On the Shoulders of YouTube : Science in Music Videos

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On the Shoulders of YouTube: Science in Music Videos

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Abstract

Music videos are about many topics, and some are about science and technology. In this commentary, the author explores what kinds of music videos about science are available and how they could be categorized. It is argued that music videos could be helpful tools for science communication and science education. However, people who reject scientific information and results are also using music videos to publicize their views. Research on the subject is still very sparse. The science communication community needs a better understanding of the practices of online video sharing and the effects of music videos about science.

Keywords

mass media, media advocacy, media effects on youth, culture and science

Today's popular culture is saturated with science and technology. Citizens are not only users and consumers of products of science, they also encounter scientific content in unlikely places like music videos. A significant amount of videos that are uploaded and watched on common online video-sharing websites such as Vimeo or YouTube are music videos, and among many other topics, some of them are dealing with science and technology (Rowe, 2009). Recent advancements in digital technologies now allow amateur

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users, too, to create, upload, and disseminate music and other videos themselves (Burgess, Green, Jenkins, & Hartley, 2009; Snickars & Vonderau, 2009). In this short contribution, I want to provide an overview on what different kinds of science-related music video clips are out there and suggest ways to categorize them. Furthermore, I consider some implications for science communication theory and research.[1]

First, scientific topics and motifs can be found in music videos made by professional artists, for instance, about biology. In fact, there is a whole range of music videos dealing with Darwin and the theory of evolution (Cells in Culture, 2009). There are also some about chemistry and the periodic table. For instance, the clip "Meet the Elements" introduces individual elements from the periodic system, explains some of their characteristics in the lyrics of the song, and visualizes the elements and their place in the periodic table in animations (They Might Be Giants, 2009). The band that produced it, They Might Be Giants (the name is reminiscent of Isaac Newton's remark that he could see a little further since he has been standing on the shoulders of giants), has created a variety of songs and video clips mainly aimed at children that deal with various basic concepts and ideas in science. Here the band paid particular attention to ensuring that the science represented in the music video is valid and accurate.

Another interesting example is the Symphony of Science Project from the composer John D. Boswell that delivers scientific knowledge and philosophy in musical form (Boswell, 2009). In these clips, the topics range from the big bang and the universe to the human brain and the quantum world. What is particularly interesting in this project is that various well-known scientists appear in the music videos and explain scientific issues in quotes that are integrated into Boswell's synthesizer music. Music videos such as these could be used in educational settings to introduce and discuss scientific ideas and concepts mentioned in the clips.

Scientific organizations also seem to value the potential of music videos for outreach purposes. For instance, two of the three winning clips of the last "Brain Awareness Video Contest" organized by the Society for Neuroscience (2011) were music videos. Individual scientists and researchers also use music videos to gain attention and maybe also to promote a more youthful image (e.g. Collins, 2011). Various institutions also use music videos to promote and advertise their research and achievements (e.g., Bell Labs, 2006). A music video from members of the CERN research facility (The European Organization for Nuclear Research) about the Large Hadron Collider (Alpinecat, 2008) makes good use of the visual possibilities of music videos, and the lyrics—which are presented in subtitles—accompany and explain

what is shown in the clip. The rap describes various experiments at the CERN facility, and the video shows the facility and uses animations to explain theoretical concepts of the research. This clip has been viewed more than 7 million times, which shows that science communication via music video can be a successful strategy to attract considerable attention and explain current research to potential mass audiences. This success has led to the production of two further music clips from the same science communicators, one about rare isotopes (Alpinecat, 2009b) and one about black holes (Alpinecat, 2009a). It is noteworthy that a competing research institution responded with its own music video (Geekdad, 2010).

However, it should be mentioned that commercial suppliers of scientific and lab equipment, too, use music videos to advertise their products (e.g., Scientists for Better PCR, 2008). Another hilarious scientific music video is used to advertise funding opportunities for young researchers from the European Commission (Eutube, 2008).

