Regular viewing of a television drama series affects responses to science ideologies in it: a focus group-based study of *Bones*

Elizabeth Coonan, Lindy A. Orthia, Felix Bloomfield, Joseph Horst, Alana Pascoe, Katherine Schiff and Sam Axelsen

Australian National Centre for the Public Awareness of Science, The Australian National University, Canberra, Australia

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Abstract

Research shows audiences respond to the science in television fiction in diverse ways, varying with personal circumstances and beliefs. Little research, however, has examined whether regular viewers of a television series see its science content differently from people tuning in for the first time. In this small study we screened an episode of forensic drama series *Bones* to five focus groups comprised of regular viewers, casual viewers and/or people who had never seen *Bones* before. While all viewers were equally skeptical about unrealistic scientist stereotypes and unconventional scientific experiments in the episode, prior experience did influence viewers’ interpretations of science-themed moral quandaries and ideological debates.

Introduction

There has been much speculation in recent decades about the impact of science-themed fiction on public perceptions of science - ranging from fears that mad scientist characters promote discontent with science, to hopes that forensic science television dramas will (and do) increase science enrolments. Scientists, science communicators and science teachers have at times been fearful of referring to movies and television fiction when discussing science, and at other times have embraced the idea of using the popularity of these fiction texts to engage uninterested people with science, for example in museum and science centre exhibits (e.g. CBS Broadcasting, 2008; National Science Foundation, 2008), and in science classrooms (e.g. Dubek, Moshier, & Boss, 1994; Liberko, 2004; Rose, 2003). Fictional portrayals of science have been criticised for causing public ignorance of science and contributing to misunderstandings of science (National Science Foundation, 2000 in Barnett et al., 2006; FASTS, 2010 in Orthia et al., 2012).

However, there is little evidence for or against this, with few empirical studies examining the impact of fiction on perceptions of and attitudes towards science (reviewed by Orthia, et al., 2012). The research that has been published suggests that fiction does in some way impact public discourse about science (e.g. Barnett, et al., 2006; Barriga, Shapiro, & Fernandez, 2010; Bates, 2005; Davin, 2003; Mellow, 2007; Reid, 2011), although the conclusions of these studies point in somewhat disparate directions, and the consensus is that audience members do not interpret the science-themed content of a given fiction text in a homogeneous way.
Human participant research into how people interpret the science content of fiction is important for dispelling unfounded assumptions. It is also important for grounding content analyses, since researchers cannot always conduct human participant studies, but may still legitimately attempt to understand what a fiction text is saying about science. The present study examined one aspect of this field of research: whether and how prior experience watching a television series alters audience interpretations of the science portrayed in it. This research question has implications for science communication and STS research including content analyses of television programs, because if prior experience does affect interpretation, then scholars need to analyse television shows with an awareness and acknowledgement of the narrative context they present.

Previous research suggests that prior experience may make such a difference. Haran et al. (2008) compared representations of scientist characters in films and in television series, and found that television series allow deeper, less stereotypical portrayals of scientist characters than films, since characters can evolve and change over weeks or years rather than having limited screen time to establish their personalities. One potential implication of this is that audiences might respond differently to scientist characters they are already familiar with because of their greater prior character development, than to scientist characters they only encountered once, even if the characters perform the same dialogue and actions. A study by Orthia et al. (2012) lent some support to this; researchers showed an episode of The Simpsons to focus groups and asked them to discuss its science content, and a number of participants drew on other episodes of The Simpsons and their knowledge of its characters to interpret the science themes and characters of the episode. However, there was no direct comparison with the responses of people who had not previously seen The Simpsons.

In this study we investigated audience responses to the science content of one episode of a continuing television drama series. Specifically, we gauged the responses of regular viewers of the series, of casual viewers, and of people who had never watched the program (hereafter, ‘non-viewers’), by showing them the episode then running focus group discussions about it. The series we chose was the US forensic drama Bones (2005-present), and we selected “The Proof in the Pudding” (Harris, 2008) from the program’s fifth season as the study episode.

