Writing Scientific Papers: Tips, Tools and Technologies

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Abstract

The paper looks at one of the complex skills in mastering communication: writing. There is growing importance to teaching writing in technical and scientific contexts due to knowledge explosion in this era of technology, cloud communication and global citizenship. However, unless a person is well versed in writing, and understands what involves in writing, it is impossible to get published and get noticed by the academic circles. This paper focuses on some of the complexities involved in writing, characteristics of 'good scientific writing' besides presenting some of the tools those writers can use in developing their materials for publishing. A detailed write up on paraphrasing with examples, and short explanation of rubrics of writing and a brief review of tools and technologies that assist a young researcher or a scholar are presented in the concluding part of the paper.

Key words: Scientific writing; Tools for writing; technology for writing; modifiers; English as a Second language

I.INTRODUCTION

Writing is an essential, productive language skill which is very indispensable for success and recognition in academic circles. A person may have mastery over subject, but unless and otherwise the scientific findings are shared in the circle of experts, the knowledge remains unnoticed. Sheils (1975) is of the opinion that there has been a long-standing concern that many people do not develop the required competence to write well according to the demands for writing at work and for scholarly purposes. Scientific writing involves presenting theory with evidence, describing, narrating, analyzing, drawings and conclusions based on logical presentation of ideas. It is very essential to write without grammatical errors, presenting and organizing ideas with

coherence, the ability to convince the audience. A writer needs to have a mastery over different genres of writing, mechanics of writing, drafting and redrafting, with right usage of words. Speaking of writing in academic contexts, Pylkkänen and McElree (2006) suggest that while constructing sentences, grammatical coordination, appropriate lexis and correct spelling needs to be focused upon.

According to Scarcella (2003) that academic English includes multiple, dynamic, inter-related competencies.

However, too much focus on rubrics of writing, language and the structure of writing may hinder the free thinking process of a writer, Rose (1980) calls this a ' writer's block'. It is because the assumptions or about writing may block free writing. Sometimes, the unrevealed audience, educational system, forces the writer to use ambiguous in conveying the ideas. But academic writing needs to be simple, effective and reader friendly. Academicians, scholars need to write articles, technical reports and proposals to get it published in order to share research knowledge to the world.

II. THE ART OF WRITING

Writing is organizing ideas as a craft using accurate language. To quote (Maley, Alan (2009) she mentions that writers need

- Getting the grammar right.
- Having a range of vocabulary
- Punctuating meaningfully
- Using the conventions of layout correctly, for example, in letters.
- Spelling correctly.
- Using a range of sentence structures
- Linking ideas and information across sentences to develop a topic.
- Developing and organizing the content clearly and convincingly.

Having mentioned the importance of writing, academicians follow the steps by reading.

Having mentioned the importance of writing, academicians need to follow the ways of citing sources to support the arguments in the research work. In this regard, paraphrasing is a useful method to summarize other writers' opinion.

III.WHAT IS PARAPHRASING?

Paraphrasing is one of the techniques used in scientific writing. It is a restatement of the quotation rephrased by the writer in his/ her words. It is used when the quotation is long and wordy, the words in the quotation are not powerful and the source of the quotation is unknown or dubious. It is not reproduction and expansion of the thought of an author and has to come with an acknowledgement. While paraphrasing a quotation the writer should carefully read the original quotation to understand the central idea. Then paraphrase is done by avoiding original words, phrases, and by ensuring that the words convey the same central idea. The writer needs to use an interesting word or phrase from the original text, use quotation marks

if needed. However always acknowledge the original source to avoid plagiarism .Substitute certain words with their synonyms, while maintaining the structure of the original quotation. To write a good paraphrase, borrow only the idea -- express the sentiment in your own words, in your own way.

How does a Paraphrase differ From a Summary?

A summary is an abridged version of the original text where as a paraphrase can be shorter or longer than the original text. While the summary eliminates details, examples, and supporting points, a paraphrase describes the original text in different words. It does not omit details.

IV. TIPS FOR PARAPHRASING A TEXT

- Quickly review the passage to get a sense of the whole, and then go through the passage carefully, sentence by sentence
- State the ideas in your own words, defining words as needed.
- If necessary, edit for clarity, but don't change the meaning.
- If you borrow phrases directly, put them in quotation marks.
- Check your paraphrase against the original for accurate tone and meaning.

