Paper Writing Tips, Tricks, and Guidelines

# Abstract

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| **Section** | **Purpose** |
| 1. Broad Background (1 sentence) | Establish context; name system, problem, or field. |
| 2. Narrower Focus (1–3 sentences) | Identify key organisms/processes; state knowledge gap/question. |
| 3. Hypothesis or Objective (1 line) | State the specific hypothesis or aim. |
| 4. Methods Overview (1 sentence) | Briefly describe what was done. |
| 5. Key Results (3-5 sentences) | Present primary findings clearly and concisely. |
| 6. Interpretation (1-2 sentences) | Explain what the results mean in the context of the hypothesis. |
| 7. Broader Implications (1 sentence) | State why this matters—ecologically, evolutionarily, or socially. |

# Background

# Methods

# Results

# Discussion

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| **Section** | **Purpose** |
| 1. Opening Statement of Findings  (1–2 sentences) | Reaffirm the most important results in plain terms to ground the discussion. |
| 2. Link to Prior Work & Hypothesis  (1–2 sentences) | Connect your findings to earlier literature and revisit your original hypothesis. |
| 3. Hypothesis Evaluation  (1–3 sentences) | State whether the hypothesis was supported, refuted, or nuanced. |
| 4. Complex or Conditional Results  (2–4 sentences) | Discuss patterns, variation, or context-specific effects in the data. |
| 5. Mechanistic/Contextual Interpretation  (1–3 sentences) | Explain biological, ecological, or theoretical mechanisms behind your results. |
| 6. Control-Based Clarification  (1–2 sentences) | Use controls to rule out alternative explanations. |
| 7. Broader Implications  (2–3 sentences) | Expand on how this affects community dynamics, natural systems, or applications. |
| 8. Speculative Extensions  (Optional, 1–2 sentences) | Offer logical speculation or future research directions. |
| 9. Caveats and Limitations  (1–2 sentences) | Acknowledge study constraints or unresolved uncertainties. |
| 10. Concluding Synthesis  (1 sentence) | End with a strong, unifying insight that reframes your findings. |

## 1. Opening Summary of Key Findings

**Purpose:** Restate your central result(s) as clearly and specifically as possible.

**Prompt:** What did you find, broadly, and why does it matter?  
**Example starter:**

* “Across [X groups/samples], we found that…”
* “Our results demonstrate a strong association between…”
* “This supports prior suggestions that…”

## 2. Link to Prior Work and Hypothesis Framing

**Purpose:** Position your work within existing knowledge and explain the rationale behind your hypothesis.

**Prompt:** How does this build on or challenge earlier findings?  
**Example starter:**

* “Previous studies suggested that…”
* “We hypothesized that…”
* “This pattern led us to test whether…”

## 3. Evaluate Whether Your Hypothesis Was Supported

**Purpose:** Address your hypothesis directly—confirm, complicate, or refute it.

**Prompt:** Was your hypothesis supported or not? What does the data say?  
**Example starter:**

* “We found no support for the hypothesis that…”
* “Our results partially supported…”
* “Contrary to our expectations…”

## 4. Interpret Complex or Nuanced Results

**Purpose:** Unpack variation or patterns in the results, even if they weren’t your primary focus.

**Prompt:** Were there strain-level, context-dependent, or temporal differences?  
**Example starter:**

* “Interestingly, we observed that…”
* “Variation across replicates suggests…”
* “This may indicate that…”

## 5. Mechanistic or Contextual Explanation

**Purpose:** Explore the biological, ecological, or theoretical mechanism behind the patterns.

**Prompt:** What processes could explain your observations?  
**Example starter:**

* “This may be due to…”
* “One explanation is that…”
* “Under conditions of [X], bacteria may…”

## 6. Clarify What the Data *Do Not* Show

**Purpose:** Use controls to rule out alternative interpretations. Strengthen your argument.

**Prompt:** What did you control for, and what does that tell you?  
**Example starter:**

* “By [using X control], we showed that…”
* “This suggests the effect was not due to…”
* “Hence, [factor] can be ruled out as the primary driver…”

## 7. Broader Ecological or Evolutionary Implications

**Purpose:** Expand from your results to their importance in the natural world.

**Prompt:** What are the implications for ecology, evolution, or applied systems?  
**Example starter:**

* “This finding implies that…”
* “These results may help explain…”
* “Our data suggest that [organism/trait] plays a role in…”

## 8. Speculative but Grounded Extensions

**Purpose:** Suggest future directions or possible roles your finding might play in broader contexts.

**Prompt:** What logical next questions emerge? What could this mean elsewhere?  
**Example starter:**

* “We speculate that…”
* “Future work could explore whether…”
* “This raises the possibility that…”

## 9. Caveats and Limitations

**Purpose:** Demonstrate rigor by acknowledging what your study could not address.

**Prompt:** What temporal, spatial, or methodological limits were present?  
**Example starter:**

* “One limitation of this study was…”
* “Our experiment was constrained by…”
* “We cannot rule out the possibility that…”

## 10. Final Synthesis and Reframing

**Purpose:** Re-emphasize your key message, reframed in light of all discussion above.

**Prompt:** What can the reader take away? What idea will resonate?  
**Example starter:**

* “In conclusion, our findings show that…”
* “Thus, the ability to [do X] may provide a competitive advantage in…”
* “Understanding this interaction is key to…”

## Optional Appendix: Table of Phrases for Transitions

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| Function | Example Phrases |
| Contrast | However, Nevertheless, In contrast, On the other hand |
| Causality | This suggests, May be due to, Could result from |
| Emphasis | Importantly, Notably, Significantly, Interestingly |
| Speculation | It is possible that, We speculate, This raises the question, May contribute to |
| Limitation | One constraint was, It is unclear whether, A potential caveat is |
| Synthesis | Taken together, These results highlight, In conclusion, Therefore we propose that |

**Author’s note:** I used a combination of my own synthesis and ChatGPT to help create this document.