



We will begin momentarily at 2pm ET



Slides available now! Recordings will be available to ACS members after one week.

www.acs.org/acswebinars

Contact ACS Webinars® at acswebinars@acs.org

1

Have Questions?



“Why am I muted?”
Don't worry. Everyone is muted except the presenter and host. Thank you and enjoy the show.

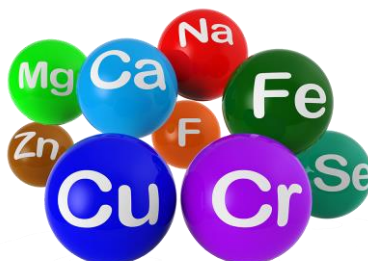
Type them into questions box!

Contact ACS Webinars® at acswebinars@acs.org

2



Have you discovered the missing element?



www.acs.org/2joinACS

Find the many benefits of ACS membership!

3



Benefits of ACS Membership



Chemical & Engineering News (C&EN)
The preeminent weekly news source.



NEW! Free Access to ACS Presentations on Demand®
ACS Member only access to over 1,000 presentation recordings from recent ACS meetings and select events.



NEW! ACS Career Navigator
Your source for leadership development, professional education, career services, and much more.

www.acs.org/2joinACS

4

Like us on Facebook!



facebook.com/acswebinars

5

How has ACS Webinars® benefited you?



“ACS Webinars provide a brief glimpse into other fields of chemistry which I am interested in, but are not a part of my job. I find these webinars refreshing and enlightening.”

Fan of the Week

Ruth Haldeman,
Laboratory Manager,
Water Technologies,
Water Resources,
LAYNE





Be a featured fan on an upcoming webinar! Write to us @ acswebinars@acs.org

6



 facebook.com/acswebinars

 @acswebinars

 youtube.com/acswebinars



7



All recordings of ACS Webinars® will be available to current ACS members one week after the Live broadcast date.

Live weekly ACS Webinars® will continue to be available to the general public.

Contact ACS Webinars® at acswebinars@acs.org

8

Upcoming ACS Webinars®

www.acs.org/acswebinars



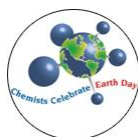
Thursday, April 16, 2015

“Catching Errors: Peer Review and Retractions in Publishing”

Dr. Charon Pierson, Elected Member, Governing Council of the Committee on Publication Ethics (COPE)

Dr. Ivan Oransky, Co-founder, *Retraction Watch*

Dr. James DuBois, Director, Center for Clinical Research Ethics



Thursday, April 23, 2015

“Improving Climate and Weather Forecasts: Understanding Atmospheric Aerosols”

Dr. Kimberly Prather, Professor of Chemistry, University of California, San Diego

Ms. Alexis Schusterman, 2014 Chem Champs Runner-Up
Ph.D. Candidate, University of California Berkeley

Contact ACS Webinars® at acswebinars@acs.org

9

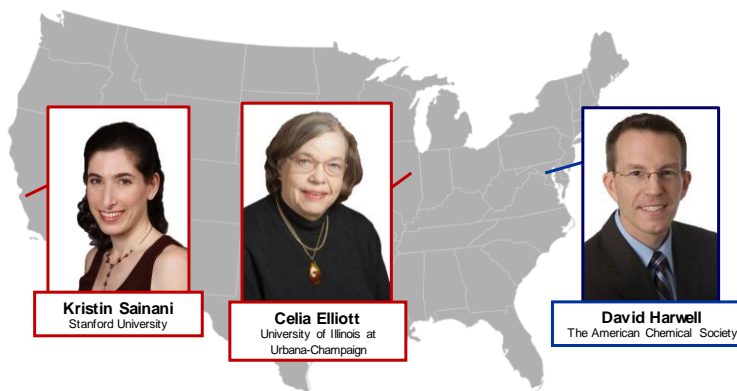
Check out **Celia and Kristin's Reddit AMA** for your answers to active and passive voice in scientific writing!



