

For fear of sounding stupid

– diary of a wimpy student

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I once attended an exercise session where the class was asked about the validity of a certain mathematical statement. “Who thinks this holds true?”, the instructor asked. No response. Since the statement was indeed false, she lit up and asked, “Who thinks this statement is false?”, a single hand was hesitantly raised, while others looked warily around. Many assumed a mask of indifference, while others had the decency to look suddenly interested in their nails. “So... Who doesn’t give a rat’s ass?”, she sighed, at which point a handful laughed, confirming that they were, indeed, still alive.

I should mention that I played the role of the dejected instructor, and the reaction left me confused, because the class consisted of some of the best and brightest our country has to offer. Why did nobody react? Had I confused them? Did they think it was a trick question? Or were they so smart that the question had been too low-level for them to even bother to answer?

The survey

I asked some people about this here and there, also including why they were reluctant to pose questions during lecture. Among the many reasons mentioned were:

- (1) I had too much for lunch/It was too early/It was too late.
- (2) I’d look stupid in front of thirty people
- (3) When the instructor asks, “Any questions?”, it’s hard to answer because your question is: “I don’t get any of this and have been confused for over an hour, can we start over?”

- (4) I'd look stupid in front of fifty people and a professor. Most of the others can probably explain it to me anyway.
- (5) I'm too busy taking notes to notice what the lecturer is saying
- (6) I guess I'm shy.
- (7) Well, I'm a third year student and this is a second-year course. So I don't want to seem like a know-it-all.
- (8) I'd probably reveal that I have misunderstood all the concepts, and sound really stupid, and ruin my chances for the oral exam.

To be honest, I was not surprised. We are probably not the most talkative lot and pride ourselves on not uttering statements that are incorrect or poorly formulated. But I feel this kind of question culture borders on being nearly destructive – how can we learn, if we are so afraid of making mistakes?

The agonizing pain of the trivial and obvious

Before I started studying maths, I had only heard the words *obvious* and *trivial* used in daily context, such as

It's obvious that counting your fingers is a trivial task.

That changed rather quickly when I began my studies. First of all, I learned that the counting of the fingers requires the construction of a one-to-one mapping between a set of cardinality 10 and the fingers, which seems rather less trivial than just counting. I then learned many other things about triviality, in the sense that the triangle inequality for inner products is a trivial consequence of the Cauchy-Schwarz inequality, that it can be trivial to show that something cannot not be true, but rather hard to explain exactly

why it is true. I was also told that for a family of random variables, it is trivial to see that independence implies conditional independence, and until I was told otherwise, I believed that to be true. Also, people tend to disagree on what is trivial, other than in the sad situation when nobody contributing to the group assignment knows how to prove a certain proposition. Then it must by definition be trivial.

The first crisis, and the second

So very naturally, the first crisis arrives. After being told that many of things I could not understand were trivial, I spent the latter half of my first semester (block 2) engaging in certain rituals that I believed might enhance my general level of intelligence. I kid you not when I say that these included the attempted psychoanalysis of one of my professors, donating money to the poor in hopes of good karma, and the well-honed practice of not asking questions when confused.

You must understand, dear reader, that when the brain went through high school, it got used to the fact that maths was actually quite *trivial*, in the common sense. You were told how to solve some Problem, and then given a dozen or so Problems of the same kind to practice. The brain has a hard time adjusting to the fact that solutions are no longer served, and trivialities are now defined as *that which is trivial for the experienced mathematician*.

I guess a lot of first-year students feel this way. I just doubt that most first-year students are willing to admit it, much less in an auditorium full of people. Some drop out, thinking they have chosen the wrong path, others try their best, some half-heartedly.

Assuming you actually make it to your third year, you see the second crisis approaching. Now people expect you have reached a

certain level of mathematical maturity. There are certain results that are assumed trivial because you have seen their proofs before, ranging from the less difficult *taking the limit preserves inequalities (but not strict ones)* to the less less difficult Open Mapping theorem (that you doubt you can remember how to prove). Now more than ever it is hard to admit to all those things you did not understand, and still don't. And even if you have understood everything thus far, pretty well, even, it is hard to remember two years worth of results and definitions.

It should be OK to ask.

The difference between a fish and fishing

For me, a lot of the pain arrived from the fact that proofs certainly did seem obvious when the instructors did them, but were not at all obvious if I had to do them myself. To use the phrasing of my Asian ancestors: I found fishing quite hard. It was much more comfortable to receive the fish. The problem is just that doing maths is all about the fishing. And after a while, even the fish that were handed to me were quite hard to catch.

Also, it was hard for me to understand what my teachers were saying, even if they spoke very clearly. Normally, if I write

I'll drop by this afternoon.

to a friend, I do not consider that *afternoon* is strictly defined as the part of the day between noon and sunset. Unless she was a very nitpicky person, she would not fault me for arriving a minute before noon. Maths talk is immediately different. Without knowing the precise definition of a mathematical term, any sentence in which it occurs is without meaning, except mayhap

I do not know the definition of the term uniform convergence

So if I was being told that we had shown a sequence of functions converged uniformly to some function, but did not know the meaning of *uniform convergence*, I would just nod along. The nodding of my head, was after all, still a trivial task.

Jump off the high dive

The solution to all of this is so simple it seems almost painful. Find the courage to raise your hand and ask about what uniform convergence is. Going back and reading first-year books is not a sign of defeat. Scary as it is to be surrounded by people who judge not by looks but by brains, the brain does not like wandering about pretending to understand things it does not. It is all right to ask for a repetition of an argument, perhaps one of your fellow students would even be grateful you asked. It is all right to attempt to answer a question you are not quite sure you understood – maybe the instructor did not formulate the problem properly, or maybe you will learn from your mistake. Even if you have put in the hard and understood, don't just sit and look bored. The brain enjoys the opportunity to ask quirky questions, such as “*Is there another way to prove this?*” or “*What is the intuition behind this?*” or “*What if I write a P for the expectation operator?*”. The learning of maths, after all, does not have to be a very grave matter.

*Go for it, man, jump off the high dive,
stare down the barrel of the gun, pee into the wind!*
– Joey Tribbiani, *Friends*.