

Of power maniacs and unethical geniuses: science and scientists in fiction film

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New knowledge has met with ambivalence, as is documented in myths ever since that of Prometheus. This ambivalence is also apparent in the representations of science in literature and the popular media, most prominent among them movies. Shelley's *Frankenstein* has become the icon of the "mad scientist" as depicted by filmmakers ever since the 1930s. To trace such patterns of ambivalence and stereotypes of scientists and science in fiction film, 222 movies were analyzed. It is apparent that modification of, and intervention into, the human body, the violation of human nature, and threats to human health by means of science are depicted as the most alarming aspects of scientific inquiry. The threat is dramatized by being associated with the image of the scientist as pursuing the quest for new knowledge in secrecy, outside the controls of academic institutions and peers. Scientific research as perceived by fiction film is seldom a venture across the boundaries of the permissible.

1. Science and movies—an improbable match?

Science is about truth, and film is about illusion, both at least most of the time. Would one turn to movies to find out about science? It depends what one is looking for. If the aim is to learn about science and how scientists work, about their problems and their methods, a fiction film is probably not a primary source of information. But if one is looking for drama, comedy, and romance, why should scientists not appear as heroes, clowns, and lovers? Posing the questions in this way points to at least two typical reactions of film critics and scientists alike when confronted with the subject of science in fiction film. Scientists, if they care at all, believe they are misrepresented in movies. Film critics either agree with the scientists' criticism by demonstrating to their audiences in what ways movies' representation of science diverges from reality, or they object to it by insisting on the autonomy of film as an art form.

To begin with, "science in fiction film" is hardly a topic at all. Less than a handful of books (and those mostly devoted to specific genres such as science fiction and horror movies) deal with the role of science as a subject for movies (Tudor, 1989; Skal, 1998; Sobchack, 1999). The number of articles is equally small, and none of these works looks at

the whole range of film genres and their different ways of representing science (Osterland, 1968; Gerbner, 1987; Back, 1995). Science, it seems, is too esoteric a topic for a popular mass medium such as the movie. However, even a superficial search for movies in which science and scientists play some role produces hundreds of cases, more than 400 in the context of this project. A study of the representation of science on television has shown that television viewers are heavily exposed to science, technology, and medicine, not through news magazines or documentaries such as NOVA in the US, but through prime-time dramatic programs (Gerbner, 1987: 110). Much of what people see in terms of “dramatic entertainment,” however, is movies, be they science fiction or hospital series or mainstream films.

Although there is little doubt that films and television are extremely powerful media, it does not seem at all clear that they influence their audiences’ views about science and, if they do, what kind of influence they have. At a time when scientists are becoming more and more worried about the image of science in society, a concern that has now pervaded all Western societies, it could be assumed that they would be focused on the media that are most likely to contribute to this image. The limited evidence there is shows that “exposure to science and technology through television entertainment appears to cultivate a generally less favorable orientation toward science . . .” (Gerbner, 1987: 112). Thus, science administrators and policymakers have every reason to be concerned about the images of science conveyed on the screen day after day.

However, our interest in the image of science and scientists portrayed in the many “running pictures” that are shown on screen extends beyond the immediate PR effects for the welfare of the institution of science. Science, i.e., scientific knowledge, is an especially problematic element of popular culture. The legitimacy of this particular kind of human knowledge, although established and substantially expanded since the Renaissance, has continually been contested. The examples of challenges to science’s legitimacy are legendary. The history of these conflicts reaches back to the trial of Galileo all the way to creationists fighting against the teaching of evolutionary theory at the end of the twentieth century. Thus, there is no reason for today’s generation to look down on their predecessors for their irrationalism. The appeal to “healers” in dealing with AIDS in Southern Africa or the outright ban of Western science by radical fundamentalists of various brands quickly demonstrate that there are still forces that question the superiority of scientific knowledge, or even fight it. The conflict over the boundaries of science, over what is considered legitimate knowledge and ways in which to generate and use it is an inherent element of Western culture. Recent debates over the limits of molecular medicine are another illustration of this.

