

STORYTELLING IN THE PLANETARIUM: KEEPING IT CASUAL AND MAKING CONNECTIONS.

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Introduction: Our goal is to lower the boundaries for scientists to telling informal stories about science and the sky. One venue that offers an easy and natural connection between planetary scientists and the public is the planetarium. Everyone listens to and tells stories, and anyone who wants to can be a storyteller for an audience [1]. Here we focus on the communication styles that help make storytelling in the planetarium a success.

Storytelling in the dark cannot depend on the body language cues that are so useful in assessing the interest level and comprehension of a group or individual. We have experienced success with effective (enjoyable and educational) storytelling in the planetarium, using an approach that is informal, accessible, and sometimes interactive. This style of communication is suitable for reaching a wide range of the public.

Star stories know no bounds: The awe felt beneath the vastness and beauty of a starry sky is a common experience, for scientists and non-scientists, children and adults alike. Cultures throughout human history have created stories in order to remember and celebrate the details of the night sky [e.g., 2–4].

However, legends and myths from within various cultural contexts are not the only types of “star stories” that can be told in a planetarium. Naturalist stories, for example explaining how star color is related to temperature, can be just as engaging. So can scientific stories, the stories any planetary scientist has to tell about their work and their field of research in general.

Storytelling in the Einstein Planetarium: The Einstein Planetarium has offered public programs on astronomy and space exploration since the National Air and Space Museum opened to the public in 1976. We utilize two systems for simulating the night sky. Our Zeiss mechanical-optical projector is operational and still provides a superior view of the night sky. However, for most programs we use a digital projection system. Each of our speakers on the staff have developed partially personalized programs.

In recent years, we have experimented with a new series of educational programs that explore use of cultural understanding and traditional sky knowledge. These programs have included explorations of indigenous perspectives with the National Museum of the American Indian, presentations on Polynesian navigation, and a series of lectures focusing on sky visibility across Africa in conjunction with the National Museum of African Art. Although the majority of our pro-

grams will continue to center around sky observations and new science, these new avenues of outreach provide an excellent companion that we hope to use in reaching new audiences.

Components of a live planetarium show: Success in giving a live planetarium show depends more on storytelling than on visual production. We offer live 25 minute sky lectures multiple times per week. The show changes based on the time of year, and where the moon and planets are in the sky, but to an even larger degree based on who is giving the talk and what stories they choose to tell.

We each have different types of stories we like to tell, but the common approach we use is in the style of presentation. The following guidelines can be used by anyone telling stories in a planetarium (or anywhere, for that matter), and are an easy way to start thinking about the stories you would like to tell.

1) *Share your enthusiasm for the subject:* Your audience will not have exactly the same interests as you, but they will know that the subject matter is exciting if you are excited to be telling the story. While scientific presentations are relatively formal, with a primary goal of convincing the audience of the factual correctness of the content, a main goal of the “star story” version of your research is helping others see it as interesting and enjoyable to work on.

Whether you want to talk about mythology, amateur astronomy, or planetary science, your excitement for the subject will act as a signal to the audience, letting them know that they can feel similarly. An easy way to help this happen is to use an informal style of conversation, as if you were talking to a friend, with colloquial rather than formal language.

2) *Use accessible wording and concepts:* Depending on the age and background of your audience, different concepts will be accessible to them. While everyone is familiar with storytelling, the public has a wide range of exposure levels to scientific concepts. However, having little to no background in astronomy, or not having the habit of closely observing the natural world, does not mean that naturalist and scientific “star stories” are off limits.

Complex ideas can be explained with simple, familiar words; as Albert Einstein said, “If you can’t explain it to a six-year-old, you don’t understand it yourself.” Keeping acronyms and topic-specific lingo out of the story will allow everyone in the audience to connect to the ideas. Using familiar words throughout

the story will take more time than using specialized language, but it will allow your audience to share your wonder for the topic.

