

Taking your Science to ‘the Public’: Meaningful Engagement with a General Audience

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Abstract

With increasing emphasis on converting funding into high-‘impact’ research, dissemination of cutting-edge scientific results to a general audience is becoming ever more important. Yet, public engagement is not something one can easily do ‘on the side;’ effective communication with a general audience requires careful planning and an awareness of audience perception. Here we focus on techniques that are useful in the context of giving oral presentations. We provide a concise set of 10 practical recommendations and specifically address techniques to get your message across to a lay audience.



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Whether or not your research is directly applicable beyond the proverbial ivory tower, public engagement is likely to play an increasing role in many scientific communities around the world. More and more funders require researchers to think about the potential ‘impact’ of their research when preparing applications for funding. Meanwhile, in some communities—including, for instance, through the United Kingdom’s Research Excellence Framework (REF 2014)—‘impact’ is being turned into a measurable quantity of research outputs, not least because most of us rely on tax payers’ money to pursue at least some of our research interests. Impact takes many different shapes, among which engagement with a general audience is a major component. Yet, public engagement is not something one can easily do ‘on the side;’ effective communication with a general audience requires careful planning and an awareness of audience perception.

Although outreach to a general audience can take a range of forms, here we predominantly focus on giving oral presentations. We specifically address techniques to get your message across to a lay audience rather than an audience composed of your peers. Although entire volumes have been written on this topic (e.g., Olson 2009; Baron 2010; Mayer 2011), our aim here is to provide a concise set of practical recommendations that can be implemented quickly and easily into most presentations. Following our 10 recommendations, we provide starting points for more in-depth exploration of effective science communication. Appropriately adjusted, a lot of our advice will also apply to written communication, particularly in the form of articles or blog posts. Suitable approaches to public engagement through social media channels have been addressed in great detail elsewhere (Thelwall et al. 2013; Jenkins 2016). The majority of that advice published to date in the English language relates to audience engagement on the well-known Western social media and other Internet platforms, most of which, however, will be unable to reach a quarter of the world’s population, notably the well-educated and increasingly inquisitive middle class in China. This emerging Asian powerhouse has a very well-developed and sophisticated domestic Internet infrastructure, where engagement through the immensely popular *WeChat* platform could offer significant potential to reach beyond traditional audiences.

credited.



RECOMMENDATION 1: THINK AUDIENCE

As practising scientists, we are used to communicating our research results to colleagues in a variety of ways (Bourne 2007). The common thread of those communications is that we use concise language that conveys our results as precisely as possible. Invariably, this involves a measure of professional jargon, which we may not even realize we use (see Rule 3). The first cardinal rule of audience engagement is that one should consider the background and likely level of knowledge of one's audience. Since our primary aim is to capture their interest, either verbally or in writing, we should first and foremost adjust our language to their expectations and, potentially, their attitudes (de Grijs 2009). Indeed, we recommend that speakers start by providing a general overview of the topic of interest to get all heads aligned, before delving into appropriate details at a generally accessible level. In a social media context, it is crucial to consider in addition *where* best to reach one's audience by asking questions such as what their favorite blogs are, which social media platforms and/or *YouTube* channels they tend to use, and even what their preferred mobile devices and operating system may be (TeachThought 2013).

RECOMMENDATION 2: RESPECT THEIR INTELLIGENCE: DON'T DUMB DOWN

Clarity of language does not imply that the message you want to get across must be dumbed down (Witt 2013). Instead of dumbing down, you can use a range of techniques to clarify the types of complex ideas we deal with in our scientific environments on a daily basis (TeachThought 2013). In any presentation or communication, build up the message gradually, using short sentences and supporting graphics where appropriate (see Rule 9). Although you should keep your message simple and short, strictly avoid making things up or telling your audience something that is incorrect, because you will most likely be found out sooner or later if you allow yourself to do so...

Once you have made sure that everyone is 'on the same page,' start simple and logically reach your conclusion (Bourne 2007). It is perfectly acceptable to provide some more advanced material, as long as it is clear how one gets to that point and what the proper context is. After all, some of your audience members will have more advanced backgrounds or more closely related experiences, so that you may want to cater to their knowledge and experience as well. Keep in mind that your audience members will be just as qualified at doing their jobs as you are doing yours; therefore, avoid insulting their intelligence by dumbing down your message. Be open to answering questions during or after the presentation. If you don't know the answer, be honest and—if appropriate—try to find a way to provide an answer at a later time. Your audience will be grateful if you do.

RECOMMENDATION 3: AVOID JARGON

The use of professional jargon in oral presentations aimed at the general public will inevitably lead to losing a significant fraction of your audience, often evidenced by glazed-over or 'dead' eyes (or worse, snoring noises) or the fact that many audience members may revert to checking their cell phones rather than listen to the presentation. Instead of simply telling your audience what they may want to hear, particularly when dealing with somewhat controversial subjects, we recommend that scientists adapt their language to guide the content choices that must be made (University of Pittsburgh 2008) but without reverting to the use of professional jargon. In particular, don't use acronyms, no matter how commonly they are used in your field: you are not talking to colleagues, so if even one member of the

audience is somehow distracted when you define an acronym, you will have lost that person for the remainder of the presentation...

