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## The Path to Nerdvana

*It is said that science fiction and fantasy are two different things. Science fiction is the improbable made possible, and fantasy is the impossible made probable.*

Rod Serling, *The Twilight Zone* (1962)

*The reality of nature is far more wondrous than anything we can imagine.*

Neil DeGrasse Tyson, Host, *Cosmos: A SpaceTime Odyssey* (2014)

*Science fiction is no more written for scientists than ghost stories are written for ghosts.*

Brian W. Aldiss, Science fiction author and historian

In the Buddhist religion, *Nirvana* literally means “blown out,” as one might blow out a candle or a match. Nirvana is a profound and imperturbable serene state of mind, arising when the fires of desire, delusion, and aversion are extinguished. It is a state devoid of suffering, and everybody’s path to Nirvana is different. As we see it, in the Way of the Nerd, *Nerdvana* means “blown out” as in “mind blown.” It is that profoundly excited, albeit transient, state of mind arising when the writer of a movie or television episode serves up a helping of badass—smothered in awesome sauce and seasoned with win—while extinguishing the fires of “Oh please!” and “Really?” It is a state devoid of suffering, and everybody’s path to Nerdvana is different.

Both authors share a lifetime love of science-based, science-themed, and, in particular, science fiction movies and television<sup>1</sup>. Give us a bag of popcorn, a bottle of soda<sup>2</sup>, a *good* space battle—one that avoids forays into the trite and pays homage to the laws of physics—and we have achieved Nerdvana. On the flip side, every time either of us encounters an egregious or easily preventable

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<sup>1</sup> And books and magazines and comics and audio dramas and web series and, well, you get the picture. Our Nerd Fu is strong.

<sup>2</sup> Or Barry’s Gold Blend tea for the Irishman.

science gaffe, a worn-out science fiction myth, or an overused trope, Nerdvana becomes a far-off abstraction, and we transmogrify into Angry Nerds<sup>3</sup>.

Sadly, most of the science portrayed in Hollywood TV and film over the years has been weird science, it just wasn't until 1985 that a filmmaker used the term explicitly. Rockne S. O'Bannon, creator of many well-known science fiction series (*Alien Nation*, *SeaQuest DSV*, *Farscape*) explains why: "In the past, the vast majority of the audience probably didn't have much of a foundation in what the specific science was in any particular show they're watching. It just had to pass the smell test. If it seemed real, if there was a sense of verisimilitude to it, then that was satisfactory"<sup>4</sup>.

Shouldn't that be enough? Outside of documentaries, TV series and movies exist primarily to tell good stories<sup>5</sup> above all else, and storytelling has always included elements of the fantastic—ever since a *homo erectus* returned to the tribe without meat and told those gathered around the fire, "You should have seen the one that got away!" To sell the fantastic, storytellers learnt to use themes, events, and settings from the natural world to ground their stories in reality and imbue them with an air of plausibility, of *verisimilitude*.

*The Epic of Gilgamesh*, one of the most ancient works of literature<sup>6</sup>, incorporates animals (both wild and tame), a forest, mountains, the weather, even a flood, basing the story in everyday reality while exploring themes of immortality, life, and death. With everyday elements like these faithfully described and woven into the fabric of the story—points of reference that most people have observed, or events to which they can relate—the story became an extension of events in the natural world, and so the audience was less likely to question *Gilgamesh's* fire-breathing thunderbirds and scorpion men.

Is storytelling any different today? Not really. Despite the emergence of different forms of storytelling over the millennia—from Greek theatre to massive multiplayer video games—writers continue the tradition of grounding their stories in the natural world. A primary goal of the storyteller remains keeping the audience immersed in their story, and neophyte screenwriters are counseled to "never wake the audience from *your* dream." Anything that removes the audience from the writer's creative vision is to be avoided at all costs. Writer/producer Andre Bormanis (*Star Trek: Enterprise*, *Eleventh Hour*) explains, "The problem is that when you see something absurd, it pulls you

<sup>3</sup> You wouldn't like us when we're angry! It's a mixed metaphor, agreed, but true nevertheless.