IV. STRATEGIES TO PARAPHRASE

- Use synonyms for all words that are not generic.
- Change the structure of the sentence.
- Change the voice from active to passive and vice versa.
- Change clauses to phrases and vice versa.

CLAUSES

Clause is a group of words which contains a subject and a predicate.
Some of the basic facts of grammar are highly useful while writing for academic purposes. In this section, the types are clauses are discussed.

Types of Clauses:

Independent Clauses	Dependent Clauses
• Contain both a subject and a verb and **can** stand alone as a sentence • *Example:* Electrical power is of great importance in Texas. • The energy sources used to make electricity can be renewable or non-renewable, but electricity itself is neither	• Contain both a subject and a verb, but **cannot** stand alone as a sentence. • Dependent clauses are introduced by subordinating conjunctions such as *because, at, if* • *Example: We* do not include data from other countries in our study as the study does not necessitate it.

Table 1 shows the use of independent clauses, coordinator, conjunctive adverbs and its examples.

Also, it is essential to understand the use of coordination to show the desired opinion and also it brings cohesion in a paragraph.

Table 2 : Independent clauses, coordinators, conjunctive adverbs and its examples:

Independent Clauses Meaning	Coordinators	Conjunctive Adverbs	Example
To add an idea	and	in addition, furthermore, moreover, also	The purpose of conducting studies is to identify system deficiencies and to establish the requirements for a connection proposal
To show time or sequence	first, second, then, next, later, meanwhile, finally	First, robots can perform repetitive tasks without becoming tired or bored. Second, they can fulfill tasks requiring pinpoint accuracy.	
To contrast	But yet	however, nevertheless, in contrast, on the other hand	Increasing the number of turbines is one solution to the problem; however, this is a long-term solution whose benefits may not be seen for many years into the future.
To show result	so	therefore, thus, consequently, as a result	Research Scholars have different needs; therefore, most colleges provide separate classes for each group.
To introduce an alternative	or	otherwise	Immediate action should be taken by the Government; otherwise, more loss will be faced by all.
To emphasize		in fact, of course, indeed, certainly	

To provide an example	for example, for instance	In the operating room, robotic equipment can assist the surgeon. For instance, a robot can kill a brain tumor.
To generalize or summarize	in general, overall, in short	In the year 2001, the National Electric Power Policy (NEPP) was developed, which set the pace for the Electricity Reform. In short, this is a follow up to Electric Power Sector Reform Bill (EPSRB).

Based on the table, it is arrived that writing can be improved using proper conjunctive adverbs. Without using it, ideas stand separate as detached in a paragraph or any written piece.

The next table shows the types of clauses, subordinators and its examples:

Dependent Clauses Types of clauses		Subordinators	Examples
1. Noun clauses		what, where, why, how, where, when, who whom, which, whose, whether, that, if	He knows that investing in a small wind system, he can reduce pollution. That nearly 20% of the electricity generated in Denmark is from wind is well known.
2. Adjective clauses		who, whom, which, whose, that, where, when	The energy that is generated from wind is known as wind energy. Last year we visited Denmark, which is a good place for investing in wind energy.
3. Adverb clauses	**a. time**	when, before, after, until, since, as soon as	When he identified the system deficiencies, he established the requirements for a connection proposal.
	b. place	where, wherever	You can invest wherever you wish to establish
	c. cause	because, as, since	The National Electric Power Policy (NEPP) was developed as the Government wants to provide electricity to remote areas.
	d. purpose	so that, in order that	The purpose of providing a direct interface among industry groups is to address barriers associated with high solar penetration levels.
	e. result	so ... that, such ... that	

	f. condition	if, unless	If she hadn't received the funding, she would have been very unhappy.
	g. concession	although, even though	Although she thought she made a good presentation, she got no encouragement from the authorities concerned.

Modifiers:

A modifier is a word, clause or a phrase that describes or limits other word, phrase, or a clause in a sentence. It is necessary to place them correctly to convey the meaning accurately to the reader. **Misplaced Modifiers:** a descriptive word, phrase, clause that is in correctly placed- 'just, even, only, almost, hardly, nearly, merely' can be misplaced in a sentence.

Dividing the electricity produced by the total energy available in the wind at that speed, you can find the coefficient of power at a given wind speed. (Dangling modifier).

1. **Multiplying the parcel's area by its thickness**, the volume (Vol.) of this parcel is determined Vol. = A * D Let ρ (the Greek letter 'rho') represent the density of the air in this parcel (Dangling modifier).

