

Did Science Fiction Influence You?

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Did science fiction influence you?

According to renowned physicist Stephen Hawking, “Science fiction is useful both for stimulating the imagination and for defusing fear of the future.” Yet to some, science fiction is a distraction from real science.

Sigma Xi is exploring new ways to inspire the next generation of scientists and engineers. Our question to our members was: Did science fiction influence you? The overwhelming reply was a resounding: Yes! A good sampling of responses is included in this document. Many Sigma Xi members shared specific titles and authors that captured their imaginations and inspired an interest in science.

The majority of responses were brief, but some provided longer reflections. Most respondents were from our emeritus membership ranks, but the demographic was remarkably wide (i.e., students to retired—the oldest being 85), including women and men from almost every research discipline.

Some are published authors of science fiction themselves, as well as peer-reviewed scientific articles and books (our own Asimov), while others write just for their own enjoyment. We appreciate those who responded to the prompt and hope you enjoy these reflections on the inspirational role of science fiction in the lives and careers of research scientists and engineers.

Sigma Xi, the Scientific Research Society

Founded in 1886, Sigma Xi is the international honor society of research scientists and engineers, with more than 500 chapters at colleges and universities, government laboratories and industry research centers. Membership is by invitation, in recognition of research potential or achievement. Over the years, more than 200 Sigma Xi members have received the Nobel Prize. In addition to publishing *American Scientist* magazine, the non-profit Society awards hundreds of grants annually to student researchers and sponsors a variety of programs that support science and engineering.

Science fiction very definitely influenced my choice of a career. I started reading and collecting SF when I was a sophomore in high school. I have never stopped. I recently donated my entire collection (except for books I have not read yet) to the MIT Science Fiction Society of which I was a member as an undergraduate at MIT. I can remember meeting Isaac Asimov when he was still a biochemistry professor at Boston University. The collection contained over 3,000 items, hard cover, paperback and a complete collection of the *Magazine of Fantasy & Science Fiction*. I continue to buy and read, and I still have about 400 paperbacks that I have not read yet. As I read them I intend to send them to the MITSFS.

Joseph Cohen (SX 1977)

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Science fiction ABSOLUTELY had an impact on my decision to study science. I was 14 when I first read *Brave New World* by Aldous Huxley, and it changed the way I looked at science. I'd always had an aptitude for math and science, but it wasn't until my introduction to the baby-making factories and psychological conditioning of Huxley's 1932 science-fiction novel that I began to seek out the technologies that had been developed since it was written. This timeless book changed the way I looked at science and inspired me to study genetics and pursue a career in research.

Jennifer Kiger (SX 2008)

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As early as I can remember, I was an active reader of Sci-Fi, probably under some influence by three older brothers, but I remember nothing specific about any of them reading or even liking Sci-Fi. They did provide me with science books on space travel and the universe by Willy Ley and others about rockets. So I was reading both science and Sci-Fi around the age of 8 for sure, possibly earlier (I was born in 1942). I remember doing a grade school show-and-tell on a three-stage rocket for launching people into space, well before any of that was done (probably based on one of those early books). My relatives always asked me about Einstein's equation, until I was sick of answering $E=MC^2$.

My early teen objective was to read every Sci-Fi book in the Boston Public Library. I think I succeeded, by visiting branch libraries and the huge Copley Square main library after school (Boston Latin School - with a curriculum the opposite of a science education.).

I became a physical chemist (AB from Boston U. & MA & Ph.D. from Princeton) leading to a 30-year career in basic developmental R&D at DuPont in Wilmington DE. I believe the lesson of Sci-Fi is simple. Sci-Fi leads one to look beyond the conventional limits of science and technology, to image what seems impossible and, in the real world of R&D, find those unexpected solutions to problems that others miss. In my career at DuPont I and my colleagues worked on the next generations of solutions to imagined objectives. When I joined the Pioneering

Research Lab at DuPont, people were already working on a series of basic quests: a really strong synthetic fiber (that became Kevlar®); a polymer paper—recyclable, lighter and stronger than cellulose (Tyvek and like sheet products of Typar & Remy); a cotton replacement, more absorbent and stronger (never got out of preproduction, but it was a fantastic product) or producing a more or less conventional fabric at speeds 100 to 1,000 times faster than looms or knitting machines (another series of technical successes that didn't meet the real market needs.)

The point is that very broad goals led us to reach way out beyond current technology. We had no literature to read on how to solve the challenges, but I believe those of us Sci-Fi fans found it easier to go outside the conventional limits, which some called hare-brained schemes. Some of them worked!

Harvey L. Kliman (SX 1963)
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My first exposure to true SF was through the short stories of H.G. Wells. My very first one was (I think) called "Pyecraft," the story of a man who wished to lose weight and confused weight with mass. As he was rather fat, he, losing mass but not volume, eventually floated and needed to wear lead weights. That was in a set school book of short stories, which also introduced me to Conan-Doyle's Sherlock Holmes ("The Red Headed League"). Both of these authors have remained favorites throughout my life (I am now 74) and brought me much pleasure. Wells filled me with a belief in the perfectibility of humankind ("Men Like Gods," "The World Set Free," etc) and an awareness of the dangers of unfettered capitalism (*The Sleeper Awakes*), as well as an awareness of the potential for science properly applied, and its dangers if misapplied. In those days British public libraries would have almost the complete works of writers such as Wells and Jules Verne, and I regret that young people today do not have such easy access to them. From Sherlock Holmes, I went on to Conan-Doyle's Professor Challenger. My first piece of "modern" SF was A.E. Van Vogt's "The Weapon Shops of Isher," and I would love to re-read it now. Isaac Asimov, Arthur Clark, J.G. Ballard and many others have brought me countless hours of reading pleasure, while novels like *The Day of the Triffids* and *The Kraken Wakes* also provide still-relevant warnings not to get too clever. The strangeness of seeing ideas from Wells' novels (such as the portable electronic books that have recently appeared but were present in an early book of his; *The Sleeper Awakes*, I think), and the conceits of other early writers such as Jules Verne that have since become established realities, amaze me to this day. Even Rudyard Kipling essayed SF, and the novels of the incomparable Neville Shute, although not perhaps true SF, frequently pushed his engineer's insights to the limits of his current professional knowledge (*No Highway*), and he also wrote pretty futuristic stuff (*In the Wet*). Yes, SF has been a great influence on me, as well as a source of endless pleasure.

