

与狼共舞： 如何用生成式AI帮助你写科研论文

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Writing Well for Science

This lecture covers:

1. Use GenAI as a Tool, Not a Crutch
2. Tell Your Own Story
3. Develop a Strong Voice
4. Master Revising

What is generative AI (GenAI)?

GenAI chatbot (ChatGPT, etc.)

a type of AI

that can create new content, including images, videos, music, and text.

It can do many things, **BUT it cannot write a research paper for you (or you are no longer needed as a researcher).**

Why do I care about GenAI?

I am a freelancer.

Once the ChatGPT came out, I started to read about it, and tried it.

1. I wanted to see how good it was;
2. I hoped to use it, if it was good.

Today's ChatGPT is much improved.

Many people like ChatGPT. But,

here is my recent experience,
concerning n-day sightseeing in Kyoto
for the first time.

I had to refine it: old people, five hours
each day. Still, the answer is very
robotic.

ChatGPT may hallucinate:

It may give you plausible-sounding but incorrect or nonsensical (荒谬的) answers.

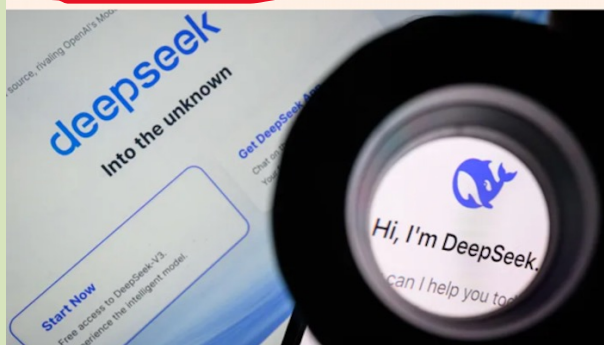
(It has other issues:

e.g., training data suffering from algorithmic bias.)

FT article:

DeepSeek与ChatGPT对文史学习的意义不应高估

林原：不能期待DeepSeek和ChatGPT提出新观点和“正确答案”，它们所擅长的或许是“头头是道”地给出看似正确的回答。



6小时前 林原 为FT中文网撰稿

目前在中文网络上，可以看到不少吹捧DeepSeek、ChatGPT的言论。笔者从事中国文史研究多年，也会关注DeepSeek、ChatGPT对中国文史问题究竟能提供何种有价值的回答，以此评估两者的中国文史“研究水平”究竟如何，以及它们是否能替代文史研究者的工作。

笔者向DeepSeek与ChatGPT提出如下问题：“华北有价证券交易所为何在1946年停业？”华北有价证券交易所的筹备，始于抗战后期的1944年12月，开幕则是在1945年8月27日。1945年11月，该所由（国民政府）财政部驻冀鲁察绥热区财政金融特派员办公处派员接收。次年4月，这家交易所奉令停拍清理。

DeepSeek对上述问题所给出答案的结构是“总分总”式。首句话是：“华北有价证券交易所于1946年停业，主要与抗战胜利后中国政治经济的剧烈动荡、国民政府的金融政策调整以及国共内战的爆发密切相关。”这句话存在可商榷之处，涉及国共内战的爆发等，下文还会谈及此。

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FT article:

至于ChatGPT，它对华北有价证券交易所停业原因问题给出的答案，不比DeepSeek更正确。答案结构也是“总分总”式，首句是：“华北有价证券交易所于

DeepSeek与ChatGPT对该问题的回答，有些像是“一知半解”者在信口开河。许多论述不严密或不够严密，多似是而非之处，经不起推敲。不过，对普通百姓乃至对这段历史不了解的教师、学者（比如研究人类学、化学等问题的学者）来说，它们提供的上述答案还是具有一定“迷惑性”的，并有可能被认为是正确答案。

对中国文史研究而言，至少目前不能期待DeepSeek、ChatGPT提出新观点，也不能指望它们提供超出以往研究者的最全面、最正确答案，甚至无法指望它们给出完全不包含错误的“初步见解”。它们所擅长的，或许是“头头是道”地给出看似正确的回答。

(注：林原，历史学博士，中国文史研究者，时评人。本文仅代表作者个人观点。责编邮箱bo.liu@ftchinese.com)

Let's try a simple task:
to improve a title

Me: Can you improve the title of
"Dynamics of ocean warming xxx"?

ChatGPT: Your title is clear and
informative, but it could be more
engaging and specific. Here are a few
improved versions:

ChatGPT:

1. **“Understanding the Dynamics of Ocean Warming Around the Hawaiian Islands”** –
Adds clarity and emphasizes the research focus.
2. **“Shifting Seas: The Dynamics of Ocean Warming Around the Hawaiian Islands”** –
More engaging and evocative.

