



Writing in the Sciences

Unit 2: Verbs



Writing in the Sciences

Module 2.1: Use the active voice



What is the active voice?

She throws the ball.

Martha will drive the car.

The President made mistakes.



What is the passive voice?

The ball is thrown by her.

The car will be driven by Martha.

Mistakes were made by The President.



Recognizing a passive verb

- Passive verb = a form of the verb "to be" + the past participle of the main verb
- The main verb must be a transitive verb (that is, take an object).



“to be” verbs

- Is
 - Are
 - Was
 - Were
 - Be
 - Been
 - Am
- could be
 - shall be
 - should be
 - will be
 - would be
 - may be
 - might be
 - must be
 - has been



Example: passive voice

My first visit to Boston will always be
remembered by me.

**Recipient of the
action**

Verb

**Agent of
the
action**

Active:

I will always remember my first visit to Boston.



Example: passive voice

She is loved.

→ Which evokes the question, “Who’s loving her?”

The recipient of
the love.

Form of “to be”

Past participle of a transitive
verb: to love (*direct object*).



Example: passive voice

"Cigarette ads were designed to appeal especially to children."

vs.

"We designed the cigarette ads to appeal especially to children."



Responsible party!



Passive vs. active voice

To turn the passive voice back to the active voice:

Ask: "Who does what to whom?"



Use active voice

Passive:

By applying a high resolution, 90 degree bending magnet downstream of the laser electron interaction region, the spectrum of the electron beams could be observed.

→

Active:

We could observe the spectrum of the electron beams by applying a high resolution, 90 degree bending magnet downstream of the laser electron interaction region.



Use active voice

Passive:

Increased promoter occupancy and transcriptional activation of p21 and other target genes were observed.



Active:

We observed increased promoter occupancy and transcriptional activation of p21 and other target genes.



Use active voice

Passive:

The activation of Ca^{++} channels is induced by the depletion of endoplasmic reticulum Ca^{++} stores.



Active:

Depleting Ca^{++} from the endoplasmic reticulum activates Ca^{++} channels.



Use active voice; be direct!

Additionally, it was found that pre-treatment with antibiotics increased the number of super-shedders, while immunosuppression did not.



Pre-treating the mice with antibiotics increased the number of super-shedders while immunosuppression did not.



Advantages of the active voice

- 1. Emphasizes author responsibility
- 2. Improves readability
- 3. Reduces ambiguity



1. Emphasizes author responsibility

- No attempt was made to contact non-responders because they were deemed unimportant to the analysis. (passive)

Vs.

- We did not attempt to contact non-responders because we deemed them unimportant to the analysis. (active)



2. Increases readability

- A strong correlation was found between use of the passive voice and other sins of writing. (passive)
- We found a strong correlation between use of the passive voice and other sins of writing. (active)
- Use of the passive voice strongly correlated with other sins of writing. (active)

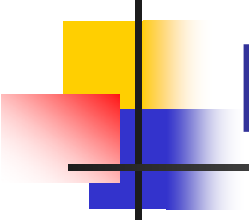


3. Reduces ambiguity

General dysfunction of the immune system at the leukocyte level is suggested by both animal and human studies. (passive)

Vs.

Both human and animal studies suggest that **diabetics** have general immune dysfunction at the leukocyte level. (active)



Is it ever OK to use the passive voice?

- Yes! The passive voice exists in the English language for a reason. Just use it sparingly and purposefully.
 - For example, passive voice may be appropriate in the methods section where what was done is more important than who did it.



Writing in the Sciences

Module 2.2. Is it really OK to use “We” and “I”?



Yes, it's OK!

- 1. The active voice is livelier and easier to read.
- 2. Avoiding personal pronouns does not make your science more objective.
- 3. By agreeing to be an author on the paper, you are taking responsibility for its content. Thus, you should also claim responsibility for the assertions in the text by using “we” or “I.”

Avoiding personal pronouns does not lend objectivity:

- You/your team designed, conducted, and interpreted the experiments. To imply otherwise is misleading.
- The experiments and analysis did not materialize out of thin air!
- The goal is to *be* more objective, not to *appear* more objective.

Passive Voice and Personal Pronouns

R. V. Ormes' judicious criticism of the passive voice [*Science* 125, 529 (1957)] reminded me, by contrast, of my own too sweeping indictment of it a year ago. A young chemistry major took my remarks seriously and wrote a formal account of experimental procedure entirely in the active voice, using the first personal pronoun. The result was revealing. At least it convinced me that the passive voice is sometimes preferable to the active, and that criticism of it should be confined, like Ormes', to its abuse.

