

Strategies for English Expression of Biological Experiment Data Results: From "Objective Presentation" to "Logical Argumentation": A Linguistic Transition

Yunsheng Chen

School of Foreign Languages, Guilin University of Technology, Guilin, Guangxi, 541006, China

ABSTRACT

This paper explores the strategies and transition mechanisms for expressing biological experiment data results in English, focusing on the linguistic transition process from objective presentation to logical argumentation. By studying the expression norms of top international journals and integrating interdisciplinary perspectives from linguistics and biology, this paper systematically proposes the basic principles, strategy systems, and practical methods for English expression of biological experiment data. The research shows that effective English expression requires not only "linguistic accuracy" and "logical rigor" but also adherence to the principles of "academic norms" and "cross-cultural communication." Addressing common issues faced by Chinese scholars in academic writing, this paper presents a structured expression framework, terminology optimization strategies, and methods for integrating data visualization, providing theoretical guidance and practical references to enhance the international academic communication capabilities of Chinese biologists.

KEYWORDS

Biological experiment data; English expression; Logical argumentation; Academic writing; Cross-cultural communication; Science communication

1 Introduction

In the context of increasingly frequent international academic exchanges, proficient ability in expressing biological experiment data in English has become a core competency for Chinese researchers. It not only affects the efficiency of disseminating research results but also directly influences the establishment of academic discourse power. However, studies indicate that Chinese scholars commonly face expression barriers such as "logical discontinuity" and "terminology redundancy" in presenting their findings, which severely hinder international peers' recognition and understanding of their important research achievements. Essentially, this expression process is far more than simple language translation; it involves in-depth transformation of thinking patterns and adaptation to academic culture, aiming to convert raw data into persuasive scientific arguments. Targeting the prominent challenges faced by Chinese scholars due to differences in Chinese-English thinking and academic norms—especially the key issue of "separation between data interpretation and conclusions"—this paper, from an interdisciplinary perspective of linguistics and biology, aims to systematically analyze the characteristics, principles, and strategies of such expression, providing practical writing guidance for Chinese biologists to effectively integrate Chinese research results into the international academic arena.

2 Characteristics and principles of English expression of biological experiment data

English expression of biological experiment data manifests in two basic forms: objective presentation and logical argumentation. The former focuses on accurate, factual description of experimental data and observation results, while the latter emphasizes explaining relationships between data and verifying scientific hypotheses to enhance the persuasiveness of reasoning. Effective writing requires a balance between the two to avoid dullness or weakened credibility. Therefore, the expression process must adhere to three principles: linguistic accuracy, logical rigor, and academic normativity. It should ensure precise terminology and standardized sentence structures to avoid interdisciplinary misuse; organize content using a "general-specific-general" structure, clarify core points with topic sentences, expand arguments hierarchically based on evidence, and finally summarize, constructing clear cognitive paths with signal words to meet the requirements of international review and academic dissemination.

3 Transition mechanisms from objective presentation to logical argumentation

3.1 Hierarchical transition between data description and argumentation

The transition from objective presentation to logical argumentation involves three levels: data description, logical connection, and argumentation depth. The data description level focuses on accurately reporting experimental results; the logical connection level emphasizes establishing relationships between data; and the argumentation depth level aims

to integrate experimental results with theoretical frameworks and previous studies.

At the data description level, researchers need to accurately report experimental data and observation results, typically using objective and neutral language. For example: "The treatment group showed a 40% reduction in tumor size compared to the control group." This level of expression focuses on facts themselves, avoiding excessive interpretation and inference. At the logical connection level, researchers need to establish associations between data and reveal the scientific significance behind them. For example: "The 40% reduction in tumor size ($p < 0.01$) indicates that the treatment has a statistically significant therapeutic effect." This level transitions from objective facts to scientific inferences, building a logical bridge between data and conclusions through statistical indicators and reasoning vocabulary. At the argumentation depth level, researchers need to integrate experimental results into a broader scientific context, engage in dialogue with previous studies, or propose theoretical innovations. For example: "Consistent with previous findings by Smith et al. (2020), our results further confirm the antitumor mechanism of X compound. The 40% reduction in tumor size observed in our study suggests that..." This level of expression not only reports findings but also clarifies their position and value in the scientific knowledge system.

