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### Rhetoric in Science

The 2017 Nobel Prize in Physics was awarded to three scientists "for decisive contributions to the LIGO detector and the observation of gravitational waves", which arouses people's annually interest in science. But what is gravitational waves and what is LIGO? Most of the audience, who are not physics lovers, probably do not know much about these abstract science concepts. Fortunately, various explanatory articles are attached to the news for extended reading, but they are interestingly different. The one titled "Gravitational waves explained" from *Science News* is more academic, while the other one from *the Guardian* is more popular and easy to read, titled "Explain it to me like I'm a kid: scientists try to make sense of gravitational waves". These two articles demonstrate the fact that rhetoric also works in science. Focusing on the similarity and differences between these two articles from *Science News* and *the Guardian*, this essay will discuss how the purpose and audience of an article decides its rhetorical strategies such as pattern, tone, and quotation.

Upon hearing the news, many people may go to look 'gravitational waves' up in Oxford English Dictionary with passion and curiosity, only to find the gravitational wave as "an energy-carrying wave propagating through a gravitational field, produced when a massive body is accelerated or otherwise disturbed and was first postulated by Einstein in 1916", then close the book or shut down the browser, disinclined and dissatisfied. Compared to the definition given by OED, which probably leaves most of the readers find their head in the clouds after reading, these

two expository compositions from *Science News* and *the Guardian* are more accessible, showing how rhetoric works in science.

For an exposition, a comprehensive description and explanation of an idea or theory (*OED*), the primary task is to make its subject clear. When it comes to these two articles, sharing the same attempt to explain the groundbreaking discovery to their readers, they both give the answers to several common questions which may probably come into readers' mind when reading the news. They are, "what are gravitational waves", "how are they detected" and "what is the source of them". Both articles explain the science concept to the public and satisfy readers' thirst for knowledge. However, articles from *the Guardian* and *Science News* are developed in completely different ways, varying in its pattern, tone and ways of quotation.

The leading difference between them is their different intended audience. Judging by the name of the press, most of the readers of *Science News* should be scholars, physics lovers or students who already have some background knowledge. Meanwhile, it can be inferred that *the Guardian* is intended for the general public, for children or ordinary people who have no idea about gravitational waves at all. With different targets, the authors must apply different techniques to explain. The two articles serve as a good example to prove that there is no such a thing as a universal template in composition, even in similar subject with similar goals. Only by considering the knowledge scope, comprehension ability and the interest point of readers can an author write an article accepted by its audience.

To make it more concrete, there is a distinct difference in the pattern of these two articles. The article from *Science News* is a typical exposition, utilizing a lot of accurate figures, informative diagram and precise definition. The figures such as "two 4-kilometer-long arms at a 90-degree angle to each other", "back and forth 400 times" and "a 1,600-kilometer round-trip" provide a

clear image of LIGO's shape and size for us. The diagrams explaining the detection process and the scientific introduction of many technical concepts are as scientific as the textbooks. Employing these figures, diagrams and definition, the author professionally presents detailed information of gravitational waves and makes the article more academic. For its audience who have already acquired some basic knowledge in this field, figures and diagrams are informative and suitable, providing precision and details.

However, the article from *the Guardian* is more popular and easy to read, involving analogies, descriptions and narrations to make gravitational waves more graspable and acceptable for freshmen in science. It not only draws analogies between the two spinning and crashed blackholes with "spinning game" and "two heavy bowling balls on a trampoline", but also compares the gravitational waves to "the waves in the ocean causes by a large bobbing boat" and "the trampoline bending downwards which makes balls roll around and move towards each other as they fall into each other's dent". *The Guardian* utilizes many common things in daily life such as the trampoline and ocean to give its readers a clear and accessible explication. With these relevant analogies, visualized descriptions and vivid narrations, even a child can understand this critical scientific event. Therefore, analogy - a comparison between one thing and another, typically for the purpose of explanation or clarification (*OED*) - is a useful strategy in explanation to general public.

The tones of the two articles from *Science News* and *the Guardian* are also interestingly different. The article from *Science News* is more serious and precise, using a number of technical terms such as "spinning neutron stars", "supernovas", "Cosmic microwave background polarization", "Pulsar timing arrays" and so on. It is inevitable to mention abstract terms when attempting to make the subject clear. Using terms is a direct and precise way to explain, and it

allows interested readers to explore more. Professional and informative as it might seem, it may lose readers' attention soon if readers have no interest in this field. Therefore, for those who just want to have a rough idea of gravitational waves, the article from *the Guardian* may be a better choice. It is more appealing, with many familiar examples from our daily life such as "spinning game", "ocean waves", "dent on the trampoline" and so on. It perfectly interprets the physical concept in a simple way and can arouse readers' curiosity and interest in the subject. Interesting and simple as it might seem, it leaves out many facts. Both tones have merits and demerits, but the choice of tone should be based on the purpose and audience to maximize the explanatory effect.

Quotation is also an obvious difference. In the article from *the Guardian*, the author quotes many other scientists' explanation to help readers understand the subject. Quotation from famous professors in prestigious universities greatly enhances the technicality of the article, establishing its credibility. The most precious thing is that quoting scientists' words does not increase the comprehension difficulty level, and it is still an article catered for the general public. On the contrary, we can hardly find any quotations in the article from *Science News*. But the article itself is precise enough to state scientific concepts clearly and it does not need extra quotation to be more convincing. Therefore, the quantity of quotation does not obey the "The More, The Better" rule and it should serve the purpose and audience.

In terms of the overall feeling, I would describe the article from *Science News* as an academic report and professional explanation, while the one from *the Guardian* as a plain and intuitionistic edition for the general public. In general, rhetoric is everywhere, with no exception in science. Only by keeping the readers in mind and discreetly choosing the appropriate rhetoric strategies such as pattern, tone and ways of quotation, can an article get its intended audience absorbed in the contexts.

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