Luis Seco Interview - Transcript

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Andrea	Luis
What sparked your early interest in mathematics?	
	Um, Richard Feynmann once said that um, the reason for the usefulness of math is that the same equations have the same solutions. I didn't know Richard Feynman when I was becoming a mathematician, but I think that sentence summarizes very well how I felt about mathematics when I chose to study mathematics, many many years ago.
And how did that inform your early research decisions?	
	Basically, the same way. I always felt that mathematics has a universality to it that I always found very very appealing. So, uh my choice of research topics were never motivated by the end objective at hand but by the building blocks that you have to develop along the way. I always found that to be much more interesting. Um, it's been a long term relationship between me and math always and I always make my decisions based on the long term, never the short term.
And is there a specific reason for that?	
	Um, that's the way I am. That's perhaps the best answer. I of course know many mathematicians, they all look at math in a different way, they all feel math differently. In my case it was the journey more than the destination that was the objective of everything I did.
And how did Charles Fefferman become your PhD advisor?	

Andrea	Luis
	Um, because I selected him and he agreed. Uh, now I have to say, when I arrived at Princeton in 1985, I was. One thing was very clear to me, which is, I wanted to look around, um, I wanted to know all the professors, I wanted to know all the researchers, before I made up my mind of what I was going to do. It was very tempting to go there with a prespecified objective as to what I wanted to do. I knew that I did not have enough information. I wanted to collect more information so I could make an informed decision. But I can say that it took me no more than a week or two. To realize that, he was different. Um, his approach to math was very much similar to mine, very personal. Um, very much focused on the building blocks. Uh, where, um, the objective was not the goal, it was the journey that made the difference. So there was this alignment of uh, feelings, uh, between him and I and that drew me close to him from the first few days that I was at Princeton.
The Chicago School of Analysis expanded through the influence of Alberto Calderon to include many Spanish speaking students do you see how that history can lead to participation by other groups in mathematics?	

Andrea	Luis
	Yes, I think what they have done is remarkable and is truly remarkable. From a mathematical point of view they did something historical. Um, they developed tools that were completely new and managed to revolutionize not one but several fields. More than that um, many of the mathematicians that were part of that school they did not stay within the realms of the school for a very long time. They left that group of problems they were working on to go and do other things. They were uh, explorers. Uh, they had developed a very unique GPS system or something that allowed them to leave what they were doing and very quickly dominate other fields. That was remarkable. Um. In my case, I was an heir to some of that. I had, I joined Charles Fefferman when he was already outside of that initial field of activity. He was working on, uh, mathematical physics at that point in time. He was perhaps the first mathematical physicist to come out of the school of, Chicago School. So, I had an advantage, which is, I had already withnessed that first step in the evolution. From that core of competence arising from the Chicago School and how that got to be used in areas that were totally unpredicted to any of the participants. That was a very powerful uh, learning experience for me back then.
What was it like to be a student of Charles Fefferman?	
	If I have to explain, I'll have to use an analogy. Imagine you are at the Museum of Modern Art in New York looking at a Jackson Pollock that they have, that goes wall to wall. You do that, at the same time, you're listening to Mozart's 41st Symphony and you're doing all of this while you're climbing Mount Everest on a mountain bike. That's probably the closest it feels. To being a student of Charles Fefferman.
And what research problems are you working on right now?	

Andrea	Luis
	My area of activity right now is focused on risk management, financial risk management and financial asset management. Um, for those of you who may not know much about this, um. These are fields, that have developed within the financial sector, somewhat independently over the last 50 years. Um, risk management has to do with the banking sector and what the regulators have done to the banking sector to mitigate losses as much as possible. Asset management is what started in the financial sector maybe, it was the beginning of the 20th century. Which is what investors have been doing over the last 100 years and what I'm interested in now is bringing those two fields under the same roof. I'm trying to come up with research themes which are asset management in their objectives but are risk management in their methods and that is creating a very novel approach to risk management, one that I find fascinating. One that my students find fascinating and one that led to the creation of a company actually does, that, manages assets from a risk management perspective.
And within that, how do you choose the directions that you go in your research?	
	I have a tremendous advantage, which is, I run a company. A company that invests real money. A lot of real money. Um, that gives me a vision as to what's relevant and an industrial point of view, which is very unique. I have the ability, have the pleasure of being able to look at the problems that we deal with on a day to day basis and find the elements of math which are underlying, but hidden in a lot of those problems and for several years now this has been the main driver for a lot of the research that takes place in my lab at the University of Toronto.
How has your education in mathematics, played a role in the field and the work you do now?	