3. **“The Changing Ocean: Dynamics of Warming Waters Around the Hawaiian Islands”** – Highlights the theme of change.
4. **“Patterns and Drivers of Ocean Warming Around the Hawaiian Islands”** – Suggests a focus on underlying mechanisms.
5. **“Ocean Warming Around the Hawaiian Islands: Trends, Drivers, and Impacts”** – More comprehensive, indicating multiple aspects of the study.

ChatGPT:

Would you like to emphasize any specific aspect, such as climate change impacts or regional variability?

You can keep on asking for refinement until you are happy with the outcome.

ChatGPT may (might)

provide a list of published papers related to your research topic. (I used "Web of Science.")

Note: None of the GenAIs has been trained for our research.

It should be safe to ask:

Can you improve this abstract?

Can you improve this paragraph?

Can you improve the introduction?

Can you improve these conclusions?

Can I write a paper in Chinese first?

Absolutely!

Remember this:

GenAI cannot improve your logic
flow by translating it into
English!

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What if GenAI can translate a paper for you?

近几十年来，高分辨率数值模型和区域观测日益强调海洋亚中尺度（1-100 公里）过程及其对地球气候系统的重大影响¹⁻¹¹。然而，包括亚中尺度涡旋和非线性内波在内的这些过程所涉及的动力学与能量，从未从全球视角被观测到。这些亚中尺度过程在何时、何地、以何种程度影响大尺度海洋环流和气候系统？本文展示的近期发射的表面水与海洋地形（SWOT）卫星¹²数据不仅证实了亚中尺度涡旋和波浪的特征，还表明它们对海洋能量学、海洋生态系统、大气天气及地球气候系统的潜在影响远超预期。SWOT开启了全球海洋观测的新纪元，将亚中尺度海洋动力学确立为地球气候系统的关键组成部分。

Are you happy with the outcome?

This lecture covers:

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Using an outline

I. Introduction

II. Methodology

III. Results

IV. Summary and discussion

Using an outline (cont' d)

I. Introduction

1.0 Opening paragraph

1.1 Background (pubs)

1.2 Present research

Note: Do not “mix” your own (published) results with other people’s results, which can really upset some reviewers.

Using an outline (cont' d)

I. Introduction

1.0 Opening paragraph

1.1 Background (publications)

1.1.1 Observational background

1.1.2 Theoretical background

1.1.3 Modeling background (pubs)

Using an outline (cont' d)

II. Methodology

2.1 Data

2.1.1 Atmos. data

2.1.2 Air-sea flux data

2.1.3 Ocean data

2.1.3.1 Data used for assimilation

2.1.3.2 Data used for validation

2.2 Models (cont')

Using an outline (cont' d)

II. Methodology

2.1 Data

2.2 Models

2.2.1 Model basics (equations, etc.)

2.2.2 Forcing field

2.2.3 Basin, resolution, and boundary conditions

2.2.4 Initial conditions

2.2.5 Output sampling and averaging

Using an outline (cont' d)

III. Results

3.1 Main run

3.1.1 Mean state

3.1.2 Seasonal variability

3.1.3 Interannual variability

3.2 Sensitivity to winds

3.3 Sensitivity to mixing

...

Using an outline (cont' d)

IV. Summary and discussion

4.1 Summary

4.2 Discussion

4.2.1 Unresolved issues

4.2.2 Future work

Note: Avoid ending a paper with a list of weaknesses of the research.

ChatGPT may (might)

Provide an outline for you.

Again: It is an LLM, has no brain, and needs to be trained!

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How to develop a strong voice?

1. Use active voice;
2. Avoid long sentence;
3. Be precise, clear, forthright, concise, familiar, and fluid

语态：主动与被动

科技文章不会因为语态被拒稿。

我只想举一个极端例子：

Tool #1, tool #2, tool #3, tool #4, tool #5, tool #6,
and tool #7 were/are used in our experiments.

这句话错了吗？

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语态:主动与被动

Tool #1, tool #2, tool #3, tool #4, tool #5, tool #6, and tool #7
were used/are in our experiment.

我一直在等 “动词” (were/are used)!

建议用:

In these experiments, we used/use the following
tools (“好好学习”) : tool #1, tool #2, tool #3, tool
#4, tool #5, tool #6, and tool #7.

有兴趣继续学习语态的童鞋，可以看看：

<https://www.aje.com/en/arc/writing-with-active-or-passive-voice/>

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How to develop a strong voice?