Brian J. B. Wood (SX 1961)
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Science fiction was very much a part of my developing interest in science. In my junior high and early high school years a friend and I devoured as much science fiction as we could. We read Robert Heinlein's books and other authors I don't now recall. My friend had a subscription to one

of the science fiction magazines, which we shared for short stories. We also bought, or got hand-me-down, some anthologies. My friend went into chemistry, and I went into biology, both with PhDs. I still read the occasional science fiction book.

Alas, neither of us has made it to Mars, much less the strange worlds of the outer universe. But the imagination of science fiction certainly has been a stimulus for imaginative thinking in my career.

Dr. Charles C. Coutant (SX 1964)

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Yes, indeed. I was an avid reader of *Astounding Science Fiction*, a nice pulp magazine that appeared monthly. I think the editor was John Campbell. It had a center section of real science. The concept of satellite communication was first put forth here, as well as the first appearance of *Dianetics* by L. Ron Hubbard, a prolific writer who appeared often in the magazine as Ole Doc Methuselah. (I find there is a lot of material on this to be found on Google) I did not think of it for the last 20 years or so until it was brought up in your note.

I would say that the genre of science fiction appealed to me because of the playful approach to a world in which scientific realism was accepted. I did not like magazines like *Amazing Science Fiction* that were based on strange monsters and promoted Fortean stories that were blatantly unscientific.

I was an EE major in my early college years, and having no previous exposure to psychotherapy, I was one of the many that became interested in *Dianetics* because of its appearance in *Astounding Science Fiction* center section. I was actually involved in an enterprise set up by Hubbard in Los Angeles. A small group with previous experience in therapy found that the Minnesota Multiphasic Personality Inventory results showed no change before and after *Dianetic* therapy. Hubbard kept this secret and subsequently changed the therapy to a religion. Aside from this side adventure I would say that I found *Astounding Science Fiction* (later *Analog Science Fiction*) a very satisfying read for my high school and early college years.

The center section article about satellite communication was by John R. Pierce under the pseudonym of J.J. Coupling. You might be interested in an article by him on creativity (http://www.smecc.org/creative_thinking_-_john_r_pierce.htm). The influence science fiction had on Pierce's thinking may be inferred from a paper he wrote (http://www.smecc.org/john_pierce1.htm). Another interesting article (<http://www.leegoeller.com/IvsR/IvR-14.htm>) specifically discusses the influence of science fiction on Pierce. There are a large number of pertinent references on Google.

Roald Schrack (SX 1978)

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My entire life has been influenced by reading a Robert Heinlein story in *The Saturday Evening Post* when I was about twelve years old. The story and the accompanying illustration convinced

me that I wanted to become an engineer and perhaps advance, by as much as a single day, the epoch in which Man would travel in space. I joined the British Interplanetary Society and the American Rocket Society, which later got respectable and became the AIAA. As it happened, by the time I received my Ph.D, the space program was well under way and it was obvious that I would not make any fundamental contributions, so I fell back to designing instruments for high altitude research from small rockets. That led to instruments for stratospheric balloons and later for military satellites.

I might note that it is important to make a distinction between real science fiction as Heinlein wrote it and fantasy as practiced by Ray Bradbury, who was happy to sit back and allow the media to refer to him as some kind of a “dean” of science fiction writers.

Robert O. Woods (SX 1965)

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As a child I devoured the stories of Buck Rogers in the 25th Century as published in the so-called “Big-Little” books. These were books about 3 inches by 4 inches, and an inch thick, with writing on one side and cartoon pictures on the other, as you opened the book at a random point. I also made childish drawings of rocket ships to the moon. Perhaps this had something to do with my interest in science, but I rather think it was the other way around—my interest in science led me to devour the Buck Rogers books. I made crystal radio sets and model airplanes, etc.

Thomas E. Kurtz (SX 1952)

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I’m not sure science fiction was an essential factor in my choosing a career in science; perhaps it was just a natural step along the way. But my love of science fiction in the late ’40s and early ’50s certainly helped to hone my interest in physics and desire to understand fundamental things about the universe. I was especially influenced by the novels of Robert Heinlein, Isaac Asimov and Ray Bradbury. I also read regularly the magazines *Galaxy*, *Imagination*, *Fantasy & Science Fiction* and occasionally the pulps. But I soon tired of phony science in popular Sci-Fi, was never a real fan of space opera and gave up reading much Sci-Fi when it took a decided turn toward pornography (even Heinlein disappointed me). I still enjoy the occasional Sci-Fi novel or short story, but am particular in my definition of real science fiction. It should violate no known laws of nature and should anticipate only technologies that would not do so. Obviously, I am not much impressed by deep space travel adventures. No Trecky, I. But if I call it fantasy, I am very willing to suspend disbelief and enjoy a fun tale, such as Diana Gabaldon’s *Outlander* time travel series. On the other hand, I am very much put off by logical inconsistencies in attempts to be scientifically correct (e.g., Orson Scott Card).

Richard J. (Dick) Jacob (SX 1959)

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Science fiction did not have an effect on my decision to go into science as I only started reading it about 20 years ago. (I am now 79 years old.) However, some comic books that I read occasionally as a teenager may have been subtly influential.

Werner Heim (SX 1951)
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My science fiction reading began in about 1950 and has never stopped, although I have rarely found good science fiction (i.e., science fiction that I enjoy) in recent years. I started with Robert Heinlein and Ray Bradbury, in books and magazine stories, and later added Frank Herbert and Arthur C. Clarke to my short list of favorite authors. The principal science fiction magazine in the 1950s was *Astounding Science Fiction*, and its principal editor was John W. Campbell. My favorite author has always been Heinlein. My father became a lot more interesting to me when he told me that he had attended the Naval Academy at the same time as Heinlein. This created a lifelong interest in science, and particularly applications in spacecraft and communications. It was always incredible to me that in my professional life I worked on the development of and operation of spacecraft, for a few years during my 26 years as a US Marine, and then totally in the next 22 years as a civilian scientist. I was able to observe firsthand as many of the ideas that I first saw in science fiction became reality in one form or another. Truly nature has imitated art!

