Eureka! Film Competition / Yale
Science Storytelling MasterClass

The basics of science communication

Popularization is an attempt to reduce the distance standing between science and everyday knowledge. To overcome that distance it is necessary to build a new special discourse, in which scientific knowledge is subjugated to a process of transformation to the audience's way of understanding. Since, in principle, science is not among the areas of interest of most people, it has to be approached to the public's interest. There are several techniques or resources which help in the process of making the message interesting and easy to understand. These techniques are not the only key to communication effectiveness, but they can help in the process when they are properly used.

The golden rule of science communication (any communications actually), and the key to its success, is to focus on your audience and take care of it.

Respect your audience. Communicate with them, don't give them a lesson. Be thoughtful with their feelings. If people are concerned that a particular area of science may be dangerous, don't say "trust me, I'm an expert". The scientific method separates the scientist as an individual from their research but when it comes to communications it is important to pay attention to the human element. Not just because scientists are humans, but also because the human connection is what keeps people engaged. That connection happens on an emotional level, so it's important to find elements in your subject that will touch the soul of the audience.

Film as a medium for science communication

To turn science into a good film for television, theater or mobile devices it must jump the gap which stands between science and common knowledge. Narrative structures used in television are mainly of a poetic and dramatic kind. This medium does not communicate intellectual, theoretical or technical knowledge in a detailed logically structured way as science does. On the contrary, it tries to build interesting discourses, to be able to attract viewers' attention through practical interest and emotional appeal.

How to tell a story

Any film needs a storyline, or plot, to hold the viewers' attention and lead them to the end. The storyline is decided at an early stage in the production process and totally affects the content of the film, since any information which does not fit perfectly in that plot will be left aside.

There are different levels of storylines: Some series tell a story as a whole; e.g. the BBC series *Seven Worlds, One Planet* tells the story of our seven spectacular continents and how they shape the extraordinary animal behavior we see today. Each episode focus in an continent and has its own storyline. For example, the one about Antarctica explains how animals have adapted to the coldest, windiest, most hostile continent. It shows penguin chicks run the gauntlet of orca and leopard seals, colorful starfish and gigantic worms carpet the seabed and one of the world's greatest feeding spectacles, by humpback whales. In each episode, some sequences are organized as highly dramatic stories with a beginning, middle and end, where a central character faces a conflict which, finally, comes to a solution. For example, the humpback whales bubble-net feeding technique, a type of feeding that it's done in groups.

<u>CHOOSING THE STORY:</u>
To build a storyline, the first step is to decide what our film is going to be about. In other words, what's the story you are going to tell.

A common mistake is to mix up a story with a topic. How to identify a story from a topic?

Let's say you're thinking: I want to create a story about…

- Time travel to other worlds through wormholes
- The revival of extinct species through genetic engineering

...then you have a topic, not a story. These are the topics at the heart of the mega-popular films *Interstellar* and *Jurassic Park.*

Without a plot, each of these things is just a topic. Take a look at how the authors of these two examples made the leap from topic to story:

- At a time where humanity is struggling to survive on planet Earth, a group of astronauts travels through a wormhole near Saturn in search of a new home for humanity.
- The collapse of an amusement park full of cloned dinosaurs shows the dangers of scientists messing with Mother Nature.

When in doubt, how do you know if you have a topic or a story?
Stories need characters, conflict and timeliness. A good way of figuring this out is to ask yourself:

- Can I communicate the entire thing in a single, declarative sentence consisting almost entirely of nouns? Then it's a topic.
- Is it time sensitive? Then is a story. In *Interstellar* Earth is turning into a gigantic dust bowl, where those who don't starve when crops wither soon face asphyxiation as nitrogen levels gradually rise in the atmosphere. This leads a group of astronauts to embark on a space odyssey leaving his children behind for a decades-long trip into space on a mission to save the Earth.
- Does it contain identifiable characters? Then is a story.
- Can I pinpoint the conflict? That makes it, definitely, a story.
- Is it heavy on theme, short on details? It's probably just a topic

How to pick the best story?
There's no golden rule to it but a good guide is to pick something you'd feel compelled to tell people over a drink or at a backyard BBQ. And then be provocative, simple and factual. Other ways of figuring out if your story is a good one are:

- Will this story challenge what we thought we knew? (It is surprising)
- Why would viewers care about this? (we usually are biased)
- Why is this story important? Why now?