The neuroscientist and science popularizer Tom McFadden explores how music videos and hip hop can be used in science education and communication and collects suitable examples of science music videos on his blog The Rhymebosome (McFadden, 2012). Some educators also encourage their students to share what they have learned in class in the form of a music video, for instance, a clip about the "synaptic cleft" in a neuroscience class (McFadden, 2009b). This also seems to work with younger children, for example, in a clip about water and how it changes its aggregate states (McFadden, 2009a). In the neurotransmission music video (and in many other music videos about science), the lyrics are also provided, which makes the scientific content of the clip more transparent, and the video visualizes the topic. In such instances, students are not only forced to learn and digest the content of science classes but they also have to engage with current media technologies and do some thinking about how the science learned could be presented in an entertaining and understandable way. Being able to communicate and mediate scientific content is a key skill that should be a central aim on the agenda of (higher) science education. McFadden is not the only science educator who explores how rap and hip hop can be made use of in science teaching (Elmesky, 2011). The chemistry teacher Mark Rosengarten offers more than two dozen entertaining science music videos on his website that are also highly suitable for teaching and intended for classroom use (Rosengarten, 2010). Another blog worth mentioning in this context is The Science Songbook: Songs to make learning science fun! (Newmann, 2012). It goes without saying that music videos are only little additional tools in science education; they cannot replace the conventional ways of teaching science. It might even be that adding music

to science information could distract some children from learning if they have trouble processing information in more than one channel. If the music and the science content are too loosely connected, then these individuals will probably focus on one of the channels to the exclusion of the other.

Furthermore, lab members and medical staff also use music videos to educate one another about codes of conduct and use them as entertaining instruction videos. A whole range of music videos have been created to disseminate lab safety rules and codes of conduct regarding health and hygiene (e.g., McKenna, 2011).

Other music videos are made to support silenced scientists speaking out on climate change in Australia (Gill, 2009), to save the Jodrell Bank observatory in the United Kingdom (Silk, 2008), to tell people about the research field of astrobiology (Chase, 2008), or to advocate issues such as climate change (Alley, 2008), and on the expertise of climate scientists (Hungry Beast, 2011), Darwin's theory of evolution (e.g., Darwin & The Naked Apes, 2009), or MMR (measles-mumps-rubella) and other vaccinations (e.g., ZDoggMD, 2011). A special case is Baba Brinkman, who wrote a whole feature-length "rap guide" to Darwin and the theory of evolution (Brinkman, 2011). The U.K. Wellcome Trust has provided funds so that Brinkman could professionally produce some music videos about aspects of the theory of evolution that are now disseminated online. Brinkman calls these educational music videos.

However, music videos can also be used to reject and attack science. People who are opposing scientific and biomedical results are creating and disseminating music videos too. For instance, deniers of climate change (e.g., Minnesotans for Global Warming, 2011), creationists (Edmonson, 2008), opponents of vaccination (e.g., NZtrillion, 2009), and asserters of esoteric alternative medicine (Goldacre, 2008) also use music videos to advocate their views. These clips are directed at a potential mass audience in order to influence public opinion. Creationists, for instance, are aware of the potential of video-sharing platforms and explicitly recommend them as helpful tools for "internet evangelism" (CreationWiki, 2012).

Especially young people and people who do not have great interest in science might encounter science topics in media channels like YouTube. The fact that many of these music videos are very professionally made, often humorous, and entertaining makes them dangerous propaganda tools from the point of view of science. It seems that many of the groups disseminating music video clips with antiscience messages can draw on substantial funding that often is not available to scientific institutions for public communication purposes.

Music videos could have an influence on what members of the public think about socioscientific issues. For instance, research conducted on how information on immunization was disseminated and evaluated on YouTube showed that videos with a negative attitude toward immunization were more likely to receive a positive evaluation and were viewed more often than the clips advocating immunization (Keelan, Pavri-Garcia, Tomlinson, & Wilson, 2007). A content and audience analysis of videos on organ donation on YouTube also found a reciprocity relationship between audience and media frames (Tian, 2010). However, so far little research has been done on the use of online video-sharing platforms for science communication.