2. To provide guidance in carrying out the technical studies, to assess the adequacy of the IESO-controlled grid in order to meet general load growth and connection ,assessment requirements, and to ensure that reliability is within standards, **this section is proposed.** (Dangling modifier)

3. To identify if approved connection assessments improve or worsen any identified deficiency, the impact of adding approved connection assessment projects should be reviewed (Dangling modifier)

Dangling modifiers:

A dangling modifier is a word, phrase or clause that does not relate to any word within the sentence and causes confusion to the reader-

Split infinitives: Split infinitives are used when an adverb is placed between to and a verb.

Infinitives consists of to +verb – to find, to analyze, to understand etc.

Split infinitives make sentences awkward, but they are not banned.

Shifts:

Shift refers to an unnecessary change in point of view-

Point of view expresses the perspective from which a piece is written. Generally, the writer should establish a point of view (first, second, or third person) in the opening sentences and maintain that point of view consistently throughout his or her work.

First person refers to the narrator being referred to as I; second person is you or one (this isn't used for narration); third person is he, she, it or they. The most common mistakes of this type involve using you when another point of view is required.

Inconsistent point of view:
Even though **he** believed that the experiment was feasible, **you** do not know how hard it can be until you try to lose a few pounds.
Consistent point of view:
Even though, **he** believed weight loss was possible, **he** did not know how hard it would be until he tried to lose a few pounds.

Inaccurate usage of tenses:

In her study of the roles of nurses in a critical care unit, Chase (1995) **has** also **found** a hierarchy that distinguished the roles of experts and others. Just as the educational experts described above **do** not directly **teach** students, the experts in this unit **did** not directly **attend** to patients.
Remember: If the focus is on the past, use past tense. When the focus is on scientific facts, use present tense.

Example:
Newton's theory holds that light and matter are made up of different kinds of corpuscles.

Verb Mood and Voice:
Shifts can also occur in the mood of the verbs. The mood refers to the manner of action. The three moods in English are –

1. The Indicative Mood- Used to state facts or opinions or to ask questions.
Example: A USML system can be designed to include tilting mechanisms and high-powered propulsion systems that would allow vehicles to follow existing ROW at very high speeds.

2. The Imperative Mood- Used to give command or advice or to make a request.
Example: Call for help before attempting to extinguish a serious fire. The fire may take hold much faster than you're capable of dealing with it, and if help is on the way, it removes one less concern for you.
Check that all other people are out of the house and have them remove pets as well. Check that they're all assembled at a safe meeting point. Do not allow children to attempt to use a fire extinguisher or control a fire in any respect whatsoever.

3. The Subjunctive Mood- Used to express doubt, wishes, possibility.
If you aim at the flames (which is frequently the temptation), the extinguishing agent will fly right through and do no good. You want to hit the fuel.
Voice: Voice refers to active and passive. When the subject is doer of the action, it is active and the subject of the verb receives the action it is passive.

4. Indirect and direct quotations:
In direct quotes, the speakers' exact words are repeated, within quotation marks. In

indirect quotation, the writer paraphrases or summarizes what the speaker has said and no quotation marks are used. "

He said, I *will* be in the lead plane on every mission'"

He said that he would be in the lead plane on every mission

5. Direct and Indirect questions

Is true that the gravitational force between two particles can be shielded by the presence of an intervening mass?

He wondered whether the gravitational force between two particles can be shielded by the presence of an intervening mass

6.   Mixed Constructions:

*   Mixed Grammar
*   Illogical connections
*   Avoid using 'when, where, reason… because'
*   Use of coordination and subordination
*   Choppy sentences or shot sentences
*   Ineffective coordination.

In the next section, the basic sentences structures summarize

7.   Sentence Structures

Sentence structures are of three kinds– Simple, compound, complex:

a.   A simple sentence has only one clause

Ex: All boys are playing

b.   A compound sentence will have two or more clauses

Ex: We took online test and checked the results.

The clauses in the compound sentence are joined by co-coordinating conjunctions.

Ex: We were looking for a toddler but we couldn't find her.

To summarize, one must keep in mind that good scientific writing involves clarity, simplicity, logical arrangement, of ideas, accuracy, objective expression of opinion and impartial tone.

