EVALUATING PEOPLE – COMMUNITIES

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Preface:

The part with numerical computation of grades is on the computer file '4 Bayesian Grading'. You can get a copy by sending an email to: skkatti@att.net. I made priors and conditional probabilities; and computed posterior distribution after each test, for each student in the class. As you can expect, most of them converge to their grade with a probability of 80% or more by the time there were three tests and the home works. There were some odd cases where the probability of the student being a B and D grader were closely to 50% each. By looking at the successive posterior probabilities one can easily tell what was happening to the student. The student can himself/herself tell what is happening to him/her. They are not anyone's opinions. Some such students withdrew passing. Some decided to crack down and finished their PhD. in four years sharp.

Here, I speak on the general issue of evaluating.
This is **similar** to what was done to me, personally, in the old time when I was in the shoes of a regular student as a youngster. People like Fisher, Tukey, Neyman, Bruno de Finnetti, Mahalanobis, P. V. Sukhatme and others would come to the podium and put out their deep ideas. I would take them down and work on them. Most of my work surrounds those ideas given to me in those lectures. I hope that I will do justice to their foot prints.

Best of the research does not start with reading the literature; finding holes in the papers; and fixing them.

It starts with observing nature and developing an intuition about what is happening. Refining it; codifying it; telling it to you; and then you taking it from there and finalizing the process with the test of time clarifying it – it takes some 50 years. It is not meant for quick sale/promotion!

That is how long it took me on this issue and it took similar time to Fisher et al whom I knew since my childhood when they were in their active mode and picked up a lot of stuff from Karl Pearson and many others.

Now that I think about it, they were eager to tell their initial phases of their research work to any one – I was the only one who was willing to listen.

Others wanted to use their prestige to get a better job and go on to living a better life because of that.

I have reviewed some Bayes-based material submitted as grant applications and analyses for the FDA – and rejected by the reviewers. I agreed with the reviewers.

Where are the problems?

The Bayesians want to claim that they are using their 'priors' to get better analyses in the spirit and glory of Reverend Bayes. It is a very personal affair with them.

But then they use non-informative prior! It is utterly silly, is it not! I have talked to the early well-known names. They justified this by quoting Fisher for using randomization. They got it all wrong. Let me go over it.

Comment on Randomization:

In randomization, one tosses a penny; if head comes the Treatment A goes to the experimental unit; If a tail comes, Treatment B goes to it.

Why would Fisher let the penny decide on this important issue rather than let the medical personnel make a studied judgment?

In those times, pre-1924 AD, making any decisions/inference was the prerogative of the monarchy, military and other power blocks. In the USA today, you see the President making the decision on killing Suma Bin La Din through secret meetings of the CIA and military with the photographs showing the face that the President and Condo Lisa Rice made at that time. A participant wants to give the details on how he did it. It is a matter of deep discontent. Should this agent be prosecuted for violating his path of confidentiality? This is going to go through the entire process. So, keep an eye.

People with contacts and power wanted to keep decision making to their own selves – 'they' made the final decisions; 'buck stops here'; and all the glory. Others were purely 'workers' who did the chores, including numeral work – clerical jobs - for them.

Fisher could not claim exception to this culture that surrounded him; he knew that. While each one of you has been told to yuck it up on 'telling the truth, the whole truth and nothing but the truth', you know better through the hard knocks of life.

I have observed you. You follow the rules of the culture most closely. That is what the Golf Courses and the Churches are about, you moron! Only recently there was a discussion if women should be permitted to a major golf club. At last, they admitted that the club is not as much for playing golf as it is for background maneuvering. They permitted Cando Lisa Rice because she qualifies on the ground of bringing the extra background information

Fisher made some experiments on his farm and spoke on the stupidity of filling a whole farm with one level of calcium one year; another level of calcium next year; and trying to compare the importance of the level difference. There were so many other issues involved that this discussion served no purpose than to give them a topic for the 'tea time gossip'.

The bosses liked that; the clerical staff was happy to laugh with the bosses; pick up the money; and go home. For these robotic clerks who made the central structure of Karl Pearson's establishment with his data collection system that spread around the world – the sun never set on the British Empire, as they would proudly say, the fact that he generated so many hundred thousand jobs was the most important issue. He was a job-creator! Our Republican candidates would be proud of Karl Pearson.

Coming to good / correct conclusions is never the goal of any substantive group. They have their life style; keeping that lifestyle constant is the goal.

'Work is hostage to money transactions.'

So, Fisher's more accurate inferences were not appreciated by the 'establishment' made up of Karl Pearson in his younger days; then by the Pearson Estate operated by his son Egon Pearson.

Fisher was neither that rich nor that highly connected. So, he had to come with a trick to get past the diversionary tactics. If he was Gandhi or he was in my Katti-Family, he would have gone to doing his thing without worrying about what others say. He was not. He thought of randomization. If you have 20 plots and you want to use one level of calcium on ten plots and the other on the remaining ten, then you assign them at random. Then, when somebody argues, you say, "You do the experiments likewise – by choosing the plots at random. You will get very similar answers." He tagged on the t-test which was in the works among his group. That clinched it.