Popular myths about scientific knowledge

Scientific knowledge and its technological applications have been associated with both liberation and domination, with the power to control and the threat of being controlled, with human welfare and destruction, since antiquity. Thus, as Gerbner notes, “the popular market for science...is a mixture of great expectations, fears, utilitarian interests, curiosities, ancient prejudices, and superstitions,” and “mass media appeal to all of these” (Gerbner, 1987: 110). This fundamental ambivalence associated with science that communicators have to deal with crystallizes around specific issues that seem to recur again and again and are cast into popular myths. Only their detailed representation changes with new knowledge. One such myth, probably the most powerful of all, is the creation of artificial human life or its alteration by intervening in hereditary material, i.e., the creation of hybrids, monsters, and

the like. As Back observes, “The achievement of the mechanical creation of human life—even of life at all—looks like a culmination of the acquisition of knowledge and the power that this knowledge brings. Most societies have set definite limits to this extension of human knowledge; modern Western society has been distinguished in trying to obliterate this limit. But the old limits still exert their power and arouse a certain dread of what will be found beyond these limits” (Back, 1995: 328). In other words, it can be expected that this myth play an important role in popular culture in general, and in films in particular (Haynes, 1994). Back cites *Frankenstein* and *Brave New World* as two such stories that have been equally influential, but represent two different kinds of warnings. The myth of Frankenstein has its roots in the Prometheus story. The warning it conveys is that crossing the human boundary and “extending human ingenuity beyond its natural limits” is a sacrilege and results in failure. *Brave New World*, the dystopian society in which artificial reproduction is the norm, has become a model for a host of other stories in science fiction literature. It represents the threat of “a society that does not leave any private space for the individual” (Back, 1995: 330). In the case of Frankenstein, the many versions of the story witness to the film industry’s diverse strategies in exploring the topic. In its most basic form, the monster’s mutations may signal a decline of the fears of science out of control. But the continuity of the myth may be seen in the modern version, in which the fear of monsters is replaced by a more ambivalent concern about human identity seen in the various depictions of robots, androids, and cyborgs. Still, the distinguishing of the human from the artificial remains the issue. Huxley’s dystopia, by contrast, has become a much more immediate prospect, due to the advances in biotechnology, molecular medicine, and reproductive technologies leading to the ethical dilemmas that are now prevalent in public discourse. It, too, echoes the myth of science invading human identity.

Contrary to the expectations of the critics of eugenics, there is a demand for these techniques in a society characterized by individualism and the drive for self-realization. There is no need for an authoritarian state to implement them, as was the case in recent history and which appears as a pattern in virtually all science fiction stories on the subject. But even “eugenics from below” raises a host of ethical dilemmas that have issued in public debates (and are treated with rare lucidity in *GATTACA* (1997)). However, the motives of those who voice this demand are entirely different from those of the state in Huxley’s novel: we have the frightening vision of a total society focused on an extreme genetic determinism, which points again to the myth of science colonizing human identity.

Thus, it is no surprise that these myths are also the themes of movies. In the majority of movies, the depiction of science reveals the fundamental uneasiness, distrust, and even mystification of science on the part of the moviemakers that must, in some way, reflect the sentiments of the crowds that watch their products. Put a slightly different way: the images, clichés, and metaphors used by filmmakers and scriptwriters to portray science and scientists are a reflection of the popular images of science, insofar as their films are a reflection of popular culture. At the same time, their films reinforce these images and provide them with imaginative detail and decorum. As one of the most popular mass media, film interacts in complex ways with its audiences, reflecting, shaping, and reinforcing images and identities; it can be safely assumed that science, as one of its subjects, is not an exception to this (Turner, 1999: 100, 144).

If the position of science is as precarious as the myths suggest, it may be fruitful to explore the patterns and stereotypes that the popular media reproduce. They may reveal expectations and anxieties directed at science. Their continuity and intensity may indicate that the current criticisms of specific research lines (such as stem cell research) or certain technical projects (such as the genetic manipulation of food) are only manifestations of a

much more profound ambivalence toward “new knowledge,” to the ever-faster production of which our societies are committed. Thus, the most basic questions guiding the analysis of a large number of films dealing in some way with science follow from the above: What is the image of scientists and science portrayed in film? What are the myths about science? Do they change over time?

2. Patterns in the portrayal of science in film

The quantitative analysis of 222 films covering eight decades of moviemaking was primarily designed to identify recurring patterns in the portrayal of science and scientists and how these change over time. The selection of films is not representative in the strict statistical sense, nor could it be, since the entire number of films showing scientists or science is unknown. Furthermore, the results are based on the coding by several people. Only in a limited number of cases have inter-rater reliability tests been carried out. In order to correct for possible error through subjective judgment, we focus on those patterns and attributes that stand out clearly. More detailed analysis will have to corroborate or disprove the results thus obtained.

