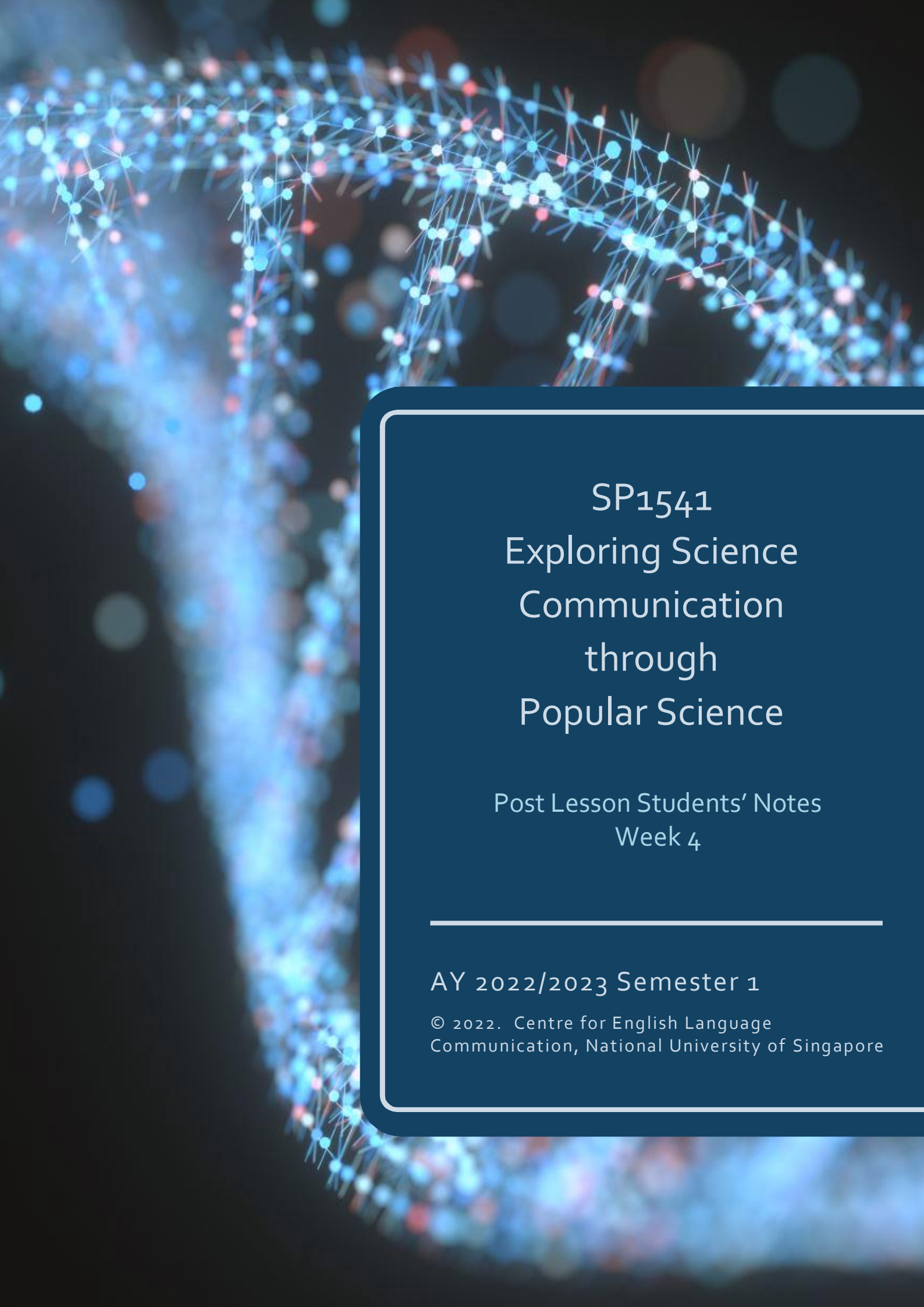

SP1541
Exploring Science Communication through Popular Science

Post Lesson Students' Notes
Week 4

AY 2022/2023 Semester 1

Learning Outcomes

By the end of this week, you should be able to:

- identify and explain **teleological** appeal used in popular science writing to secure and sustain readers' interest;
- analyse and describe **Moves 3- 5** that are conventional to introducing a news article;
- analyse and apply the use of **explanatory strategies** (exemplification and non-technical words) to explain scientific concepts and ideas for non-specialist readers;
- analyse and apply the use of **cohesive devices** to present ideas coherently and logically
- analyse and apply the writer's use of **evaluative language** (importance) and **appeals** for promoting the news article; and
- apply your learning to revise and improve your pre-course news article.

In Week 4, we discussed the following key concepts in science communication by exploring du Satory's (2003) book chapter and Buchen's (2009) news article 'Cicadas primed for defense'.