One footnote: I was fortunate to attend the same school (US Naval Academy) as my father and Heinlein, and then the Naval Postgraduate School. I must mention that the education I received was so good that I was still using it 40 years later, working on the cutting edge of aerospace applications.

Justin Wickens (SX 1968)
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When I first read Heinlein's "And He Built a Crooked House" as a teenager, I'd been playing with Euler's Königsberg Bridge problem and figured out that it was possible to make the three-shadow of a tesseract out of a continuous piece of (copper) wire!

Peter Zilahy Ingerman (SX 1977)
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Yes, radio and comic pages regarding Buck Rogers in the 25th Century were very impressive in 1936-1940.

Lester VanMiddlesworth (SX 1941)

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According to modestly-renowned physical chemist Ralph Nelson, “Science fiction is useful for projecting technology’s potential for improving the human condition and for defusing fear of the future.”

I enjoyed reading science fiction during my high school and college years (1950s)—Isaac Asimov, Ray Bradbury, Arthur C. Clarke, Robert A. Heinlein and the rest. For a trip down memory lane, see <http://www.magicdragon.com/UltimateSF/timeline1960.html>. In my first year of graduate school I had “one of those moments” that change your life. I had found a science fiction book in the cloakroom of the Graduate College at Princeton (where we did, in fact, wear black robes to dinner in 1960), and I suddenly realized that I had been standing there reading the book for a half-hour. Deciding that this was not a good use of time when the present reality had so much need of my attention, I gave up reading science fiction and have read very little of it in the past 48 years.

OK, in later years I did watch most of *Startrek* (and *Deep Space Nine*), and lots of *Dr. Who*, and some of *Blake’s Seven*—whose ending was ever so tragic, but I avoided READING the stuff. I believe that science fiction can help make science and technology more “human” to young people than it usually appears from the classroom presentations of the scientific principle, but at some point you have to leave the dreams of junior high behind and focus on the grunt-work of developing inexpensive ways to clean arsenic out of well-water and designing assembly lines to mold, label, fill and cap 40,000 milk bottles an hour.

Ralph Nelson (SX 1961)
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Science fiction has a big impact on my academic interests. I religiously watch *Battlestar Galactica*, partly because it tries to define ideas like “humanity” and “individual.” In this TV series, humans of the future battle a race of intelligent robots and wander through space in search of a new home planet. These robots look and act just like humans, and for all we know, they feel like humans too. The quest to understand my species’ place in the universe is at the core of my interest in astrobiology—studying the emergence of life using geobiology and biochemistry. Another favorite is the film *Blade Runner* (1982, directed by Ridley Scott), which also grapples with the difference between human and machine. Says the android to the policeman assigned to “retire” (kill) him: “Quite an experience to live in fear, isn’t it? That’s what it is to be a slave.”

Other great commentaries on the human/machine dialectic include William Gibson’s novel *Neuromancer* and Robert Heinlein’s novel *The Moon is a Harsh Mistress*. *Neuromancer* is very fun to read.

Some books have a lot of neat technical ideas, but might have deficiencies in plot/characters/readability. In this category are the *Red/Blue/Green Mars* series by Kim Stanley Robinson, *Rendezvous with Rama* by Arthur C. Clarke and the *Ringworld* series by Larry Niven.

Finally I'd say that *Gattaca* (1997, directed by Andrew Niccol) is one of my all-time favorite films because it speaks to my own experience as an emerging scientist with a learning disability, and my interest in a manned mission to Titan.

Josh Stern (SX 2008)
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I read most everything I could get my hands on in a small town in the 1930s and 1940s, especially technology, as *Popular Science* and *Modern Mechanix*. I also had an opportunity to read all of *Compton's Pictured Encyclopedia* before I got out of grade school. I discovered *Astounding Science Fiction* in the early 1940s while in high school. I remember reading a marvelous story on problems in a nuclear power plant at least two years before Hiroshima.

Subscribed to both *Astounding* and *Time* to keep up with the world while in college, graduate school, and currently (*Astounding* has become *Analog*).

I learned a lot of various sciences incidentally along the way, some critiquing the stories. But mostly I learned that the sciences are continually evolving and today's answers are also subject to improvement.

Science fiction was one of the many influences in my life both for knowledge/attitude and entertainment. It still is.

Jack Bennett (SX 1954)
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Yes, I was an avid reader of science fiction, e.g., *Amazing Stories*, through about grade six in K-12. By grade eight I had decided to be an engineer, having concluded that at least some science is indeed fiction. We see this today in the IPCC reports on climate change where a stochastic hypothesis and its equally conjectural consequences outrank the facts.

James R. Johnson (SX 1948)
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Neither of my parents entered high school and only one (older) sister went to college—after she married a man with a PhD in physiology—who ended up as chairman of the Physiology Department at the University of Chicago. He introduced me to science fiction when I was about 11. I was either a charter subscriber or a very early one to *Asimov's Science Fiction* and still get it (although I'm commonly three to six months behind in reading it). I received my PhD in geology from Rice University (1963) and retired from the faculty of the University of Texas at Austin in 1999. Yeah, I think that science fiction influenced me along the way.

Bill Behrens (SX 1961)

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I have been reading science fiction for over 60 years starting with the Buck Rogers comic strip in the *Chicago Tribune*. I have watched the stories develop over the years and reflect the social and political values of the time, from war and domination to utopias to modern string theories, genetics, religion and homosexuality.

I definitely favor “hard” Sci-Fi over fantasy and have been able to keep surprisingly abreast of at least the jargon of current physical and astronomical theories via reading stories utilizing the cutting edge topics of the day. I agree with Hawking that Sci-Fi is an excellent teaching tool. It allows the literarily curious to combine the age-old attractions of romance, cops and robbers or mystery stories in new settings that display alternate societies, transportation, energy, disease and life span that make the reader think about the “what if” of life. Sci-Fi could well be included in a philosophy or religious studies department at a university.

I enjoy the stories in Sci-Fi magazines (e.g. *Analog Science Fiction and Fact*) and as well as full length stories from authors such as Robert Heinlein, Ray Bradbury and Poul Anderson, to name just a few.

