

Science on Set

Depictions of science in television and movies can affect individual health decisions, influence public policy, and inspire imagination. Practicing scientists who consult for the entertainment industry aim to help accurately communicate complex scientific topics, without forgetting that the story is king.

Last spring, 9.39 million people heard Dr. Miranda Bailey tout the potential medical benefits of personal genomics.

“Genetic mapping can lead us to developing targeted therapies for diseases,” she said fervently, bringing us closer to a future of “precision medicine, where we treat illness at its molecular source, instead of just dealing with the consequences.”

Bailey is a fictional character on the popular medical drama *Grey’s Anatomy*, but it was real-life Harvard geneticist Ting Wu who helped her make her case. Wu connected with the *Grey’s Anatomy* team through Hollywood, Health & Society (HH&S), a University of Southern California program that provides the entertainment industry with accurate health information, and worked with them to develop a storyline around opening a personal genomics lab.

“I wanted to take advantage of the power of entertainment” for outreach and education, Wu says.

Television shows, movies, and other forms of entertainment are ideal outreach venues for two main reasons: emotional connection and numbers. Entertainment is about transporting viewers to another world through storytelling, which HH&S research shows is associated with increased change in knowledge, attitudes, and behavior. With the average American watching over four hours of television per day according to Nielsen, viewership can be huge, so a well told story can have far-reaching effects.

The common pitfall, of course, is when entertainers don’t convey the scientific details correctly. In many cases, though, these issues can be addressed simply by connecting writers and producers with scientific experts to provide input and fuel for imagination.

Bring in the Experts

The medical implications of personal genomics are complex, and with the rise of companies like 23andMe and examples like Angelina Jolie’s recent genetically motivated double mastectomy, it is increasingly important that people understand the possible benefits and risks. Wu, who studies chromosome organization, position, and behavior, feels that disseminating this information is part of her responsibility as a geneticist.

“You want potential medical benefit to be equally accessible to everyone,” Wu says, “and awareness is the most powerful tool.”

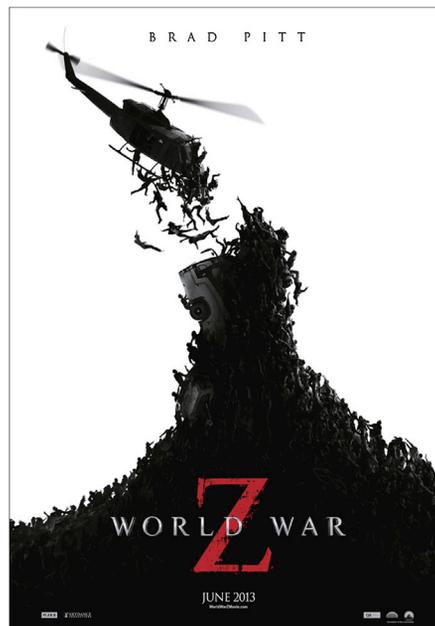
Working with *Grey’s Anatomy* may have provided one small opportunity to help spread awareness. When one of the characters learns she is at risk for Alzheimer’s

disease, 8.58 million viewers heard her husband assure her, “you tested positive for the risk factor genes, that doesn’t mean you’re going to get it.” These types of carefully crafted nuggets of information can stick with viewers without derailing the show’s main priority: the story.

Wu has consulted on five television shows and two feature films since becoming involved with HH&S in December 2012. She works with the writers and producers, answering their questions and offering her suggestions, but she doesn’t get the final say about dialog or plot choices.

“It’s been a journey because, as a scientist, I want to know how the information is being used, and I’m very picky about how things are said,” Wu says. “It’s been a process learning how to let go. If I try to control too much, it doesn’t translate well to the public. They don’t care about the details; they care about the story. We want to reach a broad audience, and I wouldn’t want to jeopardize that by shows becoming inaccessible.”

Wu is one of many active scientists who volunteer their time to consult for the entertainment industry. Between October 2009 and October 2012, HH&S tapped 483 scientific and medical experts, and has brought in experts to consult on



The collective behavior of the zombie hordes in *World War Z* was inspired by the study of ant swarms.

over 120 television programs since its founding in 2001.

