Slide 1

A Celebration of
William Morton ("Velvel") Kahan
and
Beresford Neill ("Beresford") Parlett

Berkeley

March 29, 2008

My name is Jim Demmel, and it's my pleasure as an old student, friend, colleague and collaborator to welcome you all here to celebrate the 75th birthdays of William Morton Kahan, known informally to his friends as Velvel, which means "little wolf",
(CLICK FORWARD BUTTON)
and Beresford Neill Parlett, known informally to his friends as Beresford.
To set the tone for my talk, I'd like to start with a counterexample to one of Beresford's favorite claims, one he is so proud of that he's had it posted on his door for years…

Slide 2

"Oh, well, we were all young once --- except, of course, Beresford."

Oh well, we were all young once, except, of course, Beresford.

Now the best kinds of counterexamples are visual ones, that immediately exhibit the idea, so here goes…

Slide 3

Portrait of the Scientist as a Young Man

So here is the counterexample. On the other hand, since he is wearing a tie already, one might wonder whether it is really a counterexample, but I think we can accept it.

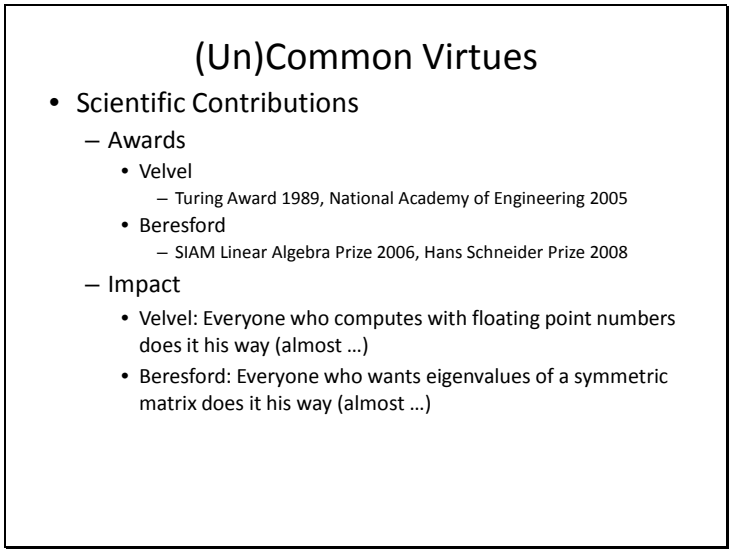
I'd like to point out my choice of title "Portrait of the Scientist as a Young Man." It is both a hint that I will need to resort to literary references to suitably praise our two honorees when my own modest words fail me, and it is a warning, that the organization of this talk might best be described as stream of consciousness.

Just in case you're concerned that my presentation will be unduly emphasize the foibles of only one of our honorees, let me put your worries to rest.

Slide 4

You may not know, but one of Velvel's own favorite pieces of work, published in 1968, had to do with bounding geometric objects as tightly as possible by ellipsoids, or ovals. (CLICK)
Here we can see that Velvel's interests in bounding objects by ellipses began at a very early age indeed.

Slide 5



Let me continue with some uncommon virtues shared by Velvel and Beresford. I'll start with their scientific contributions, first as measured, however imprecisely, by a couple of the awards they have won.

(CLICK)

Turing Award: To the best of my knowledge, Velvel is the unique winner of the Turing Award, which is the highest international prize in Computer Science, to never have written up his invited paper for the Communications of the ACM.

National Academy of Engineering: One day (Feb 11, 2005 to be exact) I called Velvel, and asked him "If I said `Congratulations' would you know why?" Of course he hadn't read his mail yet, so I had the pleasure of being the first one to let him know he'd been elected to the NAE.

We have to put these awards in perspective: are they really so important? From the UC Berkeley point of view? What is the real metric of success at Berkeley? It's whether you get a parking place or not.

Take the Nobel Prize – there's a parking lot labeled "Nobel Prize Only" so that's deserving. Sometime in the 1990's, maybe after Richard Borcherds' won his prize, the Math Department said "Well, what about the Field's Medal? We have Field's Medalists, that's the `Nobel Prize of Mathematics'. They deserve parking places!" And the university said ok.

When the EECS Dept. heard about that, they said, “Well what about the Turing Award? We have Turing Awardees, that’s the ‘Nobel Prize of Computer Science.’ They deserve parking places!” And the campus said “nah, not good enough.”

But the real measure of a contribution is not necessarily awards, but impact, how does it change the lives of, not just scientists and engineers, but of ordinary people who benefit from the ideas, without even knowing about them? It’s a bit like plumbing – people only notice when something goes wrong. So let me talk about Velvel’s and Beresford’s impact.