Year after year, he had better and better protocols to raise agricultural products.
But there was no let up on the side of the critics. I guess, they could not afford to let up. They had their economic and power considerations.

The production of corn on the farms went up from the old value of 30 bushels per acre to 80 bushels per acre by 1960. Criticisms continued while the new statistics departments took to Fisher's methods like sponge in water. I established the FSU Graduate Program in Statistics in that spirit.

At last, I was at a meeting where Kendal said, "They can thrash Fisher as much as they like; but they cannot thrash 80 bushels of corn when it is on a per acre basis."

As Gandhi and better people have said in the past and my colleague Fred Williams at UMC used to say, "The best revenge against a stubborn enemy is to succeed in your own life." My mother, Yamunakka Rukmini Sonna Katti, never argued with people to make them change their mind. When her first son became the First Ph. D. in the newly formed Pune University in 1948, her style of operation got established as standard!

It is not that the opposition surrendered after that. The Pearson establishment carried on with its goals; and the Fisher's group carried on with their goals. There is so need to battle each other – just as the census group and the survey sampling groups no more fight with each other over the superiority. Each one has a different job and they do it. The energy of Pearson is not there – nor is Fisher's. In a way, I miss the old days of more energy – blood at the meetings – rhetorically speaking.

You might ask, "How do you know all of this?" You know that I will answer it.

Fisher had a student named P. V. Sukhatme who got his Ph. D. with him; later PV took up a job at the UN, in the sector of FAO. PV's sister married my brother in 1948 when I was some ten years old. Fisher used to visit India frequently. When he was there, somebody would make it a point to get a few of us in PV's apartment.

I remember being the boy whose assignment it was to take tea and biscuit to him.

The big shots never realize that the little bodies around them would be writing about them in all of the minor details over some fifty years after those events; when none of them are around to shush them!

I remember one particular incidence when he gave a lecture at the Delhi University on randomization. My mother and I attended it. His wife Eileen and his daughter Joan Gwendolyn was in the apartment. My mother was surprised that this great man is tossing a penny to decide who gets what. At home, I asked him why he does that. When a youngster would ask him a question, he was eager to answer in full. "You have to catch them young," he would say. He asked Joan to get him a letter from Egon. He handed it to me and said, "Look at the criticisms that he makes of me. With tossing the penny, how could I be fudging the answers?" I took the letter back to another room and read it. Next day, at the tea-time, I said, "Good answer. We face some critics too. We do a variety of side things to keep them calm. Gandhi wears the half towel –for the same reason. Good line!" We left in immense peace.

Later on, I continued, "When we plan within the family, we use all of our talent. Once the algorithm and operating rules are set and it is time go public, we do the additional things, including book keeping, to assure the more reluctant participants that we are OK." He agreed.

You might have another question, "Why are you telling it, now? Why is it not well known?"

Answer: If you had come to FSU or UMC where I was for 35 years, you would have heard all of this in my personal weekly seminars, though not in this specific lingo.

Q: Why did you not publish this in any paper?

I was surrounded by the same kind of society that Fisher faced; you face today; many of you represent the structure that I am criticizing.

The en masse, the general public, had its own problems and predicaments as you have today. There are people who are looking for jobs; there are people who want to hold on to whatever jobs they have; there are people who have made their money doing certain things their way; they do not want any side arguments. Their survival is at stake.

Fisher understood that. He felt that the time had come to disturb that system; he was right. He developed a new economy without really blowing up the old group.

He once said, "I could have published some of the results and my views in 1935. I held up on the publication till 1936 in deference to the memory of Karl Pearson who was on death bed." I believed him. He owned his own printing press; he could have done that.

While major figures would act as though the Karl Pearson establishment was criticizing Fisher for his ideas/philosophies, it was all at the low level as above.

Karl's jobs were the first cash-paying job that many had received in the history of mankind; of course, Karl and the Empire did not pay them in British Pounds – they paid them in newly printed currencies such as rupees- they made place for mischief at every opportunity; they were not looking for arguments.

This is not very different from the current generation yacking it up about the computer; there is money there; they do not want me to criticize any aspect of it. I oblige public. In my own sector, I redid all of it; my students never took more than four-years for their MA and Ph.D. when they joined me.

Once, Professor Jersey Neyman told me. "You are doing what I did in Poland and England. In the course of time, the locals will take over – the local weeds will grow. You need to do what I did; leave in peace." He quoted Fisher in many ways. Between his Polish English and my Indian English, there was more communicated through eye-balls than through words that can be written down on paper.

It is indeed foolish to think that Fisher promoted the 'unthinking coin' over talent. Wake up!

Mathematics simplifying assumptions:

The elder Bayesians talked about 'Math Simplifying Assumptions'. I knew the old Bayesians closely. They were actually mathematicians. Mathematics of the type they were doing had lost its value; any promotions and tenure came outside of it – in areas like physics and new found statistics. I got a tenured job at the age of 23 with Statistics as the specialty. That bugged them all; they were in the mood of, "if you cannot lick them, join them." They were not enough talented to chuck their old dilapidated background and get on with the new game in full.

Adult people talking like this in the (1960 -70) era got me into a contempt mode even then.

They were worrying about Borel Measurability! When you are working like this, Bayesian philosophy is not your real problem, is it?

