THE TRUTH IN SELLING SCIENCE, AND
THE DRAMA OF ADAPTING IT FOR TELEVISION

by

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ABSTRACT

The path from science text to science television show is a rocky one. The fragmentation of the television market place with the growth of cable television has pushed science documentaries into a headlong pursuit for higher viewer ratings in a medium dominated by works of fiction. In response to this, science documentary has steadily been pushed to alter the techniques it uses, and adapt its content to become more dramatic.

Varying market pressures have led to the rise of two dominant methods of dramatization; narrative imposition and visual spectacle (typically CGI). However, in addition to making science shows more dramatic these two techniques have acted to create a hybridized format, blending subjective speculation with traditional expositional documentary techniques. The result of such hybridization has been to blur the lines between fact and fiction and to allow for the creation of dubious subjunctive documentaries, and almost entirely fictive narrative documentaries. This has acted to uphold the cultural practice of misinterpreting science in order to support fantasy and fiction, and has led to a rise in pseudoscience, which could be potentially very damaging to society.

The growth in the public misinterpretation of science could leave our societies woefully unprepared to make informed decisions about the future. To avoid this, I suggest that we find ways to adapt science for television that are more accurate in showing the true nature of science. Instead of bending science to conform to preconceived, linear dramatic narratives, I suggest we look at alternative narratives such as those seen in discursive 'essay' films. And, instead of stretching spectacle and visualization so far as to create fantastical dramatic fictional worlds, I believe we should focus on creating shows that use metaphor and analogy to help us visualize the real, hidden nature of science. By utilizing scientists as guides and peers rather than as heroes and elitists, by choosing discourse over teleology, and by incorporating visually rich metaphors and analogies into science shows, we can render the strange and unfamiliar understandable and engaging.
Adapting ideas from one media to another is fraught with issues such as interpretation and authorship (Elliot 2004). Whilst such issues have been analyzed at length for subjects such as literary adaptation for television and film, much less has been written on the pitfalls of adapting non-fiction science content for the dramatic media of television. Science adaptation for film carries with it some unique problems in addition to those faced by producers attempting literary adaptation. A fundamental issue faced by producers of scientific documentaries is that they have to contend not only with the inherent 'truth claim' of the genre (Winston 1993; Nichols 1994), but also with the truth claim of the science that they are adapting.

The techniques used in adapting science for television, and their effects on form and content in light of the underlying truth claims, have become more prominent in the last decade. The fragmentation of the television market place with the growth of cable television, has pushed science documentaries into a headlong pursuit for higher viewer ratings in a medium dominated by works of fiction. In response to this, science documentary has steadily been pushed to alter the techniques it uses, and adapt its content to become more dramatic (Curtin 1993; Palfreman 2002). This dramatic tendency has pushed to the forefront the issue of how to conform the non-linear discursive nature of science to a fiscally competitive, visually dramatic medium, without hiding the inherent subjectivity of the process.
Recently, the techniques used in creating this dramatic tendency have manifested themselves in a number of ways, two of which appear to be the most prevalent, and also most relevant to the issues of “Truth” in science documentary; the imposition of fictional narrative structure (Hornig 1990; Curtin 1993), and the spectacular visual dramatization of scientific content (often through the use of Computer Generated Imagery, CGI) (Scott 2003; Metz 2008). Whilst these filmmaking methodologies have no doubt made the shows more popular and competitive on television, they carry with them serious implications for the genre, the truth-claims it makes, and the scientific research which underlies the shows.

If science documentaries aim to do more than just reduce the complexities and nuances of a scientific topic into single-minded entertainment or propaganda, then they need to address the process of science and filmmaking, in their presentation and execution. An uncritical approach to adaptation, coupled with the competitive need to dramatize, has led many recent science shows to exhibit a host of undesirable characteristics, from the reinforcement of negative stereotypes and imperialist attitudes (Hornig 1990), to the warping effects of the imposition of linear narrative (Hornig 1990; Curtin 1993), and the appearance of dubious truth-claiming subjunctive documentary (Metz 2008). The creation of shows which hybridize traditional documentary techniques with highly fictive elements have blurred the lines between fact and fiction, and the danger is that such shows may end up alienating the public from the scientists and their ideas, and vice versa, by misrepresenting the very nature of science. If we are to avoid such alienation I believe that we must look at alternative methods of adapting science for
television. Instead of forcing narrative structure upon science, I believe a better approach would be to attempt to apply a more discursive approach such as those seen in 'essay' films. And, instead of using visualizations to create fantastical dramatic fictional worlds, I believe we should focus on using them to create shows that contain rich visual metaphors for scientific concepts. If we can find a way to utilize such alternative methods of adaptation then we can render the strange and unfamiliar understandable and engaging, and hopefully create dramatic popular science shows that do not misrepresent the nature of science.
The Necessity of Adaptation

It is rare (if ever) that a scientific documentary produced for television can claim to have originated the science content which it portrays. Indeed, filmmakers are, on the whole, not the same people who do the original scientific research that they make films about. The slow processes of science, of trial and error, inquiry, peer review, and multifaceted discourse, makes it almost impossible for science research to be executed specifically with the intent of creating a television show. Thus, if science shows cannot be 'created' for television, like 'original' fiction shows – whose scripts and narratives can be written specifically for the medium – it necessitates that all commercial science documentaries must be the result of the adaptation and interpretation of one, or more, works of scientific research. A producer/writer cannot simply sit down and 'create' a science show for television, when they do, the genre is called “science-fiction”. So, from the outset the producers of science shows for television must contend with the transposition of information from one medium to another, and the questions of authorship of the resulting film.