All but one of the authors of this study were undergraduate students at the time of data collection and conducted the research project while enrolled in a science communication course (inspired by the methods of Orthia et al.’s 2012 study). The project is therefore relatively small, involving 26 focus group participants distributed among five focus groups. Nonetheless, our results indicate a noteworthy pattern in public responses to fiction: that while previous experience with the television series had no discernible impact on audience members’ responses to the scientist characters or scientific experiments and facts represented in the episode, it did alter audience members’ interpretations of the ideological aspects of science in the program (where ‘ideological’ here refers broadly to abstract notions of what science is or should be). In particular, prior experience shaped participants’ interpretation of scenes that discussed science as a truth-seeking pursuit.

Before detailing our methods and findings, we will review the literature that helps understand how regular viewing of a television series might affect people’s interpretation of its science content. We will then discuss our own interpretations of the science content of the Bones episode “The Proof in the Pudding” to enable comparison with our participants’ interpretations.
The influence of prior viewing on perceptions of a television program’s content

Few authors have discussed the ways in which extensive experience with a fiction television series can affect people’s perceptions of its science content (where ‘content’ could include scientific facts, scientist characters, debates about science-related issues, ideologies pertaining to science, and more). Sparks et al. (1997) claimed that regular viewing of fictional shows that included paranormal beliefs increased endorsement of such beliefs. Van den Bulck (2002) found that regular viewing of fictional medical shows was correlated with increased beliefs in the accuracy of their representations of cardiopulmonary resuscitation. The data of these studies, however, only supported a correlation not a causal link. In contrast to these cases in which people seemed to have learned ‘facts’ about scientific reality from fiction, a number of authors argue that readers do not in fact assimilate the science in fiction in a linear manner. Dudo et al. (2011) found that Americans’ levels of television viewing, their scientific knowledge and their attitudes to science were related but not simplistically causal. Davin (2003) made the point that audiences are media literate, with the ability to interpret texts in multi-layered, complex, and often unexpected ways. Similarly, Bates (2005) found that the public uses fiction along with other media and previous understandings to form a context for their understanding of science. He suggests this is a complex process involving audiences critically assessing the value of the fiction text and the science within it. Orthia et al. (2012, p. 153) interpreted such findings as evidence for a constructivist model of audience responses, since the audiences negotiate “meanings within the broader context of their lives and experiences”.

A number of authors attribute less agency to audiences and examine instead the ways that fiction differs from other media, and how through that difference it can manipulate audiences’ thoughts and feelings, affecting their processing of science content. Dhingra (2003, 2006) argued that the way television shows present science - mixing science facts and ideas about the nature of science with a social setting peopled by scientists - has the potential to affect audience appropriation of science. A key concept she raised in both papers is the close link between television and culture, claiming television shows tend to mirror popular beliefs and behaviours, and thus have the potential to affect audiences cognitively, emotionally and attitudinally. She further attributed this potential to television stories being told through characters’ perspectives, arguing that the relationship between scientist characters and embedded messages affects audience responses. Some aspects of this model are specific to fiction, making fiction, in Dhingra’s view, worthy of specific scholarly attention.

Going still further, Brodie et al. (2001) used cultivation theory to explain how audiences they studied incorporated information from the television medical drama ER into their lives. Cultivation theory has two main components, the view that the world portrayed in fiction differs from reality, and the argument that increased exposure to this fiction world results in internalisation of this different reality (Shrum, 2004). Based on this model, “the more that people watch television, the more their beliefs correspond to the narrative world” (Appel, 2008, p. 62). Cultivation theory has much in common with the concept of ‘narrative transportation’, or the way that a ‘viewer ‘travels’ into the story world and is changed by the journey into it” (Barriga, et al., 2010, p. 9). Barriga et al. (2010) argued that transportation is an important factor in how people learn from fiction, stating that viewer engagement and transportation can be considered a framework for predicting how audiences evaluate the knowledge presented and allocate cognitive resources. They further argued that the greater the degree of transportation, the less likely the audience is to source monitor, that is to place different values on information from different sources; thus even if audiences do often think
critically about the science in fiction as other authors contend (above), the extent of that
critical thinking may vary with transportation.

