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Best daily newspaper on the world wide web (?)
EducationGuardian.co.uk

Dear Sir/Madam,

The purpose of this letter is to offer some remarks and an opinion concerning the article *What is the Yellow Cake?* by Marc Abrahams that was posted on your Web site (<http://education.guardian.co.uk/egweekly/story/0,5500,1144234,00.html>). Since you do aspire to be the *best daily newspaper on the world wide web*, I assume that you will at least give a thought to the topics brought below.

Long time ago I read a little book *A Mathematician Reads the Newspaper*¹. Then I found it very funny and I wondered about a reverse situation: *A newspaperperson reads a mathematical paper*. Well, recently I have been able to see a sample of this and it has really disturbed me. I have always realized that we, the research mathematicians, are doing a very poor job in popularizing modern mathematics, and I know that the so called *general public* reacts to any mention of mathematics in somewhat uniform way: **I was always bad in math/numbers**. However I have kept the hope that at least the educated people have some idea about what mathematics is all about, how the mathematical community functions and how much it is divided into separate areas. The article *What is the Yellow Cake?* by Marc Abrahams published/posted by a newspaper that has the word *Education* in its name, has made me just sad. Let us review this little piece of joyful creativity, or to be more precise let us re-read it together, going "paragraph-by-paragraph".

MA²: *What is the yellow cake, and what makes it yellow rather than merely cake?*

Good start - everybody can easily answer this question: the yellow cake is a kind of coffee cake³, something small, sweet and yellow that goes nicely with your afternoon coffee. It is yellow because of yolks, I believe. At least I would avoid those cakes with artificial colouring.

MA: *"The Yellow Cake" is the title of an article by Andrzej Roslanowski and Saharon Shelah, published in the Proceedings of the American Mathematical Society. (It is available online at <http://shelah.logic.at/listb.html>.) Investigator Tom Roberts mailed me a copy of it, pointing out that neither he nor his everyday mathe-*

¹by John Allen Paulos, BasicBooks 1995

²Marc Abrahams

³it should not be mistaken for yellowcake, i.e., U_3O_8 which is not tasty at all

mathematical colleagues knew what the title refers to.

Nothing but the truth. But not the whole truth: a proper citation should also mention year/volume/pages⁴. Also, who actually is Mr/Dr/Prof Roberts? Is he a mathematician? Is he a set theorist? The same question applies to “everyday mathematical colleagues”. What kind of background do they have, are they research mathematicians? These are very important questions: if I ask for the meaning of a word, I should check the background of the person answering to know how to interpret the answer. If I ask a professor of English literature in my university, who the mayor of London is, and he answers me (in his best Queen’s English), that he does not know that, do I blame him for his ignorance? No, I blame myself for not asking somebody who actually lives in London.

MA: *Nowhere in its 13 pages does the article explain what it means by “yellow cake”. The words only appear in the title, nowhere else.*

This IS interesting. The title is “The Yellow Cake” and not “On the Yellow Cake”. I am not a native English speaker, but there is a difference between these two titles, isn’t there? The latter suggests that we going to talk about an object called “the yellow cake”, so it would be natural to expect its definition somewhere. However, the former (existing) version of the title is formulated as a name, isn’t it? It is the article itself that is called “The yellow cake”. The same way I am called “Roślanowski” - nobody asked me for permission, but also nobody asks me what it stands for and where (inside me) it is defined.

MA: *A quick sampling of professional mathematicians found that none had ever heard the phrase “yellow cake” used as a mathematical concept. The meaning, if there is any meaning, apparently is confined to a very small, extremely specialised segment of the mathematical community. Possibly just the authors know, though there seems a good chance that the editor of Proceedings of the American Mathematical Society has some inkling.*

The question of who were the members of the above mentioned sample of “professional mathematicians”, how they were selected and how the question was formulated comes here to my mind again. See the paragraph before. I believe that any active mathematician, one that proves theorems and writes research papers, would inform the investigator, that in mathematics there is nothing like *a legal mathematical name*. For instance I am working now on λ -proper properties, and I may call one of them “being mabrahams”. As long as I can prove reasonable theorems about “mabrahams forcing notions” no professional set theorist will object to the name. Every, literally *every*, research mathematician knows that

- (a) it is convenient to use names as abbreviations for longer definitions, and
- (b) it is increasingly difficult to come up with names that are not widely used in different contexts.

⁴Proceedings of the American Mathematical Society, **129**(2001):279–291

For those two reasons, any real research mathematician would answer the question about the phrase "yellow cake" just like this: *this must be something those forcing people came up with, ask them*. And then she or he would add: *why should you care?* But if you got them to look at the paper itself (for which a real mathematician should ask herself/himself), then they would read the abstract (at least) and note that it does look like a nice piece of mathematics. It just happens so, that most mathematicians should understand the abstract. It is not often the case that a result coming from one field of mathematics can be understood by specialists in the other field (not even mentioning the proofs and methods). But this particular paper deals with a property that **can** be understood by anybody familiar with Calculus.

MA: *The paper is almost entirely equations and symbols, with the word "clearly" here and there. It is the kind of thing that gives non-mathematicians the willies.*

Now, the first sentence is not true, the second is just stupid. Take the paper and look at it — there are not only symbols, there is also some English! And there are not so many equations there - most of the equality symbols used there are two define/choose some objects etc. Hardly any mathematician would call them "equations". True, there is a lot of various symbols used there, but all of them are standard set theoretic notation (as explained in the part of the introduction dealing with notation). And the word "clearly" appears only 8 times, I think, and in all those cases the word means "it follows from what we have said before that". Nobody who has not actually read the sentences preceding the "clearly" is in any position to complain about this word. Finally, concerning the second sentence, **it is a research paper**, not a story for children. One does not try to read the musical score of *La Traviata*⁵ without first learning how to read it? Nobody not speaking Polish tries to read *Widok z ziarnkiem piasku*⁶. If you want to read mathematics, first learn its language, get educated, do not complain about your willies!

