STANFORD QUAL TOPICS TRAINING I

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1. Looking For Immediate Full Tenured Professorship

Stanford Faculty ought to understand that I am seeking tenure not for my mathematical skills but my *Scientific Accomplishments* over the past year, not only for Four-Sphere Theory which is a fundamental physics but extensive set of empirical results in (a) establishing the empirical validity of Aristotle's Virtue-Eudaimonia theory (b) establishing the universality of human moral nature refuting strongly theories of both *Friedrich Nietzsche* and *Immanuel Kant*, (c) establishing ethnicity-independence of human moral nature, (d) work on evolution of romantic love before the emergence of homo sapiens. Much of the data I used for my quantitative human nature and morality came from World Values Surveys. The mathematical skills I am testing just to get to levels necessary for deeper examination of the relationship between Nature and Mathematics. I have worked with *Jeff McNeal* who was undergraduate supervisor for a prize-winning Mathematics thesis at Princeton which was publishable quality in 1995. I have worked with Daniel Stroock with whom I have a publication in 2000 [2]. I am seeking immediate tenure with plans to settle in Mission San Francisco rather than work at the Palo Alto campus and I have extensive plans for development of quantitative positive psychology for applications for billions.

Please feel free to talk to people in Sciences regarding the importance of my achievements. I do not publish many things in journals but you will find my work dated and archived in [4], [3].

2. Motivation For Stanford Qual Topic Training

I have done around three or four Stanford Analysis Exams in the past month. I think this is a moment to reflect some more on the sorts of issues where I feel that I ought to sharpen attention, since I am 50 now and rusty. Some issues are not hard but difficult to habituate for fluid use.

They are elementary issues in a way, but they are worth sharpening.

3. Status Of Mathematics In Scientific Creativity

The status of Mathematics in scientific creativity does not even have any precise language to understand yet. The success of Four-Sphere Theory is profound, and so there is a great deal of interest that I have to evaluate the particular parts of Mathematics that provide the foundations for successful science at all. After the advent of quantum field theory, Hilbert's Sixth problem was held up by the failure of a rigorous quantum field theory in 3+1 dimensions. Four-Sphere theory circumvents this altogether by rebuilding all of macroscopic physics from purely mathematically

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rigorous foundations by a geometric route, and now I want to revive interest in the philosophy of science regarding the particular status of Mathematics in producing successful scientific models.

This is a serious question that demands extreme care, the foundations of all these parts of Mathematics ought to be absolutely clear and totally devoid of frivolous abstractions that distract from the purity of enterprise of understanding Nature. I am deeply unsatisfied with all manner of volumes of mathematics as a *formal tool* for use with 'science and engineering'. This approach leads I think to weaker understanding of the fundamental issues that allow Nature to be modeled by mathematical models; I am obviously in pursuit of the *only final authoritative model of Nature* and I have strong conviction that it is my Four-Sphere Theory.

4. Measurability of Limit Operations

Suppose $(X, \mathcal{A})$ is a measure space, and (Y, d) is a metric space. We assume that $f_n : X \to Y$ are measurable and $\lim_{n\to\infty} f_n(x) = f(x)$ exists for every $x \in X$. The task is to prove that f is measurable.

This sort of thing involving sets in sigma-algebra require one to reduce the work to showing that instead of the Borel sets $\mathcal{B}_Y$ of (Y, d) we need only check that $f^{-1}(C) \in \mathcal{A}$ for a much smaller class of sets $C \in \mathcal{C}$ that generates $\mathcal{B}_Y$.

The reduction step is done as follows. We set $\mathcal{D} = \{D \in \mathcal{B}_Y : f^{-1}(D) \in \mathcal{A}\}$ and show this is a sigma algebra that contains $\mathcal{C}$ and therefore equals $\mathcal{B}_Y$. Then measurability can be checked for only $\mathcal{C} \subset \mathcal{B}_Y$. This is done in Theorem 4.1.6 of R. M. Dudley's *Real Analysis And Probability.*

The Stanford Qual problem I saw was based on showing several functions $\sup_n f_n, \inf_n f_n, \limsup_n f_n, \liminf_n f$ are measurable and therefore $\lim_n f_n$.