The issue of adaptation and transposition across media, at its heart, is one of fidelity or lack thereof (Elliott 2004). And whilst there is, as Marie-Laure Ryan points out in her introduction to *Narrative Across Media*, wide ranging debate as to degree to which fidelity matters, she holds that “Even when they seek to make themselves
invisible, media are not hollow conduits for the transmission of messages” (Ryan 2004). With this in mind, it would seem impossible for scientific content, based primarily in a textual medium such as textbooks and journals, not to undergo some form of transformation in its transposition to the visual and aural medium that is television, even when the person transposing it aims for maximum fidelity. Many attempts have been made to formalize the study of such transformations, from the early semiotic frameworks such as the structuralist ones described by Roland Barthes in *Mythologies*, through to later “Neo-Structuralist” strategies such as those employed by Andre Gaudreault, Francois Jost and Christian Metz (Bordwell 2004). These semiotic strategies attempted to break down the content and media into hierarchical 'linguistic' system of signs and signifiers in order to observe their transformation from one media to another. A great deal has been written on the semiotics of adaptation, and rather than focus on a linguistic semiotic analysis of the method of science adaptation and dramatization for television, I will instead focus on the nature and execution, in line with Kamilla Elliot, who views the process of adaptation not as “a semiotic aberration but a challenge to re-think the problem of form versus content” and the pressures which shape them (2004).

**The Trouble with Truth**

The adaptation of science for a medium such as television brings with it a number of issues common to, and separate from, those experienced by filmmakers adapting literary narrative. At the forefront of these issues, I believe, are the effects of adaptation
on the truth claim of the underlying scientific research, and how this claim is eventually presented to the public on television.

The inherent issues of underlying truth when adapting science content for television are nicely summed-up by Boyce Rensberger; “As scientists will acknowledge, most scientific findings are wrong or, at least so uncertain as not to be certifiably true. But most people would never get this impression...” (Rensberger 2002). The issue that Rensberger drives at is a common theme in the critical study of science in the media. Ian Jarvie, a sociologist, takes such observation and goes further to state that “The media popularizers seem to be the last representatives of the philosophy of science of the Enlightenment movement” (Jarvie 1990). In this assertion Jarvie refers to the seeming disparity in understanding between the public and scientists over the implicit claim that scientific research has objective authority and access to a greater 'Truth'. In order to understand why this disparity might exist, we need to examine the root of the belief in objective scientific authority.

The truth claim of scientific research can be traced back to the paradigm shift of the Enlightenment Era, in which science was held up to be the “the principle means to human liberation … the first true and hence only route to Knowledge” (Jarvie 1990). Cartesian elaboration went further to posit that such knowledge is only obtainable through absolute objectivity and the removal of subjectivity (the separation of body from mind). And, subsequent Baconian ideals pushed this worldview forwards to claim that the only legitimate authority in the world was objective scientific authority so-constructed (Jarvie 1990). This separatist ideal acted to form a gulf between the arts and
sciences which continues to be felt today, creating the “the two cultures” of art and science spoken of by C.P. Snow (qtd. Kimball 1994). However, over the course of the last couple of centuries, cracks have formed, and many systemic flaws have been found when the Enlightenment philosophies are put into practice. Taken to its extreme the objectivity demanded by Descartes dictates moral detachment, leaving scientists to govern only the construction of technology, not its application. “Thus, if scientific knowledge permitted the prolonging of human life, science is not blamed for the resulting population crisis” (Jarvie 1990); such detachment has arguably dangerous implications for society as a whole. On a less dramatic level, objectivity and positivism also prevent scientists from useful, creative, personal introspection within the science community, thus removing their ability to assess the true nature of their results. As Susanna Horning puts it, “Practices common in scientific publications, such as reliance on the passive voice and the careful description of methodological procedures ...serve to legitimize scientific results by erasing the scientist from the text and disguising the ad hoc character of many research procedures.” (Horning 1990). In light of these dangers and flaws, it is not surprising to find that scientists, on the whole, do not buy into a purely positive, objective worldview. As Horning once again observes, “To insiders [scientists], who understand this code as the artificial construction that it is, the assertion that scientific research may proceed quite differently in private … comes as no surprise.” (Horning 1990). The issue that arises in the transposition of science research to television shows is that the insider knowledge Horning talks of, the nature of scientific truth, is rarely passed onto the public.
In the creation of television shows, filmmakers must use a range of different techniques to transpose science content to their films and, as Horning contends, adaptation even at its most transparent will have a transformative effect upon the scientific content (Horning 1990). The techniques employed to adapt science for television are informed both by the medium (and its constraints), and also by the subjective editorial nature of filmmaking (Nichols 2001). However, like scientists and their publications that tend to hide the complex process of science from the public, so too does documentary film hide the true processes of filmmaking. Without a filmmaker's understanding of this process, or evidence of it, viewers are often led into false beliefs about these films’ inherent truth and authority. Renov frames the issue eloquently in *Towards a Poetics of Documentary*: “Documentary has most often been motivated by the wish to exploit the camera’s revelatory powers, an impulse only rarely coupled with an acknowledgement of the processes through which the real is transfigured” (1993). So, just as the philosophies of the Enlightenment lead people to believe in science as “Truth”, Bill Nichols believes audiences are often led by documentaries to believe in the “Truth”, with a capital “T”, of the realities they describe (Nichols 2001). And, like the objective truth-claim of the Enlightenment, this documentary truth-claim also brings with it dangers. The failure of the public to account for the subjectivity involved in the portrayal of a subject, can lead to dangerous misconceptions about the real nature of that subject, and the people involved in it. This is especially true in science documentary. Brian Winston believes that the long association between the camera and its use in scientific imaging (for accurate reproduction, and as 'proof' of results) have led the public to view
the suppositions of documentary science film to be objectively truthful, by virtue of association (Winston, 1993). The real trouble with “Truth” in science adaptation comes to the forefront when we consider that science documentary on television could contain two truth-claims to its objective nature; one of science, and one of documentary. A producer not cognizant of this would inherently disguise the subjectivity of both the process of science and of filmmaking, and portray the final product as objective “Truth” to the viewer. The modern pressure for more dramatic television content has acted to exacerbate this issue, blurring the lines between fiction and non-fiction genres, whilst still failing to address the issues of their varying subjective natures. Moving down this path can lead only to disinformation, sensationalism, and mistrust. If this is to be avoided, then we need to ask what is it about the current techniques used in adapting and dramatizing science for television that causes this crucial subjective perspective to be lost, and what the effects of such misrepresentation could be.

Transformative Television

Commercial television is a medium with a set of very particular restrictions, ranging from physical (the size of the image, the loudness of sound, the length of shows etc.), to financial (budgets, competitive funding), and stylistic (the format and types of shows aired by different channels.) These restrictions act to shape the form and content of science when it is transposed from text to screen. In the last decade these restrictions and pressures have acted to push science documentary towards more dramatic presentation. Therefore, it is necessary to look at the most common methods producers currently use in
science adaptation for the small screen in order to assess their effects on form, content and truth-claims.