I. Teleological appeal in the book chapter

Teleological appeal in the book chapter refers to the **practical implication or application** of prime numbers and the Riemann Hypothesis to the field of mathematics and to the public. This type of appeal is often used in popular science writing to engage readers by **highlighting the significance of the topic to a wider audience.**

For example, the author highlights the application to the field of mathematics on page 10 ("*Most significantly, a proof of the Riemann Hypothesis would mean that mathematicians could use a very fast procedure guaranteed to locate a prime number with, say, a hundred digits or any other number of digits you care to choose*") and the application to a wider audience on page 11 ("*These three found a way to use the primes to protect our credit card numbers as they travel through the electronic shopping malls of the global marketplace").*

II. Moves in science news articles

Move 3: Provide general background for non-specialist readers

Move 3 in a science news article provides **general background information** for non-specialist readers about the situation before the study or the discovery.

In Section 2 of the news article, the author provides some **background information on the life cycle of periodical cicadas**. This particular information is not present in the research article. A possible reason why it is not present in the research article is because of the different target audience and purposes of news and research articles. The main target audience of RAs is the scientist working in the field and the purpose is to validate the findings. This is quite different from popular science which aims at disseminating scientific breakthrough/discovery to the public. Thus, to fully inform the public, authors of popular science often include background information to help them understand and appreciate the published results. In popular science genre, this purpose is referred to as 'celebrating science' (Hyland, 2009).

Move 4: Provide the rationale of the study

In Section 3, the author quotes one of the co-authors to **justify the rationale of the study**. *"It's a surprising and unique combination of a long life cycle and mass emergence. And on top of that, why do they have to be prime? [This study] ties that all together."*

This section can also be viewed as the 'bridge' between the general background on cicadas and the background of this specific study (rationale of the study). Even though this section does not specifically state what this study is about, it introduces the gap in the literature (*why do they have to be prime?*) and what this study aims to achieve (*[This study] ties that all together.")*

A leading theory that has been used to explain the cicada's bizarre life cycle is introduced in Section 4. Similar to Section 3, this leading theory helps the news author explain the rationale; however, this section **explains the rationale by highlighting the gap in the literature**. The news author explains the gap by highlighting what is known and not known in the field and how this study advances knowledge in the field.

Explaining the gap in the literature is not the only way to justify the rationale of the study. In the CRISPR article, the news author **explains the rationale of the study by**

explaining the current problems, current solutions, and the limitations of that solutions. In the CRISPR article, the current solutions (*zinc fingers, Talens*) and their limitations (*modified virus inserted their DNA at random, cumbersome techniques*) are used to show why the reported study is needed. This rationale of the study helps reader understand what has led the researchers to the objective of the study, which, in this article, is to develop a new method in order to overcome the existing limitations.

Especially for a lesser-known topic, news authors often provide a lengthy introduction to the study to justify why the study is needed. This information can often be found in the Introduction section of a research article. This move not only contributes to the 'content' of the news article, but also to the 'appeal'. Readers without prior knowledge of the topic might not know why the study is needed or how it is new; therefore, they may deem the finding less significant. By providing the immediate context, readers can have a better understanding of the significance of the study.

Move 5: Provide the source

Science news articles frequently include the source of information (i.e. the corresponding research article) in order to **establish credibility** in their articles. In this article, the author uses direct quotes from one of the co-authors (perhaps from their personal communication) to introduce the 'source' of this story. "*Their life cycles have been suspicious since the beginning," said John Cooley, who collaborated on the research with researchers in Japan.*"

The news author also cites a second source of information (*Mathematician Glenn Webb of Vanderbilt University*) in order to assist her in evaluating the findings of the study (*the explanation is reasonable*). By asking another expert in the field to comment on the findings, it could increase the credibility of this news article. Also, by introducing another hypothesis, it shows how this study fits in the larger field of periodical cicadas and how the model 'extends' the understanding of this issue (as readers may not be familiar with this field and so they may not think that it is newsworthy).

III. Explanatory strategies in science new articles

Exemplification

Exemplification is a strategy often employed by science news authors to explain a scientific concept for non-specialist readers by **providing a more concrete example**. This strategy helps readers grasp abstract scientific concepts.

The author exemplifies "a strategy of predator satiation for survival" by providing a specific example "… by buzzing around with hundreds of thousands of other cicadas, the probability of any one being eaten is close to zero." This explanatory strategy makes the concept of 'predator satiation' clearer to the readers. Other examples can be found in the table below:

Scientific concepts	Exemplification
Strength in numbers (Section 6)	They're easy to catch and don't bite or sting, so they easily become snacks for hungry predators.
The difficulty of studying cicadas (Section 10)	… it isn't known whether hybridization actually produces offspring with intermediate lifecycles.