Now R. M. Dudley remarks that Felix Hausdorff in 1914 proved the measurability of the limit and published it. This is such a fundamental issue that I would like to examine this in crisp detail.

I remind my dear reader that for me functions are not abstract mathematical objects. Spinor fields on four-sphere are functions too, and they are *matter fields* in four-sphere. And so for me these are issues of fundamental interest. Measurability is fundamental to any sort of science we will have. Haim Brezis points out that *Geometric Measure Theory* has found nontrivial 'applications' in study of natural phenomena. So these issues require crisp understanding for me to proceed with four-sphere theory.

Now rather than going into many diverse topics, I will focus on this issue. The sets $[a, \infty)$ can form a sufficient class $\mathcal{C} \subset \mathcal{B}_{\mathbf{R}}$ for measurability of functions that are real-valued. Felix Hausdorff in 1914 proved a more general theorem for measurability for functions with values in a metric space.

Let's assume that balls $B(y_0, r) \subset Y$ defined by

$$B(y_0, r) = \{y \in Y : d(y_0, y) < r\}$$

form the class $\mathcal{C}$ generating $\mathbf{B}_Y$. Let's prove in the abstract case that $\lim_n f_n$ is a measurable function. We will follow R. M. Dudley Theorem 4.2.2.

It suffices to prove $f^{-1}(U) \in \mathcal{A}$ for any open set $U \subset Y$.

Let

$$F_m = \{y \in U : B(y, 1/m) \subset U\}$$

Then F_m is closed: if $y_j \to y$ with $y_j \in F_m$ then for any v with $d(y,v) < 1/m$ for large enough j we have

$$d(y_j, v) - d(y, y_j) < 1/m$$

we have

$$d(y_j, v) < 1/m + \epsilon$$

I am not sure we can conclude $v \in F_m$.

Let's assume F_m is closed for all m. Now $f(x) \in U$ iff $f(x) \in F_m$ for some m. Then

$$d(f_n(x), f(x)) < 1/2m$$

for large enough n so $f_n(x) \in F_{2m}$. Conversely if $f_n(x) \in F_m$ for n large enough then $f(x) \in F_m$.

So

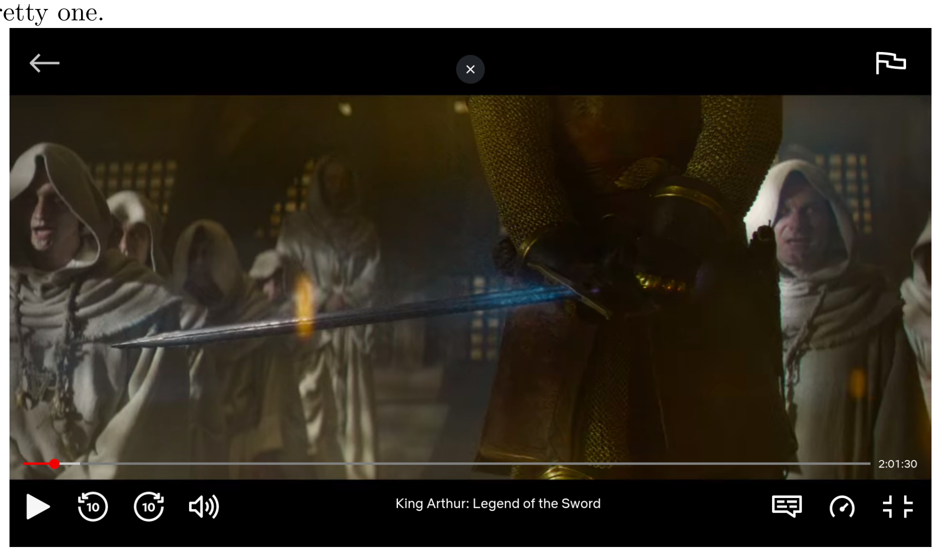
$$f^{-1}(U) = \bigcup_m \bigcup_k \bigcap_{n \geq k} f_n^{-1}(F_m)$$

So $f^{-1}(U) \in \mathcal{A}$.

Now that's pretty impressive of Felix Hausdorff. This is a sharp piece of Mathematics. Felix Hausdorff was a great loss by Nazis.