1. Use active voice;
2. Avoid long sentence;
3. Be precise, clear, forthright, concise, familiar, and fluid

主语太长

Scientific assessment of the accounting over carbon in the terrestrial ecosystem in the process land use/land cover changes caused by human activities

will help reduce

the uncertainty in estimating carbon emissions from the terrestrial ecosystem.

<http://engine.scichina.com/publisher/scp/journal/SCES/62/2/10.1007/s11430-017-9221-7?slug=fulltext>

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避免长句子

Aerosol is an important component of the atmosphere, and its source, composition, distribution, and effects are highly complicated. (source: a published abstract)

Try “; and” or better “. Its”

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避免长句子

Governments and scientists have given much attention to aerosol problems, and it has become a hot topic due to the important role it plays in climate change and the Earth's environment. (source: a published abstract)

What is this “it”?

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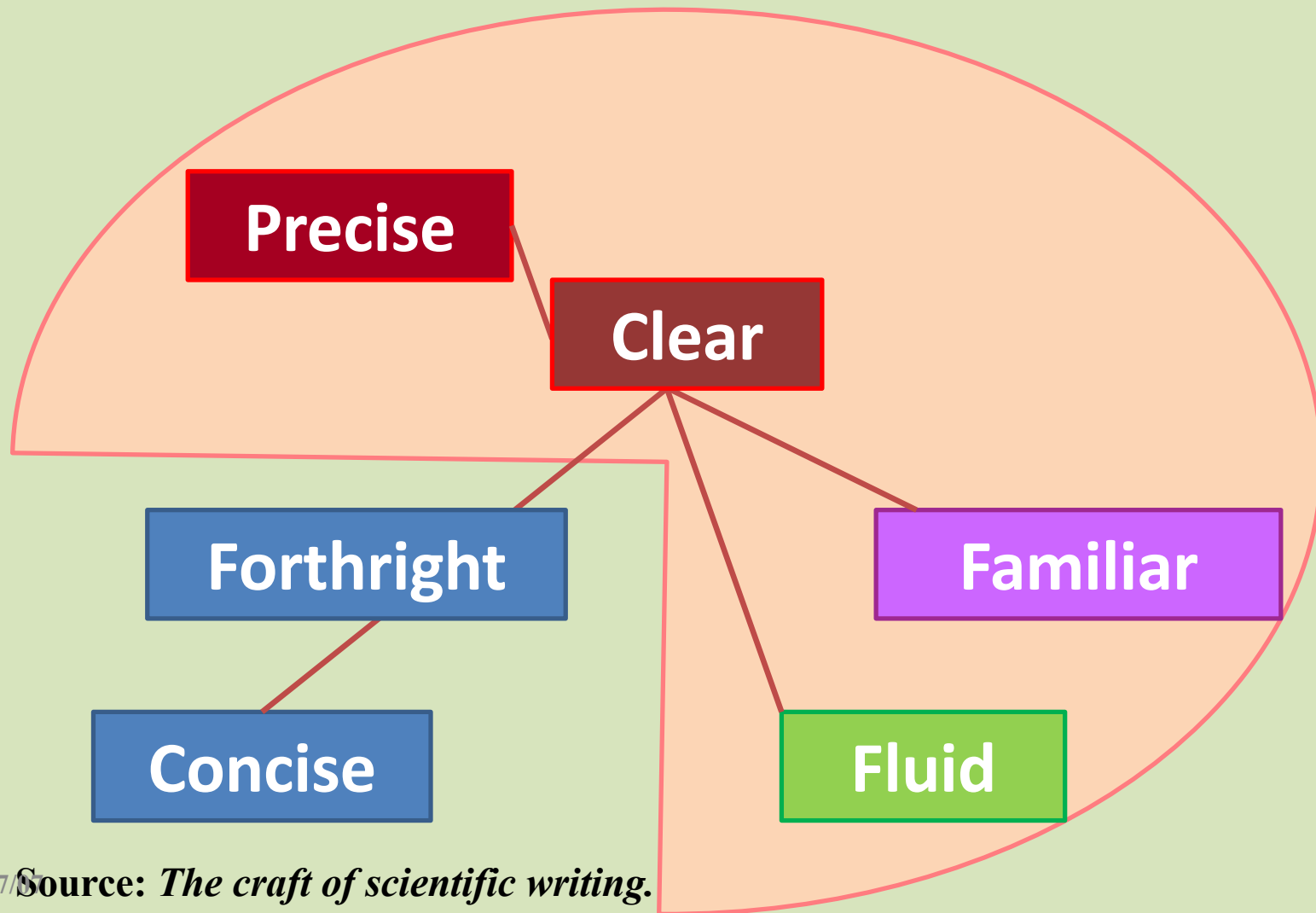
Ask ChatGPT to shorten it:

Again: It is an LLM, has no brain, and
needs to be trained!