I am a retired nuclear engineer. By the way, a recent serialized story in *Analog* was one of the best I’ve read in a while. It is “Wake” by Robert Sawyer and addresses a developing interface between a blind human and a computer that is becoming sentient.

Phil Novak (SX 1959)

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Science fiction certainly has had a great effect on me! I have written and published two science fiction books, *Ultimate WMD* and *The Riddle of Cthulhu*, both written under my pen name, Ray Emerson. I found that writing science fiction was a great relief from the rigid environment of writing real scientific books and papers. I love to let my imagination run wild thinking about fictional people wandering around in a free-for-all fictional quantum science world. Certainly, there is plenty of material to draw on in a fictional quantum world when the real quantum world is pretty much unbelievable!

Roy Emerson Murphy (SX 1956)

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I read a lot of science fiction in my youth and earned a PhD in astronomy at Berkeley (1963).

I cannot offer any specific connection that I am aware of; however, since much of science fiction is about space, which could have been an influence on my interest in astronomy. My favorites then were Heinlein, Asimov, and Jules Verne. I read many, many books and short story anthologies by many authors. I did not read “pulp” science fiction. I still read science fiction and fantasy, but not as much space-oriented stuff (that has become reality!).

David Wood (SX 1959)

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An aunt and uncle gave me three Tom Swift Jr. books when I was about 9 or 10. Eventually I had a collection of 20 or more and moved on into more adult science fiction. It was the possibilities and the imagination that brought out my own creativity and interest.

Growing up in a blue-collar family and likely headed for a similar future, these inspired an interest in science and, with my suburban/rural environment, combined to create a deep interest in geology and the environment.

Now that I approach 35 years in a career whose start pre-dated Earth Day and the Oil Embargo, I continue to have an interest in science fiction, though it's often interspersed with history as well. I was taught to think outside the box, find a way to make it work, think fast and accurately. Besides geology and the environment, I'm also into woodworking, mechanics, construction, metal and rock working, metal casting, electrical and electronics, a scuba diver and a ham operator. I tossed the word “can't” from my vocabulary and have thus far refused to participate in the current recession.

And yes, science fiction sparked the imagination to make it happen.

Lawrence M. (Larry) Austin (SX 1987)

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To me the biggest positive of science fiction is that it builds and straightens a “sense of wonder,” curiosity about the new, different and strange and a fearlessness of the unknown. I believe that if more kids read science fiction, more kids would want to know the why and how. They would not be afraid of science and pursuing science careers. At the least it may keep alive the sense of wonder that we are all born with, but many lose in their junior high and high school years.

I point you to a great scene in the movie *Close Encounters of the Third Kind*. Toward the end of the film when the ship has landed and the doorway starts to open, the assembled scientists and engineers can be broken down into three groups—those who run for the porta-potties, those frozen in place and those who move forward for a better view! I believe that being exposed to and thinking about science fiction leads you to the third group.

Also it can be a great teaching tool. Several years ago, I taught a freshman seminar on the science in science fiction. Using many examples from TV, movies and the written word, I challenged my students to think about the physics, chemistry, biology and even sociology involved and to dissect what was possible, impossible or just really different. As many have said and written before, science fiction gives you permission to get out of the box and view the universe from different angles and even with different rules.

The fear of the unknown (e.g. *Twilight Zone*—“The Monsters on Maple Street”) and the problems of dealing with cultures you cannot understand (the many “first contact” stories) are great ways to open the mind to the new.

Lawrence B. Coleman (SX 1977)

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I don't read much science fiction now, but I did back then. The one book that sparked my love of travel and investigation, not to mention reading, was *Have Spacesuit Will Travel* by Robert Heinlein. I read many of Heinlein's books as a kid. My favorites were about space travel and life on space stations and other planets, but the one that I insisted on reading to my children is *Have Spacesuit*. That a kid could go from winning a spacesuit with box tops to the moon and on to Pluto, meeting a bratty girl and the “mother thing” on the way, well, it doesn't get any more exciting than that.

Winifred Creamer (SX 1993)

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Absolutely. Asimov, Heinlein and others inspired an interest in science and a sense of the imagination and creativity that scientists can express.

Jeffrey D. Brewster (SX 1992)

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I have always remembered Fred Hoyle's *Fifth Planet*. Not for any story lines—I have completely forgotten what the story was about—except the descriptions of how astronomers worked. In particular, it was the first time I encountered the method of superimposing photos taken at different times and then alternating them to detect a moving element (planet) against a crowded background of unmoving ones (stars). As a youngster, that struck me as very clever and impressed me with scientific technique.

Edward W Stuebing (SX 1967)

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I was an avid reader of science fiction pulp magazines in my student years. It was my recreation. But it didn't affect me. I was already on the way to being a scientist, and science fiction didn't change my plans. Later, I switched to Sci-Fi novels and short-story collections. I only rarely read Sci-Fi these days. The new writers can't match the old-timers, like Robert Heinlein.

I remember reading Asimov's short item about thiotimoline in, as I recall, *Astounding Science Fiction*. I'm not the only one apparently. Googling "thiotimoline" yielded 5070 hits.

Marvin Margoshes (SX 1952)

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A resounding "YES"! Science fiction was my favorite reading genre. I grew up in New Orleans during the time of racial unrest. Women were supposed to go to college to get a husband. One of my science teachers laughed when I said I wanted to be an oceanographer. Science fiction with its heroes and heroines, along with my father, an engineer that encourage me to read science fiction, acted as role models. Science fiction fed my imagination and gave me the sense that thinking outside the box was not always bad.

Authors I read ranged from Anne McCaffery's *Dragonrider* series (which I read in the abridged form when it first appeared in *Astounding Science Fiction*) to Heinlein, to Harry Harrison's *Make Room, Make Room* (basis for the movie *Soylent Green* and still a great presentation of the struggle between human rights and ecological destruction), to Asimov (*Foundation* series), just to name a few. Science fiction can ignore the racial and sexual barriers or present them in a new light (*Enemy Mine*). Science fiction can push the mind (look at our advancement in personal computers, PDA, etc....shades of *Star Trek*).

Science fiction, and its many tendrils, tests the imagination and makes you ask "why not?" It can be relaxing, thrilling or thought-provoking. The writing can be contorted and complex, or simple and straight-forward. It calls on the mind to picture things out of the ordinary, and by doing so, breaks us of our bounds to the daily rigors of earth.