Barriga and colleagues did not find any significant correlation when they tested the impact of
transportation on identification of correct and incorrect science facts, but a study by Green
(2004) on a different aspect of transportation found that it was positively correlated with
perceived realism. Describing how differing levels and types of familiarity with a fiction text
or with themes within the text lead to different reading processes, she found that prior
experience deepens transportation, explaining this through a greater ability to understand
character feelings. This corresponds with Dhirga’s (2003, 2006) ideas and supports the
conjecture of this paper (based on the work of Haran et al. (2008)) that regular viewers of a
television program may read its content differently than non-viewers tuning in for the first
time.

Both Green (2004) and Barriga et al. (2010) presented the argument that transportation
increases perceptions of realism and hence decreases recognition of incorrect facts or
misinformation. This may help explain the findings of Sparks et al. (1997) and Van den
Bulck (2002) discussed above. Previous researchers have investigated this phenomenon
further: Marsh et al. (2003) found that audiences will remember incorrect facts that are
presented in fiction, and further, that they have a tendency to believe this misinformation is
something that was always known and that the role of the fiction text was simply to aid
recollection of these ‘facts’. Misremembered information can then be retained over time and
is often attributed to knowledgeable sources (Barriga, et al., 2010). Significantly for the
present study, misremembering increases with repeated reading of a fiction text (Marsh, et al.,
2003), though this is not exactly the same phenomenon as being familiar with previous
episodes of a continuing series.

A further mechanism explored in the literature to explain the influence of fiction is the impact
on audiences of identifying with particular fictional characters. Identification is generally
defined as “feelings of affinity, friendship, similarity, and liking of media characters or
imitation of a character by audience members” (Cohen, 2001, p. 249). Steinke et al. (2012)
linked this to transportation, arguing that identification occurs during transportation into not
only the story world but into the character’s world. They highlighted the importance of
viewer’s feelings about their similarity or difference to characters with which they identify.
Green (2004) drew the same conclusion that both transportation and character identification
are enhanced by prior experience with the fiction text. Along similar lines, Davin (2003)
found that emotional identification was crucial in viewers’ collection of knowledge from the
television drama ER. The Bagamoyo College of Arts et al. (2002) identified audience
identification with characters in a community theatre production as a key factor in
determining its impact on community behaviour and awareness of HIV transmission.

While Barnett et al. (2006) found that the scientific authority of the main character in the
science fiction movie The Core influenced high school students’ perceptions of the science
presented in it, the method used in their paper has been criticised for not considering the
impact on students’ responses of viewing the movie in class (Orthia, et al., 2012). Steinke et
al. (2012) cautioned against deterministic findings such as those of Barnett et al., arguing of
the importance of viewers’ individual characteristics and attitudes as mediators of the effects
of fiction content. Correspondingly, Orthia et al. (2012) found their focus group participant
responses were shaped by their individuality, including factors such as personal and religious
beliefs, historical and political beliefs and awareness, and experiences with other fiction.
This body of literature supports the hypothesis that regular viewers and non-viewers of *Bones* will have different responses to and interpretations of the program’s science content. In the next section we discuss the science content of “The Proof in the Pudding” and how we predicted our participants might respond to it based on this literature.

**The science in *Bones* and “The Proof in the Pudding”**.

*Bones* is a television series based on the life and work of forensic anthropologist Kathy Reichs. On her website, Reichs states that the aim of the series was to “bring her science to a broader audience and to present issues of forensic science, while showing the humanity of the scientists” (Reichs, 2012). *Bones* is popular with viewers as evidenced from its eight produced seasons at the time of writing, and it has a high level of science-themed content, but it has received little research attention compared with other forensic television dramas, such as *CSI* (McManus, 2008).

The main character of the show is a forensic anthropologist, Dr Temperance Brennan, nicknamed “Bones”. Bones works in the forensic science department of the Jeffersonian Institute, a public museum. She has a close working relationship with the program’s second major character, Special Agent Seeley Booth from the FBI, who seeks her expertise to solve criminal cases that often involve murder. Other characters who work at the Jeffersonian Institute include medical examiner and former coroner Dr Camille Saroyan, entomologist Dr Jack Hodgins, psychologist Dr Lance Sweets, and forensic reconstructive artist Angela Montenegro. The study episode, “The Proof in the Pudding”, was episode 12 of the program’s fifth season, so the characters, their relationships and the ideological framework of the show were already well established when it was made, making it appropriate for testing differences between regular viewers and non-viewers. This is one of the reasons it was selected for the study.