There are two modern methods of science dramatization that stand out as the most commonly employed by producers when adapting science for television, and which I believe have the greatest relevance to the notion of “Truth” in science documentary: the imposition of fictional narrative structure (Hornig 1990; Curtin 1993), and the spectacular visual dramatization of scientific content (often through CGI) (Scott 2003; Metz 2008). It is worth noting that narrative imposition and spectacular visualization are not mutually exclusive, but by isolating and comparing shows which embody these dramatic traits, I hope to provide a more comprehensive view of the pressures of the television medium driving their usage, and the effects of such techniques. To this end, it is necessary to contextualize the two methodologies with regard to the television environments in which they are most commonly found, and the pressures that affect them. In doing so, I hope to establish a more cognizant method for the adaptation of science for television, which mitigates the issue of 'Truth' in documentary presentation, whilst still creating 'dramatic' popular science shows.
CHAPTER THREE

ARMCHAIR ADVENTURING

The Drive for Drama

The landscape in which science documentary first took hold has changed, and in order to compete, documentary has had to adapt. This, in many cases, has caused a blurring of fact and fiction, inherently hiding the subjective nature of the science portrayed. In order to understand the pressures of the television medium which have caused this drive for dramatization, it is necessary to look briefly at the changes that have occurred in the industry.

In the late 1950's in the US, popular science documentaries were viewed by many in the network television industry as a form of 'public service', to atone for the cultural ghetto they created on air in the early 1950's, due to their obsession with vapid quiz shows (Curtin 1993). To this end, documentary departments in the major channels at the time (ABC, NBC, CBS, PBS) were located under the purview of their news departments (Curtin 1993). Most of the documentaries they produced were executed in a similar fashion to news investigative research methods, through interviews and direct exposition in a didactical manner (Curtin 1993). These early documentarians believed strongly in their inherent 'Truth'; as Robert Hacket noted at the time “the film stands as the guarantor of the narrative’s validity” (qtd. Curtin 1993). As problematic as this claim may have been, the network science documentaries of the late 1950's were bound by the same investigative journalistic guidelines as news, and their narratives limited mainly to simple
“just-so” explanatory stories. This, however, ended soon afterwards, as the types of programs on television became more diverse, and the competition for time-slots on the air, and viewers at home, increased. Under fiscal pressures, newsrooms cut free their documentary departments to fend for themselves and obtain their own funding from network executives (Palfreman 2002). No longer seen as having an automatic ‘right’ to be on television, U.S. science documentarians found that they had to justify their films not only to the station, but also to the viewers. Producers of science shows quickly found that the reality of scientific documentary, the unexciting visual environments in which scientists worked, and generally un-exotic lives their subjects lived, did not compete well with more dramatic fictional offerings (Palfreman 2002). Thus, the drive for drama in science films began.

**Narrative Imposition and Runaway Tales**

In the last decade chronic underfunding of public TV in the US, market fragmentation due to the explosion in number of cable channels, and the strong cultural influence of Hollywood has created an environment where dramatic (usually three act) narrative storytelling is the most prevalent type of long form entertainment on television (Palfreman 2002). It is in this dramatic, narrative marketplace that science documentary must now compete.

If we compare science research texts with the majority of content on television, the fundamental difference we would observe is the linearity of the media. Scientific

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1 A just-so story, describes an unfalsifiable narrative explanation for a cultural or scientific outcome or practice. The use of the term is an implicit criticism that reminds the hearer of the essentially unprovable nature of such an explanation.
research is rarely linear in its structure. Its method of dissemination may be fixed in form by the coda of scientific journals, but the subject is one of discourse and rhetoric (Gross 1990). In essence there are no fixed linear narrative beginnings, middles and ends. One could argue that scientific theories can be seen as a series of interpretive or adaptive “just-so” narrative stories (Prickett 2002). But, a caveat 'adaptive' has to be employed as the “just-so” stories must evolve as new research is presented and the rhetoric of science continued, a luxury which is not afforded to linear narrative. Despite this, science documentary producers have still drifted towards utilizing narrative three act story arcs in order to dramatize their content (Curtin, 1993). However, unlike fiction, the story arcs utilized are limited to a few specific dramatic types, and their haphazard application has led to the blurring of the lines between fact and fiction. In many cases, the scientific content of the shows become secondary to the narrative, leading the producers to 'bend' the science to fit the narrative. It is this tendency – to force science into a preconceived dramatic narrative –that I shall from here onwards call “narrative imposition.”

In order to craft dramatic narratives, producers must fashion a protagonist and an antagonist to drive the story forwards. Science, in practice, has neither. In order to create such narrative driving forces, producers resort to casting scientific endeavor in the role of the protagonist, engaged in a race or quest against adversity, striving to gain mastery over some aspect of the malevolent universe (Horning 1990). Scientific endeavor however is not a tangible thing, and hence producers more often than not resort to using 'heroic' scientists instead, portraying their struggles against adversity to expose the 'Truth' (Gregory et al. 1998). The most commonly employed narrative arcs in modern
science documentary are those which tend to the cast the scientist as the protagonist, such as in the “quest”, and “mystery/riddle” plots (Horning 1990). The 'quest' narrative typically embodies “...the protagonist's search for a person, place or thing, tangible or intangible” (Tobias 1993). Whilst the “mystery/riddle” narrative “Focuses on events that must be evaluated and interpreted...” and a “...paradox that must be solved” (Tobias 1993).