It is of the utmost importance to neither over- nor underestimate the knowledge of one's audience. One must walk a fine line between presenting your research in overly technical terms on the one hand and sounding condescending or, worse, patronizing on the other. People will respond most favorably and take away the main points of a presentation if speakers show that they respect their audience and cater to a fairly wide range of backgrounds and experiences (see also Rule 4).

RECOMMENDATION 4: LINK EXAMPLES TO DAILY LIFE

Engage effectively with your audience by making your science communication relevant to their daily lives. Do your homework prior to the presentation: explore local conditions and common experiences (University of Pittsburgh 2008) and, where possible, try to gauge the range of backgrounds among members of your audience. Equipped with this information, you will be able to more easily connect with 'the public' by referring to situations from their daily routines and common occurrences everyone will be familiar with. Good storytelling can make or break your presentation. Our brains become more active when we are told a story (Paul 2012): we will place it in the context of our own experiences, thus forcing multiple areas of our brains to work together.

You will be doing the local community a service by contributing to the build-up of scientific literacy among the general population. Scientific literacy helps us understand and shape the events in our daily lives: the importance of science in every-day events may not immediately jump out at us, yet many of our daily decisions—including in relation to health, eating habits, and technology—are guided by our (sometimes erroneous) understanding of scientific principles. This is where the scientist can connect most effectively with her audience, leading to the '*Aha-Erlebnis*' she hopes to trigger and bust any myths that may dominate the public discourse. In relation to the latter, we strongly recommend to start by sharing the facts, backed up by scientific proof delivered at a generally accessible level, because people ordinarily tend to retain the first factoid they hear about a given topic (and this better be a well-established fact!). Use the baseline thus established to logically point out the flaws associated with the particular misapprehension you intend to tackle, and close the argument by once again repeating the facts (see also Rule 10).

RECOMMENDATION 5: PROVIDE PIECEMEAL INFORMATION, NOT EVERYTHING

It is more important to convey one or, at most, a small number of key issues than to provide all relevant information (Bourne 2007). In other words, avoid information overload. As scientists, we may have been working on our pet project for years, and we certainly spent many years getting to where we are now in our careers. We have also been taught to communicate our research results as precisely as possible, including as much pertinent detail as we can in the space allocated. This is the scientific convention, but much of that detail is unnecessary baggage when communicating with a general audience.

Eliminate elements that are only tangentially related to your main message (Bourne 2007) and strive to remind your audience on multiple occasions of the relation between the material you are focusing on and the main thrust of your presentation. As speaker, you will have to select the key elements you would like to get across and present them such that your audience will have the impression that they are provided with your own interpretation. While you clearly have a much broader

overview of the field you are covering in your presentation, our advice is to focus on only a fraction of the data or results, for instance on those that are somewhat controversial, not very well known, or 'hot off the press,' thus giving the audience a shared feeling of excitement and, perhaps, an understanding of the scientific process at work. Be careful to follow ethical guidelines and obtain written consent to use materials where necessary.

RECOMMENDATION 6: ESTABLISH BOUNDARIES

Public engagement is best done in an atmosphere of mutual trust and respect. As such, avoid references to religion (unless this is inherent to your presentation, of course) and also avoid language that could be interpreted as discriminatory. If your topic is particularly contentious, you may want to define a set of ground rules from the outset, such as those governed by the Chatham House rule. Most recently revised in 2002, that latter rule states that

"[w]hen a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant(s) may be revealed."

It is crucial to respect the confidentiality of participants, patients, and audience members, where disclosure of this information could have adverse consequences. In particular in medical fields, doctor-patient confidentiality trumps all other considerations and ethical considerations take precedence over the 'wow factor.' However, even where human aspects are not of immediate concern, don't exaggerate potential benefits of your research so as not to generate unwarranted optimism. Be particularly careful in overstating your results to journalists, and—if you are aware of their presence at your presentation—always ask to have the opportunity to check their articles for accuracy prior to publication. Talking to journalists and having your work featured in the popular press can be both highly rewarding and incredibly stressful: be aware of the potentially negative fall-out that may result from inaccurate reporting.

RECOMMENDATION 7: GRAB THEIR ATTENTION

We ultimately want to enthuse our audience about the science we present and retain the key message(s). An engaging lecturing (or writing) style combined with entertaining storytelling will go a long way (Bourne 2007), but the key moments in a presentation are, in fact, the first few minutes (or the opening paragraph in the case of a written communication). This brief time period sets the stage for what is to come, and it is also the time when audience members form their first impressions. First impressions last longest indeed. Consider using a strong 'hook' to get your story started (Martinuzzi 2013), one that resonates with the audience and surprises them, but also one that addresses an overarching theme and not just the topic of your presentation (Genard 2016). It is well worth rehearsing a carefully designed opening statement, such as one including a compelling soundbite, a memorable factoid, or an arresting image, since your presentation's success will, in the initial stages at least, depend on it.

