

前 言

在党的二十大报告中，习近平总书记首次将“实施科教兴国战略，强化现代化建设人才支撑”作为一个单独部分论述，充分体现了教育的基础性、战略性地位和作用。习总书记强调，我们要“全面提高人才自主培养质量，着力造就拔尖创新人才，聚天下英才而用之”。处于高等教育金字塔顶端的研究生教育在“加快建设教育强国、科技强国、人才强国”过程中发挥着重要作用。

外语素质和能力，尤其是用外语获得资料、提取信息并进行科研的能力，对于研究生的培养具有不可替代的重要作用（北京市高等教育学会研究生英语教学研究会，2020）。熟练阅读英文学术论文，掌握相关领域的最新科技发展动向和学术前沿信息，并对所阅读信息进行恰当的分析评判是研究生开展学术研究的第一步。为了帮助研究生获得这一能力，我们编写了本教材。

本教材是清华大学研究生学术英语系列教材中的第二部。教材的编写秉承“真实语料驱动”“产出导向”“任务驱动”和“体验式教学”等教学理念，致力于提高学生的英语论文阅读能力，兼具培养学生科学的质疑精神和批判性思维能力。

教材选取高质量的学术论文作为阅读材料，设计贴近学术生活的阅读任务，驱动学生以积极探究的态度走进英语学术阅读，并促使他们全面总结和客观评价所阅读的文献。全书共设十个单元，各单元内容又细分为三大板块：阅读技巧与策略（Reading Skills and Strategies）、学术论文精读（Intensive Reading）、学术论文扩展阅读（Further Reading）。教材特色具体如下：

1. 选材反映世界最新的科技发展和学术前沿，时效性强。本教材阅读选材涵盖了重要学科的专业知识，文理兼顾，具体包括自动驾驶、公共卫生、批判性思维、艺术教育、语言学习、环境科学、学术写作、心理学、碳经济和人工智能等领域。学术论文精读部分的选文保留了原论文的文献著录格式，使学生可以原汁原味阅读某一学科领域的论文。另外，文末提供了常用学术词汇表，选词标准参考《非英语专业学位研究生英语教学大纲》和 Academic Word List (Coxhead, 2000)，助力学生积累常用学术词汇，提升阅读能力与素养。学术论文扩展阅读部分选择了相应领域的综述类文章，使学生可以通过阅读该类文章体会如何全面、系统地总结和评价相关领域的研究。因篇幅有限，精读部分文末参考文献列表和扩展阅读部分的正文，学生可以通过扫描相应的二维码获得。

2. 阅读技巧与策略兼顾宏观与微观，实用性强。本教材系统讲解了与学术英语阅读密切相关的技巧和策略，既包括整体阅读策略，如三步阅读法、顺序阅读法、批判性阅读，又涉及如何利用文章细节阅读，如利用文章关键引导词阅读、通过转述动词判断作者态度。阅读技巧与策略部分还介绍了如何阅读常见的期刊论文文体，如研究论文、理论性论文、综述论文、回应论文。考虑到学生在阅读文献后常常需要对文献进行综述，教材的最后两个单元将阅读技巧与策略延伸到文献综述撰写层面，讲解如何总结并撰写有注解的参考文献、如何撰写研究论文的文献综述部分，从而达到以读促写的目的，为他们撰写学术论文打好基础。

3. 练习设计遵循学用一体原则，针对性强。每单元后的练习设计具有精准性、渐进性与多样性（文秋芳，2017），既有考查文章细节的阅读理解题，又有训练和提高学生批判性思维的开放性讨论题。通过设计与本单元阅读技巧与策略相关的练习，本教材有意识地引导学生主动将相关阅读技巧与策略应用到论文阅读中，让他们学以致用；同时，循序渐进地布置与文献综述写作相关的产出任务，如转述文中的重要观点、为论文列提纲、撰写论文总结等，驱动学生以积极探究的态度进行学术英语阅读。

本教材适用于非英语专业的硕士和博士研究生、本科高年级学生及科技和人文学科的教师和学者。教材配备练习参考答案和 PPT 课件，方便教师和学生使用，下载地址为 www.tsinghuaelt.com。

本教材由田园编写第 5 单元和第 8 单元；张英编写第 4 单元和第 6 单元；董焱宁编写第 3 单元和第 7 单元；付林编写第 1 单元和第 9 单元；李秀立编写第 2 单元和第 10 单元。全书的统稿工作由田园负责。

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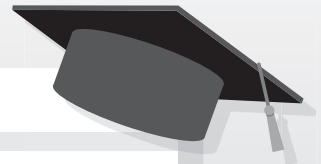
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Unit 1

Autonomous Driving



Learning Objectives

- Summarize the three passes for reading a paper;
- Explain the three Cs in the first and second pass reading;
- Compare the differences between three-pass reading and sequential reading;
- Apply effective strategies for reading a paper.