10



“Active vs. Passive Voice in Scientific Writing”



Slides available now! Recordings will be available to ACS members after one week

www.acs.org/acswebinars

Contact us via email at acswebinars@acs.org

11

We Agree on More than We Disagree on



1. The science author’s primary obligation is to **convey information *clearly, concisely, and objectively***
2. **Clear writing promotes clear thinking—** for both the writer and the reader
3. **Simple, straightforward writing** should be the goal of every science writer
4. **Direct, action verbs are usually better** than flabby verbs of being, whatever the voice



Before We Jump Into the Fray, Let's Review

Active voice: the subject of the sentence performs the action—the subject acts

Passive voice: the subject of the sentence receives the action of the verb—the subject is acted upon



The pitcher throws the ball.



The ball is caught by the catcher.

Editorial advice from the ACS: *“Use the passive voice when the doer of the action is unknown or not important.”*

A. Coghill, et al., *The ACS Style Guide* (American Chemical Society, Washington DC, 2006), Chapter 4
<http://pubs.acs.org/doi/abs/10.1021/bk-2006-STYG.ch004>

Scientific Writing Has Traditionally Been Third Person, Passive Voice...



First person: I, we

Second person: you (singular), you (plural)

Third person: he, she, it, they

...but more editors are allowing—
 even encouraging—first person, active voice,
 because it may be more direct and concise

(or maybe because so many scientists write passive voice so badly...)

***“So many papers deserve to be better written than they are.”**
“Elements of Style,” Nature Physics 3, 581 (2007) doi:10.1038/nphys724



We All Exploit the Passive Voice Sometimes!



For some reason, Table 2 was not updated.

Compare with:

I neglected to update Table 2.

Responsible party!



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)



It's OK to use "We" and "I"!



- 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. Ormer's judicious criticism of the passive voice (*Science* 122, 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 Ormer's, 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. F. 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 even 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.

2. Increases Readability



- The risk of hair loss was increased by vitamin A.
(passive)

Vs.

- Vitamin A increased the risk of hair loss.
(active)



Increases Readability



- The hypothesis that smoking causes lung cancer was rejected by tobacco companies. (passive)

Vs.

- Tobacco companies rejected the hypothesis that smoking increases lung cancer. (active)



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)



Audience Survey Question

ANSWER THE QUESTION ON SCREEN



In their instructions to authors, the editors of *Science* and *Nature*:

- encourage authors to use the passive voice
- encourage authors to use the active voice
- give no guidance to authors as to the choice of passive versus active voice
- discourage the use of personal pronouns

Journal Editors Want Active Voice!



- **Science:**

“Use active voice when suitable, particularly when necessary for correct syntax (e.g., “To address this possibility, we constructed a λZap library ...).”

- **Nature:**

“*Nature* journals prefer 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.

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)



Famous use of the Active Voice...

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

No. 4356 April 25, 1953 NATURE

equipment, and to Dr. C. E. R. Deacon and the captain and officers of R.R.S. *Discovery II* for their part in making the observations.

¹ Young, P. B., Gerard, H., and Jevons, W., *Phil. Mag.*, **40**, 149 (1925).

² Longuet-Higgins, M. S., *Mon. Not. Roy. Astro. Soc., Geophys. Supp.*, **5**, 280 (1949).

³ Von Arx, W. S., Woods Hole Papers in Phys. Oceanogr. Meteor., **11** (5) (1950).

⁴ Ekman, V. W., *Arkiv. Mat. Astron. Fysik. (Stockholm)*, **2** (11) (1905).

MOLECULAR STRUCTURE OF NUCLEIC ACIDS

A Structure for Deoxyribose Nucleic Acid

WE wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This structure has novel features which are of considerable biological interest.

is a residue o

tion. We h

adjacent res

structure rep

is, after 34 *l*

from the fibro

the outside. (

The structu

is rather hig

expect the t

become more

The novel

in which the

purine and p

are perpendi

together in f

hydrogen-bon

chain, so tha

s-co-ordinate

the other a

hydrogen bon



This figure is purely diagrammatic. The two ribbons symbolize the two phosphate-sugar chains, and the horizont

Lessons Learned

- Avoiding personal pronouns does not make your science more objective.
- The active voice is more clear, direct, and vigorous.
- Journal editors encourage use of the active voice.
- The passive voice is appropriate in some cases, but should be used sparingly and purposefully.