Non-technical words

The author changes several technical terms used in the corresponding research article to non-technical or popular terms to make it easier for readers without scientific background knowledge to understand the news.

Research article	News article
Magicicada	periodical cicadas
coemergences	match up

IV. Cohesive devices in science news articles

Coherence refers to the logical flow of your writing. In science news writing, ideas should be logically organised and appropriately sequenced into sections so they are easy to understand and follow. An effective news article often has a clear flow of ideas which allows readers to move smoothly through the article with minimum effort. All ideas should be presented coherently and logically. To achieve this flow, each of the ideas needs to be clearly connected to the ideas that precede and follow it.

Cohesion refers to the use of linking words or phrases that help readers connect ideas and show the relationship between sections, sentences or parts of sentences. This week, we explored the use of cohesive devices, i.e. **words or phrases that show the relationship between different parts of a text.** In the new article, we found three main types of cohesive devices:

i) **transitional words** (e.g. 'though' and 'but');
ii) **pronouns or reference words** (e.g. demonstrative pronoun 'this'; personal pronoun 'they'); and
iii) substitution of a **synonym** for a previously mentioned noun (e.g. the periodical cicadas, the noisy-winged critters, and the animals)

You can visit the Purdue University's Online Writing Lab for advice and tips on revising your written work for cohesion.

V. Appeals in science news articles

Deontological appeal plays a major role in enticing readers to the article. The author creates a sense of wonder by introducing periodical cicadas as the ***world's longest-living insects but nobody knows why*** they have such a bizarre life cycle. This study "*may explain the animals' **mysteriously** accurate biological clocks*". Even though the findings have no direct implications for the public, the fact that we do not have the answer to this problem makes it an interesting and newsworthy story.

Evaluative language in the area of **'unexpectedness'** has been used to enhance the sense of wonder.

VI. Evaluative language in science news articles

We have encountered three parameters of evaluative language that the news author employs to generate readers' interest.

Importance

This last paragraph emphasises the implication of the study which made this article newsworthy. The author highlights the importance of the study by using the determiner 'first' to show that it has never been done before. "This is **the first explicit mathematical treatment** of this problem."

Expectedness

The author writes "***but nobody knows why***" in section 1 and "***no one could say why"*** in section 5 to highlight the 'unexpectedness' of the story. By emphasizing that the story is still 'unsolved', it helps generate the audience's interest and adds value to the news article.

The author also uses the expectedness language when explaining the bizarre behaviour of the periodical cicadas. "*It's a **surprising** and unique combination of a long life cycle and mass emergence.*"

Possibility

The author of the news article uses hedging language as she states the result "*Now, Japanese researchers have developed a model that **may** explain the animals' mysteriously accurate biological clocks."* This could be because there is a major limitation to the study (section 10). Instead of using language of certainty as is often seen in popular science news genre, the author chooses to use 'may' which shows that this is one of the possible explanations.

VII. Citations in science news articles

You may have noticed that the news author used direct quotes from Cooley and Web. The citation format of news articles is very different from academic essays, which you are more familiar with. This is because the news articles often focus on the 'agent' or the owner of the quotes.

Instead of adding a number next to a claim commonly used in scientific publications or the surname, year and page number in APA format, news authors present it in a form of a story. News authors frequently include the following information- **who they are** (names and professions), **where they work** (name of department/university), **sometimes even why they are quoted** (e.g. a renowned microbiologist, a Nobel laureate). For example, in the science article, John Cooley was presented as someone who 'collaborated on the research with researchers in Japan' and Glenn Webb as a Mathematician who works in Vanderbilt University.

Regarding the citation format, the term 'says' or 'said' are commonly used next to the name of the owner of the quote.

> "Their life cycles have been suspicious since the beginning" **said** John Cooley, who collaborated on the research with researchers in Japan.

The news authors, mostly journalists, get these quotes from their personal communication with the researchers via phone calls, interviews, and emails. However, when personal communication is not possible, news authors sometimes take the quotes from another news website and give credit to such websites. For example, in the following *Sydney Morning Herald* article, the author took quotes from 2 websites, *Quanta Magazine* and *New Scientists*.

> Primes "really hate to repeat themselves," Dr Lemke Oliver **told** *Quanta Magazine*.
>
> "It was very weird," Professor Soundararajan **said**.
>
> "It's like some painting you are very familiar with, and then suddenly you realise there is a figure in the painting you've never seen before," he **told** *New Scientist*.

This article is available from http://www.smh.com.au/world/mathematicians-stunned-by-unrandomness-discovery-of-prime-numbers-20160315-gnjvcu.html

Images from Microsoft Word