ABOUT HUMOR IN THE CLASSROOM

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ABSTRACT. We contribute here a few thoughts about humor in the classroom, education and why humor is the answer to the ultimate question of life, the universe, and everything [1].

1. TONGUE IN THE CHEEK

Paul Erdös who is known for defining mathematicians as *devices turning coffee into theorems* also looked into the eyes of death with a smile: *"I want to be giving a lecture, finishing up an important proof on the blackboard, when someone in the audience shouts out, 'What about the general case?'. I'll turn to the audience and smile, 'I'll leave that to the next generation,' and then I'll keel over."* He died at the age of 83, while attending a conference, essentially following his dream. His response to slowing down had always been: *"there'll be plenty of time to rest in the grave."* Humor even followed him after that as on his grave one can read: "I've finally stopped getting dumber." He did not die actually because he redefined this to "leaving". Death, according to Erdoes was to stop doing mathematics and he actually never did that. His humor was infecting others. One of his collaborators (he had 500) wrote the limerick: *A conjecture both deep and profound, Is whether the circle is round, In a paper of Erdös, Written in Kurdish, A counterexample is found.* [2]

2. A VALUABLE TOOL

Humor can be valuable because it can help to free up tensions, serve as a lubricant for learning, ease anxieties, reduce stress and make teaching interactions more human, foster relationships and social interactions and de-escalate conflicts [9]. The book [8] gives examples of studies in each domain. It is a tricky topic however, as it deals with actual humans, relates to complex plays in psychology [6] and personalities. In some cases, humor can lead to objections as it is context sensitive. A wrong joke can hurt, or offend and a joker can be misjudged as non-serious. An example of a risky joke is ""What is a complex number? -

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If both women and man shout I". Woven into the set-up is the risk (or blessing!) that the audience does not get the joke. Also the shortest joke in mathematics *"Let $\epsilon < 0$."* is not recommended. A trained mathematician laughs because in all proofs, one usually starts with $\epsilon > 0$. A non-mathematician however has no idea why the joke is funny. With online teaching, humor is even much more difficult and risky. All this has to be factored in when using it in teaching. In summary, the question whether humor helps, can be complex as it has real and imaginary parts. Humor is an ambivalent form of communication [5]. It is complicated because both the author of the joke as well as the audience and the combination matters.

3. Example uses

Humor can also serve as a memnonic tool. For example, to learn the names of the partial differential equations, Heat, Wave, Laplace, Transport and Burgers equation, we can form the sentence *"Who ever eats Hamburgers during Heat Waves is Transported to La La place"*. It works because the movie La La land has been popular a few years ago so that we also have a match with the Laplace partial differential equation. Memnonic parts are commonly used in education like the quotient rule in calculus "Low Di High, Take High Di Low, Cross the line, and Square the low". This can be modified easily to finance "Buy low sell high, Take high not low, Avoid the fine, And take the dough!". In combinatorics, one knows the objects of multi-graphs or simplicial complexes. These objects can be refined in a process called **Barycentric refinement**. One can remember the word better with the following Limerick:
There was a finite set of sets, which was proud to be a simplicial complex, Wanting to grow and being excentric, It started to reproduce Barycentric.

In order to remember the Hieroglyphs, where **one million** is represented by a **priest**, the number 100000 by a frog, etc until the number 1, which resembles a stem. One can remember it with the sentence:
The priest holds a frog in his finger. The flower fears that the monkey is bending its stem.

The Fibonacci story about a rabbit population growing leads to a beautiful deep song: *In the wonderful month of Mai, Two rabbits went to play, A third rabbit saw the day, Then five and eight - yuhei! In the wonderful month of June, Thirteen rabbits grew to 21 soon, They sang*

and jumped and had more sex, Now, they all have an Oedipus complex!

To remember the beautiful Euler formula $0 = 1 + e^{i\pi}$ with *"It is naughty, if one more fly, eats up my pie! "*

4. Sensitivity issues

We live in a time, where many topics have become sensitive. Gender, race, origin, sexuality, health, wealth, political views are only the peaks in a complicated landscape which now are resemble a minefield. Even a seemingly harmless joke like "Why did the mathematician name his dog Cauchy? – Because he left a residue at every pole." can offend as we see these day on every lawn "no peeing, please be respectful" signs. Or "what do mathematicians call a toilet seats? - Ass toroid". (This is referring to toroid, which is a surface of revolution with a hole in the middle but which can produce puzzlement when doing the identification with asteroid) When is the envelope pushed too far? It depends on the personality of the person cracking a joke, it can depend on the audience. In the classroom, the relation between the class and the teacher can change. More importantly, even with the same students and the same teacher, if something else is not working like when a camera is present or with some external circumstances have altered the mood of a community. Some jokes are generation sensitive as they depend on knowledge and culture. Being able to tell the right joke at the right time requires cultural knowledge. Make sure to buy plenty of insurance before launching jokes in a sensitive area.

5. Notation

In arithmetic geometry, one knows the notion of the Tate-Shafarevich group. The reason why the Cyrillic Sha is used to describe this group is explained by the British mathematician J.W.S. Cassels (1922-2015) in 1990: the natural notation would have been TS honoring the two mathematicians, but as John Tate told Cassel, there was a worry-some lavatorial allusion to it Indeed, the Americanism "**t**ough **s**hit" would have been difficult to eliminate. So, now, we have to write it in cyrillic. Well, one can hardly avoid any associations. MATH for example is read by some as **"Mental Abuse To Humans"**. Also numbers are not excluded for abuse: juvenile calculator jokes like typing 5318008 or 7734206 and being read after turn it up side down, illustrate this.