For More Training:



Writing in the Sciences MOOC:

<https://class.stanford.edu/courses/Medicine/Sci-Write/Fall2014/about>

Other Helpful Resources:



- **Clinical Chemistry Guide to Scientific Writing:**

http://www.aacc.org/publications/clin_chem/ccgsw/Pages/default.aspx#

- Mimi Zeiger. *Essentials of Writing Biomedical Research Papers*, McGraw Hill Professional

Audience Survey Question

ANSWER THE QUESTION ON SCREEN

Changing from the passive voice to the active voice will correct which of the following writing problems?

- poor logical organization
- imprecise, qualitative language
- ambiguity
- long, rambling sentences
- none of the above

29

- a) poor logical organization
- b) imprecise, qualitative language
- c) ambiguity
- d) long, rambling sentences
- e) **none of the above**



Trick Question

Merely switching from the passive voice to the active is no magical cure for bad writing

- organizational structure
- word choice
- syntax
- tone
- emphasis

are all vastly more important than voice

The passive voice offers two distinct advantages in scientific writing

1. **Focuses the reader's attention on the method, result, or principle being described**
(who cares who added the reagent to the beaker?)
2. **Presents findings and ideas in a neutral, facts-based, objective way**

*“However, there is a clear prejudice among today's commentators on voice—particularly those who express themselves in writing textbooks — against one of the commonest types of prose, **report writing**, where the passive voice is not only common, it is generally less wordy than the active, more direct, and more efficient in conveying information.”*

Dennis Baron, “The Passive Voice Can Be Your Friend,” in *Declining Grammar—and Other Essays on the English Vocabulary* (National Council of Teachers of English, Urbana, Illinois, 1989).

1. Emphasizes what was found, not who did the finding

“We determined that annealing the thin films at 700°C produced voids and increased surface roughness.”

(first person, active voice; 15 words)

“Voids and increased surface roughness were observed in the thin films annealed at 700°C.”

(impersonal, passive voice; 14 words)



Tip: Make the **important idea, observation, finding, or conclusion** the **subject** of the sentence to make it stand out for the reader

2. Presents findings in a neutral, objective, straightforward way

“We found that increasing the pressure resulted in shear failures along grain boundaries.”
(first person/active voice; 13 words)

“Increasing the pressure resulted in shear failures along grain boundaries.”
(impersonal/active voice; 10 words)

“Shear failures along grain boundaries were observed as pressure increased.”
(impersonal/passive voice; 10 words)



But Celia, the passive voice is always more awkward and wordy...

“We measured the ductility of the high-entropy alloys at both ambient and liquid-nitrogen temperatures.”
(first person/active voice; 14 words)

“The ductility of the high-entropy alloys was measured at both ambient and liquid-nitrogen temperatures.”
(impersonal/passive voice; 14 words)

“We used energy-resolved field-assisted photoemission in a Ag/InP Schottky diode to investigate hot-electron transport in InP.” (first person/active voice; 16 words)

“Hot-electron transport in InP was investigated by energy-resolved field-assisted photoemission in a Ag/InP Schottky diode.” (impersonal/passive voice; 15 words)



... oops

Audience Survey Question

ANSWER THE QUESTION ON SCREEN



What percentage of the sentences in most journal articles are written in the passive voice?

- <10 percent
- ≈20 percent
- ≈35 percent
- >50 percent

35

- a) <10 percent
- b) ≈20 percent**
- c) ≈35 percent
- d) >50 percent



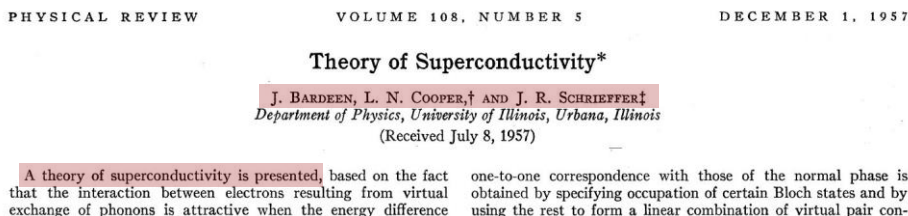
So is this whole debate a “tempest in a teacup”?
Maybe, if it diverts us from what should be our primary focus—to share our results with the community in the clearest, most concise way we can.