Andrea	Luis
	In several ways. Um, if I go back to the phrase by Feynman, that the same equations have the same solutions. Um, it is this universality of math that allows you to very quickly make analogies and resolve problems, um, in very unique ways. That has been one. But there's been more, more than that. This ability that mathematicians have, to look at a problem and figure out what's superficial to the problem and what's critical to the problem, to be able to strip off the problem of unneccesary complications is also a very good way of um, selecting research problems, identifying research problems within an industrial environment and providing some path for a possible solution.
How should the quality of research be judged?	
	That's a very difficult question. Um, research is playing a very new role in society now. Um, it used to be the case that research was always a long term venture. Um, the renaissance, um, probably led to the industrial revolution and the two are 200/300 years apart. That was probably the timeframe, um, during which research activity became relevant to society. That timeframe has shrunk to a very unusual, which, it's very often now in the lifespan of a human life that we see inventions become, um, practical. Um, it's becoming very difficult now to judge research, but at the same time, research has an opportunity that it never had before, which is, it's impact, it's societal impact has risen tremendously. Um, this is creating waves of opinion as to how research should be judged. It's changing the way people react to research. In good ways, and in bad ways. On the one hand, it makes us more demanding on research because we do see that immediate benefit research can have. On the other hand, we run the risk of forgeting about the longterm. And we need to realize that research is a long term activity. A good research activity must fail, 99% of the time. And that must be understood. That's something unthinkable in medicine for example. You cannot allow 99% of your patients to die. But in research, you have to, otherwise you're not taking enough risk. Research in today's world, is perhaps the riskiest activity and it should be that way. And, when risk is so high, the stakes must also be very high and that makes judging research a very difficult activity.

Andrea	Luis
What is your view on research being viewed as basic or applied?	
	I no longer believe in that distinction. It's interesting that, where that comes from. It's interesting where that distinction comes from. As a mathematician, mathematics was not too different from what we call engineering today, up until 1850, more or less. In 1850, something very interesting happened, which is, uh, mathematics started to develop internal paradoxes. Um, it's a very well known example, that Euler never believed the findings of Fourier. Which we now, we all know they are completely true. Um, that drove mathematics into a crisis. A crisis that took at least 50 years to resolve. This is the area ... This is the era when mathematicians or logicians like Frege were wondering as to what the definition of a number should be. That was the result of a crisis, but it created something very important which was the distinction between pure and applied math. Pure math was the new math that was created as an attempt to put order into the chaos that math had become. At the same time, the old path that mathematics was taking as a solution to everyday problems continuted, but it became more what we would call engineering today. That's finished. That um, um, ... That bifurcation of disciplines is finished. Math continues to have a short term, medium term, and long term picture. Which is relevant for any mathematician that is doing research. But I don't believe that there is such thing as a pure or applied math. And there's lots of examples that show that, where something is obviously a pure math advance which very quickly leads to an application and vice-versa. Applied problems, they very quickly lead to, to um, fundamental developments. Uh, pure and applied math I think have become no more than poetic descriptions of a recent past which I think is no longer with us.
How do you see the practice of research evolving in the future?	

Andrea	Luis
	I see room for increasing amounts of collaborative research, especially as a mathematician. Mathematics was a discipline that was for years, um, married to a certain discipline. Uh, Physics in the 20th century, Engineering in the 19th century. That's finished. Um, mathematics now has very deep relationships with many fields. Uh, medicine, psychology. It makes mathematics the centrepiece for many fundamental developments in society today and that's going to change, that's going to change we feel math and that's going to change the way we judge math going forward.
And how will we judge math going forward?	
	Another difficult question. Um, math contains internal dynamics as a discipline, as a mature discipline. Which will continue to be the driving force for mathematics evolution. But at the same time, math has relationships with many other disciplines that are breaking down walls of separation between disciplines. So, it's going to be hard. It's going to be challenging to, be able to take a both views into account. One, math as a discipline with internal dynamics that continues to drive forward and math as a centrepiece of relationships of many other disciplines.
Do you think it's possible to predict the research directions of specific disciplines?	
	Impossible. Otherwise it would not be research. Okay, you can predict many things. But as I said earlier. Research is the activity which is riskiest, is the activity where uncertainty is at it's highest and it has to continue that way, otherwise it will not be research. The day where we can predict results, the day were we can predict evolution of everything, that day research would have died.
Do you see mathematics playing a different role in industry in the future?	

Andrea	Luis
	Definitely. Mathematics has... Industry, in the 19th century. Industry in the 20th century was based on the domination of physical space. In the later part of the 20th century, certainly in the 21st century, industries are now focused, successful industries are now more focused on the domination of mental space. Facebook, Google, even Apple, they've realized that successful businesses need to thrive in mental space. Mathematics was relevant in industry and in society as the computational partner for the domination of physical space. And it was very well suited to do that. Usually with engineering as the partner. In the 21st cenutry, that is no longer needed. Math is very well equipped to be a first world partner in the domination of mental space. And therefore, companies are finding mathematicians to be um, much more useful in their everyday struggles to innovate to be better than the others and to dominate that mental space where they expect to succeed.