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Are people inspired by *The Big Bang Theory* to find out more about science? Results from focus group-based audience research

ABSTRACT

*In this paper we report some results of focus group research run with regular viewers of American sitcom *The Big Bang Theory* (2007-ongoing), regarding the representation of science and scientists in the program. Specifically we report evidence that *The Big Bang Theory* has stimulated audience members to find out more about science. The show stimulated just over a quarter of our focus group participants to find out more about the scientific concepts discussed by its characters, mainly through internet searching and browsing. In some cases the show encouraged people to feel less intimidated about engaging actively with science-related public media such as YouTube videos and public lectures about physics.*

KEYWORDS

science
communication
popular culture
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science engagement

INTRODUCTION

In the field of science communication, a major focus of research is to find out how people respond to different forms of science popularisation, as one of the discipline's aims is to inspire public interest in science. In 2010 the Australian Government's Department of Innovation, Industry, Science and Research produced a document entitled Inspiring Australia (DIISR, 2010), which was directed at reviewing the current situation of science communication in Australia and recommending strategies for science engagement over the next five years. One of its recommendations was that the media's role in communicating science be strengthened. While the report's focus was on news media and Australian-

produced science-themed programming, it was this recommendation that inspired the research project on which the present study is based. An expert working group that was brought together to make further recommendations for Inspiring Australia offered one particular recommendation, suggesting ‘a general programming supplementary fund be established to encourage television and film content that includes factual science, fictional science (i.e. superhero science), science concepts or characters’ (Science and Media Expert Working Group 2011: 11). However, there is a relative paucity of research about whether fictional science and fiction characters do inspire public interest in science.

This present paper aims to contribute to redressing that lack, through a study of audience responses to US sitcom *The Big Bang Theory* (hereafter, *TBBT*). *TBBT* is popular on the world scale, with 15.5 million viewers in the US alone for the season finale of season 6 (TV-aholic, 2013). It is also very popular with Australian viewers. An estimate of 1.3 million Australians watched the same episode (OzTAM, 2013), therefore making it a promising vehicle for delivering the kind of service the Inspiring Australia program seeks for stimulating Australians’ interest in science. In addition, *TBBT* has a science consultant working with the program’s crew during the taping of each episode, who helps by including accurate and up-to-date science in the scripts (Heyman 2008). This suggests that *TBBT*, more than many other popular fiction texts about science, is consistent with Inspiring Australia’s aims.

There is anecdotal evidence that science-themed fiction television programs can inspire interest in science. For example, NASA astronaut Mae Jemison was famously inspired to pursue her career by watching Lt. Uhura (Nichelle Nichols) on the original series of *Star Trek* (1966-69) (Penley 1997), the anonymous scientist authors of the website ‘Sci-Fi Science: The True Science Behind Science Fiction’ state ‘it was science fiction that sparked our interest in science fact’ (<http://www.scifiscience.co.uk/>), and Dhingra (2003) noted that some of the school students she studied considered scientist Dr. Dana Scully (Gillian Anderson) from *The X-Files* (1993-2002) to be a positive role model. In the present study we wished to more formally investigate such links. Many of the formal studies that have been conducted into the relationship between fiction and public engagement with science have focused on the public understanding of science facts (e.g. Barnett et al. 2006) or attitudinal and behavioural changes regarding health or environmental matters (e.g. Brodie et al. 2001, Lowe et al. 2006), rather than more purely interest in science. While, in a small study, we would not expect to find anything as striking as people inspired to become scientists by

TBBT, we did seek to know whether *TBBT* inspired its audience members to find out more about aspects of science. We defined ‘science’ broadly to include any aspects of mathematics, engineering and medicine as well as traditional science disciplines.

METHOD

To gauge audience responses to the science and scientist characters in *TBBT*, one of us (RL) conducted focus groups with regular viewers, after gaining ethics approval (ANU HREC protocol 2011/177). We recruited participants from the Canberra region but including interstate and international visitors, through publicity mainly within a university and by word of mouth. The participants’ ages ranged between 18 and 59, and the gender split was 39 women and 35 men. The total number of participants was 74, distributed among 18 focus groups. For the purposes of analysis the focus group participants were organised into two main categories: those with a science background (defined as a university degree in a science-related field) and those with a non-science background (no such degree). We further subdivided each of these into three occupational categories: undergraduate students, postgraduate students or academics, and people who worked outside academia and were not students (‘non-academics’). The 74 participants were distributed among these categories as follows:

	Science background	Non-science background
Undergraduates	8	10
Postgraduates or Academics	22	-
Non-academics	10	24

Each focus group ran for about 2 hours. A set of pre-written questions was asked, which predominantly focused on what the participants thought about various aspects of the science and the scientists in *TBBT*, and whether their knowledge or behaviours regarding science had changed as a result of watching it. The questions also inquired into participants’ personal opinions about science and experiences with it, including whether they had previously engaged in information-seeking activity about science.