*“This rule [use the active voice] does not, of course, mean that the writer should entirely discard the passive voice, which is **frequently convenient and sometimes necessary.**”*

W. Strunk Jr. and E.B. White, *The Elements of Style*, 4th ed. (New York, Longman, 2000), p. 18.



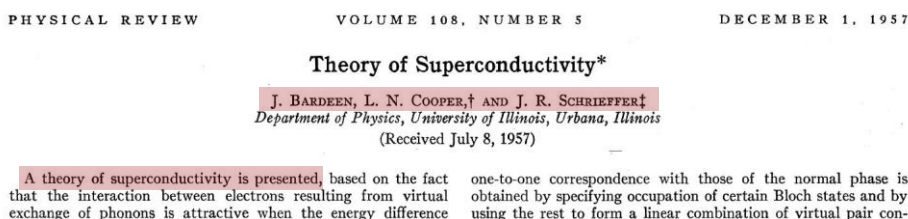
But Celia, the passive voice allows authors to evade responsibility



“An author’s central obligation is to present an accurate and complete account of the research performed, absolutely avoiding deception, including the data collected or used, as well as an objective discussion of the significance of the research... The research report and the data collected should contain sufficient detail and reference to public sources of information to permit a trained professional to reproduce the experimental observations.”

American Chemical Society, *Ethical Guidelines to Publication of Chemical Research*, May 2014. <http://pubs.acs.org/userimages/ContentEditor/1218054468605/ethics.pdf>

But Celia, the passive voice allows authors to evade responsibility



“An author’s central obligation is to present an accurate and complete account of the research performed, absolutely avoiding deception, including the data collected or used, as well as an objective discussion of the significance of the research... The research report and the data collected should contain sufficient detail and reference to public sources of information to permit a trained professional to reproduce the experimental observations.”

American Chemical Society, *Ethical Guidelines to Publication of Chemical Research*, May 2014. <http://pubs.acs.org/userimages/ContentEditor/1218054468605/ethics.pdf>

For conciseness, avoid beginning sentences with indirect preambles

(“There are...” “It is”)—use the passive voice and plunge right in

~~“There were~~ several methods used to produce the thin metal substrates—hot stamping, cold rolling, and cleaving.”

“Thin metal substrates were produced by several methods—hot stamping, cold rolling, and cleaving.”

This rewrite has the added advantage of putting the important part of the sentence (“thin metal substrates”) first and the examples directly after “methods,” where they belong (and the PV version is three words shorter, too!)

Instead of fretting over voice, consider what you want to emphasize

1. “We used an SEM to examine surface defects in the GaAs thin films.” (AV)
2. “An SEM was used to examine surface defects in the GaAs thin films.” (PV)
3. “Surface defects in the GaAs thin films were examined using an SEM.” (PV)
4. “Gallium-arsenide thin films were examined for surface defects using an SEM.” (PV)

Put the important stuff first—that’s where readers are paying the most attention



Lessons learned:

“The passive voice can be your friend”

1. The passive voice lets you control what you want to emphasize and creates an objective, facts-based narrative
2. The passive voice doesn't have to be wordy and ambiguous—do your job as a writer
3. Strive for clarity and conciseness and let the voice take care of itself



cmelliot@illinois.edu

My lectures for technical writers and students:

<http://physics.illinois.edu/people/Celia/>

(scroll down to the bottom of the page for the links)



ACS Webinars®

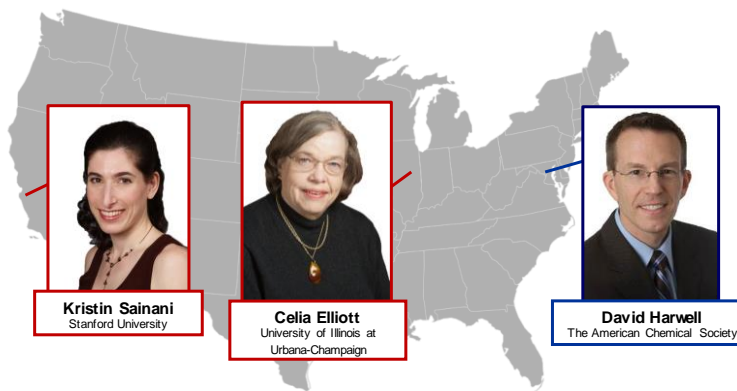
CLICK • WATCH • LEARN • DISCUSS



ACS

Chemistry for Life®

“Active vs. Passive Voice in Scientific Writing”



Slides available now! Recordings will be available to ACS members after one week

www.acs.org/acswebinars

Contact us via email at acswebinars@acs.org

42

Check out **Celia and Kristin's Reddit AMA** for your answers to active and passive voice in scientific writing!



