

## Writing the abstract - Introduction

### 1. In pairs, discuss the following questions.

- What is the purpose of an abstract?
- How can an abstract help a researcher choose which papers to read?
- What information does the abstract usually include?
- Why do some people think a good abstract is even more important in the internet age than it was before?

### 2. An abstract usually contains one or two key sentences from each section of a paper. Read the following extracts from Mya's draft abstract. Match a section (1-4) to an extract (A-D).

1 Introduction \_\_\_\_\_

3 Results \_\_\_\_\_

2 Method \_\_\_\_\_

4 Discussion \_\_\_\_\_

**A** With the aim of evaluating this possibility two microorganisms, *Acidithiobacillus ferrooxidans*, an acidophile, and *Deinococcus radiodurans*, a radiation-resistant microorganism, were exposed to simulated Mars conditions; that is, 95% CO<sub>2</sub>, 2.7% N<sub>2</sub>, 1.6% Ar and 0.6 % H<sub>2</sub>O with a pressure of 7 mbars. Temperature was set at 150 K and ultraviolet radiation was in the wavelength rate of 200-400 nm. Exposure was for different times under the protection of 2 and 5 mm layers of oxidised iron minerals. Survival was evaluated by growing the organisms on fresh media.

**B** The resistance of organisms to extreme conditions like the conditions which exist on the surface of Mars under the protection of a thin mineral layer increases the possibility that life could exist on Mars.

**C** Here we report that both the 2 and 5 mm thick layers provided enough protection against radiation and Mars environmental conditions for bacteria to survive (Figs. 2 and 3).

**D** Current surface conditions on Mars are extremely challenging for life. However, Nicholson and Schuerger (2005) reported that *Bacillus subtilis* was able to survive for 19 days under Mars atmospheric pressure and composition. The question is whether there are any features on Mars that could provide protection against the surface conditions. One possibility is that the surface material plays a protective role due to the fact that it is composed of iron oxides and hydroxides.

### 3. In pairs, decide on the best order for the extracts (A-D) in the abstract. Give reasons for your answer.

### 4. Listening: Svenja, Mya's supervisor, is commenting on the draft abstract in exercise 2. Listen to a part of the conversation and say which section (A-D) Svenja *does not* comment on.

**5. Listen again and mark the following statements true (T) or false (F).**

- a) Svenja thinks the reference to Nicholson and Schueger (2005) is useful. \_\_\_\_
- b) Mya should remove the information on iron oxides and hydroxides. \_\_\_\_
- c) Mya needs to include more information about the method in his abstract. \_\_\_\_
- d) Svenja advises Mya to refer to the visuals (figures, tables, etc.) in the abstract. \_\_\_\_
- e) Overall, Svenja thinks the abstract is well written. \_\_\_\_\_

**6. In pairs, try to use Svenja's advice to improve the three sections of the text of the abstract in Exercise 2.**

**7. Mya uses particular phrases to signal the purpose of each part of the abstract (A-D) in Exercise 2. Underline a phrase in the extracts which Mya uses to:**

- a) State the research question .....
- b) Present the hypothesis.....
- c) Introduce the method.....
- d) Introduce key results.....

**a) The following phrases can also be used to signal the purpose of each part of an abstract. Divide the phrases (a-l) into four groups according to the functions in exercise 7 (a-d)**

- a) An investigation was undertaken to explore...
- b) It seems likely that...
- c) Results show that...
- d) The aim of the study was to...
- e) The data suggest that...
- f) The present study investigates...
- g) The study provides strong evidence that...
- h) We demonstrate that...
- i) We expected that...
- j) We investigated a new method of measuring....
- k) The method involved scattering..
- l) ...was found to...

**8. The text of an abstract must be concise. Replace the underlined words in extracts 1-5 below with *that* or *those*.**

- a) The hormone increased the power output of healthy volunteers by 16 per cent after four weeks of taking the drug. Healthy volunteers who took the drug could also exercise 50 per cent longer than control subjects.
- b) We compare photographic exposure from scattered light with light from direct light.
- c) The target yield is the yield which can be produced in "perfect" conditions.
- d) Structures like the structures described in this paper are not known in glyptodonts recorded before the Great American Biotic Interchange (GABI).
- e) The lithology of failed carbonate strata differs from the lithology of their basal shear surfaces.