Another reason “The Proof in the Pudding” was chosen was because it is rich in science content - in scientific information, in scientist characters, in depictions of scientific experiments and methods, and in ideological debates about the relationship of science to truth. The story begins when government agents place Bones’ lab on lockdown and order the forensic team to determine the cause of death of an unnamed skeleton. The agents forbid the scientists from speculating about the skeleton’s identity, but this injunction has the opposite effect of provoking the scientists’ curiosity. When they begin to suspect the skeleton was former US President John F Kennedy’s, and the evidence seems to support the popular conspiracy theory that Kennedy was assassinated by a ‘second gunman’ not the man arrested for the crime, Lee Harvey Oswald, they secretly carry out experiments to test the second gunman hypothesis. Booth expresses his firm disbelief in the conspiracy theory, refusing to countenance the idea that the US government would lie and cover up the truth about Kennedy’s death. Bones’ final conclusion is that the skeleton’s condition is consistent with Kennedy’s medical history and physique, except for the presence of bone disease that is statistically unlikely (though not impossible) to have been present in Kennedy’s body. She carefully frames this conclusion when communicating it to Booth, down-playing the slim room for doubt to give the impression of greater certainty. Booth is therefore pleased because this convinces him that the skeleton was not Kennedy.

The episode raises ideological questions about the nature of science, since a major theme of the episode’s dialogue is the idea that science must be about the pursuit of truth, even if it is an unpleasant truth. For instance, the scientists felt their work should not be limited to
determining cause of death and felt that, in the pursuit of truth, they should be allowed to identify the corpse. Further, Saroyan questions Bones’ downplaying of the possibility that Kennedy had bone disease, drawing attention to a distinction between scientists finding out the truth and scientists communicating that truth to people with a vested interest in it. One of the questions we tried to answer was whether regular viewers interpreted Bones’ ‘cover up’ of the truth to Booth differently from non-viewers, since the act could be interpreted in multiple ways, for example as the kind gesture of a friend or as a betrayal of the aims of science stated within the episode. The episode highlights the fact that the interest Bones and Booth share in ‘science as truth’ has developed over time, as Booth states that he learned from Bones that it is important for him to find the truth even if it is going to hurt him. Since only regular viewers will have witnessed that development, we conjectured that the scene was likely to be interpreted differently by them than by non-viewers.

As Haran et al. (2008) discussed with respect to other television programs, the ensemble cast of Bones allows a pluralistic depiction of scientist characters. Bones, Saroyan, Hodgins and Sweets are different from each other (as well as from the non-scientists) in terms of their demographic traits, disciplines and personalities. We speculated that those differences may be more noticeable for regular viewers, because like other episodes, ‘The Proof in the Pudding’ involves a number of side stories that are personal in nature - a pregnancy test, a mother worried about her daughter, sexual tension between several pairs of characters, and a man trying hard to attract a woman heroically - which contribute to the development of the characters’ lives and the revelations about their back-stories that continue throughout the series. Accordingly, another question we sought to answer was whether non-viewers saw the scientist characters in a more stereotypical light than the regular viewers, since the latter would be familiar with the characters’ back-stories and relationships that led up to the personal side stories in the episode.

Depictions of the scientific research process in the episode mainly comprise discussions between characters about relatively uncontroversial scientific facts, such as the impact of scarlet fever on bone density. However, the episode also depicts unusual experiments used by the scientists to test their hypotheses: Booth shoots moving melons with a replica of Lee Harvey Oswald’s rifle to simulate the Kennedy assassination, and Bones uses tubs of chocolate pudding to assess the density of the skeleton’s bones. We expected that non-viewers might think the representation of scientific research in the episode was inaccurate because of the experiments’ colourful nature. Conversely, since such experiments are often performed in Bones, we predicted that participants familiar with the show might be more likely to accept the portrayed scientific process as valid.