I had listened to Fisher much in my earlier days. He once said most openly, "Mathematical Statistics is not statistics; doing mathematics for the sake of mathematical convenience/beauty is not doing good statistics."

I was impressed by that. I have defined statistics in my classes since January 1, 1960 as, "The science of making inference under uncertainty". All other considerations should be secondary to the main issue of making inference under uncertainty.

- Fisher once said, "Statistics ended by 1924. The rest of the work is unnecessary." He had no use for the asymptotic theory.
- He had no use for the Bayesians either. He thought of them as unemployed mathematicians. The way they were developing Bayesian methods, I agreed with Fisher. I visited Professor Bruno De Finetti in Rome to see what he thinks of the current Bayesian work – circa 1970. He agreed with Fisher that it is silly mathematics of no value to anybody, including making inference under uncertainty.
- I talked to Leonard Savage and his brother, I. R. Savage. While they continued to do mathematics, they knew that they were not doing good statistics, let alone good Bayesian Statistics. They were not doing good mathematics either. Time has judged!
- The only serious Bayesian whom I met was Bruno De Finetti. He expressed serious views on economic issues in Italy; later on he was arrested for that. He, just as I do, wanted to use the Bayesian methods to speak on reality in its true and explicit form and use subjective probabilities to express his personal uncertainties on those issues.
- He was a serious man, just like Sir Ronald Aylmer Fisher.
- He was not a part of a robotic clerical group that most of the rest were. You know that statistics, at least as defined by Karl Pearson, meant, 'Affairs of the state'. That meant record keeping for the states – clerks. So, statisticians keep the records straight; the big boss picks it up from there and makes his decisions in his quiet private corners.

- You, in this group! Your pride will not permit you to accept that this is what you are doing, will it!
- Those of you, who have the scope, should do better. If you engage in 'non-informative' – unintelligent priors, then you will be so rated regardless of your personal confidence/pride.
    - I have read that the US is quickly becoming the nation with the least education and most confidence.
    - I hope that they are wrong. It is our job to make sure that they are wrong.
- Sir Fisher died around 1962. After that, I would speak to Professor Neyman, who I thought of as the heir apparent to the statistical throne of statistics. He did much mathematical details for the methods that Fisher would propose. Fisher had no particular use for those proofs – with regularity conditions to show when Fisher's methods were at their best. I thought such work should be done as an analysis of the work that we are doing – not the best and the brightest; but it must be done; people involved in such work knew it; they worked under much inferiority complex.
- Neyman recognized that one must extend the statistical methods to two stage models. Thus not all statistics should surround taking samples from a given population. In corn borer data, first the corn borers lay egg-masses on the corn stalks; then each egg-mass leads to more borers that cause the real damage. Same happens in automobile accidents. First the automobile gets into trouble. Then the people inside get into trouble.
- I was impressed by that. Neyman assumed that each of the two stages had a Poison distribution, though with different parameter values. His associates called it the Neyman Type A distribution. I knew that the assumption of Poison was wrong for the infestation in the farms. Karl Pearson had recommended the logarithmic distribution for populations that have larger skewness than what can be accommodated by the Poison. The logarithmic distribution starts at one. I added the zeros. I made up the log-zero-Poison distribution as an alternative to the Neyman Type A distribution.
- Neyman came in 1964 to evaluate the Graduate Department that I was developing at FSU. I showed him my work on Neyman A and my own work. The next obvious question arose, "Why are we making the assumptions of Poison Distribution without looking at the actual data on such topics that is available if only we talk to the people in these areas? And there are many!" Neyman agreed! It is a mistake to make such arbitrary assumptions – they were done by lazy mathematicians to simplify their formulae. Even in 1964, our computing ability was enough strong so that we could afford to make more realistic assumptions, more representative of the true distribution in the field.
- Let us get away from the 'Mathematics Simplifying Assumptions'.
- Fisher had said that too! The Bayesians carrying on with that in 2013 with all of our computing capabilities has no justification at all.

Bayesian papers at the San Diego meetings:

Let me be specific. In the May 2012 issue of the American Statistical Association, Vol. 66; #2, p. 105 and up, the author writes,

$$Y \approx N\left(\mu, \frac{I}{\Phi}\right);\ \mu = I + X\text{ß}\ where\ \text{ß} \approx N(0, - - -).$$

My goal is not to criticize this particular article or this particular author. They all do it! How much thinking do you think went into writing this? None! His reference list contains all of the current 'Whose Who' in statistics.

- It is all monkey see, monkey do.
- "Everybody does this. Don't bug me. I am just trying to make a living!"

When Fisher wrote $\mu(i,j) = t(i) + \varepsilon(i.j), i = 1, --t; j = 1, --r$, he meant that the plot with treatment 'I', had a population mean, a mean that is specific to the treatment and a statistical error. He knew much about the mean treatment effect through his earlier experience. With Karl as the critic, he did not get into telling why he picked that treatment. He said, "I picked it; I will show that it is good."

When you write a linear model, y = a + bX + cY + dT + error, how do you know that such a linear relationship is the right one for your problem?

I worked with Professor Gerhard Tintner who was once an economic consultant to the Austrian Government.