For stories not related to health, entertainers looking for scientific input can contact The Science & Entertainment Exchange, a National Academy of Sciences program whose advisory board includes former Secretary of Energy Steven Chu, neurologist and author Oliver Sachs, and genome scientist J. Craig Venter as well as Hollywood figures like Jerry Zucker, Dustin Hoffman, and Rob Reiner, among others. The Exchange has connected scientists and entertainment teams for over 500 projects, including television shows like *The Big Bang Theory*, *The Good Wife*, and *Castle* and movies such as *The Avengers*, *Iron Man 2*, and *Thor*.

Informing Imagination

Even when entertainment goes beyond modern reality to imagine futuristic technology, magical superheroes, or world-changing disasters, scientists can provide valuable input to insure that the story is plausible, or at least scientifically informed. For example, the team behind the zombie apocalypse movie *World War Z* sought out Penn State entomologist and “zombie ant” expert David Hughes to provide a scientist’s perspective on the rise and spread of a theoretical zombie epidemic.

Hughes is an expert in parasite manipulation of insect host behavior, including the so-called “zombie ant” fungus. When the fungal spores infects the ants, it causes them to climb to a high elevation (the fungus’s manipulation of the ants’ behavior gave rise to the “zombie” moniker), kills them, and grows a stalk-shaped fruiting body from the corpse, which rains down spores on the ant colony below.

Hughes drew from a huge variety of natural systems to inform and inspire the *World War Z* team as they decided how their movie zombies should behave.

“There is a smorgasbord of natural history from which they could take their

inspiration,” Hughes says. “It was all just grist for the mill.”

For example, he told them about parasitic wasps that exercise host discrimination, only infecting those that are not already infected; swarm intelligence, like the synergism seen in some ant societies; and the cooperation seen between closely related deer mouse sperm.

The *World War Z* team used many of these ideas to shape their zombies. Like the parasitic wasps, the *World War Z* zombies exercise host choice by not infecting the terminally ill or seriously injured. They also display collective behavior by cooperating to capture their victims instead of pushing each other away. By looking to natural systems for inspiration, Hughes helped create a unique, sophisticated zombie with realistic biological behavior.

“Collective behavior is such a common feature in nature, so to see that represented on the Hollywood screen, that’s great,” Hughes says.

The Story is the Key

Whether they’re working on projects firmly rooted in reality or exploring the boundaries of an alternative reality, both Wu and Hughes emphasize that the science must serve the story.

“My job is not to tell them how to tell their story,” says Hughes. “I tell them the biology; they can edit it.”

Leslie Kenna, a pharmacologist for the US Food and Drug Administration by day and screenwriter by night, has also internalized this lesson. She began screenwriting in 2009 through an American Film Institute program that paired scientists with writers to create a feature-length screenplay. Although they chose not to market the project, she learned a crucial lesson: “You can’t let the science get in the way of the story.”

Telling a good story isn’t just about keeping the audience engaged; a well told story also helps the science shine

through, which can even inspire someone to pursue science on their own.

The best movies and TV shows emotionally transport and inspire their viewers, and “that’s what sets off the spark that might send people down the path to study rocket science,” says Kenna.

Hughes, who grew up in “gritty, dirty part of Dublin” and explored nature by searching abandoned buildings for deserted nests, sees entertainment as a way to reach kids who may be growing up under similar conditions. “Out there, there’s some kid who can latch on,” he says. For him, the best outcome would be if his work inspires them to explore science themselves.

“We’re discovering beautiful, intricate details of biology, and we have a great story to tell,” Hughes says. “This is just another way to get the research out there...It’s a ridiculously good opportunity to be able to link up with professionals.”

Kenna also believes that working with the entertainment industry offers her a fresh lens for her scientific work.

“It gives you a chance to step back and look at your own work and ask, ‘What’s interesting about this to people who haven’t been thinking about it for 15 years?’,” she says. “It’s inspiring for yourself, because it keeps you focused on why you came down this path in the first place.”

And when it comes down to it, Kenna, Hughes, and Wu all agree: it’s just plain fun.

“I can see doing this for a long time,” Wu says. “You can see the audience sit up and take note and get excited. It’s tangible.”

Want to Get Involved?

If you would like to work with entertainers to make sure they’re getting their science right, contact Hollywood, Health & Society (hollywoodhealthandsociety.org) or The Science & Entertainment Exchange (www.scienceandentertainmentexchange.org) to join their list of experts.

Rachel Bernstein

San Francisco, USA

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