Shows similar to *Time Machine* (2008) (of which there are countless examples on both public and commercial channels) clearly illustrate the way in which filmmakers impose narrative on science in order to dramatize it. To begin with, a narrator and a dramatic montage on screen mimetically set-out a mystery: “Is it possible we could send scientific information backwards through time?” (2008). Then, as if by providence, a lone mythological hero steps up to the plate to start contemplating the issue; “Ever since Ron Mallard [a professor of physics] was a boy, he dreamed of building a time machine” (2008). With the help of one or two colleagues, the hero then takes a series of cleanly executed, highly compressed, scientific steps towards the goal “Mallard searched to find a new way to harness gravity in order to time travel. ...for almost half a century he has conducted research in closed laboratories ...and now he has found that light controls gravity, and that gravity controls time” (2008). Then precisely within the alloted hour our 'hero' solves the problem, in this case hypothetically with “... four intersecting laser beams, causing space to be dragged around inside them... additionally in a full sized model you'll have the twisting of time as well.” (2008). It is rare that narrative science shows such as these focus on the failures of science, for instance why scientists
have still not discovered what constitutes dark matter. Gregory suggests, somewhat wryly, that when they do, it is “as rare, perhaps, as police dramas in which the robber evades capture and lives a life of luxury in the sun” (Gregory et al. 1998).

At its most base level the imposition of such linear narrative upon science, although undeniably engaging, fundamentally misrepresents the nature of science, hiding the real, flawed, tangential processes of science behind the filmmakers' desire for a clean, linear narrative. And, by leading the public to believe that science can solve all mysteries in a straightforward process, the shows set the stage for suspicion and resentment when the public discovers science can't solve everything, and scientists are not the lone heroes they are portrayed to be. The issue of the truth claim is also inherent to this type of narrative imposition. By casting scientists in the roles of heroes, producers create a separation between the public and the 'special' scientists, both trading off the authority of the scientists to justify their documentaries, and also acting to confirm that same authority (Horning 1990). Additionally, by fictionally re-creating the process of scientific discovery through stylized sequences of lab work, exotic voyages of discovery, and 'eureka' moments using real scientists, producers act to re-enforce both that the process of science is as they portray, and that the science underlying it is “True.” But, another more worrying aspect of narrative imposition is the question of authorship and the liberties that producers take with the content they adapt. If not cognizant of their effects, producers may corrupt the underlying science research and then make truth claims about it, often embarrassing scientists involved and creating a warped public perception of the content (Lievrouw 1990).
A good example of such content corruption can be seen when we compare the television, and original literary versions of popular science book *Guns, Germs, and Steel* by Jared Diamond. The original text goes to great lengths to debunk the imperialist notion that the colonization of the globe by Europeans was due to an inherent genetic superiority of race, focusing instead upon environmental advantages and happenstance that allowed Europeans to possess three devices simultaneously which allowed for empire building (those being guns, germs and steel). In fact, the text goes as far as to suggest the possibility that Europeans may in fact be physically inferior to their less industrially developed modern counterparts due to the increasingly sedentary European lifestyles and removal of basic selective pressures (Diamond 1999). In their effort to dramatize the science of the book, however, it appears that National Geographic may have inadvertently forgotten to read it.

At the opening of the show, backed by a dramatic orchestral score, Diamond, the archetypal white adventurer complete with beard, sandals, and Columbia Sportswear, is announced as “one of the most original thinkers of our age...” who “…has travelled the world looking for clues.” Thus, the producer dives into the 'quest' narrative, and from that point on, the message of the show differs fundamentally from the book. Diamond, apparently, has “set out to explore the division of the world into the have and have nots. A challenge few scholars would have dared to take on.” His “quest to uncover the roots of inequality began in the rainforest of Papua New Guinea". From here onwards, far from dispelling the myth of the superior white imperialist as Diamond sought to do in his book, the television version of *Guns, Germs, and Steel* categorically re-enforces it. The
television version of *Guns, Germs, and Steel* suggests that the mysteries of the world can only be elucidated by a white scientist traveling to other less developed nations, and drawing from their behavior conclusions that they alone could not. In this case, it appears that the producers allowed their narrative tale to run away from the conclusions of the science they sought to portray. But, by creating a documentary with an unaltering, unquestioning positivist narrative, and using a respected scientist to 'validate' it, the producers created a truth-claim about the content within, and it is here that the lines between fact and fiction become blurred.

The fundamental problem with narrative imposition is that it creates neither documentary, nor fiction film. The hybrid it constructs maintains the documentary truth claims through its use of scientists and expository narration, but it also gains a highly subjective nature due to its reliance on linear dramatic narrative structure to drive the film. By hiding the real nature of scientific fallibility and the process of scientific research, the show further warps the public perception of what scientists truly do, and this “...can do little to further the public understanding of how science really works” (Gregory et al. 1998). The question, then, is whether there are other ways of making science more 'engaging' and able to compete against more dramatic offerings on television without relying on narrative imposition. I would argue that there are, and one of the most prevalent is visual spectacle in science shows, particularly through the use of CGI to illustrate abstract, scientific content.
CHAPTER FOUR

FORM OVER CONTENT

The Slope to Spectacle

Visual spectacle, specifically the use of CGI (computer generated images), presents an alternative and equally prevalent (but not mutually exclusive) way of dramatizing shows. This technique is not without its issues, and when used excessively, it can lead to the creation of dubious truth-claiming 'subjunctive' documentaries – documentaries of that which might be or could have been (Wolf 1999; Metz 2008). Like narrative imposition, the excessive use of visualization can lead to a fundamental blurring of the lines between fact and science fiction. This blurring of the genres can lead to public misunderstanding of the content contained in the shows, and hides its subjective nature.

In order to understand why the use of visual spectacle has become so prevalent, and how it is employed, we must establish the pressures of the medium driving the use of this technique in dramatizing science, as it is adapted for television. This technique first made its debut onscreen primarily in the UK television market in the mid to late 1990's. UK television was highly regulated until the late 1980's, with only four channels; two public and two commercial (BBC 1/ 2, ITV/Channel 4). The government mandate for the public BBC stressed high quality educational values, and as such the tradition of didactical, expository documentary long outlasted its counterparts in the U.S. The public respect for the BBC and its controllers/presenters, like Sir David Attenborough (recently voted “most trusted person in Britain” ranking above the Prime Minister; Hoggart 2006),
and the weaker influence of the Hollywood narrative form in the UK, had led to a market
place in which the basic format of science documentary changed very little since the
1950's. However, with the introduction of satellite TV in the 1990's and the creation of a
fifth terrestrial channel (unsurprisingly named “Channel 5”), the BBC was put under
pressure to justify their programming in terms of audience share, and like in the U.S.,
science documentarians were forced to compete with the more flashy dramatic offerings
of the commercial channels. However, rather than pushing documentaries to become
more narrative (which likely would have conflicted with the BBC's dramatic offerings
and their educational mandate) they were instead pushed to become more visually
spectacular.

