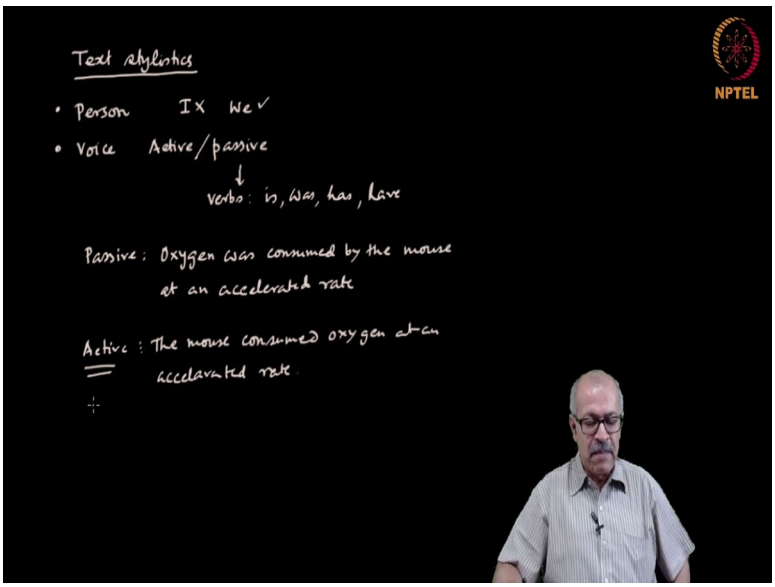
Research Methodology
Prof. Soumitro Banerjee
Department of Physical Sciences
Indian Institute of Science Education and Research, Kolkata

Lecture - 62
Scientific Writing: Text Stylistics

(Refer Slide Time: 00:20)



Now, I will come to a few points on text stylistics. Many of you know English well and you might feel that, whatever you have thought you will simply write. No, technical writing demands some style.

A few things you have to pay attention to. First, who is the first person. We normally do not write in first person. ‘I have done this’, ‘I have performed this experiment’, we do not write that way. We always subordinate the “I” and we write it as “we”. ‘We have performed this experiment’, ‘we have done this’. So, ‘we’ is the right form, ‘I’ is not.

We normally write in the style of “we”. Even if it is a PhD thesis in which it is mainly “my” work that is being presented, still we write “we”. We do not normally write “I”. In some cases, we subordinate the “I/we” part, as ‘this study was conducted’. That way we sometimes write. So, the person is important.

Secondly, the voice. As you know, there are two types of voices: active voice and passive voice. We often have a habit of writing in passive voice. But in a technical

writing the recommended style is mostly to use active voice. An excessive use of passive verbs makes the text boring to read. Passive verbs would include is, was, has, have – these are passive verbs.

For example, let me show one sentence written in passive voice and in active voice. In a passive voice, we might write ‘oxygen was consumed by the mouse at an accelerated rate’. In active voice we would write ‘the mouse consumed oxygen at an accelerated rate’.

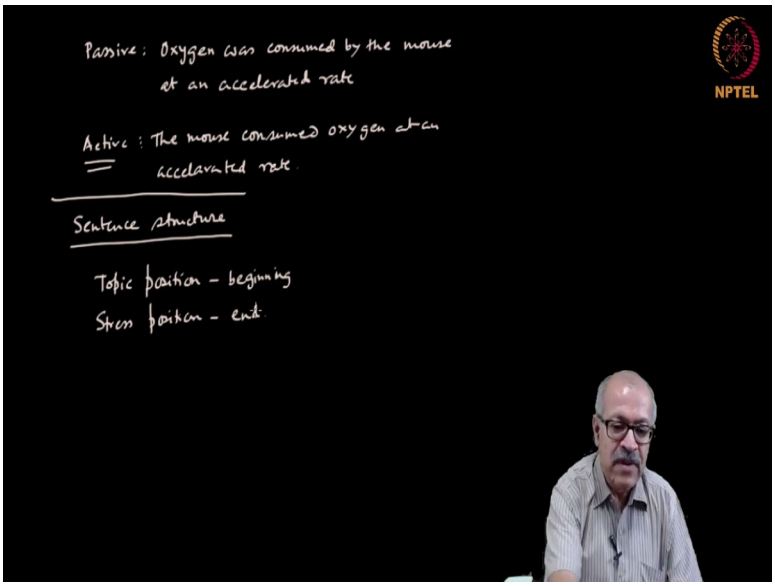
In this case, oxygen ‘was consumed’ – this is passive voice, while it is active verb ‘consumed’. This is a better, easier to read, and more direct. It is normally recommended to use active voice all the time except for the following cases. There are situations, somewhat exceptional situations, where passive voices are recommended.