To illustrate, here is a passage on procedure, chosen at random from the *Journal of the American Chemical Society*. The original reads: "The thick oil was dissolved in ether, the solution was extracted twice with dilute alkali, and the combined basic extracts were washed with ether. The ether solutions were combined, dried and evaporated to give 2.8 g. of starting alcohol. The basic solution was acidified with dilute sulfuric acid and extracted with ether. The ether layer was washed with water. . . ."

Recast in the active voice, with the

of assumptions customarily understood when certain equations are used, but the reader should know when the assumptions are original, and the simplest way to tell him is by saying "I have assumed. . . ."

After all, human agents are responsible for designing experiments, and they are present in the laboratory; writing awkward phrases to avoid admitting their responsibility and their presence is an odd way of being objective. P. W. Bridgman (*Reflections of a Physicist*, 1950, pp. 57-58) puts it even more strongly: "In suppressing these personal expressions I am doing an unnatural thing that sometimes demands obvious circumlocutions and always involves an element of convention and construction. If I want to express what obviously occurs, I have got to use the first person. Has it ever been adequately proved, or has ever the assumption been adequately examined that in forcing myself to speak non-personally I have not thrown away something vital?"

JANE J. ROBINSON
University of California, Los Angeles

"After all, human agents are responsible for designing experiments, and they are present in the laboratory; writing awkward phrases to avoid admitting their responsibility and their presence is an odd way of being objective."—

Jane J. Robinson, *Science* 7 June 1957: 1160.



Journals want this!

- The style guidelines for many journals explicitly instruct authors to write in the active voice. For example, *Science* magazine advises:
- “Use active voice when suitable, particularly when necessary for correct syntax (e.g., “To address this possibility, we constructed a λZap library ...”).”
- (<http://www.sciencemag.org/site/feature/contribinfo/prep/res/style.xhtml>)

Great authors use “we” and “I”!



Watson and Crick’s celebrated 1953 paper in *Nature* begins:

“We wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.).”

- <http://www.exploratorium.edu/origins/coldspring/printit.html>



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Module 2.3. Active voice practice



Practice: use the active voice

In a moment, I will ask you to pause the video and revise the following sentence:

A recommendation was made by the
DSMB committee that the study be halted.



In the active voice...

The DSMB committee recommended that the study be halted.



Practice: use the active voice

In a moment, I will ask you to pause the video and revise the following sentence:

Major differences in the reaction times of the two study subjects were found.



In the active voice...

We observed major differences in the reaction times of the two study subjects.

OR

The two study subjects differed in reaction times.



Practice: use the active voice

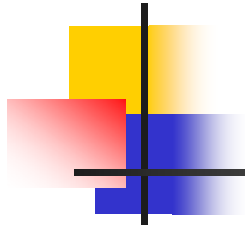
In a moment, I will ask you to pause the video and revise the following sentence:

It was concluded by the editors that the data had been falsified by the authors.



In the active voice...

The editors concluded that the authors falsified their data.



Practice: use the active voice

In a moment, I will ask you to pause the video and revise the following sentence:

The first visible-light snapshot of a planet circling another star has been taken by NASA's Hubble Space Telescope.



In the active voice...

NASA's Hubble Space Telescope has taken the first visible-light snapshot of a planet circling another star.



Practice: use the active voice

In a moment, I will ask you to pause the video and revise the following sentence:

Therefore, the hypothesis that the overall kinetics of a double transtibial amputee athlete and an able-bodied sprinter at the same level of performance are not different was rejected.



In the active voice...

Therefore, we rejected the hypothesis that the overall kinetics of a double transtibial amputee athlete and an able-bodied sprinter at the same level of performance are comparable.



Writing in the Sciences

Module 2.4: Write with verbs



Write with verbs

- use strong verbs
- avoid turning verbs into nouns
- don't bury the main verb



Use strong verbs

Verbs make sentences go!

Compare:

"Loud music came from speakers embedded in the walls, and the entire arena moved as the hungry crowd got to its feet."

With:

"Loud music exploded from speakers embedded in the walls, and the entire arena shook as the hungry crowd leaped to its feet."

Latter sentence from the novel: *Bringing Down the House*, Ben Mezrich



Use strong verbs

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Compare:

"Loud music came from speakers embedded in the walls, and the entire arena moved as the hungry crowd got to its feet."

With:

"Loud music **exploded** from speakers embedded in the walls, and the entire arena **shook** as the hungry crowd **leaped** to its feet."

Latter sentence from the novel: *Bringing Down the House*, Ben Mezrich



Use strong verbs

Pick the right verb!

The WHO reports that approximately two-thirds of the world's diabetics are found in developing countries, and estimates that the number of diabetics in these countries will double in the next 25 year.