Visual Spectacle and Subjunctive Documentary

The power of an image to produce a visceral response in us due purely to its
nature, and to drive us to want to see more, has been well documented. Jacques Aumont
has likened the idea of spectacular imagery to pornography and the visceral desire
associated with it (1997). Put simply, audiences like, and desire, to watch spectacular
things. In an effort to remain competitive in the changing media landscape, but remain
ture to their expository roots, science documentaries in the UK began exploiting the
dramatizing effects of spectacle in their shows, and experimenting with new techniques to
do so.

Science has a long history with photographic imaging, especially when it is used
to visualize physical things not visible to the human eye, such as with X-rays or
microwaves. This association has lead many to believe that the techniques used in scientific imaging are by their very nature objective and truthful (Winston 1993), and such assumptions have been reaffirmed countless times, for example in the use of X-Ray crystallography to prove the structure of DNA. So, when the groundbreaking show, *The Private Life of Plants* (1995), was created, the BBC used a wide range of newly developed scientific photographic techniques (time lapse, super macro, and ultraviolet photography), to give the audience “a privileged, almost voyeuristic glimpse of worlds that would normally remain hidden” (Scott 2003). The accuracy of what they presented was not questioned, and the response of the audiences to such visual spectacle was immensely positive. As scientific imaging technology advanced, the possibilities of the 'spectacles' that could be shown expanded exponentially, and with the advent of affordable CGI, science producers saw an opportunity to translate abstract ideas into visible entities. Mark Wolf believes that the close link between science and visualization, via the use of computer simulation and photograph techniques in science and medical research, paved the way for CGI simulacra to act as “proof” and stand in for documentary photographic images (1999). It is fitting, then, that one of the first television uses of CGI to create visual spectacle was in the series *Intimate Universe: The Human Body* (2001). In an effort to show the way hearing is affected by the passage of time, the program-makers constructed a crude 3D CGI version of presenter Professor Winston's head, so that they could “slice it open” and show the workings of 'his' inner ear.

In the documentary setting, the use of computer visualizations has led to the gradual portrayal of representative computer generated images as factual ones. This
however brings with it many of the same problems of narrative imposition, blurring the lines between fact and fiction, and portraying the subjective visualizations as objective “Truth” via the continued usage of traditional expository documentary techniques in the shows. At its most basic, this could simply be a case in which a producer sought to visualize the shape of an atomic structure in 3D and requested the particles that make-up the elements drawn in various, arbitrary colors. Such an image presented by a scientist as an accurate representation of a molecule would infer to the viewer that it was a truthful representation, subjective coloring and all. While this example might seem harmless, imagine the subjective decision-making involved when filmmakers attempt to visualize whole animals, universes, and worlds, and then portray them ostensibly as documents of truth. The real issue as David Attenborough puts it, is that as “film-makers trying to illuminate the natural world, we must be allowed to manipulate images and use all the devices that recent technological advances have given us. But we must also recognise our responsibilities to scientific truth. The events and the creatures we chronicle are more than just entertainment that can be jazzed up to taste” (2004).

However, in recent years the number of documentaries that rely on CGI to visually dramatize their content has become staggering, ranging across all fields of science from medicine, to physics, to biology and paleontology. The majority of these shows are still produced in the UK, but are now financed by partners in the U.S. and released there also (usually about a year later, re-scored and narrated for an American audience). This dual-market sales technique has been increasing the competitive pressure on the filmmakers, and as the impact of CGI becomes less novel, producers must find yet
more spectacular ways of visualizing science to secure funding. This loss of novelty is perhaps the most worrying issue with the reliance upon CGI as a dramatic technique. Just as modern commercial television pressures have pushed the use of narrative towards bending the underlying science, so too has it pushed the use of CGI spectacle towards creating more and more fantastical and fiction visualizations (Metz 2008). In just a few of the many examples, the progression of the use of CGI towards the fictional is nicely illustrated by four highly acclaimed science shows; *Intimate Universe: The Human Body* (1995), *Ocean Voyager* (2006), *Walking with Dinosaurs* (1999), and *The Future Is Wild* (2003).

In *Intimate Universe: The Human Body*, visual spectacle created by CGI is utilized mainly to show the viewers things that they cannot normally see, but which are uncontested fact, such as the structure of the inner ear and the valves of the heart. Thus the CGI acts to add spectacle, but not to deviate from what science holds to be fact. In *Ocean Voyager*, we move a step away from spectacular illustration and closer to spectacular speculation as the undersea journey of a whale is shown via the blending of CGI and live action footage. Whales are real. We know they exist. But, we do not know everything about their journeys under the sea. This must be speculated upon and the visualized dramatically through the CGI elements on-screen. The documentary, expository nature of the show acts to infer truth upon these visualized speculations, and the line between the use of CGI as illustrative and as a ‘tool to construct scientific claims” becomes blurred (Metz 2008). In *Walking with Dinosaurs*, we amble Sauropod-like over the line delineating subjunctive documentary, and begin to see the use of CGI to
chronicle events 'that might have been'. The CGI is used to visualize the speculations of scientists based on the evidence of paleontology, fully creating entire worlds from it. The show is no longer grounded in anything that could be compared to fact, and yet, the didactical narration tells us categorically that this is how the past truly was. In *The Future Is Wild*, the line between factually grounded documentary and subjunctive documentary is but a mere shimmer in the distant past, as the producers use scientists' speculation about a future Earth 5-200 million years from now to chronicle events 'which have not yet been'. In this future, the producers utilize CGI to create fictional inhabitants for our planet and proceed to document the fictionalized creatures as real, going so far as to use respected scientists as talking heads to affirm the legitimacy of the producers' (and animators') speculations. The concern with this progression towards the subjunctive documentary is that whilst the utilization of CGI has shifted, the underlying structure of the shows has not. Instead, they all trade-off the traditions of expository documentary films by utilizing voice-of-god narrative exposition and talking-head experts to infer a truth-claim upon the content contained within. Anneke Metz fears that this trend has "resulted in a baroque subjunctive documentary form that has evacuated any possibility of serious science documentary on cable channels devoted to science programming" (2008). I believe, rightly so. The current crop of subjunctive documentaries, like the dramatic narrative documentaries, are in fact, hybrids utilizing expository techniques to hide the subjective nature of the content and images they provide. The further these documentaries stray into purely fictional territory, the more they legitimate the "cultural precedent of misinterpreting science in support of
fantasy” (Metz 2008). This blurring of the lines between fact and fiction has, I believe, led to the fundamental misinterpretation of science in the public eye, and has the encouraged a public confusion of the nature of science. As Carl Sagan says in Demon Haunted World “If we teach only the findings and products of science—no matter how useful and even inspiring they may be—without communicating its critical method, how can the average person possibly distinguish science from pseudoscience?” (1996).