I want to emphasize that Bill Gates plot to murder and destroy my life is reminiscent of Nazi racial laws but here it's not *official*. United States Government is just allowing Bill Gates to destroy lives of non-white Americans with impunity without even one of these propaganda videos like *The Birth Of A Nation* or Leni Riefenstahl propaganda films. Felix Hausdorff committed suicide in order to avoid Auschwitz in 1942. But I am not particularly feeling like suicide. I am chomping at the bits to behead the Demon Bill Gates personally.

Look. See, that's my *Excalibur*. The Lady of the Lake gave it to me. She's a pretty one.



Bill Gates is the most inferior cat I have ever encountered. I have *been* homeless myself both in New York and San Francisco. I know that most homeless people are decent virtuous cats, and as such I honour them, and they are all superior to Bill Gates. Bill Gates is a charlatan huckster who lied about his SAT score even. He obtained a 1290 and claimed to have obtained 1590. I see through these savage beastly charlatans who live on black magic and murder. He ought to be slaughtered immediately. His achievements in his miserable worthless life 1955-2022 is not even worth one or two of my *smaller* achievements.

5. Simple Bounds On Fourier Coefficients

This is from Stein-Shakarchi III, *Integration Theory.* If f is integrable on $[0, 2\pi]$ the problem is to show that

$$c_n = \int_0^{2\pi} f(x)e^{inx}dx$$

satisfies $c_n \to 0$ as $|n|$ grows.

We will change variables to $y = nx$ so $dy = ndx$ and

$$\int_0^{2\pi} f(x)e^{inx}dx = \frac{1}{n}\int_0^{2\pi n} f(y/n)e^{iy}dy$$

The point of this exercise is to be efficient and precise and find the most optimal method of reaching the result that is intuitively quite clear. In particular, all manner of theorems and other arguments in integration theory needs to be arranged in just a beautiful order to accomplish these results where our *intuition* matches the precision with minimal effort and without losing lucidity for our dear readers.

Let us examine the situation again because the conviction of Fourier that all functions could be represented by Fourier series. Alexis Clairaut used a series in 1754 and then Joseph Louis Lagrange in 1759 used it to describe trigonometric series for the vibrating string. Tthe breakthrough development was the 1807 paper *M/'emoire sur la propagation de la chaleur dans les corps solides* by Joseph Fourier, whose crucial insight was to model all functions by trigonometric series, introducing the Fourier series [1].

I am extremely interested in understanding these, because my precious baby, one of my works of *immortal genius* is the four-sphere theory where there spherical harmonics of S^4 that are central, and so I want to have extremely clear understanding of how analysis allows us to have sharp understanding of very basic properties of Fourier series of *all* functions.

So

$$\int_0^{2\pi} f(x)e^{inx} = \int_0^{2\pi} f(\frac{y}{n})e^{iy}dy$$

Why is this small? Let's look at something else

$$\int_0^{2\pi} e^{iy}dy = \frac{1}{i}e^{iy}|_0^{2\pi} = 0$$

That is the reason why we get small coefficients. You see, the change of variables produces an equality with an integral where the *function* f is being stretched out from $[0, 2\pi/n]$ to the entire $[0, 2\pi]$ interval and we are looking at a function with zero integral.

This is important to understand clearly. The Fourier coefficients c_n represent some measure of things happening to the function on the $[0, 2\pi/n]$ interval only. And it totally removes interest in the behaviour of the function in other intervals. If in the $[0, 2\pi/n]$ interval there is not a lot of movement, we get something close to

$$\int_0^{2\pi} e^{iy}dy = 0$$

Let's pretend we did not have f just integrable but $f \in C^1([0, 2\pi])$. Why? To see what is actually going on. Some of these general analytical things applying all sorts of convergence theorems and all sorts of inequalities get us results and we still don't know why they are true.

$$\int f(y/n)e^{iy}dy = \int f(0)e^{iy}dydy + \int f'(0)(y/n)e^{iy}dy + O(|y/n|^2)$$

This tells us what's going on. It is the vanishing of the first term:

$$\int_0^{2\pi} f(0)e^{iy}dy = 0$$

that tells us why the Fourier coefficients are small when $n \to \infty$ because

$$|\int_0^{2\pi} |f'(0)||y/n|dy \leq C/n$$

and that is where we get something small order of n^{-1}. Once we know this we can prove some general theorem about integrable funtions without any Taylor expansion and get a valid theorem and so on.