<sup>4</sup> Grazier K (2013) The Science Advisor's Journey, in: Nelson D, Grazier K, Paglia J, Perkowitz, *Hollywood Chemistry*, pp 57–78.

<sup>5</sup> And generate revenue through tickets sales at the box office or advertisement time.

<sup>6</sup> Dating back to circa 1900 BC, perhaps even earlier.

out of the story. You are not in the world of the movie anymore. You're outside of it, commenting on it and being critical of it, because it's silly"<sup>7</sup>.

Although the goal of immersion has always been a constant, the things that will pull an audience out change with time. The days of Shakespearean asides to the audience are over<sup>8</sup>, or at least on long-term hiatus, but today there are many other less-obvious ways in which a screenwriter can pull the audience's attention out of the narrative. With ever more technically literate viewers, scientific gaffes in a film or television episode can transform each of them from being a willing participant, immersed in the writer's world in some distant future, to a person sitting in a room in the 21st century, arms crossed, saying "Oh, Please!" or "No way!" or "Really? Would that *really* happen? I don't think so!"

Northwestern University professor of biomedical engineering Dr. Malcolm MacIver, observes that the level of onscreen science fidelity that is acceptable to viewing audiences is, to some extent, culturally dependant: "Why is that realism is such a powerful force in movie making in North America and not so much in Europe? I think it has to do with, realism speaking to something in American thought that it doesn't, in Europe, [where] people are much more willing to have more poetic [story elements] and not have every little detail spelled out. That's something special, I think, that isn't characteristic of all people," says MacIver.

The answer might be found in science literacy. Although K-12 students in the United States consistently rank poorly when compared to students from other countries of the same age (and have been falling significantly behind other countries for at least the past 30 years), a 2007 study by Dr. Jon Miller, then of Michigan State University<sup>9,10</sup>, found a silver lining: adult science literacy in the United States actually surpasses most of the rest of the world, including Japan and every European country except Sweden. Miller speculated that it is the stricter science requirements in U.S. undergraduate programs that are responsible for the difference. (Before celebrating, Americans should be apprised that science literacy in the United States is still very low—so celebrating this "victory" is akin to a snail winning a race amongst other snails and claiming, "I'm Usain Bolt!" There is still a very long way to go.).

<sup>7</sup> Grazier K (2013) The Science Advisor's Journey, *Hollywood Chemistry*, pp 57–78.

<sup>8</sup> Mostly over, at least in dramas, where breaking the fourth wall is much rarer than in comedy. One notable exception in dramatic science fiction is the *Doctor Who* 1984 episode "The Caves of Androzani." Trau Morgus, one of the episode's antagonists, performs several Shakespearean-like asides to the viewing audience. Longtime fans of the show still consider this to be one of the finest episodes ever. Outside science fiction there are, of course, the 1990 and 2013 versions of *House of Cards*.

<sup>9</sup> Ralof, Janet (2010) Science literacy: U.S. college courses really count, *Science News*, Vol 177, 6, p 13.

<sup>10</sup> Miller, Jon D. (2007) The Public Understanding of Science in Europe and the United States. Paper presented at the AAAS annual meeting in San Francisco (Feb. 16).

The science literate in the American audience seem to be helping to improve onscreen science accuracy, or at least the perception of accuracy, in Hollywood productions. Screenwriters today are under increasing pressure to play to these more literate viewers for two primary reasons. First, the public's understanding of science has come a long way since the birth of television. The degree of fidelity to science that was acceptable in previous decades is no longer acceptable today. Even the laziest viewer of the 21st century has a better idea what the surface of Mars actually looks like than the most dedicated scientists of 1963. The result is that dialogue that worked on the original 1978 version of *Battlestar Galactica* would have elicited an "Oh please!" if included in the 2003–2009 reimagined version. MacIver, who was the science advisor on the 2010 television series *Caprica*, and who also consulted on the films *Tron: Legacy* (2010), *Man of Steel* (2013), and others, adds, "People have a much greater thirst for science and technology [these days] and that is probably related to technology dominating our lives to an ever more increasing degree." The silver lining for producers here is that the very same viewers that might be highly critical of scientific inaccuracies in a screenplay can be vocal supporters of a show if they believe that the storyteller has acknowledged their intelligence and honored the science. There is an incentive to get the science right.