- I asked him if he would buy that kind of model to represent the economy.
- His answer: "NO".
- Then why do you use it?
- That is the only thing that 'YOU' know how to do. After you do this computing they do their own decisions, most of the time ignoring what you are saying.
- "It is just good to list what others would say, though you know that most of it is stupid."

This is not different from a person with a problem with his wife going to a barber not too far back in time. The barber is eager to talk to him on his socio/economic problems. His final statement always is, "Just let me finish this new hair style for you. You will develop a new outlook on life." Yes, he does give you a new haircut. Does this solve your problem? No! Then why did the barber say that? He was making money by giving you a haircut. He had no interest in your family problems. It was just side gossip. Are you, as statisticians, playing the role of this barber? Are you a clerical staff who has learned his arithmetic/calculus; needs to make money; you are willing to call it 'randomization' if that is what it takes; you will call it Bayesian methods if necessary? There is no need to live in fool's paradise. Know yourself – know what you are doing.

If you really believe that you are doing good Bayesian work in doing what I saw you do at the San Diego meetings, you are not far from going to the bar for many 'shots' of tequila.

A speaker at the San Diego meetings said, "Non-informative prior works just as good as any." If we were in a medical field and if we said, "Any drug is as good as any other drug." it would mean that you lost the game long ago.

I participated in a study involving final phase cancer patients.

They were given various drugs / chemo / surgery, as agreed to by the patients and the caregivers.

One of the treatments was: Religious groups doing their thing according to their scriptures.

We had people from China giving acupuncture and claiming that it is as good as any drug. The patients felt at ease with them.

Life expectancy was the same. We kept track of the 'Quality of Life' forms. There were differences. Our basic recommendation was: Don't be invasive. Let the patient decide how he/she wants to go. Control of the opium tube was given to the patient.

I think we treat the final phase patients much better now than we used to.

Knowing local issues and adjusting with all of your talent is much better than using a mixed models etc. blindly.

Lots of snake oil has been sold over the centuries. You should know that the snake oil salesmen have to keep moving. Then there is a time when there is no place to run to.

Continue:

You should make priors with all of your abilities and talent. You should expect that others will question your ability/integrity. You should be ready to uphold it.

In grading, I picked up the initial probability of a student being it at the various grade levels from the history of the courses over the years – for which we had grade books. My two graduate assistants and I taught three classes together per semester. So, we had plenty of data. But never cut the brain off!

Automation is a way of saying, "I am not cheating." There are other ways to say, "I am not cheating – don't cheat in your life style!

Yes, there were colleagues who had plenty of questions and were contemptible of every step in our work. I felt good about it since Fisher, knighted in 1956, got much thrashing from Karl/Egon Pearson.

I asked some of them to give their numbers. I would compute the posteriors using our numbers and the numbers of others.

With three examinations and a set of home works, the final posteriors were so close that there were no arguments in assigning the final grades.

I was so proud of it that I visited the Dean and explained to him how each student converged to his own grade ever so smoothly.

There were a few whose probability of B and D were close to 0.5. With successive posteriors being computed it was clear that, when the student works he is good; when he sloughs off, he is bad. Such a student has to decide if he wants to get a C-grade and continue or clean up his act. I gave them successive posteriors after each test. So, they knew how they were proceeding. Not many people changed their mind. But, none of us were accused of arbitrary capricious behavior. Most of my colleagues were so accused!

They were at ease with the game they were playing. Life is larger than playing a game and calling it, 'fair game'. What you do at one place reflects on your other activities. Life is so long that the errors of their ways have caught up with them. Their per capita income is pathetic.

When I worked in industries I found them more stubborn in their working rules. I did the usual work; but did the extra work of using the previous trials to get the priors.

We had some stage ½ trials where we were working with serious topics such as cancer with three and five patients. The senior doctors were the best and the brightest graduates of Harvard. They got permission to do such trials by the FDA and other regulatory boards. Visual data would not tell much in view of the variability and all. But the posteriors on the details of interest were quite clear as to where we were going. We gave lectures on these topics to the prospective buyers of our copy rights / patents. They bought us off.

I used my method of tested priors so that if our priors were too far out, it is rejected by the first few observations; then we were guided towards better priors rather than letting the data correct it over the long haul. Data points were quite expensive.

When it came to submission to FDA, they went back to their sample size of 300.

Why?

They had their background set up for trials with the nursing staff hired, patients pre-agreed through the channels and all. Not disturbing that system was more important than scientific integrity.

Did others follow through on my/our work with the Bayesian methods?

No.

Why not?

The en masse group, based on its DNA likes to run lose/amuck; engage in monkey business; and laugh it off.

President Barak Obama spoke on this issue. "Making proper decisions on the various issues is not the goal of any group - the House and the Senate." They have many other agenda items.

So, the degeneracy that I am talking about is quite common.

Bayesian methods do not quite permit them full scope to use this DNA of monkey business with the glory of Mathematics and Science to run amuck.

Reverend Bayes gives you a small arena to set up your priors. But the rest is very organized. If you made up stupid deliberately biased priors to push towards your preconceived agendas, it will be publicized – no third person past participle!