Science fiction takes us to the bottom of the ocean, to the center of the earth and beyond the stars, while our feet are still on the ground.

What a great ride!

Patricia S. Glas (SX 1993)

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I started reading science fiction that belonged to my father at age 10. I read the works of Arthur C. Clarke (*Rendezvous with Rama*, *The Fountains of Paradise*, *Childhood's End*, *2001: A Space Odyssey*) then and branched out more, going into high school with books by Frank Herbert (*Dune*, *The Dosadi Experiment*, *The White Plague*) and some Isaac Asimov (*Foundation* series). I was probably a more voracious reader of comic books at the same time and also science fiction shows such as *Star Trek* (the original and next generation series). I got my BS in chemistry and later my PhD in organic chemistry not because of science fiction directly, but because I liked science. I liked science because I found it interesting, and I knew it was the route to making the things I saw in science fiction possible. I realized very early on that science fiction authors had been predicting aspects of the future long before people actually invented them, but not just the technology. They also predicted how these changes would affect how we acted and changed our ways due to advances in scientific technology...not that far a concept from Asimov's psychohistory concept in his *Foundation* series. But I really read science fiction because it caught my imagination and entertained me. It made me think and I wanted to read it. How many of us can honestly say that we would prefer to read a dry science textbook vs. a novel? This is the key point and advantage to science fiction and why I still read it today, probably even more than I did when I was young.

Good science fiction, especially when it is well written, is not just entertaining, but is a masterful use of the English language to communicate new ideas, thoughts and mental images that do not exist. It forces the mind to take leaps of logic and not just read the words, but ingest, digest and absorb them. To really think about them. The ability to communicate in written form is essential to us as scientists, and yet we write in dry boring factual sentences in our papers. This is important so that the results are true and free of distractions, but then we do the same thing when we present the data orally at conferences and wonder why non-scientists wander off in boredom and fail to understand the implications of what we have discovered or solved. The ability to communicate the potential advances that we as scientists bring to society is poorly served by having scientific education ignore the liberal arts. Science fiction is the perfect blend of science and language arts—it takes scientific concepts, proposes new hypotheses and experiments, and posits an outcome of those in such a way that the reader WANTS to find out what happens. Good science fiction hooks the reader because the readers' curiosity and interest are piqued, and if they start, they want to read more.

I'm still reading science fiction today, and I keep running into new novels that make me really think about concepts inside and outside my current field of materials science. I'm working today on multi-functional materials for aerospace applications, and the implication of creating materials that may someday have properties tomorrow that are science fiction today is not lost on me. If you've never picked up a science fiction book before—start with the Hugo and Nebula award winners. You can get an extensive list from Wikipedia. None of these books will steer you wrong—they all won awards for very good reasons; they're all good reads and in many of them there are new ways of looking at science to think about and mentally chew on. Some of them are harder in science than others, but read them because they're good works of literature and present another good way to communicate science. In a way—every proposal that we as scientists write is science fiction. It's a hypothesis unproven. Fiction until proven fact. So why not learn from the experts given that their sales of books far exceed research funds we've brought in?

Alexander B. Morgan (SX 1998)
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I read science fiction exclusively (except for assigned reading for classes) and voraciously from age 7–13 (1957–1963). Fantasy was not at all of interest during the same period. I believe that this reading nurtured an interest in imagining how mankind might achieve anything—and at that time the unknown was SPACE.

My favorite authors were the usual—Heinlein (for the age group) and Asimov, among others.

Unfortunately, in middle school and high school I convinced myself that reading science fiction was a waste of time, and that I should focus on the heavyweights of English literature. I remember starting this new course of intellectual effort by checking out *David Copperfield* from the school library. Wow, I renewed the book four times and still couldn't push myself to finish (four renewals was the limit).

Although I gave up on *D. Copperfield*, I did persist in avoiding science fiction until I became an adult (finished a PhD in biology/genetics). However, I think that science fiction definitely has a place in developing young people towards thinking about careers in science.

As a side note, we adopted a daughter through a program that allows birthmothers to select their adoptive parents based on an information profile provided by the adopting couple. The birthmother of our daughter selected us because I indicated a love of science fiction—and she thought this interest meant that her child would be raised by parents with open minds. Open minds would also foster young people towards science. So, I guess she was also supporting the idea that science fiction promotes development of young scientists.

I currently research and teach at the College of Charleston (Charleston, SC) in the Hollings and Grice Marine Laboratories.

Karen G. Burnett (SX 1992)
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Wow! During the early '40s I lived for the next issue of *Astounding Science Fiction*! What a magazine that was. Yeah, I definitely learned some science from it, and it sure was a great stimulant for my imagination. Did it influence my career choice? Beats me. It doubtlessly had a broad positive effect. Yep, I still read SF.

Well then, what did influence my becoming an engineer? Although my father died when I was 10, he was an engineer through and through. He lived it, loved it, taught me at every possible opportunity, and probably gave me some engineer genes. I still think of his shining example ... and, after all, his father was an engineer, too! Between that nature/nurture influence, I was probably put firmly on my career path. Besides being an engineer, he was also a writer ... with an occasional SF story!

After the outbreak of WWII, even before the US was involved, the magazine *Popular Science* played a career-influencing role, too, as did similar pictorial publications, with their descriptions of the engineering whiz-bangs that were in military use. By the time I was in 8th

grade (1944), I could reproduce respectable cutaway drawings of most aircraft, ships, V1 and V2 rockets, and could block diagram much of the in-use radio and radar gear. After the war ended, war-surplus radio equipment was available, and I spent every penny I could scrape together to buy tons of stuff, studied electronics books at the library and under the guidance of the father of a friend, became a “ham” radio operator. Last, but not least, were my outstanding high school teachers. My math and physics teachers got me into wonderful educational projects and my English teacher encouraged me to write extensively about any science/engineering topic that caught my fancy ... including an occasional science fiction story. With two classmates we started and published (for a whole year!) our science-fiction magazine, printed on the press of the high school weekly newspaper. In retrospect it was terrible stuff, but stirred the technological imagination, nevertheless.