Second, the Internet has had a major impact. In days long past, when learned elders were the purveyors of tribal oral knowledge, inquiring listeners dared not overtly challenge the storyteller, and there was little or no recourse to do a fact check anonymously. Even in the latter half of the 20th century, a visit to the local library just to determine if an episode of *Star Trek* got some aspect of science right might often have been considered too arduous. On that score, the Internet has been a game-changer. Tom DeSanto, producer for both the *X-Men* and *Transformers* series of movies, says, "With the Internet, and the amount of research that we can do immediately ... it used to be you had to go to the library and pull books. Now with this magic portal into the collective human consciousness, we can do a little more fact checking"<sup>11</sup>.

Not only can the Internet provide an individual viewer with a flood of information, it facilitates a ripple effect in the audience as a whole. O'Bannon explains, "I think we're living in a very different world. The bar has been set higher. With the advent of the Internet, if people are interested/passionate in a show, they might be inclined to go online, seek out others who are also fans of the show, at which point they have access to the world. Others who are interested in the same show, may, in fact, have the advantage of some scientific

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<sup>11</sup> Grazier K (2013) The Science Advisor's Journey, *Hollywood Chemistry*, pp 57–78.

knowledge and, therefore, [that knowledge] starts to encroach.”<sup>12</sup> So even if a viewer fails to notice a science problem in an episode of their favorite show, it’s sure that *somebody* else did and posted online about it—probably even before the end of the episode, thanks to social networks such as Twitter. (In a bid to boost first-run television viewing figures—i.e. to give people an incentive to watch their show when it first airs rather than streaming or downloading it later—broadcast and cable networks have been fostering “social TV” technologies that make sharing opinions about a show in real-time as easy as possible, a double-edged sword if there ever was one.) If word spreads that the science in a television series or movie is “stupid,” there can be a very real impact on that production’s ratings or box office performance, longevity, and, ultimately, revenue.

Of course, science fiction isn’t the only game in town when it comes to drawing upon science. We live in a technologically driven society. Consequently, scientific concepts and influences appear in nearly every genre seen on either television or the big screen. While it is true that there is no shortage of documentary TV series, movies, and even web content that (usually) portray science, scientists, and the culture of scientists correctly, or at least well, many of these are not produced in Hollywood. Biographical films, or biopics, usually, though not always, portray science accurately. On mainstream television, scientific themes, of wildly varying degrees of accuracy, have found play in procedural dramas like the *CSI* or *NCIS* franchises; medical dramas like *House, MD* (2004–2012); cop shows; daytime dramas; comedies<sup>13</sup>; and even cartoons. Still, science fiction is the primary torch-bearer when it comes to Hollywood’s portrayal of science, and it’s there that successes and failures in technical accuracy stand out in sharpest relief.

With the popular success of James Cameron’s 2009 film *Avatar*, and critical acclaim for television’s reimagined *Battlestar Galactica*—both of which were groundbreaking on several creative and technical fronts—the genre of science fiction has never been more popular or, arguably, more respected. With the possible exception of its close cousin fantasy, no other genre can compare to the variety of stories open to a science fiction writer. Heroes in works of science fiction have to go to greater lengths to emerge victorious. Average people, caught in extraordinary circumstances, have to overcome greater odds simply to survive. Lovers have to cross greater distances, in time as well as space, to be reunited<sup>14</sup>. Is it any wonder that so many of the highest-grossing

<sup>12</sup> Grazier K (2013) The Science Advisor’s Journey, *Hollywood Chemistry*, pp 57–78.

<sup>13</sup> For Hollywood science (and science fiction) accuracy, it’s surprisingly difficult to top *The Big Bang Theory*. They’ve got game.

<sup>14</sup> Amy and Rory Pond. Enough said.

films each year, and also of all time, are science fiction? The only thing that might be surprising is how long the genre has struggled for respect.

