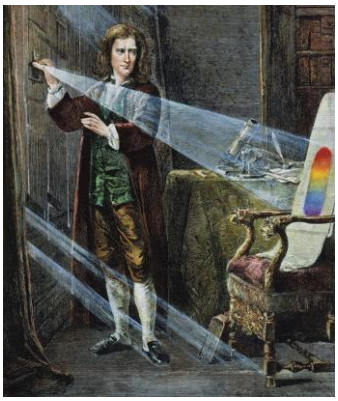
Writing up research

The way that scientific papers are written has changed considerably since Newton first wrote the letter below for publication in *Philosophical Transactions of the Royal Society*, No. 80 (19 Feb. 1671/2), pp. 3075-3087.



SIR: To perform my late promise to you, I shall without further ceremony acquaint you, that in the beginning of the Year1666 I procured me a Triangular glass Prisme, to try therewith the celebrated *Phænomena* of *Colours*. And in order thereto having darkened my chamber, and made a small hole in my window-shuts, to let in a convenient quantity of the Suns light, I placed my Prisme at his entrance, that it might be thereby refracted to the opposite wall. It was at first a very pleasing divertisement, to view the vivid and intense colours produced thereby; but after a while applying myself to consider them more circumspectly, I became surprised to see them in an *oblong* form; which, according to the received laws of Refraction, I expected should have been *circular*.[1]

Why is research not written up like this now?

Task 1 The style is very personal with Newton using the first person '*I*' to show himself as the agent carrying out the experiment. Can you identify and find evidence in the text for

- the genre, i.e. what type of text this is, who is the reader and what is the purpose
- the main functions which express the method and results of the experiment
- cohesive devices which link ideas together
- Newton's evaluation of the results
- Reference to other studies carried out previously
- A problem that needs further investigation

What is the theoretical concept that underlies Newton's experiment?

Which parts of Newton's text describe or explain phenomena?

Do any parts of the text attempt to convince the reader to accept a particular interpretation?

[1] Available online from http://www.newtonproject.sussex.ac.uk/view/texts/normalized/NATP00006. Image available online http://warehouse-13-artifact-database.wikia.com/wiki/Isaac_Newton's_Prism

RAINBOWS

The phenomenon of a rainbow in the real world can be explained by the concept of dispersion, as Newton showed in his experiment. Drops of rain act as prisms that separate the components of light. Here are three descriptions of rainbows. Which ones have an emotional tone and which is neutral? Highlight the words that helped you decide. What types of words are these?

1) And forgetting, startled, she looked for the hovering colour and saw a rainbow forming itself. In one place it gleamed fiercely, and, her heart anguished with hope, she sought the shadow of iris where the bow should be. Steadily the colour gathered, mysteriously, from nowhere, it took presence upon itself, there was a faint, vast rainbow. The arc bended and strengthened itself till it arched indomitable, making great architecture of light and colour and the space of heaven, its pedestals luminous in the corruption of new houses on the low hill, its arch the top of heaven.[2]

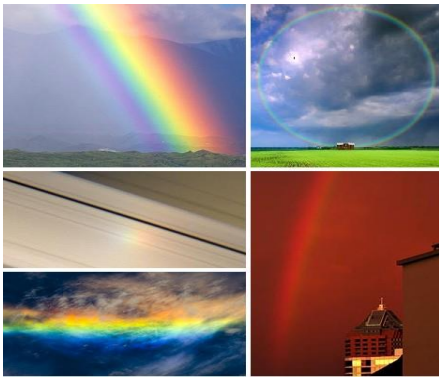
2) Rainbow

Adapted from Wikipedia the free encyclopedia[3]

A **rainbow** is a meteorological phenomenon that causes a spectrum of light to appear in the sky when the Sun shines on to droplets of moisture in the Earth's atmosphere. It takes the form of a multicoloured arc, with red on the outer part of the arc and violet on the inner section. A rainbow spans a continuous spectrum of colours; the distinct bands are an artefact of human colour vision. The most commonly cited and remembered sequence, in English, is Newton's sevenfold red, orange, yellow, green, blue, indigo and violet. Rainbows can be caused by other forms of water than rain, including mist, spray, and dew.

3) Spectacular Spectrums: 10 Amazing Rainbows [4]

By Steve in 7 Wonders Series, Nature & Ecosystems, Science & Research



Gloriously hued and ephemeral in nature, rainbows are one of the most beautiful sights the skies have to offer. They come in a wide variety of shapes, styles, sizes and yes, even colors. These ten amazing arcs show what happens when Mother Nature gets out her paintbox.

[2] The Rainbow by D.H. Lawrence p 300 Digireads.com Available in Google Books.
[3] Available from http://en.wikipedia.org/wiki/Rainbow. Accessed 20.01.20
[4] Available from http://laughingmotherofallmothers.blogspot.co.uk/2011/04/amazing-rainbows.html Accessed 11.12.16

The language of science evolved to enable scientists to

- label material processes with noun phrases, e.g. the *Phænomena* of *Colours*
- relate them externally to each other, e.g. *shining light through a prism causes the components of light to disperse*
- relate them internally through interpretation, e.g. *dispersion of light through a prism shows that light is made up of different components*[5]

The preferred format for explaining physical phenomena evolved

from *a happens; so x happens*
happening a causes happening x
to *happening a is the cause of happening x*

> In other words, scientists and researchers now write about relationships between concepts and processes, and not about people and what they do and think.

The important features of academic writing can be summarised as follows:

1. Write about concepts and processes and how they relate together not about people and what they do and think. You need labels, in the form of noun phrases, for the concepts and processes.
2. Tell your reader what you are going to do before you do it.
3. Structure your explanation from general to specific and familiar to new so that you
    a. give the reader the Big Picture before you fill in the details
    b. remind them what they know before you introduce something new.
4. Use summarizing noun phrases, e.g. *this concept, this problem*, to link ideas in preference to signpost expressions.
5. Use functional language for defining, classifying, comparing, contrasting, linking causes and effects, discussing problems and solutions, linking evidence to claims in an argument.

[5] Halliday, M.A.K.(1993) On the language of physical science. In Halliday and Martin, *Writing Science*, pp 54-68.

Analysing texts – top-down and bottom-up frameworks

Genres are typical texts with names, e.g. research report; genre analysis answers the questions

- Who are the readers of this text?
- Why was it written? What is it trying to achieve?
- What structure has been selected to achieve the purpose for the audience?
- What are the stages or moves in this structure?

Functions show relations between ideas, e.g. comparison, cause, usually at paragraph level; they create cohesion in text through sentence linking devices; function analysis answers the questions

- What is the relationship between ideas in this paragraph?
- How do these ideas link with what was written before?
- What functional language shows this relationship and these links?

Phrases and *sentences* are the basic building blocks of texts; they fit inside each other like Russian dolls according to well-established patterns and rules; sentence analysis answers the questions

- What am I talking about?
- What am I saying about it?
- What is the situation in which the activity happens?

Words have different connotations, i.e. secondary meanings which evoke ideas or feelings in addition to the primary meaning. These can introduce positive or negative evaluation into texts.

- What feelings does the writer intend to evoke in the reader?