



By Invitation of the Editor-in-Chief

English Scientific Communication

Part 1—An Introduction

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Beginning this month, the Chemical Society of Japan will take steps to encourage its members to increase the degree to which they communicate about science in English. For good or ill, English has become the dominant language for communicating science internationally and science has become increasingly international in almost all respects: research groups are increasingly diverse in the nationality of their members, international journals are now the primary place for scientists to disseminate their findings, research funding often targets international interactions, and as research becomes increasingly interdisciplinary, international collaboration has become the norm. This article will be the first of a series written in English, which will deal with approaches to communicating science more effectively in English.

Before I begin, I would like to introduce myself. I am a chemist, working in the area of photochemistry, spectroscopy, electron spin dynamics, and radical pair based reaction kinetics. In addition, I have a long-running interest in chemical education and in communicating science to people of all ages: from toddlers to pensioners, and at all levels; from the general public to my graduate students. I am originally from the United Kingdom and when I was working there as an academic, it was not unusual to find me dressed as Harry Potter, demonstrating the “magic” of chemistry to primary school children! I first worked in Japan as a postdoctoral research associate at RIKEN for two years in the 1990s and returned in 2008, where I worked first at Tokyo Institute of Technology before moving to the University of Tokyo where I now do my research and teach on the new PEAK (Programs in English at Komaba) undergraduate and GPES (Graduate Program in Environ-

mental Sciences) degree courses in the College and Graduate School of Arts and Sciences. The PEAK program is an excellent example of my earlier point about increasing internationalization and English use. PEAK was launched in 2012 and allows students to study on a four-year undergraduate degree course at the University of Tokyo with all classes conducted entirely in English. Students do not need to have any Japanese language skills to enter the course, but they are required to learn Japanese as a compulsory part of the program. During my time in Japan, I have had many opportunities to help both students and faculty with their English communication skills and through this series of articles, I hope to share with you some of what I have learnt and offer my best suggestions for developing these skills.

“English”

The title for this series is “English Scientific Communication” and I would like to begin by taking a look at each of the three words in turn. I have already discussed the increasing importance of English to Japanese chemists. Whether you are a student, a teacher, a researcher or a working chemist of any kind, you will inevitably have to deal with English as part of your work or studies because so much of the existing literature of science is written in English. When you look up a particular reference, it is very likely that the research article you need to read will be written in English and so the ability to understand the contents of such articles is paramount. As chemists, informing both the scientific community and the public about what you know and what you have learned is an essential aspect of your work and the ability to share your understanding and ideas on an international stage through the use of English is a key step in reaching a wider audience.

“Scientific”

The next word is “Scientific” and when used by itself, the meaning of this word is clear – we are talking about science! The importance of this word is in its interaction with the other two words, so let us consider them both individually. “Scientific English” refers specifically to the particular vocabulary and language usage necessary to describe things of a scientific nature using English. Before we even get to thinking about communicating effectively, there are many specialist terms and expressions to learn. Clearly scientific English is not quite the same as ordinary English and this can sometimes help and sometime hinder us. One advantage is that the experience of reading scientific journals and sometimes textbooks in English means that most chemists in Japan are already familiar with most of the important “Scientific English” terms relevant to their area of study (or they need to become so!). The expression “Scientific Communication” on the other hand focuses our attention on an important point, which is that communicating science has many unique challenges that exist regardless of the language we are trying to communicate in. This series of articles is not really about improving your spoken and written English, as this is something that you can only really achieve through sustained study and practice, but rather it is about improving your ability to communicate about science in English, which is a very different skill. I believe strongly that the difficulties of communicating in English and the difficulties of communicating about science cannot be separated and so I will try, over the coming months, to deal with the two together. In many cases, some of the ideas presented will be relevant to communicating science in Japanese, or indeed in any language while

other ideas will be specific to English, but our goal will always be to better communicate science in English and so both of these skills are equally important.

