

# Using Artificial Intelligence to Support Academic Research

# Glue pizza and eat rocks: Google AI search errors go viral

24 May 2024

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# A Five-Part Prompt Brief



## Task

What should the AI do?



## Context

What situation or information matters?



## Audience

Who will use or read the result?



## Constraints

What boundaries, requirements, or limits apply?



## Output

What format should the response take?



Use this framework consistently across every professional AI task.



# Weak Prompt → Structured Prompt

## ✗ Weak Prompt

"Write an email about our new policy."

→ Generic output. No audience. No tone. No format.  
Heavy correction required.

## ✓ Structured Prompt

### Task

Draft an employee announcement

### Context

New hybrid-work policy begins November 1

### Audience

All employees, mixed seniority

### Constraints

Professional tone, concise, explain what changes and where to direct questions

### Output

150-word email with subject line

# Better Prompt $\neq$ Factually Correct Output

Specification improves relevance and format; it does not verify truth.





Research is **not**  
collecting supporting  
links.

It is interpreting  
patterns across  
evidence.

# Use AI. Verify AI. Own the Research.

AI can assist the work, but you still own the research. This framework answers most responsible-use questions:

**Explore → Verify → Own the Decision.**

- ❏ If you cannot explain, verify, or defend it, it is not ready to become part of your research.



# Where Should AI Help in the Research Process?

AI is a research assistant, not the principal investigator. The researcher defines the question, evaluates sources, and owns every claim.

| Stage             | AI Can Assist                                         | Researcher Owns                       |
|-------------------|-------------------------------------------------------|---------------------------------------|
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# A Practical AI Workflow for Literature Reviews

## Search

Ask for keywords, concepts,  
and candidate papers

## Open

Go to the actual article, library  
record, or DOI

## Read

Read abstract and relevant  
sections yourself

## Verify

Confirm authors, year, journal, methods, findings,  
page

## Synthesize

Use AI to compare only the sources you verified

### ✓ Good Use

"Find candidate peer-reviewed papers on X. Give me  
DOIs and tell me what I must verify."

### ✗ Bad Shortcut

"Give me 10 perfect sources and citations." Then cite  
them without opening the originals.



# Two Credible Sources Can Disagree

## EVIDENCE A

### Higher sugar intake can be associated with poorer health outcomes

A 2023 BMJ umbrella review covering 73 meta-analyses and 83 health outcomes found that higher dietary sugar consumption—particularly sugar-sweetened beverages—was associated with numerous adverse outcomes. For example:

- each additional 250 mL/day of sugar-sweetened beverages was associated with a **17% higher risk of coronary heart disease**;
- another pooled analysis found each additional serving/day of sugar-sweetened beverages associated with a **27% higher risk of type 2 diabetes**.
- Importantly, the authors noted that much of the evidence was low or very-low quality and that results varied by type of sugar and outcome.

## EVIDENCE B

### Sugar itself does not always produce the expected harm under controlled conditions

A systematic review and meta-analysis of controlled feeding trials published in *Annals of Internal Medicine* found that when **fructose replaced other carbohydrates without increasing total calories**, it did **not significantly increase body weight**.

But when fructose was added on top of the normal diet and therefore increased total calories, body weight increased.

The authors concluded that the weight gain observed in the high-calorie trials might be attributable to the **extra energy**, rather than fructose alone.

# How Do I Know Whether an AI Answer Is Reliable?



Verification Intensity Should Rise with Consequence

Statistics, quotations, named studies, laws, policies, and claims affecting people require independent verification. The higher the stakes, the more rigor you must apply.

# Human-Subject Data: AI Should Flag, Not Convict

**Example: AI flags a survey response as "duplicate" or "fabricated." That signal requires human review as it is not proof.**

## AI Flag

## Signal for review not a verdict

## Human Check

## Inspect timestamps, patterns, metadata, and protocol

## Document

**Record why the case was retained or excluded**

## Recourse

## Protect legitimate participants from automated harm



# Is AI a Tool or a Co-Author?

## Make the Contribution Visible.

The practical question is not *"Did AI type words?"* it is "Who made the intellectual contribution and accepts responsibility?"

### Tool-Like Use

Grammar, formatting, brainstorming, outline options, critique, coding assistance

Still your responsibility.

### High-Disclosure Use

Drafting substantive text, summarizing sources, generating analysis plans, coding/interpretation suggestions

Verify sources, defend methods, interpret findings, and disclose as required.

 Keep an AI use log: tool + task + prompt/purpose + what you accepted or rejected + how you verified it.

# Before Uploading Research Data, Run the Privacy Gate

01

---

**Is it identifiable?**

**Names, emails, IDs, free-text details,  
small groups**

02

---

**Is it sensitive?**

**Health, employment, education,  
finances, protected data**

03

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**Is this tool approved?**

**Institutional policy and data-  
processing terms matter**

04

---

**Can I minimize it?**

**Remove fields, de-identify, aggregate, or use synthetic data**

05

---

**Do I actually need to upload it?**

**if not keep it out of the model entirely**

# Grammar Help Is Not the Same as Research Thinking

## Lower Risk

Spelling, punctuation, grammar, sentence clarity, formatting

## More Judgment

Word replacement, tone changes, paraphrasing, reorganizing argument

## Higher Risk

New factual claims, new citations, interpretation, conclusions, "write my literature review"

Tools like Grammarly can improve language. They cannot supply evidence, judgment, or ownership.

# Use AI to Strengthen Thinking Not Bypass It

## The Habit to Avoid

"Give me the answer." → Copy → paste → submit.

Ask AI to Challenge You

1. Ask AI to generate a question based on the course materials.  
2. Answer the question.  
3. Ask AI to challenge your answer by asking for evidence or reasoning.  
4. Defend your answer or revise it based on the challenge.

## Better Pattern

Think → ask → challenge → verify → decide

Make AI your intellectual sparring partner.



**Best study prompt: "Use only these course materials. Quiz me one question at a time. Don't reveal the answer until I respond."**

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## Ask AI to Challenge You

- Give me 3 competing explanations
- What assumptions am I making?
- What evidence would weaken my argument?
- What stakeholder perspective is missing?
- Which claims require independent verification?



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# Before You Use AI in Research, Ask Five Questions

1

What task am I delegating?

2

What data am I exposing?

3

What claims must I verify?

4

What judgment must remain mine?

5

What do I need to disclose?

## Use AI. Verify AI. Own the Research.

# Blind Evaluation: A Professional Habit

## 1. PROMPT

Choose one realistic professional task.  
Write one clear prompt and enter it in **Arena.ai**.

## 2. BLIND COMPARE

Do not reveal the model names.  
Compare Output A and Output B using:  
**Accuracy • Evidence • Relevance • Completeness • Professional Usefulness • Risk / Limitations**  
Choose: **A • B • MIXED**

## 3. REVEAL

Vote and reveal the model identities.  
Discuss:  
**Did knowing the model names change your judgment?**

## 4. VERIFY

Select one factual claim from either response.  
Check it using an appropriate external source.  
**Claim → Source → Supported / Qualified / Unsupported**

## 5. IMPROVE

- Identify:
- one element to keep from A;
  - one element to keep from B;
  - one weakness to correct or remove.

## 6. SHARE

Briefly report:  
**Task → Judgment → Surprise → Verification → Improvement**