Methods
We elected to use focus groups to investigate our research questions, because they are beneficial in exploring people’s knowledge, attitudes, beliefs, and experiences (Gibbs, 1997; Kitzinger, 1995) and allow for a wide range of open responses compared with quantitative survey methods (Bates, 2005). We recruited 26 participants (sorted into five focus groups) via face to face contact and social media, which inadvertently resulted in the participant pool being weighted in favour of people studying or working in science, and included personal acquaintances of the researchers. While focus group research is almost always indicative rather than representative of a population, this recruitment strategy and sample should be
considered a potential limitation of our study. Nonetheless we consider the results useful, at least as indicative of patterns of response.

Our data collection protocol began with participants filling in a short questionnaire about their level of prior experience with *Bones* and asking them to identify the last time they were formally involved in science as a student or worker. Participants were shown “The Proof in the Pudding”, then given a short break. We then facilitated focus group discussions about the episode. Our focus group questions were designed to facilitate open discussion rather than to elicit particular kinds of answers, and their order was designed according to the suggestions of Krueger and Casey (2009). We began with generic questions asking participants to share their initial thoughts about the episode, then moved on to specific questions about the episode or about science generally, such as “What did you think about Dr Brennan's comment to Agent Booth 'you wanted the truth even if it was going to hurt you'?”; “Do you think this is typical of scientists trying to get the truth?”; and “How accurately do you feel the scientists were portrayed in this episode compared to real life?”. Participants often discussed the topics that our questions addressed before we asked them, indicating that there was a free flow of ideas driven by participants’ thoughts, feelings and interests, rather than focus groups producing directly comparable discussions that dealt with topics in the same way or the same order.

We ran four focus groups of five people and one of six people. About half the participants identified as casual viewers of *Bones* (n=12), with the remainder split between regular viewers (n=8) and non-viewers (n=6). The focus groups took place in comfortable private spaces, and food and drink was provided as an incentive. Discussions were recorded and transcribed, with pseudonyms replacing names to protect participants’ anonymity: participants were coded ‘R’ for regular viewers, ‘C’ for casual viewers or ‘N’ for non-viewers, then numbered for individual identification. While focus group 1 was comprised entirely of casual viewers (C1-C5), the other four groups were mixed in composition. Group 2 included regular and casual viewers (R1-R4, C6); group 3 regular and non-viewers (R5-R6, N1-N3); group 4 casual and non-viewers (C7-C10, N4); and group 5 included representatives of all three types of viewers (R7-R8, C11-C12, N5-N6).

Focus group transcripts were analysed using an approach inspired by grounded theory, to allow for the flexibility of emergent results (Strauss & Corbin, 1998), particularly considering the free flow of discussion beyond the bounds of the questions asked. Transcripts were read iteratively to identify themes, and then participants’ comments were aligned with these themes.

**Results and Discussion**

**Ideologies of science**

The one finding of the study that supported our predictions was that regular viewers of *Bones* tended to respond to ideological aspects of science in “The Proof in the Pudding” differently from those with little or no prior experience of the show.

This was exemplified in participants’ reactions to the scenes in which Bones downplays the possibility that the skeleton was Kennedy when talking to Booth. Regular viewers were less critical of Bones’ comments and actions in these scenes than casual or non-viewers were. They tended to interpret Bones’ comments and actions in light of the past relationship
between her and Booth, and her ongoing character development. For example, R3 suggested that Bones’ decision to downplay the Kennedy possibility “was her showing respect for [Booth’s] need to know whether what he had been doing was right or not.” R5 referred to Bones’ character development, reflecting on how she would have behaved in earlier seasons:

I think in the original, in Series 1 and 2 she would have actually said no, no that’s JFK, that’s it. You know over the seasons she’s been slowly learning how to be, particularly with Agent Booth, how to be more sensitive, and how to you know compromise her natural beliefs.