3.2 Logical functions of tense usage

Tense usage plays a crucial role in the transition from objective presentation to logical argumentation. The MIT Academic Writing Workshop emphasizes that describing experimental results should adhere to the principle of "past tense as the foundation, present tense for emphasis." This principle helps distinguish specific experimental findings from universal scientific truths.

Specific experimental operations and observation results should use the past tense, as they are actions that occurred in a specific experimental context. For example: "The samples were incubated for 24h, during which a 12% increase in enzyme activity was observed." These descriptions refer to completed experimental actions and observed data with specific time attributes. In contrast, interpretations, inferences, and theoretical summaries of experimental results should use the present tense, as these scientific truths are universal and enduring. For example: "The data demonstrate that this novel mechanism plays a crucial role in cellular metabolism." This distinction in tenses helps readers clarify which are experiment-specific results and which are universal scientific laws.

4 Strategy system for English expression of biological experiment data

4.1 Structured expression framework

Constructing an effective structured expression framework is key to realizing the transition from objective presentation to logical argumentation. The "three-dimensional training model" developed by VIPKID has proven effective, encompassing linguistic, thinking, and cultural dimensions. This model helps researchers systematically improve their academic English expression abilities.

At the linguistic dimension, parallel comparative translation of SCI papers strengthens terminology sensitivity and sentence diversity. The Harvard Academic Writing Guide recommends flexibly using participial structures and inverted sentences to enhance expressiveness while maintaining basic subject-verb-object structures. For example: "Depicted in Figure 3A is the dose-dependent response..." has more academic texture than the plain "Figure 3A shows...". Studies indicate that mastering 8 sentence variants can increase paper acceptance rates by 23%.

At the thinking dimension, the "result reverse deduction method" is used to cultivate logical reasoning abilities, helping researchers establish a thinking chain of hypothesis-evidence-conclusion. Addressing the tendency of Chinese to prefer induction and English to emphasize deduction, the "pyramid writing method" is designed: first present core conclusions, then expand evidence hierarchically. This adjustment in thinking is particularly important for Chinese scholars, as differences between Chinese and English thinking patterns often lead to insufficiently direct argumentation logic.

At the cultural dimension, rhetorical strategies in top journal papers are analyzed, such as euphemistic expressions like "It bears noting that...". Academic writing requires not only logical rigor but also adherence to the politeness principles and dialogue traditions of academic communities. By learning and imitating rhetorical strategies in international top journals, Chinese scholars can better integrate into the international academic communication system.

4.2 Terminology and sentence optimization strategies

Optimizing terminology and sentences is crucial for improving the quality of English expression of biological experiment data. Accurate translation of professional terminology is a basic skill in academic writing. For innovative concepts, the coinage method "coined as..." is recommended, such as "This novel phenomenon was termed 'X effect' to

describe...".

In terms of sentence optimization, the following points should be noted: first, avoid excessive use of vague qualifiers such as "somewhat increased" and "possibly related" that weaken verification strength; second, distinguish the semantic boundaries between "validation" and "confirmation"—the former emphasizes systematic proof, while the latter refers only to single-point verification; third, standardize the expression of statistical verification, correctly using statistical indicators such as " $p < 0.05$ " and avoiding imprecise expressions like "significant difference".

The following are examples of common terminology misuse and corrections in English expression of biological experiment data:

Misuse: There was a big difference between the two groups.

Correction: A statistically significant difference ($p < 0.05$) was observed between the two groups.

4.3 Integration of data visualization and expression

Data visualization expression is an important component of English expression of biological experiments. Chart descriptions should follow the progressive principle of "overall-local-trend". The Cambridge University Research Training Manual notes that excellent papers use an average of 3.7 compound sentences to interpret charts, which not only convey overall characteristics but also highlight key data points. Effective chart descriptions should include three levels: first, describe overall patterns and trends; second, highlight key data and outliers; third, provide statistical annotations and theoretical explanations. For example: "As illustrated in Fig.2, the upward trajectory of Group A ($p < 0.01$) contrasts sharply with the plateau observed in Group B under identical conditions. This divergence suggests that...". Such multi-level descriptions integrate charts with text, enhancing the persuasiveness of arguments.