RESEARCH:

Once you have the story, the next step is to learn everything you can about your film subject. This is where you put on your reporter hat. Do a lot of digging and follow leads. Gather facts, make calls, interview people… The gems of your story are sometimes buried deep out of sight.

Write down the main ideas you get from your research . It will help you identify the core story points of your film and how to organize them to create a sequence with them.

SHOT LIST:

This is a list of the footage and interviews you will need to make your film. Think of it as your list of "ingredients". Include here:

- If there is existing footage or photos that help tell your story or will everything need to be shot brand new.
- Who are your primary characters. Who do you want to interview.
- What locations do you want to visit and shoot. Landmarks that are essential to your story. In every film there are places that define the characters and the story. If you can film these places, they will give your project power and depth.
- What activities do you want to capture.
- Is there some existing situation you can film or do you need to create the moment?

A word about interviews. You may be tempted to put a lot of people on your interview wish list. There are no rules because each documentary has its own set of circumstances but in general, it is hard for an audience to get to know more than 7-8 characters within one film. So even if you interview 100 people, don't be surprised if you are only able to fit a fraction of them into your film.

A word about activities. Think about the activities the people in your documentary do as they go through their daily lives. As you list situations that might be filmed, give some thought to the sequences of events. In *Seven Worlds One Planet*, a BBC documentary series, filmmakers wanted to show humpback whales' bubble-net feeding technique to feed multiple mouths at one time. To tell the story they shot all the events leading up to the feeding moment, including the trip to Antarctica to film the whales, the preparation of the boat, how they approached them without disturbing them, the preparation of the drones since it is a process that it is better seen from above, and how they quickly responded to the sudden appearance of the whales at the surface.

The sequence concludes with footage of the spectacle of several humpback whales teaming up in bubble-net feeding.

Think also about mundane tasks. Things like going to market, or drinking a cup of tea. Consider events that happen once a year, like a birthday, or once in a lifetime, like a wedding or a graduation.

When you make a list of these situations, be alert for the ones that seem to have the most "life." Such situations will naturally rise to the top of your shooting list.

WRITING THE SCRIPT / STRUCTURE:

Many science documentaries are unscripted. This means that you can't plan everything beforehand. You simply give yourself guidelines and let the story evolve based on the material.

Some filmmakers write a treatment or preliminary script before they begin shooting with the information gathered during the research and they develop it gradually in the editing room based on the footage. Other filmmakers, after the initial research, they assemble a crew, contact interviewees, and start filming. Then they watch each day's footage, choose the best clips, and allow the story to emerge developing the script gradually.

None of the options above is better or worse. It depends on the filmmaker and how he/she feels more comfortable.

To write the script, the written document containing the dialogue and action for your film, pinpoint the most compelling elements of your story and start crafting "mini-scenes" around those events. Remember, a script isn't necessarily what's spoken or a voice-over. A script describes what the audience is seeing AND hearing.

When writing the script, to give to your story an effective overall structure follow the following guidelines:

The opening: it is the most important part of the script to capture your audience's attention. It is in the first few seconds that the viewer will decide if he/she will watch your film or not. You should give an idea compelling enough to hold their attention and keep them with you. Choose something intriguing. Even surprising. Build tension, suspense, by playing with the footage, the music, sounds and/or the words.

Put yourself in the mind of your viewer: when you are building your script, if you include some ideas on the edit but leave things out, for you it is easy to fill in the gaps because you have the knowledge. But your audience doesn't. They rely on you to understand the story. So if you have taken out an idea that it is important to not get lost in the story, put it back in. If the idea is not essential, take it out.

When in doubt on how to choose what should stay and what should go follow the criterion of "telling stories and presenting facts the way I would like to hear them if I knew nothing about that subject".