An approach inspired by grounded theory was used to analyse the data for the project as a whole, since it ‘results in the generation of new knowledge in the form of theory; therefore areas where little is known about a particular topic are most deserving of research effort’ (Birks and Mills 2011: 16-17). The grounded theory approach demands that data be analysed in such a way that the conclusions are built upon the participant’s responses, rather than analysing data to test *a priori* determined hypotheses based on existing theory. Accordingly, our approach was first to draw out core concepts from the responses to each of the pre-written questions, and in subsequent iterations of analysis, to explore themes and trends emerging from the data.

The present study focused on just one of the core concepts that emerged from the research, answering the question: does *TBBT* stimulate its audiences to find out more about science? The focus group data were analysed for participant responses that provided answers to this question, starting with a broad interpretation of the question then refining it somewhat. Some of the relevant data came from questions directly posed to focus groups (‘Is there a scientific concept, experiment or theory that you came to know of from the show rather than in school or through other educational means?’ and ‘Has the information given in the show stimulated you to do more in depth research on your own?’) while other data came from elsewhere in the focus group conversations. We were guided by the twin goals of, first, quantifying ‘yes’ and ‘no’ answers to our research question, and second, investigating participants’ experiences qualitatively within each of these answers. To achieve the latter we identified common themes through iterative readings of the data, and then classified responses according to them.

RESULTS

Out of the 74 participants, 54 answered this question directly. Twenty-two of these had a science background, and of them, 8 revealed that *TBBT* had stimulated them to find out more about science (classified as a ‘yes’ answer), while 14 said it had not (‘no’). Among the 32 participants with a non-science background, 12 gave a ‘yes’ answer, 14 gave a ‘no’, and 6 gave answers that we classified as ‘maybe’. Those classified as ‘maybe’ were mostly participants who couldn’t remember whether they had engaged in information seeking activities because of *TBBT* but had a feeling they did.

The majority of the 20 participants who did not answer this question directly didn’t answer because they felt they had previously indicated that the show had not inspired them to

engage in information seeking activities. Most of these participants (18) had a science background. We do not discuss their answers below, but they can potentially be considered additional ‘no’ answers, suggesting the total percentage of ‘yes’ answers was about 27%.

‘YES’ ANSWERS

We identified three categories of response for those who gave a ‘yes’ answer:

1. Participants who indicated that they already knew about a particular aspect of science, and when it was mentioned on *TBBT* they were stimulated to find out more. For example, one participant said that she wouldn’t look it up unless she already had a vague understanding of it, because otherwise she wouldn’t know how to spell some of the words used in the show, like ‘Schrödinger’s cat’ (female, 26, non-science non-academic). Another said:

There [have] been a couple of times when I’ve been unsure of what they’ve been talking about, I’ve heard of it and I have sort of Goog led it to try find a bit more (male, 59, science non-academic).

2. Participants who thought the science in *TBBT* sounded interesting and it made them want to understand what the characters were talking about. For example:

I understand what the joke would be about but I would have no clue about the physics part of it, so it makes me more interested to look it up and study (male, 26, science postgraduate or academic).

3. Participants who were sceptical about the completeness of the science being presented and their doubts made them check up on the accuracy. For example:

It’s always sort of doubtful when I watch it. I’m like ‘do they sort of dumb it down for people and not have all the facts there’ so if I’m confused about something I’ll always try to look it up later (female, 20, non-science undergraduate).

Most of the participants who we classified as giving a ‘yes’ answer expressed that the science sounded interesting and it made them want to find out what the characters were talking about, especially when the science was a key theme that the humour revolved around. Participants often indicated that they wanted to understand the science because it opens up a whole new level of humour to the jokes, allowing them to appreciate them more.

Two participants made comments that demonstrated they had gone beyond searching on Google or Wikipedia:

I recently subscribed to a You tuber who does minute physics where he actually draws and talks about physics, science concepts... *The Big Bang Theory* has definitely edged me towards the science, the interest in science like I've always been interested but it's probably pushed me to learn more about them (male, 25, non-science undergraduate).

You know, one thing I have noticed since I've started watching this show, if there's lectures and if they interest me, especially for example solar flares, or even creationism versus scientific origins of the world, I would actually pause and give a look and think 'do I have the time to attend it? 'And I think that's something that I don't think I would have done prior to watching the show so I think that's one behavioural change I've noticed in myself since watching...I wouldn't walk in thinking 'oh my god, I'm not going to understand anything 'because it's ok if I don't understand everything (female, 34, non-science non-academic).

From these positive responses it seems that *TBBT* has been successful in stimulating interest in science for some members of the audience.

'NO' ANSWERS

While the 'yes' answers easily fell into three categories, the 'no' answers were far more diverse: we identified numerous kinds of reasons people did not look up the science in *TBBT*. However, we grouped the majority of responses into three main categories:

1. Participants who were either already in a science field or had a working knowledge of the science presented. For example, one participant said, 'it's the field that I work in already so a lot of the stuff they're talking about I'll know of at some point throughout my academic career' (female, 30, science postgraduate or academic).
2. Participants who didn't have time to look up the science. Some people indicated that they sit in front of a computer all day at work so they didn't want to sit in front of a computer at home. For example: 'Most of the time I've watched it I wasn't near internet access so there was a time lapse' (female, 29, non-science non-academic).