Another surprise is that it is television—for decades generally considered inferior to movies in terms of artistic credibility<sup>15</sup>—that has probably done most to improve science fiction’s critical reception. Shows like *Babylon 5* (1993–1998), *Lost* (2004–2010), and *Battlestar Galactica* pioneered and established a highly serialized approach to television storytelling that has become the format of choice for many of today’s best dramatic actors and writers.

## 2.1 I Can’t Define Science Fiction, But I Know It When I See It

The historical struggle for respectability gave rise to various internal divisions within the science fiction community. Consequently, the term “sci-fi”<sup>16</sup> was used for decades in a mostly pejorative sense, distinguishing pulp science fiction publications and low-budget “B” movies from more serious works of science fiction. As the genre’s critical reputation has improved, creators and fans have mercifully pretty much chilled out about this terminology and today “sci-fi” is, essentially, synonymous with “science fiction”<sup>17</sup>.

What do we mean by when we say something is science fiction, though? As already noted, science and technology motifs permeate modern screenplays. Yet nobody confuses *House M.D.* for *Fringe* (2008–2013), even though both have been known to feature experimental medical procedures with highly uncertain outcomes performed by a mentally unstable drug user. When James Bond climbed into a space shuttle to infiltrate a super villain’s space lair in 1979’s *Moonraker*, did the movie cross over into science fiction? What about when Bond drove an underwater car in 1977’s *The Spy Who Loved Me*?

When *The Encyclopedia of Science Fiction* was first published in 1979 it included a lengthy discussion and debate over the definition of science fiction, yet didn’t converge on a lone conclusive definition. Currently, Wikipedia currently cites 30 separate examples under the entry “Definitions of science fiction.”

<sup>15</sup> When Oscar-nominated movie actor John Lithgow decided to star in the sitcom *3rd Rock From the Sun* in 1996, pundits worried if he was committing career suicide. Now film stars like Matthew McConaughey, Claire Danes, and Steve Buscemi are as likely to be found on the small screen as the large.

<sup>16</sup> Science fiction Writer/Talent Agent/Superfan Forrest J. Ackerman first used the term sci-fi—similar to the then-popular term “hi-fi”—in the early 1950s. Although Robert Heinlien is sometimes credited with the first use of the term, he actually coined “sci-fic” a few years prior.

<sup>17</sup> In these pages, we will use “science fiction”, “sci-fi”, and “SF” interchangeably and as qualitative equals.

Taking the minimalist and tautological approach, controversial author Norman Spinrad offered, “Science fiction is anything published as science fiction.” No help there, nor from author Damon Knight: “[Science Fiction] means what we point to when we say it.” Legendary editor John W. Campbell suggested, “To be science fiction, not fantasy, an honest effort at prophetic extrapolation from the known must be made,” but this definition suffers by defining the genre, in part, by what it is not. Science fiction legend Theodore Sturgeon claimed, “A science fiction story is a story built around human beings, with a human problem, and a human solution, which would not have happened at all without its scientific content.” While the best yet, that definition could still be applied to today’s procedural dramas like the *CSI* series, *NCIS* series, and medical dramas like *House, M.D.*—none of which are considered science fiction. Science fiction novelist David Brin quips simply, “Science fiction posits possibility that our children do not have to repeat our errors. That does not mean that all science fiction has to be optimistic.” Literary scholar Tom Shippey believes, “Science fiction is hard to define because it is the literature of change and it changes while you are trying to define it”.

So let us offer our own working definition for the purpose of this book: To be science fiction, (most of) the situations, natural phenomena, and technology in a story should be either plausible or based upon scientifically understood laws and theories at the time of the work’s creation. In addition, the story must also make a departure into the unknown—there must be some element of *what-if*, however well-grounded. What if we could travel to another star? What if we could make intelligent machines? What if we could manipulate our own DNA?