For example, when it is necessary to draw attention not to the person doing the work or entity doing the work, but the work that is being done. For example, “mosquito larvae were apparently killed by an infection”. “An infection killed the mosquito larvae”. Here we are subordinating the fact of infection, rather we are stressing the fact that the mosquito larvae were killed.

“Mosquito larvae were killed by an infection”. It is basically a situation where you draw attention to the person or thing that is being acted upon, in this case, mosquito larvae, and when the actor in question, who is doing it, is not important. For example, “the aurora borealis can be seen in early morning hours”. “I can see the aurora borealis”. I or we or who can see is not important. It can be seen. This center stage is taken by the aurora borealis and therefore, it has to be written in a passive voice.

Thirdly, in describing experiments, ‘I poured 20 cc of acid into the beaker’ – this is not the right way of writing. We write ‘20 cc of acid was poured into the beaker’. That is a passive voice. So, in these situations passive voice is ok, but otherwise try to use active voice as much as possible.

(Refer Slide Time: 06:43)



Next comes the question of sentence structure. If you know English, you know how to write grammatically correct English. But that does not mean that your expression will be apt for a scientific writing because scientific writing demands a little more importance.

One important thing is that, when we start a sentence, we start with a subject and then, the subject does something. Now, when a reader reads, whenever the subject is read, the reader's mind looks for the closure of that; that means, what is it doing. And until the reader finds what is it doing, the rest of it, I mean, if you put a large number of words in between, then that number of words will actually not be properly read or given attention to by the reader. And it is relatively boring to read that kind of a sentence even though it is grammatically correct.

So, you should try to put the subject and the verb as close as possible to each other, so that the reader immediately knows what the subject is doing. And then, you put the rest. That is point number one. Point number two is, whenever a sentence starts, the reader's mind expects right in the beginning, the reader wants to know what is it all about. So, the subject of the sentence is right at the beginning. That is called the 'topic position'.

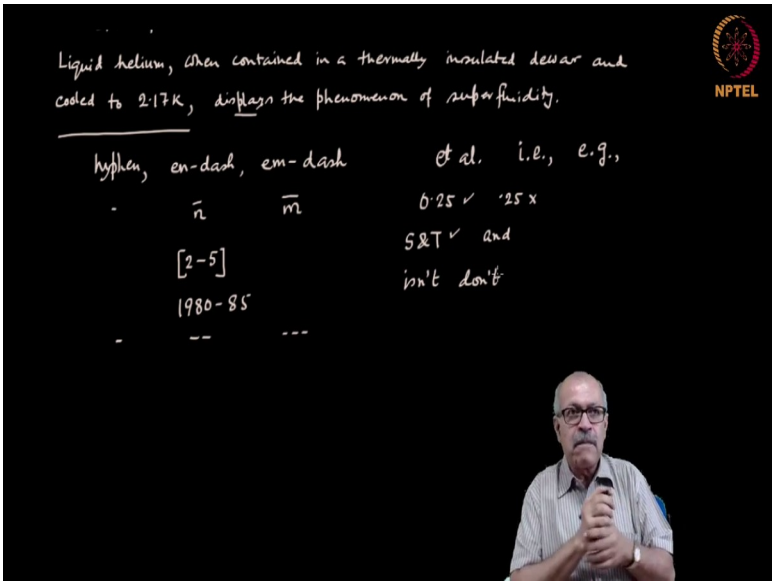
When the reader has read the sentence, whatever comes at the end, that is what lingers in the reader's mind, when he goes onto the next sentence. And therefore, whatever comes at the end of the sentence, gets a stress. So, if you want to lay stress on something in the

sentence, put that at the end. So, that is the ‘stress position’. So, the topic position is the beginning of a sentence, the stress position is at the end of a sentence.

So, depending on what we want to say, you have to give attention to each sentence and you have to place the topic right at the beginning. And deliberately what we want to stress through that sentence, you put that at the end of the sentence, so that, when the reader goes to the next sentence the mind automatically expects the next sentence’s topic to be what the earlier sentence ended with. That way a narrative can be engaging. You have put one sentence in which there was something in the stress position, what has been stressed, and the next sentence elaborates on that. So, that comes to the topic position and then, something else is then stressed. The next sentence gets that as a topic position and so on and so forth. That becomes an easy paragraph to read.