During those high school years I worked for free at radio shops and local radio stations just for the experience and whatever knowledge I could get. Sometimes when I did something particularly well they sweetened the praise with a few bucks. No doubt; I wanted to be an electrical engineer. My high-school guidance counselor was the only negative influence. He stoutly maintained that there was no market for engineers, little future if I ever did find such a job, and that I should become an apprentice electrician if I wanted a financially secure future while I still pursued this nonsense. He also sent notes home addressed to my mother and stepfather to reinforce his message. Consequently, after high school I was completely bewildered but had enough sense to realize that a few years of military service could straighten me out. That was the second-best decision of my life. (Marrying my wife was the first.) As a GI, I wound up in the Atlantic Missile Range where I had personnel, PR, administrative, technical and operational responsibility for all my stations. I was also Czar of power generation, radio and radar equipment and stayed on a steep learning curve. We were often in the midst of wonderfully dynamic places and witnesses to the making of history. On the other hand, we were often in the midst of a pile of sand or rock or miles of ocean with little other human contact. What a study opportunity! I took correspondence courses through the Armed Forces Institute and read a lot of science fiction.

After nearly six years of service, I went directly from the Air Force into Purdue University (then the nation’s largest engineering school) with a reasonably clear vision of where I wanted to go professionally. Friendly, helpful and knowledgeable faculty, instructive jobs and boundless growth opportunities were always assisting me. Our kids (who learned lots of geography first hand) were raised on campus and criss-crossing the country as I followed those plum summer engineering jobs ... some stretched out longer. I had, of course, the usual teaching and laboratory jobs on campus, (as well as some well-paying but menial labor jobs—ya do what ya gotta do) but also worked on jet-engine fuel-flow control systems at the Aircraft Engineering Dept., Allison Div. of General Motors in Indianapolis; worked in the Inertial Navigation Dept., Autonetics Div., North American Aviation where I became a Research Engineering Supervisor and won a North American Aviation Science-Engineering Fellowship to fund me through my PhD; and taught Aerospace Engineering at UCLA. This was where science fiction was meeting science reality!

Ten years after being honorably discharged from the USAF, I took inventory and decided that I’d made some pretty rational decisions. I had married one amazing wife, adopted one precious kitty cat and earned one Professional Engineer license; adopted two wonderful doggies (Border Collie and Sheltie) and had bought two houses (sold one); earned three degrees (BSEE, MSEE, PhD) and was inducted into three honoraries, including Sigma Xi; had four wonderful kids ... and was starting in a dream job to launch me into a truly exciting aerospace R&D career where science-

fiction dreams were being brought to life in a company with a strong Sigma Xi/RESA presence. What a decade! Hey, high-school guidance counselor, look at me now!

North American Aviation begat North American Rockwell which begat Rockwell International which begat Boeing North American which is now an integral part of Boeing ... and every one of those entities has made huge contributions to the industry, economy, science knowledge base and national security. To spend one's career there was a privilege. (Recall the advertising series "Rockwell, Where Science Gets Down to Business" and "A Spaceship Just Landed on Earth; It Came From Rockwell!") I retired from Rockwell International in 1990 after 31 years, established a consultancy, Signal Processing and Controls Engineering (SPACE) Corp. that I operated for another 13 years, then went on several international lecture tours, published a jillion articles and now am lazing along as a classroom volunteer at the local high school.

Today my wife, kitty cat and I live in our ocean-view home high in the hills of San Clemente where I sun myself on the deck as I read science fiction and look for leads for speakers for our coming Sigma Xi Chapter meetings. In retrospect, I don't think I'd change a thing! I think I'll give a call to physicist/science-fiction writer Gregory Benford.

Stan White (SX 1965)
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Science fiction has always been a highlight of my reading. Every grant proposal that I have written or read is science fiction. Of course the novelists that make money from their writing provide me with entertainment and an insight into possible directions, implications and consequences. Jules Verne and H.G. Wells initiated my Sci-Fi adventures by showing me that imagination is the first step to discovery. The outlandish may only be a decade or century away from development. Jack Chaulker tempers with reality by assuming that existence is maintained by mathematical and physical constructs that can be manipulated. Asimov, in *Foundation*, demonstrated that the behavior of a large enough number of things, including people, can be predicted by statistical mechanics. Why don't our economists take a lesson? Piers Anthony provided a sense of humor to the fiction. Heinlein, Bradbury and others highlight the people who are caught up in the scientific advancements. Unlike the fact-filled papers and textbooks that I write about what has been done, these authors provide an escape to another plane or a future possibility to strive towards.

Ken S. Rosenthal (SX 1978)
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Science fiction had a great impact on my choices to pursue a career in science. While I read Sci-Fi classics by Asimov, Clarke and others, truthfully *Star Trek* was the biggest motivator! I was enthralled by Dr. McCoy's medical instrumentation, Spock's logic and scientific outlook and the psychology involved in dealing with people from other cultures. Appreciating IDIC—Infinite Diversity in Infinite Combinations—has served me well in my scientific career.

Carol Stephenson (SX 1990)

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Frank Herbert's *Dune* is speculative, science-based fiction that becomes more relevant with time. It had a strong influence on my appreciation for the complex interplay of culture, energy, religion and ecological cycles. It has important things to say to scientists today.

Neal Stephenson's *Snow Crash* has been influential in the development of virtual reality; it and predecessors from William Gibson among others have actually inspired researchers to develop the technologies these authors "predicted," turning them almost into self-fulfilling speculations. In this case, the influence is indisputable.

Arnie Cachelin (SX 1986)

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Science fiction that I read as a youngster in the '50s did influence my choosing a career in astronomy and physics. Some of the books include: Victor Appletons II's Tom Swift Jr. series, E.R. Burrough's Mars series, and E.E. Doc Smith's Lensmen series.

Martin B. Richardson (SX 1980)

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Yes, science fiction provided much food for thought for me as a child and beyond. I was more affected by TV and movie versions than books on science fiction because the characters were more able to look you in the eye. I certainly was intrigued by the possibilities of things not currently possible, but I was most affected by the ability of science fiction to pose questions of ethics without seeming to threaten daily life. Certainly *Star Trek* did that. The raising of issues about racism and sexism probably added to efforts to overcome both. The ability of those scripts to question positions of economic class and environmental degradation has been exemplary. The ability to get us humans to look at ourselves a bit more rationally was a favorite concept for me ("ugly bags of mostly water"). I felt it as the series questioned the definitions of Right (legal and economic sense) and right (as in I am always) and how we define those. And how could I not love and respect Mr. Data?