3) *Hook the audience (create anticipation)*: Finally, telling a good story requires the audience to care about its conclusion. Creating anticipation of the arc of the story helps people pay attention and understand a story [5], whether it lasts 30 seconds, 5 minutes, or a significant part of the show. Hooking the audience at the beginning of a story is a great way to start your storytelling.

Hooks for drawing in the audience: These are some of the hooks we use when telling scientific stories in the planetarium.

Open questions in science: Although people learn about the process of doing science, and the resulting scientific knowledge, in many different environments in their lives, there is commonly held belief that science is a collection of facts. Science is more interesting if we think of it instead as a litany of unanswered questions, questions that lead to fascinating puzzles that someone, somewhere might figure out.

We use open questions in space science to get the audience interested in the stories we will tell, including those related to our own research. When there is not a particular answer anticipated at the conclusion of a story, the audience members are invited to do their own speculating. Speculating on what is unknown means first learning what is known, which provides a personal incentive to listen to an interesting scientific story.

Scientific discovery as an adventure: Related to bringing up open questions in science is telling the story of scientific discovery. The discovery of a particular concept or fact in planetary science has a history that we reference when writing papers, and may learn in parallel with the basic physics concepts we use. There is an aspect of heading out into the unknown when we start a research project, and a sense of having an exciting conclusion at its end. Highlighting the excitement of participating in the process of discovery can help your audience relate to doing science, if only by analogy to an adventure of their own.

Recent discoveries in science: Another hook we use in the planetarium is to bring up recent discoveries in astronomy and planetary science. Something in current events works well, such as how many extrasolar planets have been confirmed to date, while pointing out the location of the Kepler Mission's field of view. Your audience will probably find that some the most interesting recent discoveries you can talk about are your own, if you can talk about them accessibly.

Familiar entry point to the topic: Using a cultural-familiar image of the story's subject matter, even if

it is not connected to the science you will talk about, is a good way to get people thinking about the topic. For example, if you are talking about the possibility of finding evidence for present or past life on Mars, you might start by mentioning that people used to think there was life like us on Mars, based on seeing 'canals' on the surface, and then talk about recent observations.

If you're talking about the Moon's composition, you might start by mentioning the old phrase 'the moon is made of green cheese,' and then saying that it is actually similar to the Earth. Science fiction could be your entry point, or a cultural origin myth (with the caveat that the scientific understanding is explained as another way of understanding the object's origin, rather than a correction to mythology). You could even use a common experience, such as observing that things fall downward on Earth, to segue into talking about gravity and the mass of other planets.

Interaction: There are multiple levels of interaction that can work well in a planetarium, depending on your flexibility. A particularly interactive style would actually call for audience participation. One benefit of having the audience call out answers to yes-or-no questions, or to identify an object, is that there will almost always be someone who calls out the correct answer(s), which you can reinforce by explaining a bit more about the answer.

Asking open-ended questions that do not require an answer (such as 'What animal do you think this group of stars looks like?', or 'Where would you want to land on Venus?') is another way to draw the audience into the story, in that they invite the audience to be part of the storytelling process.

What story will you tell? The following questions are a good place to start thinking about what stories you would like to tell in your local planetarium.

What are your interests?

What are your favorite stories about those topics?

How did you become interested in science?

What are you most comfortable talking about (no memorization necessary)?

You don't have to be an expert on the topic you choose for storytelling, you only have to be excited to share it in an informal and accessible way. Keep it casual, connect to your audience, and tell a story you'd love to hear.

References: [1] Meader, J. T. et al. (1993), *The Planetarian* 22, N.4. [2] Thompson, V. L. (1966), *Hawaiian Myths of Earth, Sea, and Sky*, U. of Hawaii Press, Honolulu, HI. [3] Taylor, H. P. (1993), *Coyote Places the Stars*, Aladdin Paperbacks, New York, NY. [4] Rey, H. A. (1952), *The Stars*, Houghton Mifflin Co., New York, NY. [5] Stephens, G. J. et al. (2010), *Proceed. Natl. Acad. Sci.*, doi:10.1073/pnas.1008662107.