How to develop a strong voice?

1. Use active voice;
2. Avoid long sentence;
3. Be precise, clear, forthright, concise, familiar, fluid, familiar, and fluid

Six Goals of Language in Scientific Writing:



Language: Being Precise

Choose the Right Word

affect/effect

farther/further

fewer/less

its/it's

The craft of scientific writing. Michael Alley.

Denotation and connotation of words

A word's connotation is its associated meanings, which may go against its dictionary meaning (denotation).

Examples:

adequate ↔ adequate safety record
(insufficient)

cheap (negative connotation) / inexpensive

simplistic (negative connotation) / simple

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Language: Being Clear

Avoid Needless Complexity:

- 1) Needlessly Complex **Words**
- 2) Needlessly Complex **Phrases**
(avoiding stringing modifiers)
- 3) Needlessly Complex **Sentences**
(avoiding run-on sentences)

In scientific writing,
beauty lies in clarity and simplicity.

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Needlessly Complex Words

Category	Example	Possible Substitute
nouns	familiarization	familiarity
	utilization	use
verbs	facilitate	cause
	utilize	use
adjective	aforementioned	mentioned
	discretized	discrete
adverbs	firstly, secondly	first, second

Hint: Opting for the simpler word choice makes your ideas more clear to your readers.

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Avoiding Ambiguity

1) Ambiguity in Syntax

Example:

During 1990-2000, we used in situ data for our
anomaly maps.

We used in situ data from 1990-2000 for our anomaly
maps.

2) Ambiguity in Pronouns

“it” and “this”

3) Ambiguity in Punctuation

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Avoiding Ambiguity (cont' d)

3) Ambiguity in Punctuation

Example:

We tested neat methanol, neat ethanol, methanol and 10% water and ethanol and 10% water.

We tested four fuels: neat methanol, neat ethanol, methanol with 10% water, and ethanol with 10% water.

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Language: Being Forthright

Avoid the following phrases:

As is well known, ...

The results clearly demonstrate...

It is obvious ...

Our results prove ...

Use instead:

The results show...

Our results support ...

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Avoiding Weak Verb Phrases

In general, the smaller the verb phrase,
the stronger the verb phrase.

is beginning

→ begins

is used to detect

→ detects

made the decision

→ decided

made the measurement of

→ measured

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Language: Being Concise (简洁)

1. Eliminate Redundancies
2. Minimize “Writing Zeroes”
3. Reduce Passive Voices
4. Reduce Sentences to Simplest Forms

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Eliminating Redundancies

A redundancy is a needless repetition of words within a sentence.

(already) **existing**
(alternative) **choices**
at (the) **present** (time)
(completely) **eliminate**
(currently) **underway**
first (began)

introduced (a new)
mix (together)
(most) **critical**
never (before)
(still) **persists**
(very) **unique**

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Minimizing “Writing Zeroes”

It is interesting to note that ...

It should be pointed out that ...

It is noteworthy that ...

Use: Note that ...

Simplifying Phrases

Fat Phrase

has the ability to

in light of the fact that

in the event that

in the vicinity of

owing to the fact that

Reduction

can

because

if

near

because

Reducing Adjectives and Adverbs

detailed **understanding** of ...

somewhat **unique**

somewhat **perfect**

very **important**

very **heavily** depending on ...

Note: Avoid adverbs “always” and “never.”

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Language: Being Familiar

1. Avoid Unfamiliar Terms

2. Define Unfamiliar Terms

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Language: Being Fluid

1. Vary Sentence Rhythm
2. Vary Sentence Lengths
3. Vary Sentence Structure
4. Vary Paragraph Lengths

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Eliminating Discontinuities

1) Make Transitions Between Ideas by Using Transitional Words.

Continuation: also, moreover, first...second...

Pause: for instance, for example, in other words

Reversal: however, on the other hand, conversely, nevertheless

2) Avoid gaps in logic.

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Revising, revising, revising...

You may feel bored.

You may feel you are wasting time.

Note: Revising is the key to
strong scientific writing.

How to revise:

- You need to obtain some distance from the current version.

(Go for a long walk, put it down for a few days...)

- You have to become a good reader, if you want to become a successful reviser.
- You should solicit criticism of your writing.

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Remember, you can always ask ChatGPT:

Can you improve this sentence?

Can you improve this paragraph?

Make sure its "improved text" does not sound like a commercial.

How to contact me

- Email: zuojun_scs@yahoo.com
- WeChat: not recommended
- My Blog at 科学网:
<http://blog.sciencenet.cn/u/zuojun>