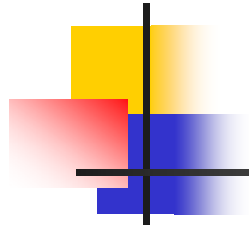
The WHO estimates that two-thirds of the world's diabetics are found in developing countries, and projects that the number of diabetics in these countries will double in the next 25 years.



Use strong verbs

Use “to be” verbs purposefully and sparingly.

Is are was were be been am...



Don't turn verbs into nouns

Don't kill verbs by turning them into nouns.



Don't turn verbs into nouns

Example:

During DNA damage, recognition of H3K4me3 by ING2 results in recruitment of Sin3/HDAC and repression of cell proliferation genes.



Don't turn verbs into nouns

Example:

During DNA damage, recognition of H3K4me3 by ING2 results in recruitment of Sin3/HDAC and repression of cell proliferation genes.



During DNA damage, H3K4me3 recruits ING2 and Sin3/HDAC, which together repress cell proliferation genes.

Say exactly who does what to whom!

Don't turn verbs into nouns

Weak verbs

Obtain estimates of

estimate

Has seen an expansion in

has expanded

Provides a methodologic emphasis

emphasizes methodology

Take an assessment of

assess

Formerly
spunky verbs
transformed
into boring
nouns



Don't turn verbs into nouns

Provide a review of

review

Offer confirmation of

confirm

Make a decision

decide

Shows a peak

peaks

Provide a description of

describe



Don't bury the main verb

Keep the subject and main verb
(predicate) close together at the start of
the sentence...

- Readers are waiting for the verb!



Don't bury the main verb

The case of the buried predicate...

subject

One study of 930 adults with multiple sclerosis (MS) receiving care in one of two managed care settings or in a fee-for-service setting found that only two-thirds of those needing to contact a neurologist for an MS-related problem in the prior 6 months had done so (Vickrey et al 1999).

predicate



Don't bury the main verb

The case of the buried predicate...

One study found that, of 930 adults with multiple sclerosis (MS) who were receiving care in one of two managed care settings or in a fee-for-service setting, only two-thirds of those needing to contact a neurologist for an MS-related problem in the prior six months had done so (Vickrey et al 1999).



Writing in the Sciences

Module 2.5: Practice examples



Practice Exercises

Really long
subject!

“The fear expressed by some teachers that students would not learn statistics well if they were permitted to use canned computer programs has not been realized in our experience. A careful monitoring of achievement levels before and after the introduction of computers in the teaching of our course revealed no appreciable change in students’ performances.”

negatives

wordy

Passive
verb



Practice Exercises

“The fear expressed by some teachers that students would not learn statistics well if they were permitted to use canned computer programs has not been realized in our experience. A careful monitoring of achievement levels before and after the introduction of computers in the teaching of our course revealed no appreciable change in students’ performances.”

“hedge” word



Buried pred
+ boring ver



Really long
subject!





Practice Exercises



Many teachers feared that the use of canned computer programs would prevent students from learning statistics. We monitored student achievement levels before and after the introduction of computers in our course and found no detriments in performance.



Practice Exercises

**When's the
verb
coming?**

"Review of each center's progress in
recruitment is important to ensure that the
cost involved in maintaining each center's
participation is worthwhile."

**Watch vague descriptors
such as "important" and
"worthwhile"**

Clunky phrase

**"to be" is a
weak verb**



Practice Exercises

We should review each center's recruitment progress to make sure its continued participation is cost-effective.



Practice Exercises

“It should be emphasized that these proportions generally are not the result of significant increases in moderate and severe injuries, but in many instances reflect mildly injured persons not being seen at a hospital.”



Practice Exercises

**Dead
weight!!**

- It should be emphasized that these proportions generally are not the result of significant increases in moderate and severe injuries, but in many instances reflect mildly injured persons not being seen at a hospital.

Can we use a more informative adjective than a pronoun? What's important about "these" proportions?

More dead weight.

Ask yourself, what does the sentence lose without this qualifier?



Practice Exercises

- It should be emphasized that these proportions generally are not the result of significant increases in moderate and severe injuries, but in many instances reflect mildly injured persons not being seen at a hospital.

**Watch out for awkward
uses of “to be”**

**“The result of” → Use
“In many instances” positives.**



Practice Exercises

- Shifting proportions in injury severity may reflect stricter hospital admission criteria rather than true increases in moderate and severe injuries.



Practice Exercises

Important studies to examine the descriptive epidemiology of autism, including the prevalence and changes in the characteristics of the population over time, have begun.

Identify the problems...

- where's the verb?
- watch fluff words like "important"
- can changes occur without being "over time"?
- "of the population" is vague



Practice Exercises

Important studies to examine the descriptive epidemiology of autism, including the prevalence and changes in the characteristics of the population over time, have begun.



