

## Scientific Writing: Active and Passive Voice

The terms active and passive voice refer to the way subjects and verbs are used in sentence construction. In scientific writing, we use both voices to write clear and coherent research articles. Although many scientists overuse the passive voice, most scientific journals (e.g. *Science* and *Nature*) actually encourage active voice. The main difference between active and passive voice lies in the amount of emphasis given to the person or object *performing* the action of the sentence, versus the amount of emphasis given to the person or object *being acted upon*.

In a sentence using active voice, the **subject** of the sentence **performs** the action described in the verb.

We collected samples from six counties in California.

In a sentence using passive voice, the **subject** of the sentence **receives** the action described in the verb.

Samples were collected from six counties by our research team.

In scientific writing, the person or object performing the action is usually removed. In this case, the person or object performing the action is **implied**.

Samples were collected from 6 countries.

### When to use active or passive voice

The active voice is direct, clear and concise. The passive voice is indirect, but sometimes it is useful to emphasize the research, instead of the researcher. Instead of committing to one or the other, choose active or passive voice based on which part of the sentence you wish to emphasize.

#### *Active Voice*

Unless you have a compelling reason to choose passive voice, use active voice. Consider active voice as the default and don't be afraid to use the first person when applicable.

“The day-3 vaccinated animals expressed higher levels of IFN- $\alpha$  at both day 0 and day 3 after challenge compared with the other groups.” (Marzi 742)

“In parallel, we investigated the time to protective immunity after a single high-dose VSV-EBOV vaccination against challenge with EBOV-Makona.” (Marzi 740)

#### *Passive Voice*

Passive voice is useful to pull the emphasis of the sentence away from the researcher. It is especially applicable to the “Method” section of scientific journals. When using passive voice, make sure that the performer is either obvious or unimportant.

*The implied subject is obvious:*

“Colloidal CdSe-Au NRs were synthesized according to...” (Wu 633)

In this example, we know that the researchers synthesized the Colloidal CdSe-Au NRs.

*Implied subject is unknown/unimportant:*

“In the spleen, CD4<sup>+</sup> and CD8<sup>+</sup> T cells were significantly reduced in DOCK8-deficient compared with wild-type mice at 7 dpi...” (Flesch 519)

In this example, we do not know what is reducing the CD4<sup>+</sup> and CD8<sup>+</sup> cells; we only know that they are reduced.

### **Common Patterns of Error**

When writing in passive voice, watch out for these common problems:

***Dangling Modifiers.*** A dangling modifier is a word or phrase that modifies the wrong subject in the sentence. This mismatch occurs because the **implied** subject is missing.

“To examine cell cycle progression, mice were pulsed sequentially with the nucleoside analog 5-ethynyl-2'-deoxyuridine (EdU)...” (Gitlin 644)

In this sentence, the modifier (To examine cell cycle progression) modifies the subject (mice). However, the author’s intention is to modify the **implied** subject (the researcher). Unless the mice are indeed examining cell cycle progression, this sentence should be rewritten as:

*Revision:* “To examine cell cycle progression, we sequentially pulsed mice with the nucleoside analog 5-ethynyl-2'-deoxyuridine (EdU)...”

***Nominalization.*** When we turn a verb into a noun, we create a nominalization (i.e. “Analyze” becomes “Analysis”). While nominalization can be useful, scientists tend to overuse it when writing in passive voice.

*Ineffectual Nominalizations:*

In the following example, by changing the verb to noun, the writer detracts from the true action of the sentence. We can correct this example in either active or passive voice, depending on which is more applicable.

“Genotyping of cases was carried out using various Illumina GWAS arrays...” (Miller Method)

*Revision:* Cases were genotyped using various Illumina GWAS arrays...

*Revision:* We genotyped the cases using various Illumina GWAS arrays...

Ineffectual nominalization can also occur when writing in active voice:

“We obtained new benthic and planktic radiocarbon measurements...” (Thornalley 707)

*Revision:* We measured radiocarbon decay from new benthic and planktic...

When scientists use nominalization in this manner, then they no longer “genotyped” or “measured,” instead they “carried out” and “obtained.” This style of writing also detracts from the clarity of the writing and unnecessarily increases the word count.

### *Useful Nominalizations:*

The nominalization may be a subject that refers to a previous sentence:

“Each circuit configuration was chosen randomly from the Haar measure, which was implemented via a direct parameterization of phase shifters (47), the probability density functions of which are displayed in Fig. 3A. For each implementation (Fig. 3B), detection events were counted for each of the 20 collision-free ways in which three photons can exit the six output ports of the device” (Carolan 714-715)

### **Resources**

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Sheffield, Nathan. *Scientific Writing Resource*. Duke U, n.d. Web. 9 September 2015.

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