JASON BROWN: Social math of bullying

November 15, 2013 - 6:12pm **JASON I. BROWN**

I'm writing this column on Remembrance Day, always a thought-reflecting time for me.

And it follows Holocaust Remembrance week.

Last Tuesday evening, I went to listen to Philip Riteman speak about his horrific experiences in Nazi concentration camps during the Second World War. You could have heard a pin drop as Riteman relived the unspeakable traumas he endured.

As I sat among other adults and hundreds of university students, an elderly gentleman sitting next to me introduced himself. He'd spent his life as a church organist and lit up at my mention of mathematics.

He immediately recounted this magical property of numbers that he had heard: if you take any three-digit number — say 245 — and write it twice in a row to form a six digit number — in our case, 245,245 — you always get a number divisible by seven (245,245 happens to be seven x 35,035).

Before I could ponder it, the event started, and all thoughts turned back to the 1940s.

What struck me during Riteman's talk was that while so much has changed technologically and scientifically, nothing much has changed socially over thousands of years. Civilization still has the same set of knuckle-walkers as its ancestors.

Bullying, whether on a grand scale like the Holocaust or on smaller scales in our schools, sports teams and offices, remains an ever-present threat.

I read about Richie Incognito of the Miami Dolphins and shake my head. Really? He blames the locker-room culture for his behaviou

But when I think of the interactions that go on in all arenas of social interaction, I see underlying networks, like the ones that lurk in th mathematical recesses of Facebook. These are collections of points, representing individuals, with directed links between some pair to indicate a relationship between them, usually friendship.

These diagrams are called graphs and are the very objects I have spent my life studying. So I wondered, what can mathematics say about the nature of bullying?

As usual, these thoughts led me to read what researchers have to say. It is so easy to believe the standard excuse that bullies are th result of psychologically damaged and socially marginalized individuals, but is this really the basis of the problem?

An article I found looked into how the very fabric of social networks affects aggression in high school settings. What the authors foun was the bullying depended very much on a person's status in the social network, rather than on family structure or parental educatio or employment.

The authors introduced a mathematical measure of how central a student was in a social network, and they found many fascinating, counterintuitive results.

For example, they found that aggressive bullying behaviour came mostly from those in the centre to near the top of the social netwo those who felt bullying was a way to climb higher.

Those at the periphery of the social network exhibited little in the way of aggression, as did, surprisingly, those at the top of the structure, perhaps because for the latter bullying was less effective than other approaches in maintaining high status.

Perhaps such data can be used to find new ways to inoculate society against bullying, whether on the national or individual level. Mathematics may be the way out.

And by the way, what about the divisibility by seven conundrum? Walking out of Riteman's talk it became clear. Write any three-digit number, say abc twice in a row. That give you abc,abc, which is 1,001 x abc.

And you can check that seven divides 1,001 evenly. When you do, you can see why the trick works.

And if yours and the church organist's social network's intersect, be sure to share the answer!

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