Don't try to explain everything: There's a paradox at the heart of science communication. On the one hand, you have to make sure that you include essential pieces of information in a story. But you cannot try to include everything about your story. A substantial amount of the work in giving a story structure is figuring out all the stuff you can throw out and still get away with a successful, compelling, narrative.

Some scientists think this simplification inevitably means distortion of reality. As Carl Zimmer says: *you are not trying to create a replica of reality but a well-made shadow.*

Often, simplification means reduction of dimensions to a smaller scale, where human beings feel comfortable. A brilliant example (widely used in highly successful documentaries like Attenborough's *Life of Earth*) is to compare the whole history of life on our planet to a one-year calendar, in which humans would not have appeared until December 31st.

In particle physics people think particles are like ping pong balls, and we know they are not; it is a simple metaphor. You have to know how far can you go in simplification and, unfortunately, there's no algorithm to help you figure out when you have gone too far.

Don't underestimate your public: Don't assume the audience is stupid. Admit that the world is complex and try to deal with it. Not everyone will understand everything you say - if they do, you have probably made it too simple - but hopefully people will go away motivated to learn more. It is more important to ask questions to your audience than to try to give them all the answers.

STYLE:

Stories are about people: science doesn't happen by itself. We are used to read headlines like "A study finds that exercise lowers the risk of several types of cancer" but studies don't find anything. People run the studies and people find out things.

When you interview people, try to understand their experiences as human beings. Scientists are not robots chunking out new bits of knowledge. Asking simple questions such as, "How did you end up spending your life studying quantum physics?" or "What is the most important experience you have had as a marine biologist?" can unleash powerful human stories.

Writing about people also helps attract viewers who might not otherwise watch your film because they are not passionate enough about your subject. People like to read about people. To get viewers to care about something -say the mantis shrimp- try to make them care about the people who care about mantis shrimps. (Note: this animal, just a few inches long, has one of the most powerful punches in Nature).

Conflict & Suspense: conflict is an essential element to hold the viewers interest in any film. Some scientific issues do not offer many opportunities for conflict. However, quite often a conflict can be found in the scientific research process. Wildlife films, for example, show three different kinds of conflicts: individual vs. environment, predator vs. prey, and individual vs. another individual of the same species.

When a story is told by means of one or more characters facing a conflict, another very useful narrative resource can be used: suspense. Suspense is a doubt that appears in the viewer on whether a character will be able to achieve their aim. Therefore it must be based on advancing some information about the character's objective, so that a situation of uncertainty can be created. Wildlife films show many situations of suspense, especially those related to animal fights. Very often, music plays a very important role in those situations, since it reinforces the sense on uncertainty.

Avoid jargon: Scientists invent words, which they use to talk to each other efficiently. But most people outside a scientist's field of expertise have no idea what many of these words mean, including other scientists. These are not the words to tell stories with.

Everyday language has a wonderful power to express the magic of scientific research without forcing readers to pick up a dictionary or leaving them clueless trying to understand what you just said. Astrophysicist Roberto Trotta in his book, *The Edge of the Sky*, tells the story of how the universe was created restricting himself to the 1,000 most commonly used words in English.

The hard part is: there's no rule you can use to determine what's jargon and what isn't. You need to develop your mind-reading abilities. You need to be able to put yourself in other people's shoes. If you need help, find a friend who is not an expert on your story's subject and conduct a little vocabulary quiz.

There may be times when you absolutely have to use jargon. These times are far rarer than you may think. If you choose to introduce a term, do not simply throw out it out in a sentence and then explain it later. Do the opposite. Until readers grasp the concept behind jargon, it acts as dead weight that pulls your story down into the murk of confusion.

Avoid formality: Scientific language can be too formal and unwelcoming sometimes. Formality is dangerous because it drains the passion, just the opposite of what we want: to let the audience experience wonder, anger, fear, outrage… when watching a story about science.

Use active voice: The scientific community favors writing in the passive voice. You shouldn't. The passive voice destroys the impact of action and, by doing that, it dissolves the story.