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Complex *NUMB3RS*

By Sarah J Greenwald

Mathematicians appreciate that the television show *NUMB3RS* is raising public awareness about the importance, beauty, and usefulness of mathematics. But in its second season it has been promoted as more than mere entertainment. The fact that the CBS website now offers classroom worksheets as part of an educational initiative co-sponsored by CBS, Texas Instruments (TI), and the National Council of Teachers of Mathematics (NCTM), and that recent items in AMS and MAA publications suggest that this initiative is a good way to attract students to the mathematics profession blurs the distinction between *NUMB3RS* as television entertainment and *NUMB3RS* as school curriculum. We should think carefully about whether the mathematical community should endorse the show to the extent that it has. The way that mathematics and mathematicians are depicted in the show may not, in the end, be all that positive when trying to encourage students to pursue a mathematical career.

The violence and sexual innuendos on the show make any classroom use more complex. *The Art Gallery Problem* worksheet on the CBS website is aimed at grades 8–12. It begins: “In the *NUMB3RS* episode “Obsession,” pop star Skylar Wyatt is being stalked in her home by an intruder.” There is no indication of the difficulties in discussing stalking with eighth graders, nor are there any suggestions of how to do so in a way that will lead to successful implementation and positive effects for students.

The representations of mathematicians are also quite problematic for use with students without addressing some of the related issues. Consider the relationship between Charlie, the main character, and Amita, his former graduate student. In an interview with NCTM, Gary Lorden, one of the show’s mathematics consultants, says, “I think it would be great if they made it more of a collaboration and less of a beautiful assistant sort of thing.” One of the website questions for students to work on was whether Amita wrote a love letter to Charlie; some episodes have explored a romantic relationship between them. Note, however, that she is still a student, obtaining a second PhD in a related field. Such a relationship could affect her future career and would violate faculty guidelines at many institutions. For example, what happens when she needs a letter of recommendation? If we are going to use Amita in the classroom, all of this comes along with that use.

Alex Kasman, who runs the *MathFiction* web site, says:

“The mathematician is, like so many fictional mathematicians, somewhat quirky... He has stated, without explanation, that he does not drive. (Considering that he lives in Los Angeles, this might not be merely quirky but seriously crazy.)... In the second episode, the mathematician seems unable to control his brain, working on P vs. NP rather than a more important problem (that could save the life of his brother and other FBI agents) as if he was in a trance...”

Charlie often fits the stereotype of the gifted mathematician who readily finds the right answer. He even has what the producers refer to as “Charlie visions,” during which he does mathematics. While the producers consult with mathematicians during production, terms are sometimes mispronounced or used incorrectly. Little attempt is made to show how mathematicians actually think, and mathematics is often presented as consisting entirely of formulas, rather than concepts and logical connections between them. In the second season, the mathematics on the show has made less sense, including such topics as “deep current sets.” Nevertheless, the worksheets are advertised as exposing students to real-life mathematics used in FBI cases. While these representations can work well for the television show, they can be problematic for use with students.

In fact, research studies have shown that stereotypical representations of mathematicians can actually discourage students from pursuing more mathematics. As mentioned in the article “Who? How? What?” in the *Mathematics Teacher*, “We know that many students perceive mathematics as a discipline that is

done by others rather than people like themselves. The ‘others’ may be the smartest students (Oakes 1990), boys (Meyer and Koehler 1990), or specific ethnic groups (Moody 1997).” The authors of “Mathematics: a dilemma for feminists,” in *Transforming the Disciplines*, discuss how examples of exceptional women mathematicians such as Noether can be detrimental. A number of studies show that television commercials that are gender-stereotypic caused some women to underperform on a math test, avoid more math questions in favor of verbal questions on an aptitude test, and indicate less interest in quantitative career fields than those who had not been exposed to the commercials. To encourage students to study mathematics, numerous authors recommend exposing students to mathematicians whose style of doing mathematics is identifiable to the students as being similar to the way they do mathematics. Additional studies and full bibliographic references can be found at <http://SimpsonsMath.com/wim.html>.

As teachers, it is we who are ultimately responsible for what we bring into our own classrooms. But since NCTM’s name is associated with the *NUMB3RS* worksheets, some may incorrectly assume that any difficulties or cautions are discussed in the teaching notes. Jonathan Farley of *Hollywood Math and Science Film Consulting* proposed the program in early 2005, but it is TI and NCTM who run the worksheet program. In a session on *NUMB3RS* co-sponsored by the AMS, MAA, and TI at the Joint Mathematics Meetings, Johnny Lott, past president of NCTM, mentioned that the worksheet authors receive from TI a summary of all or part of an episode, and sometimes think, “What can we do now? Can we do anything with this?” The intense time pressure to post worksheets before a show airs can cause fundamental problems.

For example, three worksheets from “The Running Man” episode were removed shortly after they were posted. Presumably this is because someone realized the worksheets were unusable due to the finished show being so different from their working script. Unfortunately, many of the worksheets that remain on the CBS website suffer from the same problem: they explore events that never happen on air or even contradict episode events. They are useless as a tie-in to the program. In addition, the worksheets do not contain links to the traditional curriculum and they do not mention NCTM standards or Committee on the Undergraduate Program in Mathematics (CUPM) guidelines. Lott remarked, “We have no idea what teachers are doing with this and how teachers are using them.” Until class testing, surveying, and revisions occur, at a minimum, there should be some kind of teacher forum to discuss what works and what doesn’t.

Of course, TV portrayals of most professionals are to some degree inaccurate glorifications and stereotypes; why should a portrayal of a mathematician be any different? But if we are to follow President Bush’s remarks from the recent State of the Union address, namely that “we need to encourage children to take more math and science,” then we must identify and correct inaccurate portrayals of our profession, especially stereotypes that could keep students out of math classes. Someone browsing the CBS website might even conclude that the show’s representation of mathematics and mathematicians is one that is endorsed by the mathematics community as a good tool for teaching students. Popular culture can indeed be a powerful way to engage students, but care must be taken to use it effectively. Without careful research and reflection related to the benefits and difficulties with using *NUMB3RS*, we run the risk of having the positives outweighed by the negatives.

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