Use of passive forms, first person pronouns, nominalization, and thematic structure are some of the characteristics of scientific writing. Thus scientific language – like virtually all language – is intimately related to the context (here the 'field') within which it is produced.

A clear and straight forward writing with sound knowledge of subject matter and the ability to give information in a clear and concise manner is very essential. The language needs to be understood by a lay man and for this reason, too many acronyms should be avoided.

IV. TECHNOLOGY AND TOOLS FOR WRITING:

With explosion of knowledge, the technology makes even complex matters simple. Writing is a complex skill and there are many tools to make it simple. For a researcher procrastinating the moment of writing an important research paper after the preliminary research, the following tools come handy (of course with a price tag for some attached to them). The following are suggested by Morris R, who teaches online writing:

Colwiz : A reference manager to accelerate the research process and enable to sort, cite and share the sources. It is used to locate relevant articles and manage the notes and references through cloud backup. This tool enables one to automatically format the bibliography with over 6500 citation styles.

Ninja Essays : This essay writing service can be useful through all stages of research paper writing: from conceptualizing to researching to writing to editing.

Read Cube : With the help of Read Cube, one can progress through the different stages of writing with ease. The tool enables to import PDF files from the computer and make them searchable.

Qiqqa: This free reference manager and research manager is one of the most effective tools to use as it enables to organize the PDFs for the project, import them into separate libraries, search through them and detect duplicate sources.

Mendeley: This free tool helps to manage the writing, research and citation process with ease. It gives 2GB space for online storage, which is enough to keep all your sources secure in one place. One can access the collected materials online or offline, and annotate on the go by highlighting and adding sticky notes throughout the text. It also enables the writer to generate the citations and bibliography in the style he / she chooses.

Citavi : It helps in saving the important quotations accompanied with proper citation information (including page numbers). The tool can be used to insert the quotations and thoughts directly into the document.

Endnote : This powerful tool enables one to collect and manage different reference materials and manage the journals, research papers, essays or books you write. The ability to search through extensive online databases and access full-text articles will enable a writer to complete your research papers much faster.

It should be remembered that Commitment is the most important tool a writer must have**.**

Technology:

Technology helps the writer to check grammar, spelling etc. Some of the technologies that help a writer are as follows:

Ghotit: It is an online Contextual and phonetic spell checker along with grammar and punctuation checker

Voice Dream Writer: Make fewer mistakes, use the right words and organize your writing better with this app. Text-to-speech and voice-to-text help you to proofread to avoid awkward sentences or grammatical mistakes. Other applications that assist the

writers include Co -writer, Text Expander, iWordQ, Type-O HD etc.

Conclusion:

Human brain is amazing. It has capacity to store information based on input. To conclude a writer should be a well versed reader to have the ability to express well. To end, whatever tips, tools, technologies that the times may offer, one must have the habit of reading to write well. To quote Stephen King, "If you don't have time to read, you don't have the time (or the tools) to write. "Simple as that."

References:

1. Robert Morris :4th June 2015 @ http://www.fedena.com/blog/2014/11/7-tools-make-research-paper-writing-easier.html
2. http://libweb.surrey.ac.uk/library/skills/writing%20Skills%20Leicester/page_65.htm
3. http://grammar.yourdictionary.com/style-and-usage/characteristics-of-technical-writing.html
4. King S: @ http://www.goodreads.com/quotes/tag/writing
5. Source: http://web.mit.edu/academicintegrity/writing/paraphrasing.html strategies can I use to paraphrase**?**
6. Rose, Mike (1980): Writer's Block: The Cognitive Dimension. Studies in Writing & Rhetoric. Conference on Coll. Composition and Communication, Urbana, Ill.
7. Pylkkänen, L., &McElree, B. (2006). The syntax-semantics interface: On-line composition of sentence meaning. Handbook of psycholinguistics, 2.Sheils, M. "Why Johnny Can't Write."*Newsweek,* Dec. 8, 1975, pp. 58-63.
8. Maley, Alan: Advanced Learners. Oxford University Press
9. Scarella, R. (April 2003). Academic English: A conceptual framework. The University of California Linguistic Minority Research Institute – Technical Report 2003-1.
10. Singhal, Meena (2004): Academic Writing and Generation 1.5 Pedagogical Goals and Instructional Issues in the College Composition Classroom: The Reading Matrix: Vol4.No.3
11. Thurow.L (1993).Fortune Favors the Bold (p. 6). New York: Harper Collins.)