Part 1 Reading Skills and Strategies

Reading a Research Paper

1. Introduction to Three-Pass Reading Method

When you want to keep current in your research field or do a literature survey of a new topic, you have to read a lot of research papers. Learning to read a paper efficiently is a critical skill. The three-pass reading method (Keshav, 2007) is a practical and efficient approach for reading research papers. The key idea is that, instead of reading a paper from the beginning to the end, you read the paper in up to three passes. Each pass achieves specific goals and builds upon the previous pass: using the first pass to get a general idea about the paper; using the second pass to grasp the paper's main content but not its details; using the third pass to help you understand the paper in depth.

1) The first pass

In the first pass, you quickly scan through the paper to get an overview of it. For example:

- ✓ Read the title, authors, abstract, and keywords;
- ✓ Read the section and sub-section headings, but ignore everything else;
- ✓ Read the conclusions.

This pass should take five to ten minutes. At the end of the first pass, you should be able to answer the following three Cs:

- ✓ Category: What type of paper is this? A review or an original research article? An experimental, theoretical, or numerical study? A description of a new theory/method or an application of existing theories/methods?
- ✓ Context: What is the research problem? Why is the problem important? How is the research problem addressed? What are the findings and conclusions?
- ✓ Contributions: What are the paper's main contributions? Are they significant?

After doing the first pass and answering the above questions, you may decide not to read further. This could be because the paper does not interest you, or the ideas are too vague to comprehend, or its contributions are insignificant. Incidentally, when you write a paper, you

can expect that most reviewers and readers will make only one pass over it. Therefore, you have to choose a good title with coherent section and sub-section headings, write concise and comprehensive abstracts, and draw proper conclusions. If a reviewer cannot understand the gist after one pass, the paper will likely be rejected; if a reader cannot understand the highlights of the paper after one pass, the paper will likely never be read again.

2) The second pass

In the second pass, read the paper with greater care to grasp the main content, but ignore details such as proofs, implementations, and complex equations. You can do the following:

- ✓ Read the first sentence of each paragraph;
- ✓ Read carefully about any part that really interests you, e.g., the introduction section;
- ✓ Look carefully at the figures, diagrams, and tables;
- ✓ Glance over the references, tick off the ones that you have already read, and mark relevant unread references for further reading (this is a good way to learn more about the background of the research).

You may spend up to an hour on the second pass. At the end of the second pass, you should be able to answer the following three Cs:

- ✓ Correctness: Which previous studies is this study based on? Which theoretical bases are used to analyze the problem? Do the assumptions appear to be valid? Are the conclusions well supported by the data evidence?
- ✓ Creativity: How creative and original are the presented ideas or implementations? Is your mind refreshed or influenced by this paper?
- ✓ Clarity: Is the paper well written?

You should be able to explain the main thrust of the paper with supporting evidence to someone else. Sometimes you cannot comprehend a paper even after the second pass. This may be because the topic is new to you, or some proofs or experimental techniques are unfamiliar, or the paper is poorly written with unclear ideas and numerous forward references. You can now choose to: (1) put the paper aside and hope you do not need to understand the material to be successful in your career; (2) return to the paper later, perhaps after reading background materials; or (3) persevere and go on to the third pass.

3) The third pass

To fully understand a paper requires a third pass. The key to the third pass is to virtually reimplement the paper, that is, making the same assumptions as the authors and recreating the work. By comparing this recreation with the actual paper, you can easily identify not only a paper's innovations but also its hidden assumptions and failings.

The third pass requires great attention to detail. You should:

- ✓ Read through the paper as many times as needed;
- ✓ Identify and challenge every assumption in every statement;
- ✓ Reconstruct the current research;
- ✓ Identify hidden assumptions and failings;
- ✓ Think about how you would present a particular idea;
- ✓ Add excellent research techniques or writings in the paper to your repertoire of tools and jot down ideas for future work.

The third pass may take several hours to complete. At the end of this pass, you should be able to reconstruct the entire structure of the paper from memory as well as identify its strong and weak points. In particular, you should be able to pinpoint implicit assumptions, missing citations to relevant works, and potential issues with experimental or analytical techniques.

Do a literature survey in a field that interests you to test your three-pass reading skills.

- ✓ Use an academic search engine and some well-chosen keywords to find three to five recent or highly cited papers in the area.
- ✓ Do first-pass reading on each paper to get a sense of the work and then pick two to three excellent papers for further reading.
- ✓ Read the introduction section of the selected papers to get a thumbnail summary of the recent work, and perhaps, if you are lucky, a pointer to a recent survey paper. If you can find such a survey, read the survey paper and you will get a good overview as well as the important papers of the entire field.
- ✓ Read the bibliographies of the selected papers and find shared citations and repeated author names. These are the key papers and research in that area. Download the key papers and then go to the websites of the key researchers to see what they have published recently and where they have published them. That will help you identify the current trends and top journals in that field.
- ✓ After gathering sufficient relevant papers, do three-pass reading on these papers to build up your survey. If several papers all cite a key paper that you did not find earlier, obtain and read it, iterating as necessary.

The three-pass reading method is an incremental and iterative approach of reading a paper. The method goes from a general overview to the specific details with each step taking more time and helping you obtain a deeper understanding during each iteration. It can help you quickly read recent papers, do background research, and write reviews. This disciplined approach prevents you from drowning in the details before getting a bird's-eye-view of the papers. It allows you to estimate the amount of time required to review a set of papers.