Your prior is written down in numerical format for posterity. Over the long haul, even over a five year period, we can look at them and say, "Are you telling me that on this issue, this was the state of affairs? Were you the only one who is this stupid or was everybody this stupid? I know the stories of moon being made of green cheese. Are you one of those who said that with probability of one?"

In my daily life there were many people – I would not call them Bayesians – who were trying to make a living using the name of Reverend Bayes. After a debate on a topic, when they would vote, 'Yes' or 'No', I would ask, "What is your Bayesian probability that you voted the right way?" They would feel insulted/hurt/agitated. A few times they admitted that it was just 50%, actually more like 15%. I would comment, "You are against a Type I error of 5%, 10%; Type II error of 20%. How can you vote when the probability that you are right is only 15%? These were not gossipy stories to me. I would take notes and bring up the topic when we are discussing other items.

I hope that you will do the Subjective Probabilities and Bayesian methods with honor and dignity that you owe to Reverend Bayes and make this a better world.

Uncertainty is not the same as confusion:

In the God Father Movie, the man who wants to be an actor says, "I don't know Godfather! I don't know!" God Father slaps him and says properly, "Crying like a woman! Be a man."

If you are sitting confused, will Bayesian methods help? No! Will anything else help? No! My neighbor has twin babies. I enjoy watching them. The parents are very attentive. They feed them and clean them according to schedule. They give them the recommended medications. But the twins have to learn all the important things by themselves. The baby boy held the chair, my legs and whatever and got up on his feet. Soon, he figured out what 'balancing' means. He would hold his hands up like Frankenstein and get to the next chair without falling. His twin baby sister can live without all of this. She has learned to crawl on her knees at a fast rate. She gets there from here faster than the baby brother does. We watch it with amusement and learning – on our part. I don't think either the Bayesians or the Randomizers can help in this situation.

If you have no clues, nobody can help you. If you have formulated your structure so that you know what is going on, as Bayesians, we can tell you how to develop your uncertain aspects into numbers for computing.

I remember my talking to a medical doctor in the local hospital in Tallahassee in 1960. He had a research appointment. He was developing new protocols for surgery. I was trying to get him to do it in a systematic way. He got angry and said, "If I got a good protocol, I know it. If I got it wrong, I know it. How can you, a mathematician help on this issue?" I knew that I had crossed the line/boundary. Over a period of time, we would let him talk and we would take notes; keep track of the data ourselves. Later on the doctor was amazed as to how much information he can get by going over the old data that he himself created on a second and a third look in a systematic format. When we started, the mortality rate among the surgical patients was almost 50%. Within a year, it was down to 10%. After Y2K, mortality in that kind of surgeries is unheard of.

This joint relationship cannot and should not be ignored. We taking the data from the doctors through the internet without ever knowing the name of the doctor or knowing what the data is about; running PROC MIXED, throwing in the Uniformly non-informative prior for any non-estimable parameter all on our own, cannot be good statistics/science.

In the cancer studies where I participated, I would even go to see the patients – teary eyed and all. I would not delay computing till all the data is collected and verified and put in the computable format. I would compute on a continuing basis. With this, the doctors caught many errors in their protocols. A protocol is not a trivial simple thing. It has many parts. The intermediate calculations shed light on a lot of things. Of course, when all of the data is collected, you do a final analysis for final submission.

At the San Diego 2012 Annual JSM meetings, I attended many Bayesian sessions. None of them involved any interaction of the statistician with the technical experts. It is wrong for the Bayesians to do it; and it is wrong for the randomizers just as much.

What makes the Bayesian methods stand out is that they act like a serous group; it is 'their subjective prior'. They are unashamedly using their 'subjectivism'. They do not realize that expressing an opinion and signing your name to it is not a trivial affair. That is why we have committees, sub-

committees and secret meetings! The aim is to hide behind others – that is what human DNA is about. In my neighborhood, everybody has two dogs. The dogs bark. When they see me, they go behind a tree; but keep barking. They are scared! When I start walking at them, they skedaddle! The Bayesians cannot escape this human/dog DNA: to bark and run away. So, these Bayesians have not evolved that much from my neighborhood dogs, have they!

How can you talk of 'your personal priors' when you are using the stupid non-informative uniform priors!

A more distressing part of the meetings and my own consulting practice has been how the computer personnel try to do it 'all by them selves' – without realizing for a moment that they are writing the algorithms and doing the calculations for others. The 'others' are not just a market. They are the reason for your being here. I talked to some of them. I did not change anybody's mind. They had picked on a computer trick; they were going to put out something for which 'they hoped there was a market'. "You would not know if there is a market until you put it out, will you?"

You list all things that are wrong with this style of putting out software all on your own. Now go over that list; see what are all the things that are wrong when you develop statistical methods, Bayesian or otherwise, without any contact with the users.

When I guided Ph. D. dissertations – more than15 of them – the students and I would attend the meetings/seminars/lectures of the doctors and the people in the School of Business. We would filter out a version for which we can give a solution. Since they were dissertations, the solutions had to be much better than what some would give with the basic knowledge of statistics.

Life is much too complex to develop a solution the way it presents itself in the world. We can only give solutions to some cleaned up versions. Then, we can keep making our solutions more general; at the same time, we can operate the society in such a cleaned up fashion that some of the complexity is reduced at the life style level.