MA: *Some of the symbols are at least as obscure as the title, perhaps more so. One agglomeration of squiggles, on the second page, has the subscript "sweet" tacked onto its lower right edge. One might infer that yellow cake, whatever it is, is sweet, whatever that is - but the inference would be pure conjecture.*

As far as the first sentence above is concerned I can only repeat: learn the language of mathematics if you want to write about it. Or ask a real mathematician — any reasonable person not knowing how to read a musical score would ask a real musician to play it, right?

Now, reading the sentence about the word "sweet", and looking simultaneously at the paper, I have to notice that

- (c) what we are referred to is Definition 1.4, which defines the concept of an \mathcal{F} -sweet forcing notion and the property denoted by $(\boxplus)_{\text{sweet}}^{\mathcal{F}}$ is this definition.

⁵by Giuseppe Verdi

⁶by Wisława Szymborska

I understand that the phrase “one agglomeration of squiggles” refers to the symbol $(\boxplus)_{\text{sweet}}^{\mathcal{F}}$. Now again, the lack of knowledge of the field and the mathematical culture apparently prevents the author from noticing the obvious fact (noticeable for any mathematician) that this symbol is just a label, something like a number, that is going to denote what stands next to it. Also, that particular section of the paper is called \mathcal{F} -sweet forcing notions, so why this surprise that the notion of *sweetness* actually appears? As far as the yellow cake is concerned, again, it is sweet and yellow and it does go nicely with your afternoon coffee, everybody knows that.

MA: *The same authors once published a 70-page mathematics paper called “Sweet and Sour and Other Flavours of ccc Forcing Notions,” in which “sweet” is defined in terms of “sweetness,” the definition of which is said to be in yet a different paper. But to most mathematicians sweetness, like yellow cake, is far from being a household notion.*

I am not sure about this part - I would like to say that every single piece of it is false, but I do not have a good proof for it yet. So let us look. The paper *Sweet and Sour and other flavours of ccc forcing notions*⁷ has not been published yet – the galley proofs are still waiting on my desk. Now, Mr. Abrahams gives the impression that

- (1) the paper *The yellow cake* mentions “sweetness” without explaining what it means, and that
- (2) the paper *Sweet and sour* . . . also mentions sweetness but sends the reader to yet another paper to find its meaning.

This is just not true. Sweetness is defined properly in *The yellow cake*, and also in *Sweet and sour* . . . (though the respective properties are somewhat different, but also the exact way the names are phrased is different). In the latter paper, just before the definition of sweet forcing notions, there is the following sentence:

However, there are *sweet* (=strong ccc) properties of forcing notions which are preserved by amalgamations.

So even if a set theorist does not want to understand what the definition means, she/he should be able to get the feeling of what kind of properties we are dealing with. Finally, *sweet forcing notions* have been around for some time. They do appear in papers of Shelah⁸, Stern⁹ and others; or just check the set theory textbook by Bartoszyński and Judah¹⁰. So yes, sweetness is already a household notion for set theorist (though “the yellow cake” is not, true).

⁷by Roslanowski and Shelah, to appear in Archive for Mathematical Logic

⁸see, e.g., Saharon Shelah, *Can you take Solovay’s inaccessible away?*, Israel Journal of Mathematics, **48**(1984):1–47

⁹see e.g. Jacques Stern, *Regularity properties of definable sets of reals*, Annals of Pure and Applied Logic, **29**(1985):289–324

¹⁰Tomek Bartoszyński and Haim Judah, **Set Theory: On the Structure of the Real Line**, A K Peters, Wellesley, Massachusetts, 1995.

MA: *There is an obvious, simple way to solve the mystery of "The Yellow Cake". Ask Roslanowski or Shelah. The former is now at the University of Nebraska, the latter jointly at Rutgers University and the Hebrew University of Jerusalem. But the enjoyment in solving puzzles comes from actually solving them, not from asking someone else for the answer. So if you do ask Andrzej Roslanowski or Saharon Shelah to tell you the secret to "The Yellow Cake", please keep that information to yourself, unless of course you are the kind of person who enjoys eating other people's cake or otherwise spoiling their fun.*

The author, apparently, is not at all interested in what "the yellow cake" stands for (so I did not provide the answer) - otherwise he would have asked us. But then what is he writing all this story for? Lack of better material? Then why is this mostly uninformed and empty (and in non-empty places incorrect) story published in a newspaper pretending to be education-related? Could it be that one of the reasons is the will to underscore and deepen the gap between the research frontier and so called "general public"? Is it yet another example of "I do not understand it so let me make it look stupid" approach? Maybe we all should rather work on building bridges between the research frontier and the public?

And a final comment: mathematics is (contrary to popular belief) an Art. The main motivation and criterion for doing and evaluating mathematical research is beauty. We, the research mathematicians, while following the precise rules of constructing mathematical proofs, are somewhat free in choosing the way we organize and present them. We may use this fact to pick nice names for nice properties and bad names for bad properties, we may play with terminology to underline the charm of the argument. But to understand and appreciate this charm and beauty one has to study for long time - it does take a lot of time to learn how to read a music score, doesn't it?

Sincerely Yours,

Andrzej Roslanowski