Based on the recent plethora of pseudoscience shows on documentary-based television channels (such as MonsterQuest – History Channel, A Haunting – Discovery Channel) and the quasi-scientific methodologies that they employ, it would appear that Sagan was correct, and the erosion of the distinction between the science and pseudoscience has already begun. If the goal of science documentaries is to increase the public awareness of scientific activity and to portray the true process of science rather than to create confusion, then I believe it is necessary to look for different ways of adapting science for television.
CHAPTER FIVE

AN ALTERNATIVE APPROACH

Pushing the Limits

It would be nice have the ability to propose a totally idealistic way to adapt science for television, but it is apparent, after looking out how producers currently do so, that such an idealized notion has to be tempered by the realities of the pressures faced by producers in the current television climates. There is a strong and growing thrust to make science dramatic and engaging in order to compete with other content offered on television. It is of little use to any TV producer to create a show that showcases the true nature of science and of filmmaking, but which no one will watch or, worse, fund. My goal then is to try and suggest a documentary form that mitigates the truth-claim issues posed by two of the most widely used forms of dramatization, but that still maintains their positive popularizing effects.

The main issue apparent from the current application of narrative imposition and spectacular visualization is that both create hybrid documentaries that maintain the truth-claim of the expository documentary genre, but hide their subjective nature, and thereby lead to the confusion of fact and fiction. Cross-hybridization of the two techniques appears to only create shows that compound apparent problems in their methodologies. Shows such as *The Crocodile Hunter* (2004) and *Storm Chasers* (2008) take the worst aspects of the 'heroic' scientist narrative and add spectacle to them, doing little to address the process of science, or the subjective nature of their content. Instead, they act to
polarize the issue and construct even more spectacular narratives by formulating situations such as “Man vs. Nature” and “Science vs. Nature” story lines. Shows like *Prehistoric Park*, on the other hand, act to add stronger narrative to spectacular visualizations, and do nothing to reduce these issues. In *Prehistoric Park*, the underlying science is first bent to fit a narrative arc, such as adventure, revenge, rivalry (or any other that comes to the producer's mind) and then spectacular visualizations literally re-create the science to affirm the truth of the narrative. For example, when the host (Nigel Marven) goes back in time to save a couple of baby T-Rexs for his 'zoo' before a Volcano destroys their habitat, he misleadingly presents the story in the style of a traditional natural history host. Arguably, this is where we now cross into the bounds of true science fiction. But, all these shows still cling to reliance on expository documentary techniques to add some validity to their content, and I find that very problematic. While there are many viable roads to correct this misstep, perhaps one of the most promising would be to remove the vestigial documentary element and push each technique to its logical limit to see what kind of science film this new formula could create.

If we were to drive narrative imposition to its logical limit, we would inherently formulate a show in which narrative was the main force with all expository documentary techniques removed. I personally believe the result would resemble a fiction show for all intents and purposes, but bear in mind I am not talking about science fiction, where the science is created to fit the narrative. I am instead talking about a factually-based science film with purely fictional narrative presentation, the effect of which is the creation of a scientific allegory. In fact, this approach has some precedence as seen in the publications
of Robert Gilmore, a scientist who is renowned for writing his popular science books entirely in the form of well-known narratives. In his book *Scrooges Cryptic Carol* (1996), Gilmore rewrites *A Christmas Carol* (1858) by Charles Dickens as a scientific allegory to explain the basic principles of entropy, time, and quantum mechanics. Gilmore dispatches the idea of adding narrative to science and instead adds science to narrative, leading Scrooge on a voyage of enlightenment guided by the “Ghosts of Science Past and the Spirits of Energy and Entropy”. But, how would such an allegory work as television? Lacking any readily identifiable examples, I set out to create such a scientific allegory myself, resulting in *Malice in Wonderland: The Red Queen Theory* (2008). By examining the science of male-female/parasite-host relations explained by Matt Ridley in his book *The Red Queen: Sex and the Evolution of Human Nature* (2003) and condensing the story arc from Lewis Carroll's *Alice's Adventures in Wonderland* (1865), I created an experimental, allegorical science tale. Film in hand, I set about showing it to a large number of unsuspecting guests, family, and members of the public. The feedback I received was in line with the experience I had reading Gilmore's books. Put simply, without some type of didactical, expository explanation, it is very hard to establish what science information you are supposed to take away from the allegory. And, whilst undeniably dramatic and engaging, purely narrative science films lack the definite steps of knowledge progression needed to fully understand the content, and do nothing to portray the true nature of science (other than perhaps the feeling of confusion often felt by researchers). Gilmore actually resorts to adding expository information 'boxes' throughout his books in order to allow better comprehension. Based on this
experience, I don't believe that a truly narrative approach, whilst intriguing, is viable as a means of popular science adaptation for television.