## 2.2 It’s Alive! Fictional Science: History and Attitudes

Both the French author Jules Verne and the British author Herbert George Wells have been referred to as “The Father of Science Fiction”<sup>18,19</sup>, though Verne’s writing career predates that of Wells by easily 40 years. Through both were pioneers of sci-fi, they had sharply different approaches, establishing a division which manifests in work produced to this day.

Verne was the more devoted to accuracy within his science romances: his first version of *Five Weeks in a Balloon* (1863) was rejected for being “too

<sup>18</sup> Adam Charles Roberts (2000) *The History of Science Fiction*, p 48 in *Science Fiction*, Routledge, ISBN 0-415-19204-8.

<sup>19</sup> The accepted term for science fiction stories in the era when these men wrote was “scientific romances.”



scientific.” Verne was also fascinated with exploration. In his day, explorers from many countries were eagerly surveying every unknown (to Europeans) expanse of the globe. In a twist on this largely horizontal activity about the Earth’s surface, Verne often imagined vertical excursions, such as in *A Journey to the Center of the Earth* (1864), *From the Earth to the Moon* (1865), and *Twenty Thousand Leagues Under the Sea* (1870)<sup>20</sup>.

H.G. Wells was less interested in rigorous adherence to science, and more interested in using fantastic stories as platforms for social commentary, a tradition continued by Hollywood with television series like the original *Star Trek* and the reimagined *Battlestar Galactica*. Take Wells’ 1895 novel *The Time Machine*. Despite a veneer of scientific explanation (which Wells cribbed from an earlier short story he’d written about time travel), *The Time Machine* ducks exploring the implications of voyaging through time, such as the grandfather paradox or the manifestation of chaos known as the Butterfly Effect (both staples of later works of time travel). Instead, the novel is primarily a satire of the rigid class structure of 19th-century Britain, being mostly set in a far future when humanity has divided into the dim-witted but beautiful Eloi and the brutish but industrious Morlocks. It’s basically *Downton Abbey* in the year 802,701 A.D.

I prefer to see SF as a mirror to the present. Set up that mirror 50 years into the future and today’s confusions become clearer.

Brian W. Aldiss, Science Fiction Novelist

Dr. James Gunn<sup>21</sup>, science fiction author, Professor of English, and founder of the Center for the Study of Science Fiction at the University of Kansas, shares his view:

My thesis, at least, is that they [Verne and Wells] probably share the title of the “Father of Science Fiction,” of their own kind. It seems to me that there are two major elements, or trends, in science fiction. One we can call the Vernian tendency of science fiction adventure and exploration and discovery, and there’s the Wellsian version of philosophical consideration of change itself, and you can see those elements still existing in science fiction. There’s a whole tradition of the Vernian adventure story, and the use of technology and exploration, and then there’s the Wells idea story of philosophical considerations

<sup>20</sup> Verne also wrote a Faustian Romantic fantasy entitled *Master Zacharius or the Clockmaker Who Lost His Soul* (*Maitre Zacharius ou l’horloger qui avait perdu son âme*), about a clockmaker whose intense pride leads to his damnation. In some respects, this was an 1850’s Michael-Crichton-like cautionary tale about scientific hubris. The short story was adapted for television twice in 1961: for the *Shirley Temple Show*, and for *Alfred Hitchcock Presents*.

<sup>21</sup> Not the same James Gunn who co-wrote *Guardians of the Galaxy* (2014).



and notions and the exploration of concepts rather than the extrapolation of technology into the future.

Robert Sawyer believes that it is Wells who deserves the nod for overall title “Father of Science Fiction,” explaining, “Wells was writing science fiction as social commentary ... Verne was the Tom Clancy of his day, producing technothrillers, but without any cutting edge. Wells, though, wanted people to think: about the British class system when he wrote *The Time Machine*, about the evils of colonialism when he wrote *War of the Worlds* (1897). Science fiction isn’t just escapism, thanks to him. If we’d only had Verne to build on, we might have had the original 1970s *Battlestar Galactica*, but we’d never have had the 21st-century reimagining”.