In contrast, casual viewers and non-viewers responded more cynically to Bones’ communication of her scientific conclusion to Booth, some referring to it as “a lie”, since, in N3’s words, “she implied she was ruling it out when it was far from impossibility that it was JFK”. This differed from regular viewer R6’s more forgiving statement that “she never lied to him, she didn’t say anything incorrect, she just didn’t put proper emphasis”. Casual and non-viewers were also cynical about Bones’ statement that Booth wanted to know the truth no matter how much it hurt him: C8 commented “but she didn’t tell him the truth,” and C1 said “it was rather ironic, considering that she didn’t tell him the truth.” Casual and non-viewers tended to express the view that Bones misrepresented the results, and that Booth’s character was flawed, as seen in C3’s comment that “he didn’t really want the truth, like, he didn’t try and accept the truth”.

Importantly, these differences were not evident when participants were speaking more generally about the science-as-truth ideology promoted in Bones, rather than as it was applied in the context of Bones and Booth’s conversation. Most participants responded critically to the idea that scientists always seek the truth, for example casual viewer C6 said, “scientists can cover things up too”, casual viewer C12 said, “truth is always up for revision”, and regular viewer R7 commented, “I think truth is a fairly flexible concept”. Participants used real life experiences with science as evidence for their cynical views, for instance R4 said, “I think we were once told you can make the statistics say whatever you want them to say”, R3 said, “you can always dodgy up the experiment … especially when your research money keeps flowing every year”, and R8 noted, “we all know science history is riddled with people who’ve discovered something and … the scientific community has said ‘no that can’t possibly be right’ so it’s very political, people’s egos get in the way”.

The relative unity of these perspectives belie the differences seen when the participants turned their thoughts to the specific scenes from Bones. Interchanges between regular viewer R5 and non-viewer N1 illustrate the differences expressed by the two sides:

N1: I think the girl made a bad move to cover up and pretend it wasn’t Kennedy just to make the guy feel better. I think she should have been honest and crushed his hopes.

R5: But their relationship is very important.

... You can’t prove to Booth that that was JFK and that was a cover up any more than you could prove to people that god doesn’t exist. They’re just not going to believe you because it’s so important for them to believe it.

N1: Yeah well, then they are silly and are not real scientists.
Facilitator: Do you think she was right in doing that?

N1: No.

R5: I think it was justified given her relationship to [Booth], and how important it is to maintain that relationship ... From a scientific perspective if she had gone to the wider public and said that no, that would have been unacceptable. But because this is just an interpersonal relationship ... I’d say that the sacrifice that’s well worth it.

R5’s empathy for Booth’s motivations, and his exceptionalist attitude regarding the relationship between Booth and Bones, is consistent with the idea that regular viewers will be transported into the fictional world and will identify with characters emotionally. In contrast, N1 interpreted the scenario not in terms of the established relationships and dynamics of the Bones world, but in light of her own preconceived opinions about what scientists ought to do, that is, the same ideological frame that she might apply to real life.

We did not ask about participants’ transportation or identification so cannot draw firm conclusions about the mechanism. Nonetheless, the findings suggest that prior experience with the show influences viewers’ interpretations of ideologically loaded incidents in it. This in turn supports Haran and colleagues’ (2008) observation that the continuing nature of a television series has the potential to communicate different messages about science to viewers (than film) because of its continually evolving characters. It may support some of the tenets of cultivation theory, though the fact that regular viewers applied different ideological standards to in-show incidents than to their general beliefs about science suggests that people’s identification with the values of the in-show universe is limited to their engagement with the show and not applied outside it.

**Scientist characters, scientific methods, and laboratory setting**

Our predictions were not borne out with respect to other aspects of the episode’s science content. All participants, irrespective of their prior experience with Bones, responded critically to the scientist characters, scientific methods, laboratory setting, and science issues presented in “The Proof in the Pudding” by talking about the show as a constructed entertainment product. This suggests that, to a significant extent, participants did not experience narrative transportation into the Bones world.