Fields of science—which disciplines are popular in movies?

The relative frequency with which different scientific disciplines are shown in movies is, first of all, a descriptive item that provides a background. The data reveal a picture that could at least partly be expected. “Medical research” figures most prominently, followed at some distance by the classical natural sciences: physics and chemistry. The place of psychology ahead of biology and genetics is mildly surprising. The fairly prominent role of psychology reflects the many movies featuring therapists and may be an expression of the behavioristic preoccupation in US society in the 1940s to 1960s. The wave of films dealing with genetics and the genetic manipulation of humans is probably still to come. The eugenic films that were popular until the mid-1930s have found few followers in recent times. The already mentioned *GATTACA* (1997) is an exception, as is *The Boys from Brazil* (1978), about the cloning of humans (Kirby, 2000).

The humanities as disciplines are surprisingly often the subject of film plots, and, as will soon become clear, are associated most unambiguously with benign knowledge.

The prototypical scientist

Stories—visual stories in particular—depend on acting individuals. Characters in action convey their messages. How are scientists portrayed in them? The clichés are obvious. The typical scientist in Hollywood’s fiction film (more than two-thirds of the films coded are US productions) is white/ Caucasian (96%), American (49%), male (82%), and middle aged (40% are roughly between 35 and 49 years old). The youth cult that dominates other genres has not penetrated the images of science. Slightly fewer than one-quarter of the movies portray scientists who are youthful, i.e., between 20 and 34 years old (24%). However, films such as *The Manhattan Project* (1986) or *Chain Reaction* (1996) may signal the representation of the preferred age cohort to come.

Accordingly, the vast majority of movie scientists have an inconspicuous appearance, and caricatures such as that of Jerry Lewis in *The Nutty Professor* are rare. Finally, very little is revealed of their private lives. Almost one-third of them are single, and of well over another one-third we are never told if they have any relationships at all.

Women in science

Science is traditionally a very male world, in which women have either no place at all or “their” place, i.e., a woman’s place. In view of this, it is no surprise that fewer than one-fifth (18%) of the characters in these films are female. More importantly, women scientists are younger and more attractive than their male counterparts, and they are lower on the career ladder. In a sense, this is a quite realistic picture of science, albeit a bit out of step with recent developments.

Good, bad, or . . .—depictions of scientists’ characters

The messages of a film are conveyed through the characters of the actors, their motives and interests, their emotions and their deeds. In view of the notoriety of the “mad scientist” as the icon of a movie character, one might expect that whenever scientists appear in film plots they tend to be descendants of Victor Frankenstein. Here we have compiled a slightly more complex picture that needs some explanation. On the one hand, results from a host of opinion polls show, time and again, that science as an institution is trusted highly by society. This is reflected in the large number of films portraying scientists as “benevolent” and “good.” On the other hand, our category of the “benevolent” scientist already includes traits of ambivalence. The benevolent scientists are naive when dealing with powerful interests; they mean well but see their discoveries being put to some perverted use. The “ambivalent” scientists are those who are easily manipulated; they are idealistic but become progressively corrupted; they are ambitious but lose sight of the consequences of their work; and, most importantly, they grow willing to violate ethical principles for the sake of gaining new knowledge.

If one looks at the distribution of profiles by field it is quite obvious that medical research, physics, chemistry, and psychology are the disciplines that are portrayed with the greatest ambivalence. In these fields the audience is most likely to be confronted with a “mad scientist,” the Faustian who trespasses ethical boundaries in order to gain forbidden knowledge and fame. Anthropology, astronomy, zoology, geology, and the humanities, by contrast, are the fields that seem to have an unchallenged image of trust. Scientists from these fields are in the large majority depicted as “good” and “benevolent.”

This picture supports the thesis that medical research, including research on the mind as well as physical and chemical interventions into nature, are regarded with the greatest skepticism and get most easily into conflict with the ethical boundaries drawn around them.

Another item in the analysis lends additional support to this interpretation: looking at the ways in which knowledge is gained, as seen by the filmmakers.