Doing your work without regard to the customer/user cannot be a winning solution.

- Dr. Frank Wilcoxon of the non-parametric fame was a true chemist who had worked on bomb manufacturing and later of drug development.
    - He used ranks because with the bomb blasts, any other measure would be non-descriptive of what they saw.
    - So, his methods were not isolated unconnected incidents where a mathematician says, "This continuity of the random variables bugs me. If we stay with integers, I can use a lot of the old results in the mathematics literature. So, let me call it 'ranks' and get going."
    - I knew some graduates of the Stanford University to whom the Rank Sum and the Paired Rank methods were just that. Many of them are still alive. They still wonder why their methods did not catch on.
    - Some of them were thrilled that for the first time in their life they can actually say, "Let $\mathbf{F}$ be a class of distributions" and then go on to listing regularity conditions. Wilcoxon used to laugh at them and say, "We are just ranking the five rabbits from 1 – 5. I did not know that we need this kind of vocabulary to say that."
- Fisher thought of himself as a geneticist. In his lectures he would give his background in his area first and build statistics around it. His lectures were most effective.
    - He did not keep writing symbol after symbol to impress the audience; then sell software that they will buy; then go on to making his millions; and then go on to buying his first Rolls Royce or Mercedes.
- Abraham Wald was a major mathematician. But he worked directly with the industries. His work has survived the test of time.

I knew John W Tukey personally. I would tell him about my work; and he would tell about his projects. He took deep interest in the area of application and understood every detail.

He worked with astronomers and others; he was the one who said, "If you use a two stage model, you can go out of the earth's gravitational field with the current level of our energy production.

You cannot develop a good tool if you do not have a visualization of the need. Direct connection to the need is most desirable. This does not stop you from playing your solitaire games.

Now, you list others who developed statistics that has lasted through time. You can also list people who just figured out calculus and measure theory and went that-a-way.

This 'job specialization', where the worker does not know anything but how to twist a wrench, is completely wrong headed; not so just in the area of current discussion. I see it in every economic sector. This degeneracy has occurred right in front of my own eyes. We used to think of coal miners and such workers as being this narrow. We wondered if they can afford it. We did not expect the degeneracy to seep this deep.

Daily operation:

To me, this is not just a game to earn my daily bread through employment.

There are people who will pay you money for saying, "I know Bayesian methods." As one of my sister in laws used to tell her children, "You do not need to know what it means. You just say it!"

I have been the Director of Graduate Studies in the Statistics Departments since January 1960 until I took early retirement in August 1995. When I would admit a student, I would interview them closely and give them my honest probabilities of what they will accomplish with what probability in how much time. I would say, "This is my evaluation at this point. But the one who determines these probabilities is you. This is my attempt at giving you a guide. You can get cracking and do much better. You can slack off and do worse. I have no interest in proving that I am right. It is meant to give you an idea of where you can go. Good luck to you."

As expected, students who decided to work with me finished their MA and Ph.D. in four years sharp. In the Mathematics Department, they would take six years and ask for extension.

My colleagues had no use for this systematic style. They were worrying about many other side issues. Some arguments were:

- You are graduating too many Ph. D. s.
- It took me six years to get my Ph. D. These kids are infinitely stupider than me.
- I am not going to create a competitor for myself by giving them a Ph.D.

One of them complained about me to the Dean. He held a meeting with the Vice President being present. The Vice President felt that if you are operating a Graduate Department, you should be graduating Ph. D.s of virtue. If you are scared of their competing with you, you are in the wrong game. My style was approved. I did not make any friends. Most of those colleagues are still alive and living in Tallahassee, FL and Columbia, MO. With the long life expectancy, we do not have to wait for the judgment day. You see it while alive.

This is an example, if you ever needed one, that to most people, work is hostage to money exchange. I had the good fortune of having some people at the top, who understood it; and who were not that much a part of the game themselves.

Assigning numbers did immense good in daily behavior – in contrast to making general verbose statements; it made all of us more serious. There was not much uncertainty in the system. It was most disciplined and calm. There were no daily arguments and vehemence. Of course, there were no arguments of the type, "I thought you meant this." or "Why did you not tell me?"

This had the format of the way Supreme Court handled the Health Care bill by Obama. While FOX TV was blaring away 24/7 for months on end, the Supreme Court questioned the partied for 7 hours spread over three days – make it four if you wish. When they were discussing among each other, it was not a question of each one blabbing away. You make your statements the most explicit way and distribute

to all. People responded explicitly and with accuracy. With such tightness of operation there is no daily bitching and back biting that I see in most places and even families.

There were no statements with 'credible deniability' – making a statement and keeping the options open to say, "That is not what I meant, stupid! I meant this."

It was most legalistic - not the format of 'courts of law' but the court of logic.

There were no prolonged harangues. Statements were clean cut and clear.

On a few occasions, the Deans and the Presidents called me to check. I would show them my data. They would say very satisfying things. I continued. So, there was none of the daily haggling.

My colleagues were full of such daily squabble and arguments – of course, privacy rights, secrecy and all, while talking simultaneously that they wanted complete openness and disclosure!