3. Participants who were not particularly interested in physics, but were more interested in other aspects of science such as environmental science. For example, one participant said: 'I'm not confident in my ability to understand it basically and I don't have enough of a drive to learn more about physics' (female, 28, science postgraduate or academic).

One participant commented that while *TBBT* did not stimulate him to look further into the science, it did stimulate the interest of his children: 'No, but it has stimulated my kids to ask questions so it certainly, there's a certain amount of 'what's that' which comes out of it' (male, 48, science non-academic). He also indicated that he was able to explain the concept of lunar ranging to them with the help of an experiment presented on *TBBT*.

Another participant's response revealed that the perceived accuracy of science on the show makes a difference to those who are watching it:

It's funny you mention that because I've never had the impulse to look up something I've found on *The Big Bang Theory*. I think *The Big Bang Theory* has done enough for me to establish its credibility, like it doesn't make outrageous claims ... I basically assume that if it's on *The Big Bang Theory* it's probably right (male, 26, non-science non-academic).

This is the converse of the third category of 'yes' answer, in which some participants were sceptical about the science presented so looked it up to check it. Both kinds of answer indicate an appreciation for accurate science among *TBBT* audience members, which is something that the Inspiring Australia program seeks to foster.

'MAYBE' ANSWERS

Many of the responses we classified as 'maybe' answers had elements in common with 'no' responses. Notably, the time lapse between watching the episodes and getting to the internet was a factor contributing to participants' uncertainty about whether they had looked up some of the show's science or had just thought about doing it.

Some participants said that although they did not actively seek more information about the science in the show, they had become more sensitive to it, and picked up more information when they saw it in the news or magazines:

They went to [the] Large Hadron Collider...so having seen that on the show, I might pick up a bit more if I heard something about it on the news...but I wouldn't actually go out and then look up on it (female, 33, science postgraduate or academic).

This resonates with the first kind of 'yes' answer, in which participants who already had a vague understanding of the science could pick up more information when watching *TBBT* and do further research if they wished. Essentially, *TBBT* has the potential to plant a seed of a science concept, which builds upon previous knowledge and upon which further knowledge can be built.

INFLUENCE OF SCIENCE BACKGROUND AND OCCUPATION ON RESPONSE

There was no particularly clear relationship between participants' response type ('yes', 'no' or 'maybe') and their science background or occupation (Table 1), though it should be noted that the small sample size prevents us from drawing any rigorous quantitative conclusions or conducting more formal statistical tests. It may be notable that all the responses we classified as 'maybe' were from people without a science background, but nothing in the participants' responses explains why this might be the case.

Table 1: Response types by science background and occupation for the 54 participants who directly answered the question.

	Sciencebackground	Non-sciencebackground
Undergraduates	Yes 1 No 7	Yes 5 No 4 Maybe 2
Postgraduates or academics	Yes 3 No 7	-
Non-academics	Yes 3 No 3	Yes 6 No 9 Maybe 4

DICSUSION AND CONCLUSIONS

This study suggests that *The Big Bang Theory* does have the potential to stimulate interest in science, among scientists and non-scientists alike. Many of the participants expressed that

they had been stimulated by *TBBT* to find out more about science, and while not all of them took action as a result, over a quarter of participants did. Many of those who were not stimulated to seek more information already knew something about the science being discussed, or trusted that the information was true, and so felt no need to look into it further. For some participants the program planted a seed of interest, and/or made science seem less intimidating or alienating, both of which may enable future science engagement to develop. This is consistent with many of the previous studies on public responses to science-themed fiction, which mostly demonstrate that people process the science they see or read in fiction in complex and diverse ways that vary with innumerable contextual factors (a constructivist model of ‘learning’), rather than merely ‘learning’ it in a linear fashion (reviewed by Orthia et al., 2012). These results are promising with respect to the aims of the Inspiring Australia program, affirming that including science in popular media including entertainment television can have the desired effect of engaging Australians with science.

What is not clear from this study is whether other popular media would achieve the same result as *TBBT*. Some of the participants’ responses suggest that the science-based humour of the program is an important driver of information-seeking behaviour, because finding out more about science increases the entertainment value of the show. Other responses suggest that an interest in scientific accuracy is another driver that can encourage information seeking behaviour, and can also promote viewership, but there was no consistency among participants about whether they thought *TBBT* was accurate or not. It may be that people with an inherent interest in scientific accuracy are drawn to watching *TBBT*, rather than the show itself encouraging this interest, though certainly some participants watched *TBBT* despite not having an inherent interest in its scientific subject matter.

This study provides evidence that at least some science-themed popular fiction television has a role to play in inspiring public interest in science. This confirms, with a broader population sample, anecdotal evidence that has previously suggested a link between television fiction and science engagement.

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