Standard use of statistical language is crucial. Statistics from the Stanford University Office of Academic Integrity show that 42% of paper revisions result from imprecise statistical descriptions. It is recommended to use the standard format "reached statistical significance ($F(2, 34) = 5.67, p = 0.008$)" and avoid colloquial expressions like "went up". Standard statistical descriptions not only reflect academic rigor but also ensure research reproducibility.

4.4 Adherence to academic norms and ethics

English expression of biological experiment data must also strictly adhere to academic norms and ethical guidelines. Literature citation should construct a knowledge coordinate system. The Chicago Manual of Style notes that citations in the results section should focus on methodological inheritance, such as "Following the protocol established by Smith et al. (2021)". Appropriate citation of previous methods can increase the credibility of innovative expressions by 40%. It should be noted that citations should avoid abuse in the form of "Cite as proof". Citing literature is not about simply 堆砌 authoritative views but establishing academic inheritance and dialogue. Effective citations should accurately identify specific contributions of previous work and clarify differences and innovations between current research and previous studies.

In addition, academic writing must avoid academic misconduct such as plagiarism, data falsification, and duplicate submission. The Journal of Experimental Biology explicitly requires manuscript repetition rates to be controlled within 10%. Papers must ensure originality; overly published or cited articles will not be published or indexed. Duplicate submission is prohibited, and plagiarized or mechanically written manuscripts are rejected. These academic norms are fundamental principles of international academic communication and must be strictly followed.

5 Applications and challenges from an interdisciplinary perspective

From a linguistic perspective, code-switching theory and rhetorical structure theory provide key insights into English expression of biological experiment data. Code-switching research indicates that similarities between Chinese and English phonetics affect switching costs, suggesting attention to the phonetic characteristics of terminology to avoid misunderstandings. Rhetorical structure theory reveals fundamental differences between Chinese and English academic writing—Chinese tends to use inductive argumentation, while English emphasizes deductive logic. This difference requires Chinese scholars to consciously adjust their argumentation structures, such as adopting the "pyramid writing method" to clarify core viewpoints first. Furthermore, research on the impact of audio-visual cues on language switching suggests that integrating multimodal resources (e.g., chart analysis, oral reports) into teaching can effectively improve scholars' comprehensive academic communication abilities.

Differences between Chinese-English bilingual thinking pose specific expression challenges, manifested in asymmetric language switching costs under different perceptual conditions and negative transfer phenomena caused by Chinese thinking habits, such as excessive nominalization, avoidance of passive voice, and lack of conjunctions. To overcome these

obstacles, researchers can systematically adopt four strategies: continuously studying top journal papers to enhance professional language sense; participating in specialized scientific English writing training; actively seeking feedback and revisions from peers and experts; and using corpus tools to quantitatively learn common expressions and sentence structures in high-quality papers, thereby gradually developing discipline-specific writing abilities that conform to international norms.

6 Conclusions and prospects

This paper systematically studies the strategies and transition mechanisms for English expression of biological experiment data results, proposing a linguistic transition path from objective presentation to logical argumentation. Research shows that effective English expression requires comprehensive use of linguistic, logical, and rhetorical strategies, adherence to international academic norms, and adaptation to cross-cultural communication needs.

Future research can further explore the following directions: first, developing AI-assisted personalized writing guidance systems to provide real-time language feedback and revision suggestions; second, establishing interdisciplinary academic discourse systems to promote effective communication in interdisciplinary integration; third, in-depth study of the cognitive processes of bilinguals in scientific writing to reveal the neural mechanisms of language switching; fourth, expanding cross-cultural rhetorical research to explore the establishment of diversified academic communication paradigms. Only by unifying linguistic precision, logical rigor, and cultural appropriateness can true dialogue between Chinese wisdom and global academia be achieved. With the continuous improvement of China's scientific research strength and deepening international exchanges, research on English expression of biological experiment data will become an important bridge connecting Chinese science with global science, making positive contributions to the innovative development of the human knowledge system.

References

- [1] Wei Shiting. A Study on the Relationship between Phonetic Similarity and Code-Switching Costs [D]. Ningbo University, 2017.
- [2] VIPKID Teaching and Research Team. How to Describe the Verification of Experimental Results in English [J]. Youzi Youliao, 2025.
- [3] Ji Jiangye. The Impact of Audio-Visual Cues on Language Switching in Chinese-English Bilinguals [D]. Hebei University, 2014.