For instance, participants were aware of the limited ability of fiction to present a broad cross-section of scientist characters. R5 noted that “one [character] was a stereotypical conspiracy theorist, one was a stereotypical sociopath”. When asked if Bones’ behaviour was typical of a real life forensic anthropologist, many participants were ambivalent, with R2 responding that “some might be but others are completely different” and R6 saying “I’m sure that there are a diverse range of people and characters who are forensic anthropologists”. Some participants saw the representations as very divergent from the norm: several noted that the characters were “prettier” or “better looking” than real scientists, R8 felt that “no one would wear that dress and those shoes to work like that”, C5 said it was “way too glamorous” and C12 thought that the proportion of women in the scientific workforce was “unusually high” in the episode. Participants in groups 1 and 4 (both dominated by casual viewers) debated whether
Bones’ “autistic spectrum” character traits were realistic for forensic anthropologists or for scientists in general.

McManus (2008) found, using content analysis, that while much of the forensic anthropology in Bones is fictional, some of the techniques used such as skill and pelvis morphology are scientifically accurate. Similarly, the participants’ comments on the unrealistic science tended to focus not on the scientific ‘facts’ (regarding, for instance, the bullet’s trajectory through the skeleton’s head), but rather on the melon and pudding experiments conducted in the episode. Regular viewer R2 observed that melons are “not really like a skull”, regular viewer R4 thought that in real life “they probably wouldn’t be allowed to put bones in puddings”, and casual viewer C10 commented “in terms of the scientific analyses and things they sort of come to the conclusions really quickly”. In addition, participants perceived the science lab as unrealistic, particularly those less familiar with the show. Casual viewer C6 described it as “strange”, asking, “where did they get the pudding mix and the eggs” for the pudding experiment. Non-viewer N5 observed that “where they worked looked like the set of Star Trek or something. It didn’t look like a real place.” Similarly, many participants commented on the unlikely availability of the rifle and the too-convenient existence of a secret passage used to slip past the government agents.

Several episodes of Bones involve the use of museum materials and equipment in experiments, but whereas regular viewers drew on their knowledge of Bones to justify and contextualise Bones’ motives in downplaying the truth, they did not attempt to explain the unusual laboratory setting in the same way. It may be that the museum setting is not as critical to the program as the Bones-Booth relationship, so could not function as an explanation in the same way; certainly Bones often carries out field experiments away from the museum. Alternatively it could be that elements of the program that are intentionally quirky and unusual - Bones’ ‘autistic’ persona, colourful experimental props, and the museum setting - must simply be accepted as the premise of the program and cannot be explained with reference to real life, because they are intended to be unique. The relationship between Bones and Booth, in contrast, has obvious parallels in real life human relations, and thus provides a compelling frame through which a viewer can respond to an ideological dilemma.

Consistent with this is the fact that when participants did draw on prior knowledge of Bones, the comments were somewhat vague, focusing on the show as a whole rather than particular episodes, knowledge about characters, or references to how science is represented in the show. This may be a result of the regular viewers holding disparate definitions of ‘regular’: Shrum (2004), for example, notes that different “people define watching as everything from ‘eating a snack while looking at the TV’ to ‘sitting in a room where the TV set is on, but not looking at the screen or listening’ … to instances when they might be intensely connected with the program and the characters in them” (p. 276). If Dhingra (2003, 2006) is correct that audience responses are most affected by representations of characters and the scientific messages packaged through them, it may be that the one thing viewers glean and value when looking at Bones while eating a snack is the dynamic between the two main characters.

Participants’ perceptions of the science content as unrealistic may have decreased the level of narrative transportation and character identification they achieved. Busselle & Bilandzic (2008, p. 268) argue that when narratives show events that are inconsistent with viewer’s pre-existing notions, their responses should be critical, because these inconsistencies interfere with the “smooth construction of mental models.” They argue that this can result in decreased engagement, and can decrease the persuasion of the narrative. Conversely, Kirby (2003)
found that film content that appears to be ‘realistic’ makes it difficult for audiences to distinguish between fact and fiction. The unrealistic or quirky content in this episode may have sharpened the distinction between fact and fiction and broken narrative transportation, particularly when viewing in an artificial focus group environment in which people may be more self-conscious.