So, what about pushing the idea of visual spectacle to its limit? This would require the total reliance on visualization to convey a scientific concept to the audience, whilst creating a dramatic and spectacular display. While there are films which rely entirely upon spectacle, such as Ron Fricke's *Baraka* (1992), I initially had no idea what form such a science show might take. However, by happenstance this summer I met someone who I believe does, a violinist named Kenji Williams. Kenji is a filmmaker and multimedia artist whose primary focus is science outreach and spiritualism. Currently, he is attempting to use visual spectacle and music to portray the scientific concept of the Gaia Hypothesis, in the hope that it will help promote an increased recognition of our place in the world. This scientific theory is an ecological hypothesis proposing that the biosphere and the physical components of the Earth interact to form a complex system, which humans are part of, not separate from. In order to portray such a concept, Kenji utilizes NASA visualizations of the Earth from space rendered in HD and coupled with live electronic music. He performs the resulting installation, *Bella Gaia*, live at large screen venues such as planetariums, in videos on the web, and sells the recorded performances on DVD (2008). His shows are undeniably spectacular, and incredibly popular, even on the small screen. However, like my attempts to create a scientific allegory, a purely spectacle-based approach once again leaves the viewer in the situation of having to interpret what they should be taking away from the performance, and again does nothing to elucidate the nature of science. Without some form of definite
knowledge progression, it is hard to know precisely what you are witnessing, except of course something spectacular, and thus the interpretation of the spectacle's intent is hard to fathom. Kenji often resorts to an aural explanation of his intent at the start of his show, and often takes Q & A afterwards, both of which act to perform the interpretation for the audience. So, as a way to create popular science television, I do not believe that a purely spectacle-based approach is particularly viable either.

If removing the problematic hybridization of the expository documentary tradition from the modern dramatizing techniques is not a method for creating popular science documentaries, then perhaps it is necessary to contemplate what could be done fundamentally differently to correct the issue. To this end, I believe that rather than bend science to conform to preconceived, linear dramatic narratives such as 'mystery' and 'quest', we should instead look at alternative narrative models which match the discursive nature of science better. And, instead of stretching visualization so far as to create fantastical dramatic fictional worlds, perhaps we should instead focus on creating shows which visualize the real, hidden nature of science.

**Essays of the Hidden**

The real issue with narrative imposition as a way of dramatizing science for television is that fundamentally there is a mismatch of narrative format; science is tangential and discursive, fiction narratives are linear and didactic. There is, however, a type of 'narrative' structure that could be utilized for films that I believe is far more suited to science, and which addresses many of the concerns about truth-claims and subjectivity.
But, to create such films requires the re-thinking of the way we utilize scientists in the filmmaking process, and the role of narrative exposition. Referred to briefly by Sheila Bernard in her book *Documentary Storytelling for Film and Videomakers* (2004), and far more expansively by Phillip Lopate in *In Search of the Centaur* (1996), this is the 'essay film'.

The essay film format as envisaged by Bernard is a film which, instead of using a teleological approach to its content (like the old expository documentary format), is “driven by questions” (2004) and utilizes a guided discursive approach, inviting the viewers to form their own opinions as to the validity of the content. Lopate sees the essay film in a similar way, in which the film “follows a helically descending path, working through preliminary supposition to reach a more difficult core of honesty” (1996). Through this approach the subjective nature of the film and its content are not hidden, and the audience is able to see progression of logic that gives rise to the eventual conclusion. However, Lopate places emphasis upon the necessity of an essay film to be personal in nature suggesting that the film should be driven by the form “What do I really think about X?”(1996). The idea of using a discursive essay format to structure a film has some precedent, Lopate calls Chris Marker “the cinema's only true essayist” (1996) and holds *Letter from Siberia* (1957) as a classic example, Bernard believes Michael Moore's film *Bowling for Columbine* (2002) is a more contemporary example.

Chris Marker's film *Letter from Siberia* (1957) highlights many of the features which define an “essay film”. The film is narrated from a single perspective by Marker,
and far from being a simple expository exploration of the Soviet Bloc of the 1950's is a personal reflection upon what he witnessed and, after the fact, thought. Marker's use of humor, self deprecation, and wit help him to lead us through his thought process as he attempts to decide what he really feels about the region and his journey within it. Marker's essay-like approach in *Letter from Siberia* (1957) acts to reveal the subjective nature of the film and his commentary. A clear example of this (as noted by Lopate, 1996) is when Marker humorously re-interprets the same footage of the Yaklutsk Capital three different ways; once as a soviet propagandist, once as an american propagandist, and finally once as an obtuse but 'objective' viewer. In showing the three re-interpretations, which are obviously part of Marker's later re-interpretation of his footage, Marker highlights the subjectiveness, and power, of a narrator whilst maintaining his credibility as one through his honesty. To my mind the great strength of the essay film is this ability to question both itself, and its subject matter, whilst maintaining a credible voice.

Like Marker, Michael Moore has made a highly successful career for himself using a discursive essay format, with hit films like *Bowling for Columbine* (2002) and *Roger and Me* (1989). Unlike Marker's films, Moore's films have a very obvious strong liberal bias, he does not attempt to disguise the subjective nature of his investigations. Like his gut, he quite literally lets it all hang out. But, it is through the documenting of his meandering thoughts, the questions that he asks, and investigations he undertakes that the audience is able to draw value from the film and its subjects. As Alan Gross says in *Reference without Reality* ; “Only through persuasion are importance and meaning established” (1990). Discursive essays, unlike traditional narratives, do not attempt to
gloss over the imperfect nature of their progression, they are tangential, they back track, and more often than not emphasize the process of trial-and-error by which a conclusion can be reached.

In the context of science, the acknowledgement of the tangential and imperfect progression of knowledge acts to remove some of the inherent truth claims that the current methods of popularization confirm, and it helps to create a better dialogue between scientists and the public. This approach of discursive essay writing to acknowledge the non-linear process of science has been used widely in recent years within the genre of popular science writing by authors such as Brian Greene, Matt Ridley, Richard Dawkins and many more. Their books provide strong science content, but present it with historical and cultural context, acknowledging the provisional nature of the conclusions they draw.