43

Upcoming ACS Webinars[®]

www.acs.org/acswebinars



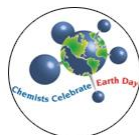
Thursday, April 16, 2015

“Catching Errors: Peer Review and Retractions in Publishing”

Dr. Charon Pierson, Elected Member, Governing Council of the Committee on Publication Ethics (COPE)

Dr. Ivan Oransky, Co-founder, *Retraction Watch*

Dr. James DuBois, Director, Center for Clinical Research Ethics



Thursday, April 23, 2015

“Improving Climate and Weather Forecasts: Understanding Atmospheric Aerosols”

Dr. Kimberly Prather, Professor of Chemistry, University of California, San Diego

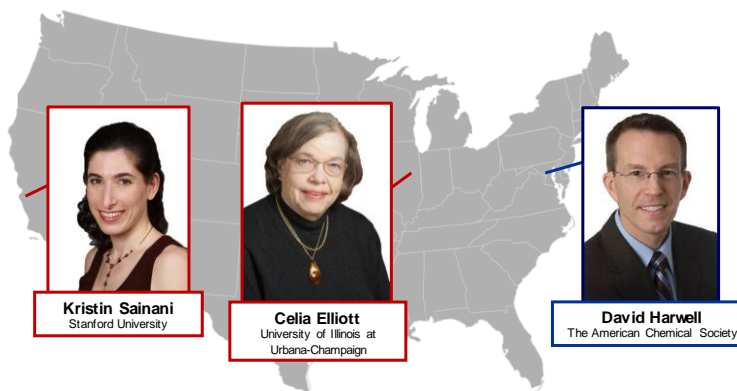
Ms. Alexis Schusterman, 2014 Chem Champs Runner-Up
Ph.D. Candidate, University of California Berkeley

Contact ACS Webinars[®] at acswebinars@acs.org

44



“Active vs. Passive Voice in Scientific Writing”



Slides available now! Recordings will be available to ACS members after one week

www.acs.org/acswebinars

Contact us via email at acswebinars@acs.org

45


How has ACS Webinars® benefited you?



Be a featured fan on an upcoming webinar! Write to us @ acswebinars@acs.org

46



 facebook.com/acswebinars
 @acswebinars
 youtube.com/acswebinars



47



Benefits of ACS Membership



Chemical & Engineering News (C&EN)
The preeminent weekly news source.



NEW! Free Access to ACS Presentations on Demand®
ACS Member only access to over 1,000 presentation recordings from recent ACS meetings and select events.



NEW! ACS Career Navigator
Your source for leadership development, professional education, career services, and much more.

www.acs.org/2joinACS

48



ACS Webinars® does not endorse any products or services. The views expressed in this presentation are those of the presenter and do not necessarily reflect the views or policies of the American Chemical Society.



Contact ACS Webinars® at acswebinars@acs.org

49

Check out **Celia and Kristin's Reddit AMA** for your answers to active and passive voice in scientific writing!



50

Upcoming ACS Webinars®

www.acs.org/acswebinars



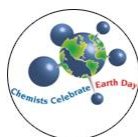
Thursday, April 16, 2015

“Catching Errors: Peer Review and Retractions in Publishing”

Dr. Charon Pierson, Elected Member, Governing Council of the Committee on Publication Ethics (COPE)

Dr. Ivan Oransky, Co-founder, *Retraction Watch*

Dr. James DuBois, Director, Center for Clinical Research Ethics



Thursday, April 23, 2015

“Improving Climate and Weather Forecasts: Understanding Atmospheric Aerosols”

Dr. Kimberly Prather, Professor of Chemistry, University of California, San Diego

Ms. Alexis Schusterman, 2014 Chem Champs Runner-Up
Ph.D. Candidate, University of California Berkeley

Contact ACS Webinars® at acswebinars@acs.org

51