I find the comment about science fiction being distracting very odd. I think that some scientists today still believe they can be value free. It is as if one could be context free. To believe oneself to be value free is a dangerous delusion for a scientist, it warps interpretation of ones data. It is not possible, but it is possible to be aware of one's values and evaluate how they might affect one's science. Science fiction can do that for us.

Maggie Fusari (SX 1965)
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At a fairly early age (11-12), I read all the *John Carter on Mars* by Edgar Rice Burroughs that I could. These were more fantasy than science fiction, but they led me on to science fiction magazines such as *Amazing Stories*, *Planet Stories* and especially what is now *Analog Science Fiction*. I wound up as a chemist rather than an engineer, but I am still a fan of science fiction.

Harry E. Moseley (SX 1968)
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I think I was born to be a scientist. It captured my interest when I was very young.

As a young person in the third or fourth grade and beyond, I read about radioactivity, studied and collected spiders because of a non-fiction book I read. Likewise, I collected live animals including snakes, horned toads and frogs, I dissected flowers (botany text) and raised a duck until it became someone else's dinner. In the ninth grade, I studied human anatomy, built my own battery from zinc and acetic acid, built a "dry cell" magnet and created hydrogen and oxygen in a test tube using my parents' car battery.

I have been encouraged by my friends to read this or that Sci-Fi book, but I have read very few. I've read Asimov's trilogy, *Dune*, and probably one or two others. That's it! Sci-Fi has had very little affect on my life and interests. The real thing has had a much larger influence. I concluded my formal study with a PhD in chemistry from UCLA but have continued to read and study science. Now that I'm retired, I'm working on a vanadium fuel cell in my spare time.

James P. Hardy (SX 1970)
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I have been nearly a life-long fan of science fiction books from the time I discovered them in my local library at about the age of 12 and later on the movies based on science fiction. I think that science fiction was a way to let my imagination soar and dream of new places and new considerations of what it meant to be human. I read the books of Heinlein, Arthur C. Clarke, and Isaac Asimov and many others. I still have not lost the thrill and interest in seeing new places and in thinking about how to apply new technology to old and new problems. My professional career has taken me to many of the more remote places on earth and has spanned all of the continents except Antarctica. I am also involved with meteorites and am a member of the Colorado Meteorite Society and the International Meteorite Collectors Association. There is much intrigue in the universe and the physical things that populate it. Science fiction has often led the real science breakthroughs (from fission with Edward Smith to Waldos and slidewalks from Heinlein, and others). There are obviously a lot of things in fiction that have not become science fact or are

not possible, but that does not obviate the usefulness or fun of the medium. What will really happen when mankind comes face to face with alien intelligence? We seem to be having enough trouble dealing with other humans; this is the only medium that can and has speculated on the nature of truly alien thought processes and societies (*Ender's Wars* and the *Hive Queen* series by Orson Scott Card and other series such as *Star Wars* and Rodenberry's various *Star Trek* creations). I obviously am voting for science fiction as a positive creative medium that helps spark imagination and excitement, and I believe it can be a motivator for bringing new young minds into the real scientific world.

Richard Kunter (SX 1970)

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Many who read science fiction also began at an early age reading about dinosaurs. That fit me exactly as dinosaurs consumed my extra reading hours from 1st through 3-4th grades. Specifically it was *Journey to the Center of the Earth* by Jules Verne that triggered an interest in science fiction, which paralleled my increasing interest in science in 6th grade. From there all science fiction became a reading staple for me—though “hard science fiction” I suppose would win out among future scientists because of the more direct science link to the real world. A.C. Clarke stands out as a key figure in this realm of science fiction. Ask the question how many scientists became interested in science through *Star Trek*, for example, and the number would definitely be surprising. An interest in astronomy also naturally ties into science fiction for the sense of wonder about the nature of the universe. In our society, science fiction is looked down upon as anything but serious literature—it can lay claim as the “literature of ideas” for people of all ages who like to think in addition to simply being entertained.

James Cox (SX 1982)

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The biggest thing science fiction did for me was to get me reading fiction. For a long time in high school and college I read everything I could find from the full spectrum of authors, including both fantasy and science fiction. Other forms of fiction were of little interest to me with the exception of some of Conrad's work for example. I was most interested in style, not ideas, and was rather put off by both Crichton and his producer in their missed educational opportunity. Some of my reading science fiction was purely escape, but I could only reread those pieces that were well-written in any genre. I am sure the books and magazines I've read have influenced me at least subconsciously and in terms of attitude, but I would have difficulty pointing to any one work or any one author as a vector towards my career. I still read lots but very little science fiction. Probably *Jurassic Park—The Lost World* is my favorite science fiction piece, but Well's *War of the Worlds* is right up there too.

Jack R. Woodyard (SX 1971)

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It would be hard to conceive of anything that influenced my scientific thinking as profoundly as Frank Herbert's *Dune* series. To a developing aquatic biologist with interests in the interactions between people and ecosystems, his tale of the desert world of Arakkis and human manipulations of it over millennia was compelling and provocative. The concepts of "planetary ecology" and the job-description of "planetologist" are things that we are coming close to realizing. Herbert's writing anticipates the rise of "biogeochemistry" and incorporates many of the hopes that the 1970s environmental movement held. Re-reading the books recently, I was amazed how well they have aged. Sadly, my surveys of current classes suggests that the books aren't being read much by the next generation...though some students indicated they had seen the David Lynch film, or the recent television mini-series.

My dad was a high-school English teacher with degrees in English/French and no real interest in science. I'd read most of the high-school English curriculum (which was what filled his shelves at home) by the time I was 10. The turning point came when I read John Wyndham's *The Chrysalids*; apparently Wyndham never accepted science fiction as a genre...clever, well-written stories that use fantastic plots to explore humanity. That led to Bradbury, Asimov and onward. In fact, the Wyndham book I should have read that would have cemented my interest in marine biology was *The Kraken Wakes*...but I didn't read that until I was a postdoc.

