all, it is important to be consistent with your choice of tense. If you have any questions about your writing, please contact us at AskAnExpert@journalexperts.com. Best of luck!

[1] Carraway LN "Improve scientific writing and avoid perishing." *Am Midl Nat* 155(2):383-394 (2006)
[2] Lin P-Y and Y-R Kuo "A guide to write a scientific paper for new writers." *Microsurgery* 32(1):80-85 (2012)
[3] Fahy K "Writing for publication: argument and evidence." *Women Birth* 21(3):113-117 (2008)
[4] *Eukaryotic Cell* Instructions to Authors http://ec.asm.org/site/misc/journal-ita_abb.xhtml#01
[5] "Writing a scientific paper" in *The ACS Style Guide: A Manual for Authors and Editors* ed. JS Dodd (Washington, DC: American Chemical Society, 1997)
[6] Salager-Meyer F "A text-type and move analysis study of verb tense and modality distribution in medical English abstracts." *Engl Spec Purp* 11(2):93-113 (1992)