General Research Statement (1/2): Mathematics – Freestanding and Unlimited by Context

Mathematics on its own

Dear Esteemed Colleagues,

This letter of research statements is intended to summarize my approach to pure and applied mathematics. Part of my research interests lay and rely entirely on mathematics research. I also hope that this will also serve as a supplemental document to further explain the great overlap between my past research experiences and mathematics research.

1) Developing an understanding of pure mathematics

In my opinion, pure mathematics, for the purpose of mathematics and nothing else, is a difficult concept to follow for anybody. I think mathematics should be motivated by curiosity, artistic inspiration, and a willingness to 'try-and-see.'

When I look at any research, not just mathematics, at first glance, it could be 'emotionally exciting' or it could be 'emotionally nothing' - I think and feel that there is an emotional source that a good researcher should reach, within, to understand 'what is what.'

What inspires me at the very first as a mathematical researcher is, of course, an unlimited curiosity for a real life inspiration or an application (the context). Yet, we should realize or recognize that it is unlimited, and as the 'mathematical' part of my understandings grow, and the solution for abstract considerations, then it really does become the case that the 'driving research question' should become a development within pure mathematics itself.

If we consider research as an immersive experience, and if mathematics is to follow reason and logic, then when I attempt to understand mathematical research by reading papers and to conduct my own research: For me, it really does become a matter of reaching emotional satisfaction by 'grasping' new mathematical solutions on their own.

So to consider solutions, and to come to useful conclusions, I have to be able to test new things. I am also looking to meet my interests in engineering and natural sciences, therefore it is as if I can 'make a mathematical analysis, test limits' within my imagination and in my calculations, 'test extrema' and get excited on my own about all and any possibilities… of what could be?

Then, this isn't just work… its mathematical thinking and feeling, isn't it?

But… of course, I have to work hard to read and grasp new mathematics, then I would spend valuable time, and practical 'relatively simple' - 'minimal' mathematical solutions are *so useful* in engineering and natural sciences!

Still a point for purity in mathematics – because to 'find simplicity' you may have to do it on your own! (There isn't just everything ready and waiting, laid out for you… in many cases, in advanced research.) Mathematics would be 'standing freely on its own' as something to achieve upon. This would be, becoming a 'pure mathematician.'

2) Mathematics applied to observe natural sciences

Applying ‘math’ to natural sciences: Any one of my esteemed colleagues would call it ‘developing a theory.’ We develop theories to explain things; why things work, why and when things happen(ed); what is the ‘story’ and what is the ‘history’?

I think this ‘soft and round’ approach is not always what happens in practical research. Many explanations are made by observation, and so it will be made by observing the mathematics that match the observation of the science. (This is mathematical thinking and feeling.)

This also means something else: In my opinion, a good researcher doesn’t always (and in many cases shouldn’t) use math to explain phenomena (things in engineering, things in science, even – at first – things in mathematics) at the very beginning… when they first ask themselves their research question.

Mathematics is separate (its freestanding and it is unlimited by context); it can come later and it can be developed: A good, useful explanation (an acceptable theory) should be understood independently – and it should be understandable by anyone!

Then the good news is: We can read and use ‘pure mathematics’ that pure mathematicians have worked and found. That’s what ‘natural science theorists’ would do. Isn’t it called ‘applied mathematics’ beyond this point?

After that of course, it should be ‘testable’ - with hypotheses… (and in research reality, with ‘scientific data’).

Sincerely,
Rahmi Orhon Pak, PhD