“Communication”

This leads me into the most important word in the title – “Communication.” It is this word that I would like to spend the rest of this introductory article thinking about. The Irish playwright and co-founder of the London School of Economics, Sir George Bernard Shaw once said, “The problem with communication is the illusion that it has occurred.” It is entirely possible to give a presentation to an audience and for no communication to take place. Communication is very different from “speaking” or “presenting.” The key difference is that these two terms are actions performed by an individual, whereas communication requires the involvement of two people – the one transmitting the information and the one receiving it. In other words, to communicate something effectively to people, we need to consider how they receive the information as well as how we transmit it. This theme will be an important one in this series. By thinking in this way, the prospect of giving a presentation in English can be considered quite differently. Let us consider a number of important ideas related to this distinction.

How important is grammar?

Many of the best scientific presentations I have experienced were not given by native English speakers. If these presentations were to be assessed in terms of the correctness of the English used, they were a long way from being perfect. However, any audience listening to a scientific presentation in English will not be paying attention to the quality of the grammar used unless the grammar is so poor that they cannot understand the contents. Indeed, many members of the audience probably struggle with English themselves or have done in the past. In the Japanese school education system, English is taught from a relatively early age and I think it fair to say that all Japanese adults with a University education have acquired sufficient knowledge of English grammar to make

themselves understood, as long as they have knowledge of the appropriate technical vocabulary. The big difference then, is in using the skills you already have to their maximum potential. We will see in the coming months that there are many ways to try to do this, but they require thought and planning. Many presentations I have seen given by Japanese scientists focus too much on getting the grammar correct and not enough on really trying to communicate the important scientific message.

Communication is multichannel

When a good presenter communicates with an audience, they actually do so by communicating on a number of different channels. Of course the language that they use is important, but they also make effective use of other channels including body language (for example gestures and facial expressions), voice modulations (including changes in both pitch and volume and the use of silence), and visual information (including images, animations and mathematical equations). There is a well known formula used by researchers studying non-verbal communication, that says that communication is 55% body language, 38% tone of voice and only 7% the actual words spoken. This formula comes from the work of Albert Mehrabian and must be considered in the context of his original research, but it is safe to say that effective communication always has a significant non-verbal element. Learning to make use of non-verbal communication effectively can make a profound difference to the degree of communication that can be achieved.

What I say is not what you hear

When we communicate with our friends and family, we do so with a shared knowledge of what the other already knows about something. There are many things that we don't need to say and we have a very good idea of how they will interpret what we say. When communicating with most audiences, we are not in such an easy situation. First of all, we need to consider what the audience already knows about what we are saying and what the key pieces of

information are that we need to tell them early on, in order for them to understand our message. This concept has a number of important implications, which can strongly influence how well an audience understands us. For example, providing an appropriate context is essential in helping our audience to connect with what we are saying. When we present in a language in which we are not an expert, this problem becomes more important, as it is an additional way in which we can be misunderstood. We need to think in detail about exactly what we are trying to communicate and how that is best achieved. We then also need to think about how the information we transmit will be processed by the receivers – the audience. To do this more effectively, we will learn some useful lessons from psychology about the way in which the human brain processes information. Based on this we can develop some simple tricks that will make our communication more effective. Exploiting current understanding of how the brain works will also be a repeating theme throughout the series as it can influence almost all aspects of presentation giving.

Communication, communication, communication!

In this introductory article I have tried to highlight the importance of communication over simply speaking. Each month we will look at different ways in which we can communicate in English more effectively and I hope that by the end of the series, I will have convinced you that you can become effective “English Scientific Communicators” with the level of English language skills you already have. Of course, developing your English language skills is also a very effective way to improve and should be something you work on, but it is far from the only way. Many of the tips and tricks I will present in the coming months will allow you to make relatively rapid improvements to your presentations through understanding some important concepts and by designing effective preparation strategies.

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