Rod Serling, creator of *The Twilight Zone*, was cut from the same cloth as H.G. Wells, and wrote tales of science fiction and fantasy as vehicles for social commentary. He said, “On *The Twilight Zone*, I knew that I could get away with Martians saying things that Republicans and Democrats couldn’t”<sup>22</sup>.

The original *Star Trek*, was never about the future, it was about the world of the 1960s. It was about the social issues that Gene Roddenberry wanted to address, but found that network people typically didn’t like writers coming in with stories about God, or racism, or war. He thought, if I do it in a show that’s about aliens and spaceships, they’re going to think “Well, that’s just fantasy, we don’t really need to worry about what kind of stories he’s telling on that show.” *Star Trek* was very much a show about the present-day, but using the tools of science fiction storytelling to shine a different kind of light on those issues.

Andre Bormanis, *Star Trek* Science Consultant

This fundamental difference in the writing philosophies between Wells and Verne is a recurring tension in science fiction, especially in Hollywood science fiction. Does a screenwriter present realistic science and technology, or focus on telling a compelling story with engaging characters, bending science to the needs of the story? The current thinking in Hollywood among writers and producers is that, while accurate science may be an important component to add verisimilitude, story trumps science every time.

Although Verne and Wells are among the most well-known early titans of sci-fi, and many Hollywood productions have spawned from their writings, they did not invent the genre. Both men appeared on the scene well after Mary Wollstonecraft Shelley, and in his book *Billion Year Spree: The True History of Science Fiction*, British author Brian Aldiss argues that Shelley’s *Fran-*

<sup>22</sup> From the PBS series *American Masters*, episode “Rod Serling: Submitted for your Approval” (1995).

*kenstein* (1818) represents “the first seminal work to which the label SF can be logically attached.” Despite having no formal education, Shelley was an avid reader, and the science depicted in *Frankenstein* is representative of the state of the art at the time the work was written, with reasonable extrapolations about what scientific advances might be possible. Shelley also wrote *The Last Man*, the first work in the “last man standing” type of stories—later examples include the novels *On the Beach* and *I Am Legend*, both of which were adapted into well-known movies, and the latter of which was the original inspiration for the modern zombie-apocalypse sub-genre<sup>23</sup>.

However, the belief that *Frankenstein* represents the first work of science fiction is not universally held among SF historians. Gunn believes, “My own feeling is that *Frankenstein* is much too Gothic in its origins and nature.” Some have argued that *The Epic of Gilgamesh* should be considered the first work of science fiction because it includes a graphic depiction of a flood scene, similar in feel to what one might find in modern disaster movies or apocalyptic science fiction. If we accepted this definition, then the movie *The Johnstown Flood* would be classified science fiction, and it clearly is not<sup>24</sup>. Further, though *Gilgamesh* includes text we could label as “science”, if that was enough to classify it as science fiction, then all modern medical and forensic procedural dramas should be similarly classified as sci-fi as well. So science fiction without science is merely fiction, but fiction that includes some science is not necessarily science fiction.

You can't have science fiction until you have the scientific method.

Robert J. Sawyer, Science fiction novelist

*Gilgamesh* aside, there *is* a work that pre-dates Shelley's *Frankenstein* by nearly 200 years that has to be given serious consideration, one that both science fiction author Isaac Asimov and planetary scientist Carl Sagan have christened the first work of science fiction. The mathematician and astronomer Johannes Kepler, a contemporary of Galileo, wrote an edutainment story<sup>25</sup> entitled *Somnium* (“The Dream”) between 1620 and 1630, published posthumously by Kepler's son Ludwig in 1634.

*Somnium* is the seventeenth century literary equivalent of a modern day docudrama—a discourse on physics and astronomy wrapped in a fictional

<sup>23</sup> *I Am Legend* itself has been adapted four times: *The Last Man on Earth* (1964), *The Omega Man* (1971), *I Am Legend* (2007), and the direct-to-video mockbuster *I Am Omega* (2007).

<sup>24</sup> There were actually three different movies about the Johnstown Flood, a 1926 animated short, a 1946 drama, and a 1989 documentary.

<sup>25</sup> Apparently Kepler was a pioneer in that genre as well.

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