A great lesson for you is: Life is long – very long, very-very long. Ninety years is a very long time to live. Any and all mischief will come to haunt you – and it will look like forever and it is.

Watch a few of the Republican Party speeches. Their past is haunting them and they are reeling. They also talk of 'Complete openness' and then they discuss 'covert actions in Pakistan / Afghanistan / Syria'. These are adult men/women (Michelle Bachman of Minnesota)! What a shame.

The word 'Shamelessness' is becoming a part of the common vocabulary.

Uncertainty cannot be deleted from life. 'Keeping trap shut' is not an option. Your progeny needs your input.

Go Bayesian.

In the industries, I was never late in my submissions – never asked for time extension!

Epilogue:

- At the level of family and friends, it is not that different. I had realistic views of the current situation and I would express them – though not computing posterior distribution every time. The accuracy would make Reverend Bayes proud.
    - Life does not face us in such a strong mathematical format that we need the exact numbers and the final computing. The interest in the numbers gives enough hints; and proper decisions get made in the middle of the societal operation. As it happened with medical doctor, having written down the numbers, over a period of time, it was most informative to see why we were where we were and the next steps looked so obvious.
- My mother, who never learned to read or write, had her algorithm all set up. She was my proof that the 3Rs that we stress are grossly over stated. If you are honest and humble, your decisions are obvious without much of data collection and computing. You need all of the computers / rules / regulations because people are questioning your integrity and honesty!
- By being accurate about the things you know and speaking with humility about things that you are extrapolating, one can accomplish many enviable things.
    - For things, that you almost know, use probabilities to express that state of uncertainty.
- While sitting in two 8'x8' rooms with a total family of seven, one of my brothers became the first Ph. D. of the newly formed Pune University in 1948; another brother became a Civil Engineer; a sister got an MD; I got my Ph.D.at the age of 21/23 depending on which records you look at; and I am here talking to you.
- I have mentored 87 people who got many notches up in their lives. A few details about them might give you a better idea on the value of quantifying uncertainty properly, not just in earning money using statistics but in conducting daily operations.
    - Ten of them were prisoners in the Missouri State Penitentiary. I picked them after talking to them in the mode of operating a 'Toast Masters Club'. They were musicians. Their heats were truly in their music. So, why were they in the penitentiary? I talked to the authorities and agreed on an operating style. I would buy them musical instruments and they will practice and perform. When we got going, I was surprised how many people there were who knew more about these things

than I did. For a measly $2500, they had more and better equipment than the best of the bands. Within a year, they played band at the Governor's ball; they soon were operating from their homes and farms. Working with a most difficult system and finding a structure that can be productive for all needs more depth of working with probability than Borel Measurability.

- Why did the jail-warden not know about it? He, like the rest of the en masse, was there to make a living – not solve world's problems.

- One student had been admitted to Harvard; came back with a failure. He was admitted to the Engineering school; he took his first three courses in mathematics and failed. He was sent to me. He was the most honest man that I have seen. He had brought his books and examination papers and answers that he gave to get the scores that he got. I saw the point: Mathematic is as practiced in the USA is a part of a culture. He was bad in dealing with any cultural issues, here or in life. It was not in him to give to the culture what the culture wants. I got him to withdraw; and told his family and the court system that I will handle him as a mentee for a while. Living details were well agreed so that we will not mix up every problem with the uncertainties of life. I showed him my personal computer with matrix operations. I said, "Start with additional and subtraction; let me show you how I go through the manual." I went through a couple of pages. He said, "I can take it from there." With the cultural silliness pulled out, he solved all the problems in the manual in only two days. We had APL2 and Mathematika. He did all of the calculus in a week or two. He got his Ph.D. within four years and got a job at the FDA. He got many awards there for excellence in his work. Since others had failed in working with him, the style of working with him was a matter of much curiosity to the higher ups. Knowing the 'subject' closely and dealing with the various uncertainties without introducing my own confusion was the main trick. Since I had mentored other people, I did not have to justify it any further.

Post script:

In the 1960 era, Dr. Ralph Bradley and I started the Statists Department at FSU. He was the Director of Statistics and I was the Director of Graduate Studies. We had a one channel black and white TV. We did not agree much. He was trying to enjoy his life with his wife and two children. He was a much older man than I was. There was not much time left for him. He wanted to get on the Gulf and all. I was 21 and I was curious to see where we were going with the new-fangled computers which had a capacity of 2K – 2048 storage cells and they could add 30 numbers per second – just like the car – actually, it was the same engine, just miniaturized.

We both had watched a Gorilla show and a Star Trek kind of show. Bradley remarked, "We are not going much farther with the modern technology of the mass communication brought in by the TV and the vast storage and manipulation capacity by the computer. The Gorilla was doing his fist fights. The Star Trek crew was doing the same. The fact, that they were on a mission in space, did not make any difference. Maybe we should get back to the cave days, a little better cave; and a little better medical facility. We are not capable of handling anything deeper, are we?"

Can we change human DNA with education / technology?

At that time, I left the topic as open. I was going to live long enough to see what happens next and make conclusions later.

Now, this is Y2K – 2000+ AD.

In 1960, the industries had just started producing. One thing about industries: Before they get into production, everybody sits around as stupid as one can get. Once the production starts we get swamped. Salaries were adjusted so that the voluminous extra production can be moved out of the ware houses.