So, this is how we normally arrange the paragraphs. Now, let me give an example, an example taken from a paper.

(Refer Slide Time: 10:55)



“Liquid helium, when contained in a thermally insulated the container called a dewar, and cooled to 2.17K, displays the phenomenon of super-fluidity”. Now, this is a sentence that is well constructed and grammatically correct. So, there is no apparent problem with it.

But the problem is that the subject is liquid helium. After the reader has read these two words ‘liquid helium’, then the reader’s mind unconsciously looks for the closure of that. What is liquid helium doing? And only when he goes on here, he finds, it displays the phenomenon of superfluidity.

Therefore, the closure comes at the end. In between, whatever words are there, that gets erased out of the reader’s mind, because when he was reading it, the reader’s mind was unconsciously looking for the closure. So, the attention was not devoted to this. So, if you want the reader to give attention to this, then you cannot write it like that. The right way of writing would be, where you say ‘liquid helium displays’. Immediately ‘displays’ comes right after the subject.

‘Displays’ is the verb. The subject is liquid helium. “Liquid helium displays the phenomenon of super fluidity, when contained in a thermally insulated dewar and cooled to 2.17K”. That is a better way of constructing this sentence. Same sentence. Same thing conveyed, but in a better way.

In this construction that I just said, the topic position is taken by liquid helium. But the stress position in this particular sentence was taken by the phenomenon of super fluidity. When I just constructed in a better way, the stress position, the end of the sentence, is taken by the condition that gives rise to super fluidity. Now, it may be so that you want to stress on that point: the condition. Under what condition superfluidity happens? Then that is the right way of construction of the sentence.

But if your plan is that in the next sentence you will elaborate on the phenomenon of superfluidity, not on the condition for superfluidity, then this has to come at the end. Then the right way of writing that sentence would be, “when contained in a thermally insulated dewar and cooled to 2.17K, liquid helium displays the phenomenon of superfluidity”. So, these two are again next to each other: liquid helium displays the phenomenon of super fluidity.

The phenomenon of superfluidity comes to the end and therefore, assumes this stress position. If the next sentence elaborates on the phenomenon of superfluidity, then the reader will find it easy to grasp. So, this is how we normally construct sentences in technical writing, so that the reader’s mind is deliberately guided in a particular way.

The things that we want to stress are stressed. The things that we want to state but not with that much stress – this is the way to do that: to put it in the middle of the sentence, so that it does not get stress. Something that goes at the end of the sentence – that gets the stress. Something that is at the beginning of a sentence – that is the topic – you are telling what this sentence is all about.

Then, a few relatively minor things I have to tell, because I have noticed that many people do not know the use of these. One is the use of hyphen, the en-dash and the em-dash. The hyphen is a short horizontal line. The en-dash is a relatively longer horizontal line and the em-dash is even longer horizontal line. Now, this is of the width of the letter n and this is of the width of the letter m.

When is hyphen used? When two different words are being joined together that were normally not joined, then you have to put a hyphen, not a dash. But if you are telling 'from–to', say a reference 2 to 5; that means, 2, 3, 4, 5 all these references together, this is an en-dash. Or, if you want to say 1980 to 85, this is an en-dash. In the Microsoft Word if you go into special characters then you will find there is a special character called en-dash. That is what you have to put here.

In Latex, just a single hyphen is hyphen, 2 hyphens are automatically converted into en-dash and 3 hyphens are automatically conducted into em-dash. There is also a special character called em-dash. Where do you want to put the em-dash? Where you otherwise could have used a bracket.

That means, you are writing a sentence in which you have to put something that could have gone in a bracket, but instead you can put in between two em-dashes. So, this is how we normally write.

For example, suppose I write that the supernova in 1987 happened in the Small Magellanic Cloud. But then, in a bracket you have to explain what this small Magellanic Cloud is. You might say then, an em-dash, a smaller galaxy satellite to our Milky Way galaxy, again em-dash, then you talk about the rest. That means, something that could have gone in a bracket, if you want to put that in the sentence, then you put an em-dash.

There are some common mistakes that students make. For example, 'data' is a plural word. So, there is nothing like 'datas'. There are some words that are homophones; they

pronounce similarly. And you have to be careful about them: complement and compliment, affect and effect, discreet and discrete, principal and principle. You have to be very careful about writing these spellings properly.