Growing up in the '70s, it's amazing how much of the science fiction I enjoyed was actually from the '40s. In parallel, I was watching more TV and was enamored with *Star Trek*. I started noticing the writing credits and then looking for these names on the bookshelf. That was remarkable show. What an amazing series of authors.

Dr. John A. Berges (SX 2003)

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Science fiction did help to confirm my adolescent decision to make science my life's work. Reading Asimov's *Foundation* series as a high-school student helped me realize that science and technology (broadly defined) have a major impact on humankind in that they help to shape culture. So my determination to Save the World (ah, adolescent idealism!) was consistent with a life in science. Bradbury's *Martian Chronicles* helped me recognize the myriad ways that humans can hurt one another. I wouldn't describe Bradbury as a positive influence, but at least he was an influence that helped me see how humankind might change—and how it probably won't change—as time goes on.

Larry Niven's *Future History* series also helped me broaden my technological and temperamental horizons, in addition to being rollicking good reads. David Brin was a different kind of influence, because I knew him personally: he was a grad student at UC San Diego at the same time I was, and he and I and my current colleague, Prof. Carlo Segre of IIT, were among the leadership of the graduate student government at UCSD. So as his fiction achieved critical and popular acclaim, I was able to say (at least to myself and my wife), "I knew him before he was famous." His current Web site discussing technology and privacy issues, in addition to his fiction, provides provocative starting points for thinking about how technology and culture interact.

Is SF a distraction from the real work? Yes, of course. But so are eating and sex and a lot of other things that non-SF people would be loath to abandon. Distractions, appropriately handled, are healthy.

Andrew J. Howard (SX 2006)
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I cannot single out any one particular author or title, except one. As a 6th-grader, I read *Star Man's Son* by Andre Norton and was hooked! The entire body of work impressed me about the possibilities of the future. What I read in the 1950s from the older works included projections that were already becoming reality. I saw as a teenager that creative imagination led to the inventions of the future.

Yvonne Rogers Clark (SX 1970)
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Both my maternal grandfather and my mother were avid science fiction fans, and there were always plenty of science fiction books and pulp magazines around. I was particularly fond of just about anything by Asimov, Heinlein or Clarke. My interest in current science fiction disappeared almost entirely in the early 1970s when hard-core science fiction was superseded by boring and very unscientific social commentary posing as science fiction. What seemed particularly blasphemous to me was the treatment of science fiction lightweights of that period, such as, say, Joanna Russ, as the peers of the great writers from the Golden Age of science fiction. The Nebula and Hugo Awards were significantly devalued in my mind from that point on, and as far as I was concerned, science fiction qua science fiction was dead.

However, science fiction from the Golden Age greatly affected my thoughts and imagination during my childhood, and they played no small role in my becoming a space engineer.

David A. Levinson (SX 1975)
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I suspect that the answer would be “yes” for a substantial fraction of those who grew up in the '50s and '60s, at any rate. Certainly it was for me:

My parents were, for some twenty years, freelance fiction writers, and my brother and I grew up in a universe of words and books. My mother was an early enthusiast of sophisticated science fiction, and I came across one of her magazines, *Fantastic*, in the summer of 1952, when I was 10. It contained two stories I never forgot: Paul W. Fairman's “Someday They'll Give Us Guns” and Ray Bradbury's “The Smile.” I was hooked. My appetite was voracious and my taste

sufficiently unrefined as to be absolutely eclectic. I read Asimov, Heinlein, Bradbury, Clement, Bester, Simak, juvenile SF writers of every level of sophistication, “Tom Corbett, Space Cadet” comic books, Entertaining Comics wonderful science fiction comics—everything I could get my hands on. All this material triggered a wonder-driven love of the sky. When I saw a copy of the Golden Nature Guide, *Stars*, laying a wrinkled sheet of black velvet at a neighborhood book store, I ran for blocks in a state of desperate urgency to babble breathlessly to my parents on the glories of the book and to beg them to buy it for me. They did—and I own it to this day. From then on, science and science fiction walked very much hand in hand. Around 1954, I joined the Science Fiction Book Club, saving my lunch money and skipping meals to gather the resources to buy one or two cheaply printed books a month. I loved them dearly, and I still have nearly all of them in my library. Some literally disintegrated from repeated reading. Some I have already passed on to one of my two daughters (both of whom also ended up in scientific careers).

I even tried my hand at the art (having professional writers for parents tends to influence one in such a direction), and submitted a few tales to high-end magazines I had no business talking to. But just at the point when I was getting friendly rejection notices with specific guidance on how to orient my work for publication, in place of the form rejection (“Thank you for submitting your material. Unfortunately, it does not meet our needs at this time”), my attention became concentrated on my doctoral work in mathematics, and I never returned to the project.

Before encountering science fiction, my fantasies orbited around cowboys and Indians and soldier- and war-games. Once infected, I had a goal: I was going to be a scientist (since it was obvious from my frail build and glasses that I would never be a spaceman). Though I ended up a mathematician, spending most of my professional life doing operations research and systems analysis for the US Army, I have never lost the sense of wonder at the glorious sidereal universe from star-cloud to atom. Impact? I can scarcely imagine what would have become of me had I not stumbled over my mother’s SF magazines so long ago. Science fiction had much to do with my intellectual, philosophical and scientific orientation—more so by far than any single teacher or professor I ever had.

Joe W. Knickmeyer (SX 1966)
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Science fiction had a huge impact on me. There are a whole slew of individual little examples that formed my mental landscape. I learned about logic from Spock on *Star Trek*, I learned about gamma radiation after reading issues of *The Incredible Hulk*, and so on.

Zen Faulkes (SX 2004)
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Yes, science fiction was a strong influence in my choice of becoming a scientist. Fiction that combines scientifically defensible settings with exciting plots and interesting characters should be used to bridge the gap between the scientific knowledge of the lay public and scientists. Kim

Stanley Robinson, Greg Bear, Gregory Benford and David Brin are some of the authors who inspired me in the past and continue to inspire me. Larry Niven and Jerry Pournelle have also been influential. I look forward to reading new authors who combine the best of science with the best of fiction. I have used a non-fiction book *The Hot Zone*, as ancillary reading in a freshman biology course, and will use science fiction in the future. Ancillary reading can increase the interest for the subject matter for students or show them new perspectives in science.

Barbara Hayford (SX 1997)

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