6. Seeking evidence

With humor it is a bit like with love: it is a simple idea but can become complicated. Research confirms that the effect of humor can be tricky. The topic has been studied by philosophers and psychologists or linguists but also more and more by social scientists. The situation is even more complicated because anecdotal evidence can be misleading. It is not like in physics, where experiments can be repeated and always give the same result. A test lecture working in one set-up might not work in an other, even with the same teacher. Humor needs to be fresh. A joke told twice can become lame. This can be engineered to some degree: most comedy show for example include artificial laughter or place cheering actors at strategic places to trigger the rest of the audience at the right moment. Late night shows use such amplifiers. This is a reason why many jokes, if just read are not funny. One can try this out. Take a book about jokes and read them alone.

7. In the classroom

Any unease with mathematics can easily be dispersed with humor. In a classroom, it sometimes only needs one or two students who appreciate jokes and make things work. They can make class experience a delight. I myself try to use humor as a tool to deflect from stress. But it is a tool which has to be used correctly. Sometimes, I have prepared a joke or a funny story and do not deliver it because I feel it is not the right time. Using humor needs some sensitivity. It is also important to be able to walk away from a joke that bombed. Maybe the joke was too subtle to be understood, poorly told or failed in some other way. One has then to be able to laugh about the failed joke itself.

8. Remote teaching

This happens especially when teaching remotely. Making jokes is then even more difficult. First of all, anything done online can be recorded and jokes out of context can look terrible. Also, the reduction of body language, the distance, or possible bystanders can change the situation considerably. I have also taught courses in hybrid format where some students are present others watch remotely. This is easier with more students present, it is more difficult with only a handful students in the classroom. Sitcoms, night-shows need the audience. One sees this during 2020: there was a collapse of funny shows. Also many team sports do not work without audience. One only realized now how much actually depends on the audience.

9. The art of humor

The art of humor has got more challenges. One has to work harder to make a good joke. In general, producing jokes is a form of creativity which needs time, ideas and reflection. In the spring of 2019, I was asked by the Harvard College Stand Up Comic Society to contribute at their Faculty Lounge show. I said twice 'No" at first, not because of fear, but because I knew that this would require a lot of my time, time I would not have. I eventually got convinced as the group assured assisting and helping with the preparation. How can I always tell "Everybody can learn math", if it is not also possible that "Everybody can do comedy". One might not see the work but it really needed a lot of time. Especially difficult is to navigate the boundary of what is possible and what is not adequate. What really helps is to bounce ideas with a partner (I used my wife to test jokes out), and then later, when things are written down to present it to a smaller group and get suggestions and feedback. It is hard work, like producing mathematics, but it can be fun to conquer the challenge eventually (at least if the expectations are not too great).

10. Diplomacy

Alleen Pace Nielson [9] illustrates the value of humor in diplomatic situations and tells the story of the former First Lady Barbara Bush who used humor to deflect the tension after a mishap in which President Bush became ill and vomited on Japanese Prime Minister Kiichi Miyazawa. Mrs. Bush placed first the blame on the American ambassador, an accusation which increased the already high tension but then explained with a twinkle in her eye that the Ambassador and the President had been badly beaten that afternoon in tennis by the Emperor Akihito and Crown Prince Naruhito and that "we Bushes aren't used to losing." This was a huge relieve. Everybody realized that if Barbara Bush would have suspected some foul play like poisoning or something serious like a hart attack, she would not have made the joke. Alleen also mentions Reagan who after being shot quipped on the operating table that he hoped the doctors taking care of his wounds were Republicans.

11. Complications

The article of Nielson has many more interesting examples like the paradox that not laughing about an ethnic joke was felt offensive by a person of that ethnic group because not laughing about it was felt like considering it true and not a joke. It can be complicated. My

wife told me once of an encounter with two friends in college, when one of them made a joke about the other persons fatness. My wife had then interfered with: "That is not a very nice thing to say!" The large person then replied. "Well, I felt very good until you said that!" Indeed, by pointing out that the joke about the fatness was not nice, the quip about it has become no more a laughing matter but has has turned into a serious matter. The situation was still defused because the meta joke of the big person laughing about "considering the matter serious" has rendered the problem again a funny matter and all three could laugh.

12. LITERATURE

In [8] investigates the social and cognitive benefits of humor. It tries also to classify humor in a taxonomy, distinguishing into groups like jokes, irony, or mockery. An example of a canned joke is a narrative, an example of irony is a self-deprecation, an example of a mockery is a parody. [7] stresses the links between positive emotions and education and also mentions humor as a survival tool for stressed leaders. [10] distinguishes figural, verbal, visual and auditory humor, and categorizes humor. The book [4] start with a reference to the Talmud "begin a lesson with a humorous illustration" and also relates humor with a good proof in mathematics. Actually, a clever solution to a problem can provoke a smile. The concept of self-reference which is used in logic see [3] often has a humor aspect. The barber who shaves everybody who does not shave himself is such a pun. Humor is in some sense woven into the fabric of the foundations of mathematics. This is the final proof that humor is the answer to the ultimate question of life, the universe, and everything.

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