Progeny! You have a big job on your hand. You need to think from scratch as I did in my days; list all the errors in the system and get started on a new path which has more accuracy. The Industrial Revolution that got started in 1850 AD has now been fully developed / tested. You need to collect data

and ask yourself, "How much of what we are doing is distortion that we must work on eliminating? What is the level at which the human DNA is capable of working?"

You know this much: While we talk about freedom and 'pro-life activities', USA puts in jail / in bondage / incarcerates, more people per hundred thousand than the worst of the dictatorships in the world.

In 1960, when the US Presidents would talk about peace on earth as soon as they finish off with the dictators who are causing the trouble, I would comment, "You morons! You threw two atomic bombs on population centers! Don't you catch on that you are not that far ahead in human evolution than any bear, wild animal?"

You can no more assume that what you have inherited is right; and that you take it from there and move forward. "You just need to take the graph and extrapolate forward."

Have we done it right in building long roads and sending the population far and wide so that some people commute fifty miles each way to a minimum wage job? The children have no place to go – they are living in isolated homes, far apart from each other?

Are we really better off than when we lived on farms and in communities surrounding our work places?

Is 'competitive society', 'supply demand economy' and other phrases that you hear in the economics books – is that the best way to go?

Should we be telling everybody, "You must compete for your daily bread. If you die, you die!"

Are we that much right in saying, "After a child is 18 years old, the child is on its own." I have had the time to read some of the old documents. The pioneers did to quite say this. This is a great distortion of what they were aiming at.

Is currency the right way to go? Or should we get back to the exchange of 'goods and services' as the cave people did?

Should we give people who control the printing press the full authority decide who gets what?

You must formulate the problems first. Then it is time to quantify it by using mathematics. Then quantify your uncertainty through probabilities, frequency or Bayesian as you need. Some problems can defy attempts at quantifying and assigning probabilities.

Is it proper for any educationist to say with integrity, "For better job, get better education."? Is it really true? Take some samples and test it out. I have seen the advertisements of 'quick training programs'. They are the Y2K version of coin changers.

Is it necessary to do things 'fast'?

- A season lasts so many months. Grass grows at a certain rate. Corn takes so long to grow. Chicken too.
- There are limits to how many chicken we eat; corn meal we eat and all.
- Is it necessary to use hybrid corn at the rate of 104 bushels per acre? Raise chicken in crowded cages where most chicken never see the light of the day?
- Is it necessary to maximize your currency income by using hybrids and all when the final game is to get so much food, drinks and lodging for all? A US President promised a chicken in every pot. But he/we do not promise a Cadillac in every garage!
- Our neighborhood has a lawn mowing person who calls himself a company. He got the fastest mower. This year was a dry season. So, he is going bankrupt. Is it necessary?
- Our stores and mechanic shops want speed. Then they give the minimum wage for two hours and they are declare the workers as 'unemployed'. Is this any way to run a rail road?

I am sure you can think of many more.

Think of them. Then give a solution.

As my mother used to tell me in like situations, "You have to keep hacking. Even you might not be alive when we see the end of this tunnel. But maybe your children might! After all, we are all intermediaries between the past and the future. That is good enough contribution."

It is tempting to say, "I want to do things for myself; I am not particularly trying to make a good life for the progeny." My answer is, "Whatever you do, you are going to die. Do something worthy with your life."

It is easier to inherit something and make a living doing what the previous people did. There are plenty of people who cannot go beyond that. Let them do that.

At this meeting, you think you are smarter, more educated. Then you are the right people to think of better solutions; not get disheartened to find that your forefathers were not that bright; but accept it and improve on it; chucking the old as needed.

I did that in India starting around 1942. People in India were not upset with me for doing that. If you find that there are errors in your system and give better solutions you will be a hero – not necessarily with a name that the youngsters will have to memorize or you making your million by going on the Facebook; just have the satisfaction, as Gandhi did, that you left a better world.

There is a limit to how many pizzas you can eat. You don t quite need a full million dollars!

I remember people telling me that it was Karl Pearson (b. 1856, d. 1936) used the word regression to mean just that: whatever we say, we must regress – go back – to where we were; and it takes three generations to do that.

Undoing what you have done is not easy.

I hope that I have done enough of a good job in my teaching/research career and in my general life so that the people around me know what I am saying and they will run a structure that will lead to a better life without the imagery and consternation created by what we called 'technology'.

I kept track of the 'text messages' of a few people. It was all trivia. There was nothing that my parents did not know/do when they were walking to the farms and the temples.

It is not that the Bayesians are the worst. The whole system needs reevaluation. I hope that you will be enough wise / talented to not throw the baby out with the bath water. You will make wise decisions.

In my days, people would not like to think far beyond the quarterly reports. I was the only one who would talk about sets of twenty years. I could catch the important issues more accurately than my colleagues whose attention was focused on the immediate: Will this fish bite!

As my still-alive colleagues now accept, fifty/sixty years pass. You need to accept that hundreds of years will pass. There was a time when the appearance of the years 2000 was made a big surprise. Now you are living in it.

Now that I have told you everything, you are on your own.