Social media such as YouTube, Twitter, and Facebook provide arenas for messages and actors that challenge scientific results and that try to confront audiences with antiscience worldviews. Since there are no real "gatekeepers" and consequently no "quality control" taking place in these media channels, virtually everybody can claim anything. Media formats that are widespread in popular culture are often used to challenge the views of scientists. For this reason, I propose that it is not only necessary to study how social media can be used in science communication, it is also necessary to study how the promulgators of antiscience messages use social media channels and popular formats such as music videos, comic books, fiction movies, and so on. Only then will we know how widespread and influential they are and how "new media" and products of popular culture are used by antiscience agitators. And only then can we start thinking about how they could be countered effectively.

Questions that arise for the science communication community in the context of music videos are therefore: How many of these kinds of video clips about socioscientific issues are out there and who watches them? What are the comments to these clips? How could they be utilized in science education and science communication? What is their impact on public opinion and who is being influenced by them? Where do these (pro- and antiscience) music video clips come from, who produces and uploads them? Another very interesting question is how the producers of science music videos could provide proof of the veracity of their science content and what the relevance of their rank or status is in this context.

However, music videos made by young scientists and researchers about their research, work environment, and working conditions could also be interesting for practical science communication purposes (e.g., Mcmeekind, 2010). They allow a glimpse into what life in the lab looks like, what it means to be working as a scientist today, and what scientific work actually looks like in practice. Some of these music videos are very humorous and entertaining (e.g., ScooterTHd, 2011; UEA BMRC Laboratory, 2011). They allow an

insight into the settings of lab work even for people who do not have a great interest in science. Sometimes, they also have a subversive edge, especially if they are shown together with overly positive depictions of science.

The Lady Gaga parody "Bad Project" (Zheng Lab, 2011), for instance, addresses the efforts and hardships that need to be endured in order to gain a science PhD when the research is not going well. The clip follows a PhD student in her everyday work in a lab while she sings about various issues that trouble her. Through the backdoor, the clip introduces various topics that concern many young scientists today, such as the pressure to publish, short-term contracts, the dependency on superiors and funding, and also an intercultural component, when scientists from all around the world meet in multicultural labs and maybe have different ideas about how and in what languages samples should be labeled.

In general, the music video clips mentioned here can be differentiated into two different types of videos: nonofficial "amateur" videos, produced by grad students, lab groups, and other individuals, and official and more or less "professional" videos, produced by research organizations and other established institutions. The motives for producing these clips and their (science) communication objectives often differ. The nonprofessional clips often parody current popular songs and are used to vent scientists' anger about everyday issues that bother them. Some videos are also used to make their voices heard or make a stand against opposing views. The purpose of the more professional clips is often to promote a particular research project and advertise institutions, funding programs, and products.

Music videos about science have the advantage that they are short and that they can easily be shared via online video-sharing platforms such as YouTube or Vimeo. Many mobile devices now also make it possible to watch music videos on the go. These developments allow popular music video clips to become "viral" if they are done well. In this sense, they have the potential to reach a huge number of viewers. If the science in these clips is accurate and valid and if they are entertaining and gripping too, they have the potential to become helpful tools in science education and science communication (e.g., Watercutter, 2011). The danger implied is that music videos that are too superficial trivialize science. As shown in some examples, people who reject scientific information and results also know how to use this media format to their advantage. In the current scenario, it is therefore likely that we will see more music and other video clips about science, technology, and related issues in the future and that social media are used as arenas for promulgating messages about and against science. The science communication and education communities would in all likelihood do themselves a favor if they already

had these kinds of developments on their radar and if they looked beyond the obvious routes of communicating science.

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1. The clips mentioned in this contribution have been found using online search engines or were recommended by colleagues. Since online content is volatile and difficult to sample systematically, the provided references serve as illustrative examples only. There are many more scientific music videos available on the Internet, but due to limited space, they cannot all be cited here. I apologize in advance for nonfunctional links in references. Music videos are often stored in various locations on the web, so it is helpful to search for the titles of music videos, which can often be found under more than one URL.

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