A critical component in these authors' construction of their books is the compelling use of metaphors. They do not resort to wild sensationalist extrapolation to demonstrate a point; a lesson that could be learned by popular science filmmakers. Their ability to portray a complex idea in a manner so as to make its significance understandable and engaging is one of the key features of such popular science essay texts. The books of Greene, Ridley, and their peers are full of rich visual metaphors that enhance scientific understanding rather than fabricate it. Ridley, for example, fills his book *The Red Queen: Sex and the Evolution of Human Nature* (2003) with allegorical metaphors of Lewis Carroll's *Alice's Adventures in Wonderland* (1865) as a way of explaining the complex idea of the arms race between predator and prey, male and
female, and parasite and host, in a way which is accessible to all. As to their subjective nature, Ridley's analogs are so visual and allegorical in style there is little danger that they will be mistaken for homologue. In the context of creating science essay films, I believe that using visualization to create clear, rich, visual metaphors would allow producers to create engaging science films without the risk of creating spectacular visual 'proofs' such as those formed in subjunctive documentaries. The use of rich, visual metaphor also opens-up the avenue of humor in science films, something I personally believe the current didactical documentary forms prohibit by their very nature—how can one laugh if one cannot introspect? The use of humor in discourse is a powerful tool, one which Chris Marker fully understood in *Letter from Siberia* (1957) and which Michael Moore utilizes in all his films, it can show the ridiculousness of a proposition in a single line far sharper than a tome of text. Like metaphor, humor is also self-evident in its subjective nature, and acts to create lively and engaging content.

So what would an science essay film look like? In current television line-ups there are no archetypal examples of what I imagine this genre to be. However, both *The Elegant Universe* (2003) and *Intimate Universe: The Human Body* (2001) display a number of features that point towards the real possibility of realizing what I believe a popular science essay film could do. From its outset, *The Elegant Universe* (2003) suffers from the attempt by producers to build Brian Greene into a 'hero' for his ideas about string theory. But, throughout the series he states that his theories are not fact, and makes constant reference to the notion that “we may not be smart enough to ever fully understand the universe...” implying that neither is he. And while the show is far more
strongly focused on the narrative of why Einstein was unable to unify the theories of
space, time and gravity, the show still manages to lead the viewer on a discursive (often
humorous) exploration of Greene's ideas, regularly going off on tangents about the
pitfalls of theoretical research. If only the producers had allowed Greene to be a little
less heroic, a little more frank, and less directly linear in his presentation (like in his book
of the same name), the show could have become something approaching a science essay
film. *Intimate Universe: The Human Body* (2001) on the other hand, is driven primarily
by a series of questions about the human body, and casts neither Professor Winston, nor
science in the squarely in the role of 'hero', opting for a more 'progression of knowledge'
approach to understanding our bodies. The series, however, suffers from the problem of
an overriding urge for expository narration. But, there are some moments where the
highly distinguished host, Sir Robert Winston, breaks this tradition and engages the
audience in a far more frank, and often discursive manner. One scene that springs to
mind is when Winston, tasked with the issue of establishing the effects of alcohol on the
body, eschews the expository tradition, and sets about it as you or I would, namely
drinking large amounts of alcohol in front of the camera and describing what he
experiences to the audience. It is in instances like this where we are able to glimpse what
a science essay film about the human body might look like.

On reflection, it would seem that the key to realizing a popular science essay film
is to create discursive essay narratives that encourage scientists (or presenters) to act as
guides and peers, holding their subjective assumptions directly accountable to the
viewers, and to avoid the temptation to revert to didactical exposition rather than
attempting more rhetorical presentation. There is a danger that an overly personalized essay-like approach could create film about the scientist rather than about the science. But, as science can't literally have it's own voice, the challenge of the essay format in science film must be to get scientists talking engagingly in the first person (not the third) about their ideas, and those of the scientific community. When a presenter or scientist breaks the “fourth wall” and addresses the viewer directly and frankly, the subjective nature of the film's content and its construction becomes apparent. Eschewing the tendency to paint science in a wholly positive, infallible light, allows the audience to view the hidden nature of the process of science allowing them to reach more informed conclusions about the science portrayed.

Conclusion

The path from science text to science television show is a rocky one. Producers must contend with the adaptation of content from one media to another, and the effect of such adaptation on the inherent truth-claims of the content. Even when producers aim for the utmost fidelity in the adaptation of science to the screen their efforts are restricted by the pressures applied by the media and by the environments in which it resides.

In recent years the competitive financial pressures of the modern television environment in the UK and US have pushed science films away from their traditional expository formats as they struggle to compete with other more dramatic fictional content. The varying cultural histories and market pressures in the UK and US have led to the rise of two dominant (but not mutually exclusive) methods of dramatizing the
science content in documentaries; narrative imposition (in the US) and visual spectacle (typically CGI in the UK). However, in addition to making these shows more dramatic, these two techniques have acted to create a hybridized format, blending subjective speculation with traditional expositional documentary techniques. The result of such hybridization has been to blur the lines between fact and fiction and to allow for the creation of dubious subjunctive documentaries, and almost entirely fictive narrative documentaries. The retention of the expository documentary techniques in these hybrid documentaries, hides the subjective nature of their content and construction. This has acted to uphold the cultural practice of misinterpreting science in order to support fantasy and fiction, and has led to a rise in pseudoscience, which could be potentially very damaging to society. And, a growth in the public distrust of science, could leave our societies woefully unprepared to make informed decisions about the future. As Brian Greene so aptly puts it; “when we look at the wealth of opportunities hovering on the horizon — stem cells, genomic sequencing, personalized medicine, longevity research, nanoscience, brain-machine interface, quantum computers, space technology — we realize how crucial it is to cultivate a general public that can engage with scientific issues; there’s simply no other way that as a society we will be prepared to make informed decisions on a range of issues that will shape the future.” (2008).

If we are to avoid such unpreparedness then perhaps it is time to re-assess the way in which science is treated and presented on television. It is clear though that to remain competitive on television, science shows must find ways to be engaging and entertaining — gone are the days of literal dry, didactic exposition. But, instead of blindly using
modern dramatic techniques, I suggest that we find ways to adapt science for television that are more accurate in showing the true nature of science. Instead of bending science to conform to preconceived, linear dramatic narratives, I suggest we look at alternative narratives such as those seen in discursive 'essay' films. And, instead of stretching spectacle and visualization so far as to create fantastical dramatic fictional worlds, I believe we should focus on creating shows that use metaphor and analogy to help us visualize the real, hidden nature of science. By utilizing scientists as guides and peers rather than as heros and elitists, by choosing discourse over teleology, and by incorporating visually rich metaphors and analogies into science shows, we can render the strange and unfamiliar understandable and engaging. After all, isn't that what dramatic storytelling is all about?
REFERENCES CITED


Monster Quest. The History Channel. 2007.