You see, when Fourier claimed in 1807 that all functions on $[0, 2\pi]$ can be expressed in simple trigonometric series e^{inx} many very intelligent people were highly skeptical.

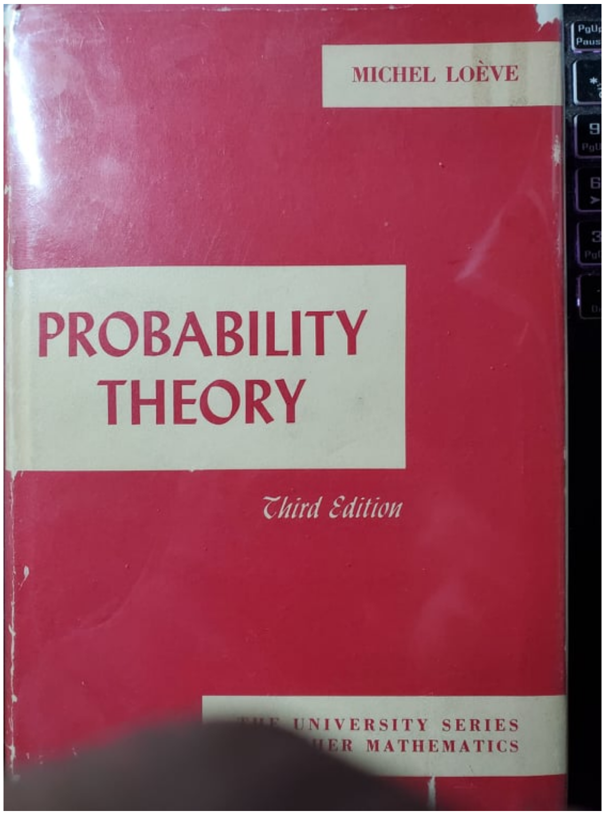
A nice friendly photograph here of Jean-Baptiste Joseph Fourier. Fourier gained immortal stature in human Civilisation because he was right, but it's not trivial why. And we should not be lulled by various terminology and dismiss the skeptical people as idiots. *Their intuition did not see this, and we should realise that new intuitions are necessary to see it.*

6. Why Does Jean-Baptiste Fourier Matter So Much To Zulf?

You see I have deep convictions today that if the universe were actually $\mathbf{R}^3$ there would be no *localised particles* at all in Nature. There would be no quantisation of energy. These are *my* discoveries, and my discoveries alone. In the entire human history of past eight million years from the emergence of homo sapien species in Africa, to this very day, *only I, and I alone, had seen this profound truth of Nature.* And this is eternal truth, unchanging, and this has been so a trillion years in the past – as expansion is rubbish theory – and will be so for a trillion years in the future, and I, Zulfikar Moinuddin Ahmed, immortal genius, shall have been the discoverer, the great man whose quest for truth had led him to a clarity about Nature of existence my beloved people the Human Race had never known, the eternal four-sphere geometry of *absolute space*.

This is why Jean-Baptise Joseph Fourier (1768-1830) is so important to me. The spherical harmonics for S^4, like the trigonometric series e^{inx} are labeled by 'frequency', i.e. the spectrum of the Laplacian on S^4, and unlike the circle the eigenspaces are not one-dimensional but there is a formula for their dimension. In each there is a zonal harmonic, and that is point-localised. These are the fundamental reason for existence of point particles in Nature. This is the reason we have *things* in Nature like trees and clouds, rivers, oceans. None of the earlier physicists, Albert Einstein, Erwin Schroedinger, Isaac Newton truly understood Nature so clearly as I had.

7. From Michel Loeve's Probability Theory



I have studied some probability theory, so I thought it would be good to appreciate any special insights from Loeve's book regarding classical analysis. Classical analysis is concerned with continuous functions alone but passages to the limit do not preserve continuity; the essential achievement of Borel, Baire, and Lebesgue, in modern analysis is the introduction of a wider class of functions that are closed under limsup, liminf, sup, inf, in addition to algebraic operations (p. 106).

Now the thing that intrigues me is whether some of these limiting operations are important for *matter fields*, as the spinor fields on S^4 are the fundamental objects of Nature in my theory.