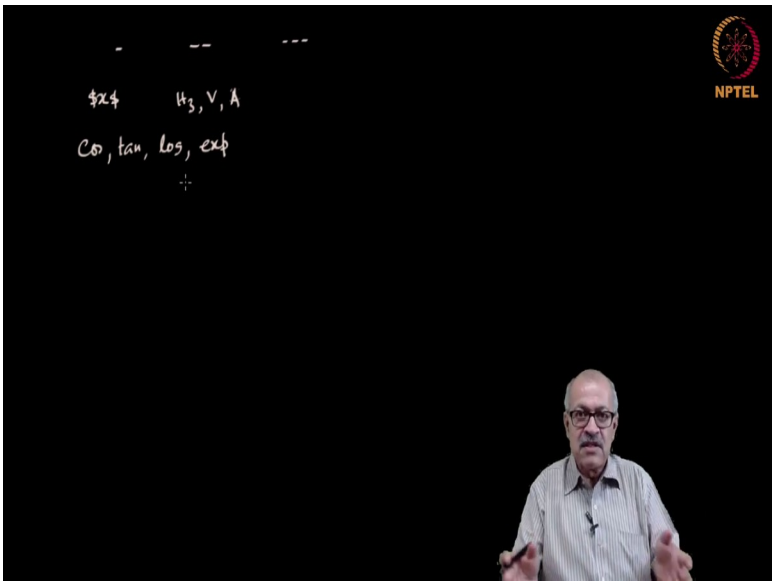
‘Non’ is not a word, e.g., nonlinear, it should not be written as non linear, because non is not a word. Therefore, they have to be joined together without a hyphen. So, nonlinear is single word. So, whenever non is prefixed to any other word it has to be a single word.

‘Et al.’ (and others) has to be written like ‘et al.’ this is how we write this. “That is” is written as ‘i.e.,’ i full stop e full stop comma; Similarly e.g., is ‘for example’.

So, this is how the punctuations go. Always write say 0.25, this is right. Just .25 is not the way we write in a technical paper. Do not use the ampersand except for the situations where say, Science and Technology is abbreviated as S&T. This is ok, but otherwise in place of “and” writing ampersand ‘&’ is not right. So, use ‘and’ in technical writing.

Criterion-criteria, phenomenon-phenomena; you have to be very careful about the singular and plural forms. Phenomenon is singular, phenomena is plural. Do not use the abbreviations like, “isn’t, don’t”; write ‘is not’, ‘do not’ because it is formal writing. These are the things that you have to keep in mind.

(Refer Slide Time: 22:05)



A few words regarding fonts. In the mathematical part, say, you are writing *x*. *x* is a mathematical symbol. And that has to be written in a specific font, a specific character

font, which is different from the font in the text. In latex we simply put it in dollars and it automatically converts that into the proper mathematical form. So, anything that is in the mathematical symbol that has to be written in a proper form.

That means, these are normally written in italic. But the units should not be in italic; for example, Hertz (Hz), Volts (V), Amperes (A). These units should be not in Italic, but in usual Roman. The cos, tan, log, exponential – these should not be in italic, these should be in normal font. These are the things that I needed to tell you in addition to the usual stuff.

One more word of caution. Many people make that mistake. Do not use more than one font family in a single document. Times Roman as well as Arial, do not use it. Just one font family should be used in a single document. Do not use bold face to highlight something. To emphasize something, do not use bold face. Bold face is reserved for section headings and things like that. If you want to highlight something, if you want to emphasize something, use italic. That is the usual emphasis.

And finally, I have to tell you something I am borrowing from a writing of Professor Harry Sweeney of the University of Texas at Austin. He says, “Become your own critique. Read the text aloud, either alone or with another person, to check the flow of sentences and to find ambiguous or irrelevant statements. Ask colleagues or friends to critique your manuscript and volunteer to critique theirs. The most helpful critiques are often those unfamiliar with the subject matter.”

Writers tend to become attached to their text and are reluctant to make revisions. This must be avoided. Listen carefully to the questions your readers raise, and respond by revising your manuscript, rather than becoming defensive. He says, “prune off material not essential for your story. The longer a paper the fewer readers it will have. Delete words, phrases, sentences, paragraphs, figures, tables, sections that are not really necessary. Lengthy details can go into an appendix or supplementary information.

“Finally, give the preparation of a manuscript and effort comparable to that put into the experiment, computations and analysis. Working through the logic of the arguments is an essential part of a creative process, often leads to new insights. A well written paper will garner the attention that the research deserves, while an ingenious result presented poorly

may go unnoticed.” So, this is the final thing that I would like to say regarding the paper writing.