Studies have begun to describe the epidemiology of autism, including recent changes in the disorder's prevalence and characteristics.



Practice Exercises

There are multiple other mechanisms that are important, but most of them are suspected to only have a small impact or are only important because of impact on one of the three primary mechanisms.



Multiple other mechanisms play only a small role or work by impacting one of the three primary mechanisms.



Practice Exercises

After rejecting paths with poor signal-to-noise ratios, we were left with 678 velocity measurements of waves with 7.5 seconds period and 891 measurements of 15 second waves.



Rejecting paths with poor signal-to-noise ratios left 678 velocity measurements of 7.5-second waves and 891 of 15-second waves.



Practice Exercises

It is suspected that the importance of temperature has more to do with impacting rates of other reactions than being a mechanism of disinfection itself since ponds are rarely hot enough for temperature alone to cause disinfection.



Ponds are rarely hot enough for temperature alone to cause disinfection; thus, the effect of temperature is likely mediated through its impact on the rates of other reactions.



Practice Exercises

It was assumed that due to reduced work at the joints of the lower limbs and less energy loss in the prosthetic leg, running with the dedicated prostheses allows for maximum sprinting at lower metabolic costs than in the healthy ankle joint complex.



The prosthetic leg reduces work and energy loss compared with a healthy ankle joint, which may lead to lower metabolic costs during maximum sprinting.



Writing in the Sciences

Module 2.6: A few grammar tips



1. “Data are” not “Data is”...

The word “data” is plural.

- ex: *These data show an unusual trend.*
The data support the conclusion.
The data are critical.
(v. *datum*, singular form)



2. Affect vs. effect

- Affect is the verb “to influence”
 - *The class affected her.*
 - As a noun, affect denotes feeling or emotion shown by facial expression or body language, as in “The soldiers seen on television had been carefully chosen for blandness of affect” (Norman Mailer).
- Effect is the noun form of this influence
 - *The class had an effect on her.*
 - As a verb, effect means to bring about or to cause, as in “*to effect a change*”



Affect vs. Effect

Headline: Terrorist Plots ~~Effect~~ the
Beauty Industry

Correct:

Terrorist Plots Affect the Beauty
Industry



3. Compared to vs. compared with

- Compare to = to point out *similarities* between different things
- Compare with** (used more often in science) = to point out *differences* between similar things

ex: “Shall I compare thee to a summer’s day?”

ex: Brain tumors are relatively rare compared with more common cancers, such as those of the lung, breast, and prostate.



4. That vs. which

“That” is the restrictive (defining) pronoun

“Which” is the nonrestrictive (non-defining)
pronoun

What’s the difference between these two?→

The vial that contained her RNA was lost.

The vial, which contained her RNA, was lost.



That/which

that

Example: *Other disorders ~~which~~ have been found to co-occur with diabetes include heart disease and foot problems.*



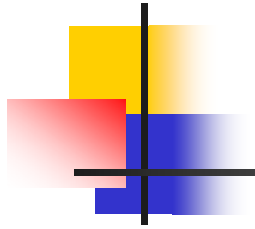
That/which

- Key question: Is your clause essential or non-essential?
 - THAT: The essential clause cannot be eliminated without changing the meaning of the sentence.
 - WHICH: The non-essential clause can be eliminated without altering the basic meaning of the sentence (and must be set off by commas).



That/which

- *The bike that is broken is in the garage.*
(Identifies which bike of many.)
- *The bike, which is broken, is in the garage.*
(Adds a fact about the only bike in question).



That/which

- “Careful writers, watchful for small conveniences, go *which*-hunting, remove the defining *whiches*, and by doing so improve their work.” –*Strunk and White*



That/which

From physicist Richard Feynman:

- “When we say we are a pile of atoms, we do not mean we are *merely* a pile of atoms because a pile of atoms ~~that~~ which is not repeated from one to the other ~~that~~ might well have the possibilities ~~which~~ you see before you in the mirror.”



That/which

Another example:

- Stroke incidence data are obtained from sources, which use the ICD (International Code of Diseases) classification systems.



That/which

- *Stroke incidence data are obtained from sources...?*
- Is the clause essential? Is it defining the subject?
- Yes!
- ∴ use “that”



That/which

- Stroke incidence data are obtained from sources ~~that~~ ~~which~~ use the ICD (International Code of Diseases) classification systems.



5. Singular antecedents...

Do not use “they” or “their” when the subject is singular. To avoid gender choice, turn to a plural!

Each student worries about ~~their~~ grade.

Each student worries about her grade.

Better: All students worry about their grades.