I am beginning to like the idea of just taking all theory of Fourier series and obviously I will be able to transfer them to $L^1(\Gamma\Sigma S^4)$ and $L^2(\Gamma\Sigma S^4)$ and so we want to understand what classical and modern analysis will do for us. Without this motivation, I would have very little interest today in Analysis at all.

In fact, my point of view is that *until my Four-Sphere Theory was formulated, all of Analysis was not worth all that much, and only became valuable for it could in fact yield insight about Truth of Nature, i.e. Four-Sphere Theory.* I do know other people, think otherwise. We allow that people do need their delusions and fantasies; we don't consider their fantasies and delusions, that any part of Mathematics can actually *matter* if it does not shed light on my Four-Sphere Theory, to be all that important. Obviously nothing else actually matters if it does not shed light on my Four-Sphere Theory.

8. The Wild Side Of American Culture: Context Dependence

You see, America is a place where nothing makes any sense. If you talk to African-American people in the wrong place and offend them, they will kill you bad. But you go down to Chicago and find Indian boys hugging each other and saying ”How’s my nigga doing? Long time no see. How’s it going my nigga.”

Then you you throw a party and if enough bodacious babes are into it, you can call each other ”nigga” and ”cunt” or whatever you want and the response always ”Love you baby!”

It’s all about the context, and no rules actually apply.

9. The Rare Interview With Bill Gates

10. The Old Partial Differential Equations Of Physics

A solid text for partial differential equations is Peter J. Olver. He lists a number of areas in Science where partial differential equations have arisen. Quantum Mechanics (Schrödinger, Dirac), Relativity (Einstein), Electromagnetism (Maxwell), Optics (eikonal, Maxwell-Bloch, nonlinear Schrödinger), Fluid Mechanics (Euler, Navier-Stokes, Korteweg-de Vries, Kadomstev-Petviashvili), Superconductivity (Ginzburg-Landau), Plasmas (Vlasov), Magnetohydrodynamics (Navier-Stokes + Maxwell), Elasticity (Lamé, Von Karman), Chemical Reactions (Kolmogorov-Petrovsky-Piskounov).

I want to understand how all of these are consequence of one law, my S4 Electromagnetic law, or the great Ahmed-d’Alembert Equation, the final dynamical fundamental law of Nature that is the source of all other laws.

11. Zulf Presents A Vision For All Science With Four-Sphere Theory

Examining the partial differential equations that are used in models of Nature, it’s clear that all of them can be replaced by analogous derivations from my S4 Electromagnetic or Ahmed-d’Alembert Law. It’s possible, then, to present Four-Sphere Theory, the derivation of all the extant laws in use, and pure mathematical issues in a single canonical text including unified treatment of solutions using *eigenspinor basis* for four-sphere. This is probably not a difficult exercise. This would be all of Science in coherence that is unchanging and eternal. Then Science students can all learn the same material in several semesters and globally have the same education on these. That will have a tremendous transformative impact on all future of Science and Technology because all aspects of Nature will be unified and all people will know the same things extremely well. Then all further researches will be far more focused. I have enough here to seal up Science for centuries macroscopically.

11.1. **The Bane Of People With Geometric Intuition.** Analysis is not pleasant to people with *geometric* or *algebraic* inclinations. Analysts swear on the absolute importance that it is imperative that you should understand that in such and such a situation you can have convergence in the $\|\cdot\|_{\alpha,\beta,\gamma,\delta,\eta,\rho}$ normed Banach space dual, but pointwise convergence is not possible unless your function has at least 3.5214715 derivatives that are L^2. Now to Analysts, this seems quite natural. We, the geometric intuition types, are not enthusiastic about this. We are simple people. We draw pictures, we like topological invariants. We understand simple tales of why things work. We don't know the exceptional situations where there is meak * convergence in Horlicks spaces provided that there is a family of seminorms that moved to London in 1645 and never really fit into English Society because of their aversion to James Bond movies.

References

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[3] https://github.com/zulf73/human-nature

[4] https://github.com/zulf73/S4TheoryNotes

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[6] Jens Lenström, On the origin and early history of functional analysis, Uppsala, 2008

[7] https://en.wikipedia.org/wiki/Mollifier

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[9] Haim Brezis, *Functional Analysis, Sobolev Spaces And Partial Differential Equations*,2010