How knowledge is gained

Looking at the ways in which scientists gain their knowledge reveals where the lay public sees borderlines crossed, values violated, and crimes committed, i.e., it focuses on suspicions about the scientists’ doings. The major categories in question are “experimentation on humans and animals,” which represents a certain problematic type of research, and “field research and expeditions,” which are associated with the adventurous sciences. The other two categories, of new knowledge being gained “through genius” or “by accident” point to familiar prejudices about the process of scientific discovery that are held by the lay public and supported by scientists. While “genius” may convey a residual ambivalence because of its elevated and elusive nature, it is not associated outright with danger but more

with a privileged access to “opening and reading the book of nature.” Accidental discovery, or serendipity, suggests not a dangerous or ethically problematic approach to discovery but rather the fruit of attentiveness and concern.

The results of our analysis show that medical research, psychology, chemistry, biology, and genetics, as portrayed in film, emphasize experimentation on living objects as the dominant method for gaining knowledge, but at the same time “genius” plays a major role, presumably because it can often be associated with ethically problematic ways of gaining knowledge. Physics trails the other fields, because it is not characterized by experimentation on humans or animals. It is also noteworthy that astronomy and the humanities are outside these concerns. Their methods of gaining knowledge (literature research and revelation of ancient knowledge) are not considered problematic, nor are they associated with “genius.” The status of these disciplines in the eyes of filmmakers is at best one of benign marginality, at worst of complete insignificance, precisely because their methods do not collide with established societal values and ethical convictions.

Representation of scientific work

This interpretation is supported once again by looking at the patterns of representation of different types of scientific work. In light of the preceding argument it may be assumed that the representation of the scientists’ actual methods of work will be of interest only if they reveal the problematic, even criminal, nature of these methods. Where these methods are not foreign to the everyday practices of the lay public, the representation would tend to focus on the results only. Obviously, an additional factor may be the representability of the methods in question. Research as practiced in the humanities is not easily represented in visual stories, let alone interesting to the viewer.

In astronomy and the humanities, the methods are not shown or discussed in detail. In fact, in all fields the results are emphasized more than the methods. Only psychology is represented equally in terms of its methods and its results.

Detailed research into individual films could further clarify which methods figure prominently in the representation by filmmakers. The representation of results rather than methods has probably something to do with the distance of the film medium from science. It is precisely for the same reason that the representation of science to the public is a problem.

Secrecy and adventure—settings of scientific work I

A characteristic feature of the “mad scientist” film is the secret basement laboratory in which the illegitimate experiments take place. In *The Brain That Wouldn’t Die* (1963) a modern version of this setting appears in a suburban home, indicating the continuity of this alchemist icon into the second half of the twentieth century. Dangerous research is taking place outside official institutions such as university laboratories and government facilities (although they house their share of dangerous practices), and hidden from the critical observation of the scientific community. Scientists working in their home basements are outsiders. They have isolated themselves from official science because they feel misunderstood, often because they are obsessed by their research, the questionable goals and methods of which they see justified by the expected success.

Films that portray this image make up one-fifth of our sample. The second, slightly larger, group of films stages research in the field. Here we may assume that it is the tribute that science has to pay to action film. From *The Mask of Fu Manchu* (1932) to *Raiders of the*

Lost Ark (1981), archaeologists and anthropologists are involved in high action adventure. Only brief scenes at the beginning and end of the film acquaint the viewer with the scientists' mundane academic home base.

Secrecy and adventure—settings of scientific work II

When we look at these results and refer them to the disciplines, the expected picture emerges. Medical and chemical research is most prominently associated with the secretive-ness of the laboratory in the private basement, while anthropologists, zoologists, biologists, and, surprisingly, psychologists are associated with performing their research in the field. The humanities, by contrast, are located at the universities. With some simplifying generalization it may be concluded from this that the socially and ethically problematic disciplines are associated with research in secrecy and in private homes (35% of the films show scientists working in secret settings), whereas the unproblematic disciplines operate outdoors in action contexts or in institutional settings such as a university or a governmental or industrial laboratory.

This is also a polarization of a *public* science in which the scientist works in the context of a community of peers, and a *private* science where the scientist has chosen to leave the community or was excommunicated by it because he or she transgressed the boundaries into forbidden research territory. That boundary is a thin line, and the viewer is often unable to decide which side to take: that of the scientists, who consider their genius misunderstood or falsely judged by misgiving colleagues (20%) or that of their opponents. Solitary scientists (in 42% of the films about scientists) who work in their home laboratories, are not controlled by their peers, nor by public authorities. Their discoveries or inventions are depicted as dangerous in more than 60% of the stories. In almost one-half the films (48%) the "invention is kept secret from the public"; in more than one-third (35%) "the discovery or invention gets out of control"; and in more than one-half the films (58%) the discovery or invention causes damage intentionally or unintentionally.