Ask one or more pertinent questions at the start of your presentation and return to them throughout the talk (see Rule 10). Carefully maintain a strong story line and use clear markers along

the way so as to provide anchor points for the audience to follow your train of thoughts. Neuroscience tells us that our brains are hardwired to remember interesting experiences; we don't pay attention to boring platitudes (Medina 2015). Our previous experience nudges us to pay attention to what we perceive as interesting, which implies that audiences drawn from different cultural backgrounds may perceive a given presentation very differently. Ultimately, we pay most attention to questions related to our basic instincts, particularly those related to survival (threats, procreation, eating and being eaten) and past experiences. If you can harness these instincts in the context of a strong hook, you will be well on your way to delivering a successful presentation. And don't forget to project positive body language, too: actively engage by communicating interest and enthusiasm by adopting an appropriate posture, using hand gestures for emphasis, occupying the available space to signify confidence, and making eye contact, for instance.

RECOMMENDATION 8: CATER TO DIFFERENT LEARNING STYLES

Not everyone absorbs new ideas and information in the same way. Effective engagement with a general audience implies that one should use different teaching techniques to adequately reach different learners among your audience. In practice, most individuals benefit from multimedia approaches that target verbal and visual cognitive processing channels. During a presentation, one may consider varying one's lecturing style, providing hands-on experiences, and catering to both visual and auditory learners. In addition to the speaker going through his material one text-based slide at a time, inserting relevant videos, documentaries, and animations offers a change of voice, which hence introduces freshness into the presentation, thus alerting the audience of something new. Be careful to consider the needs of color-blind audience members too when selecting your visual material. Cater to visual learners by including graphs and figures that make your presentations highly visual and which clearly show the relationships between and among different aspects you address. Don't forget to involve the audience in your story: ask them questions and give them the chance to speak their minds, thus engaging most effectively with auditory learners.

RECOMMENDATION 9: USE ARRESTING VISUAL AIDS

You want your exciting scientific results to come across clearly to your audience, and ideally be remembered for some time to come. Use simple, clear, and easily understandable visual aids (Bourne 2007). Avoid showing highly complex diagrams – and this applies to high-level scientific presentations, too! Many inexperienced science communicators rely on *PowerPoint* slides full of bullet points. Unfortunately, textual information overload will not contribute to the retention of received knowledge. Clear, well-designed graphics, on the other hand, do have that potential (Leonhard Center 2008). After all, there is truth in the common phrase that a good figure is equivalent to a thousand words... Good graphics require time to design, evaluate, and then redesign.

Many national and international scientific institutions employ dedicated science outreach specialists, who provide their multimedia materials for free on their websites. Similarly, you may want to explore the high-quality figures that are often custom-made for the most exciting articles by the graphics editors of both *Nature* and *Science* (as well as their subsidiary, topical journals). These can be used for non-profit, educational purposes free of charge, provided that proper attribution is included. Remember to obtain written consent if you want to produce or base a figure on potentially confidential medical information or photographs that may potentially be used to identify human subjects.

RECOMMENDATION 10: REPEAT YOUR KEY MESSAGE

Repeating the essential points of your presentation is key to getting the message across and facilitating longer-term retention (Bourne 2007). In fact, if you want to get a message through, you should state it clearly at the beginning and return to it at the end of the presentation, to add more emphasis. Although such repetition may feel forced, remember that your audience most likely experiences your material for the first time. They will benefit from repeatedly hearing or seeing the key points using different methods and means of repetition. Some members in the audience will inevitably become distracted at some point during your presentation. Others may have a limited attention span. As such, it may be useful to signpost your presentation and divide it into several parts, each concluded with a brief summary of what has just been covered. Repeat the key messages once again at the end of the presentation.

FURTHER EXPLORATION OF TECHNIQUES IN SCIENCE COMMUNICATION

A brief set of 10 recommendations for meaningful engagement with a general audience such as that presented here is obviously too concise to serve as a comprehensive review of the subject. In addition to the references provided throughout the text, we strongly recommend the following starting points for more in-depth exploration of this subject:

1. *Public Understanding of Science* (SAGE Journals): <http://pus.sagepub.com>
2. The AAAS Center for Public Engagement with Science and Technology: <http://www.aaas.org/pes>
3. The Alan Alda Center for Communicating Science: <http://www.centerforcommunicatingscience.org>
4. COMPASS Online: <http://www.compassonline.org>
5. The Leopold Leadership Program: <https://leopoldleadership.stanford.edu>
6. The *Harvard Business Review* – Presentations collection: <https://hbr.org/topic/presentations>

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