*Adapted from Cambridge English for Scientists 2011*

## Writing the abstract – Practice

**Task 1 Read the titles of articles from various journals of physics. In pairs, discuss which articles you would read, and which titles are most helpful for the reader.**

- A) Determination of molecular structure from microwave spectroscopic data
- B) Factors influencing the learning of classical mechanics
- C) The role of turbulence in star formation laws and thresholds
- D) Can apparent superluminal neutrino speeds be explained as a quantum weak measurement?
- E) An experimental analysis of a vibrating guitar string using high-speed photography

**Task 2 Exam Practice - How to write an abstract - summary**  
**Complete the text with the clauses A-I**

- A) that is not also in the main text
- B) it is not the focus of the paper
- C) to summarize your conclusions
- D) understandable without reading or looking at anything else
- E) it should be featured
- F) until after you have written the rest of the paper
- G) that contrast with your results
- H) then you would include the numerical result and uncertainty
- I) it will lose its impact

The primary purpose of the Abstract is (1) \_\_\_\_\_. What new and interesting thing are you telling the world? If the whole point is that you have improved the accuracy of some measurement, (2) \_\_\_\_\_. Otherwise, you probably wouldn't include the uncertainty. In fact, the best experiments often lead to Abstracts with no numbers at all! A qualitative conclusion that is interesting enough to be published is usually of wider interest and application.

Along the way, you usually give some description of your equipment or experimental technique. However, this does not need to be detailed if (3) \_\_\_\_\_. On the other hand, if the point of your paper is that you have designed a new apparatus or made an improvement to some experimental technique, then (4) \_\_\_\_\_.

There is also an element of marketing in Abstracts. The Abstract is your advertisement enticing anyone doing an abstract search to read your full article. As a result you often refer to previous work or common assumptions of the past (5) \_\_\_\_\_. Or you might explain in one or two sentences why the field is vitally important.

Whatever the focus of your paper is, it should be clear by the second sentence of the Abstract. If you leave it until the end of the Abstract, (6) \_\_\_\_\_. Since the Abstract is a summary, nothing should be in it (7) \_\_\_\_\_. An Abstract is not an introduction; the paper should be complete even without the Abstract. One way to ensure this is to leave writing the Abstract (8) \_\_\_\_\_.

The abstract is almost always required to be a single paragraph. It has to be self-contained (i.e., (9) \_\_\_\_\_). It cannot have or refer to any figures or tables – it's just straight text.

(Physics Writing Guide, available at <http://www.geneseo.edu/~mclean/Dept/JournalArticle.pdf>)

**Task 3 Read this abstract and try to identify the parts given in Exercise 2.**

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### **THE FAILURES OF THE STANDARD MODEL OF COSMOLOGY REQUIRE A NEW PARADIGM**

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Cosmological models that invoke warm or cold dark matter cannot explain observed regularities in the properties of dwarf galaxies, their highly anisotropic spatial distributions, nor the correlation between observed mass discrepancies and acceleration. These problems with the standard model of cosmology have deep implications, in particular in combination with the observation that the data are excellently described by Modified Newtonian Dynamics (MOND). MOND is a classical dynamics theory which explains the mass discrepancies in galactic systems, and in the universe at large, without invoking 'dark' entities. MOND introduces a new universal constant of nature with the dimensions of acceleration,  $a_0$ , such that the pre-MONDian dynamics is valid for accelerations  $a \gg a_0$ , and the deep MONDian regime is obtained for  $a \ll a_0$ , where spacetime scale invariance is invoked. Remaining challenges for MOND are (i) explaining fully the observed mass discrepancies in galaxy clusters, and (ii) the development of a relativistic theory of MOND that will satisfactorily account for cosmology. The universal constant  $a_0$  turns out to have an intriguing connection with cosmology:  $\bar{a}_0 \equiv 2\pi a_0 \approx cH_0 \approx c^2(\Lambda/3)^{1/2}$ . This may point to a deep connection between cosmology and internal dynamics of local systems.

### **Task 4 Exam Practice - Tense review**

**Complete each sentence with the present perfect or past simple form of the verb in brackets.**

1. In 2005, scientists \_\_\_\_\_ (measure) a land temperature of 70.7°C in the Lut Desert in Iran. No higher temperature \_\_\_\_\_ (record) on earth since then. This is the only time scientists \_\_\_\_\_ (record) a temperature above 70°C.
2. A team of Russian scientists \_\_\_\_\_ (just complete) a five-year study of the behavioural patterns of three Siberian wolf packs.
3. New research indicates that scientists \_\_\_\_\_ (discovered) a potential cure for some forms of dementia. The key finding \_\_\_\_\_ (make) two months ago by a team working for Julia Davidson.
4. Research \_\_\_\_\_ (demonstrate) that people can delay the onset of diabetes by losing weight.