Scientific knowledge and ethical values

This ambivalence about the potentially threatening nature of scientific knowledge and technical inventions that accrue from it is expressed directly in the conflict between scientific knowledge and ethical values. In just more than one-half the films (51%), ethical values are challenged and undermined and are in direct conflict with the science portrayed in the respective story. Again, this overall result is broken down for the different scientific disciplines, and the previous picture emerges once again: The disciplines that are ethically problematic are most frequently medical research, followed by physics, chemistry, genetics, psychology, and biology. Astronomy, anthropology, and the humanities are regarded as mostly outside this concern. There is a qualification: although physics is predominantly seen as being in conflict with ethical values (51%), to a considerable extent (37%) it is also seen as completely outside this concern. The humanities are seen in a surprising 29% of the films as being in conflict with values. The "sensitivity" toward values of disciplines can also be measured by the extent to which they are seen as having no relation to them at all. Only 10% of the films about psychology and 12% of those about genetics were classified in this way.

This leads to the question about what kind of knowledge it is that these disciplines produce and that comes into conflict with established values.

Utopias and dystopias of science—objects of fictional science

Science and scientists are relatively abstract subjects to be represented in visualized stories. Fictionalization is a means of circumventing the problems of representing the world of knowledge when adapting it to the rules and constraints of visual drama. But the concern with fictional developments is also an expression of the mystique of the production of new knowledge. Science is associated with the unknown future, and it becomes the object of projections of utopias and dystopias. Science itself is often portrayed at a fictional state of development, just beyond its contemporary research fronts and technological achievements. In 39% of the films, real scientific fields are depicted at a fictional level of development; in an additional 14.5%, fictional fields of science are shown. Fewer than one-half (47%) of the movies deal with a nonfictional area of science.

If one looks at the kinds of subject matter of the fictional or semi-fictional sciences, it is apparent that the projections of the future associated with them are mostly dystopias, or at least highly ambivalent utopias. Roughly one-third of the movies in the sample deal with artificial, supernatural, human, animal, or extraterrestrial life-forms, or cloning, reanimation, and immortality. If illness and cure are added to this category, the share is even larger (by 5%). Only a smaller segment (approximately 20%) is devoted to super weapons, time travel, and other technological gadgets. The utopian or dystopian views about science are clearly dominated by concerns about the manipulation of human and animal life.

Not surprisingly, medical research is, again, most often associated with fictional developments, followed by genetics, physics, psychology, and chemistry.

3. Conclusion

The deep-seated fears and expectations connected to our own lives are thus projected into fears and expectations about those fields of science that are concerned with the prolongation, improvement, manipulation, expansion, and termination of life. The popular fiction film, like literature, gives expression to these fears and expectations. Across all genres, the creation and manipulation of life is the dominant (or at least prominent) category. By uncovering this pattern in a sufficiently large number of movies over a considerable span of time, we can appreciate much better than before that the content of movies is, indeed, driven to a considerable extent by basic myths about the creation of new knowledge, its boundaries, and the dangers of trespassing those boundaries. At the same time, this dwarfs short-term concerns about the public image of science and its improvement and relegates them to their proper place. No PR campaign and no slick television-infotainment magazine even addresses the myths of dangerous knowledge, let alone has any impact on them. The detailed analysis of the representation of these myths in popular media such as the fiction film can contribute to further elucidating their origins and their manifestations. The distance of society from its science, and the ambivalence that characterizes the relationship, are illustrated by the fact that roughly one-quarter of all scientists represented are portrayed as “off the planet” and about one-sixth as eccentric, but only little more than 5% as comical. The strongest genre among films about science is the horror movie. By contrast, there are hardly any comedies about science. Evidently our society does not find much to laugh about in science.

Notes

1. This analysis is based on the report 'The Perception and Representation of Science by Hollywood' prepared in the context of a research seminar at Bielefeld University 2000–2002 by C. Muhl, K. Brandhorst, V. Davids, A. Lingnau, C. Loschen, and J. Walter.

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