The high level of science education most focus group participants had may have exacerbated an alertness to potential problems. Unsurprisingly, viewers who have had real life experiences with the information, issues, people or events presented in television shows are most able to recognise ‘unrealities’ or inconsistencies within them (Potter, 1988). Consistent with Bates’ (2005) findings that the public base their understandings of science on their previous experiences with science, fiction and other media, many participants drew on their real life experiences with science when responding to the episode.

Why the difference?

The explanation for the differences between viewers’ interpretations of the ‘ideological’ science content and the other aspects of science represented may be simply a methodological one: our study was small, and a larger study with a more diverse sample might have obtained a different result. It is also possible, though, that our study is an accurate indication of the bigger picture. There are important differences between the different kinds of science-themed elements in fiction that can help explain the results. While the primary purpose of most fiction is to entertain (Kirby, 2003), its method of doing so is to set up hypothetical scenarios (such as plots and character arcs) to explore possibilities - be they possibilities for individual human choices, possibilities for whole societies, or other kinds of possibilities. The hypothetical scenarios in contemporary drama frequently contain moral quandaries, and through its resolution of those, moral messages, and this moral content can provide a core of meaning in the program, even if there are other reasons why viewers enjoy the program. The majority of participants in Orthia et al.’s (2012) focus groups commented that they thought the representation of science ‘facts’ in The Simpsons was inaccurate but that the show contained a pellet of moral truth.

Similarly, it was the moral content that viewers in our study interpreted differently depending on their prior experience with Bones, rather than the less morally loaded elements such as scientist stereotypes and scientific research methods. More specifically it was the moral quandary established between the main characters Bones and Booth that viewers disagreed about, rather than (for example) the moral quandary about whether the scientists were right to disobey the government agents and identify the skeleton. Empathy for the main characters and awareness of the complexity and nuance of their relationship appeared to be the factor that swayed regular viewers to a particular perspective on the moral quandary. Causal or non-viewers, who lacked that same empathy and awareness, gave a perspective on the moral quandary that prized ideological consistency and condemned exceptionalism. They wanted the characters to act in ways consistent with the overtly stated ideology of the episode, “science-as-truth”, and felt that those who acted inconsistently were dishonest. It could be argued that the program’s negotiation of its moral quandary gave answers that made sense and were satisfying to regular viewers - because they were able to find acceptable reasons for the apparent inconsistencies - but were unsatisfying to casual viewers and non-viewers. The moral framework was therefore deeply contextualised rather than universalist.
Conclusions

Our data provide some support for the argument that people who watch a television program on a regular basis will interpret its ideological messages differently from people who are tuning in for the first time. However, the same argument does not hold up for other science-themed elements of fiction, including scientist stereotypes and the plausibility or accuracy of scientific research enacted on screen. In line with much of the literature, our data suggest that audiences tend to think critically about these things, freely and analytically comparing what they see on screen to what they think is realistic. This is the case even if they are regular viewers who are engaged with and enjoy the television program.

The fact that viewers’ interpretations of the ideological elements were highly contextual has significance for scholars in this area. A common feature of science communication and STS research is content analysis, in which scholars interpret the significance for science of a movie or television show or novel, by analysing its science content. Our study suggests that caution is warranted when conducting a content analysis, particularly for a continuing series (be it a television series, a series of comics, a series of novels, etc). It shows that the narrative context of the science content may greatly shape its meaning and significance for its audience, so must be taken into account. Scholars may worry (or rejoice) over what people ‘learn’ about science from a television program’s resolution of a moral quandary; we might, for example, be concerned that “The Proof in the Pudding” teaches people that scientists cover up the truth to serve American nationalism. But if we fail to take into account the context in which people engage with a fiction text, then we have failed to understand that fiction text.

The results are also significant for science communication practitioners, including science teachers, who use fiction to engage students with moral and ideological questions about science (e.g. Berne & Schummer, 2005). If the particular work of fiction chosen is part of a continuing series, it is important to note that the moral landscape may change depending on people’s prior experience with it. That may mean it is worthwhile engaging seriously with aspects of the fictional work that would normally seem irrelevant to science, such as personal relationships between characters outside the lab. As with much of the material science communicators deal with, we cannot confine ourselves to the purely scientific. The social context of science has a relevance all its own in the world of science-themed fiction.

References


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