(CLICK)

In Velvel’s case, everyone who adds, subtracts, multiplies or divides floating point numbers, non-integers, in a computer, does it his way, namely according to the IEEE floating point standards 754 or 854 (well, almost everybody, we’ll get back to that). It would be an interesting exercise to estimate how many operations have been performed Velvel’s way: 10^20? 10^30? I don’t know, but someone once estimated the cost of all the computers sold that did arithmetic Velvel’s way; back in 2005 the number was a Trillion dollars. Actually Dave Hodges guessed $1.8 trillion, and Dave Pattersion guessed $1 trillion, but you know, a trillion here, a trillion there, it’s real money no matter how you count it.

In Beresford’s case, (almost) everyone who wants eigenvalues and eigenvectors of symmetric matrices does it his way, or should be doing it his way (Cleve, pay attention). There are two reasons to make this claim. The first is because of sparse matrices, ones with lots of zero entries, which arise in lots of engineering simulations. Beresford’s development of selective reorthogonalization and look-ahead (with his student Horst Simon) made the Lanczos algorithm the practical tool of choice.

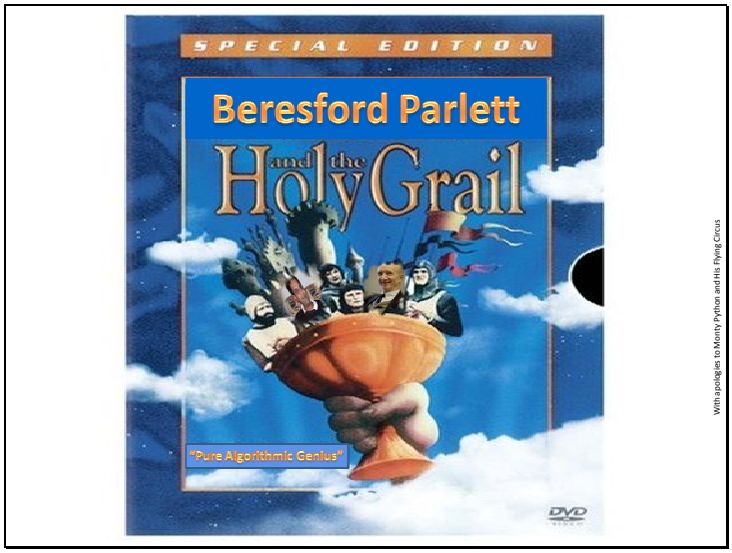
The second reason is an algorithm for finding all the eigenvalues and eigenvectors of something called a tridiagonal matrix, lowering the complexity from N^3 operations to N^2, where N is the size of the matrix. N^2 is the fewest you can possibly do, and it’s much smaller, and so faster, than N^3.

Now it was known for a long time how to get the answer in just N^2 operations, as long as you didn’t care about getting the right answer. But to get the right answer this fast was an open problem that had defeated the likes of Wilkinson.

It became a search, a quest, over many years, to find this wondrous algorithm. The search inspired and defeated many.

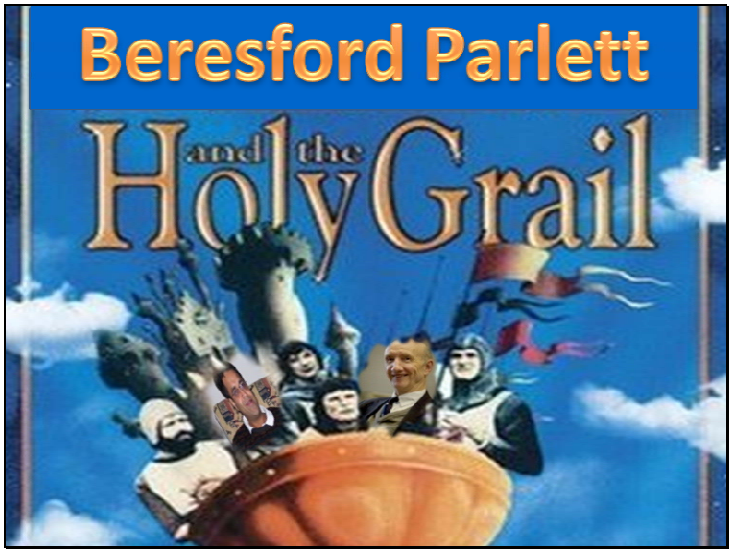
[In case anyone asks: Dave Hodges guessed by taking IBM’s annual hardware revenue, multiplying it by 3 for the rest of the industry, and then multiplying by 15 years. Dave Patterson had a similar guess (500M PCs x $1000 each x 2).]

Slide 6



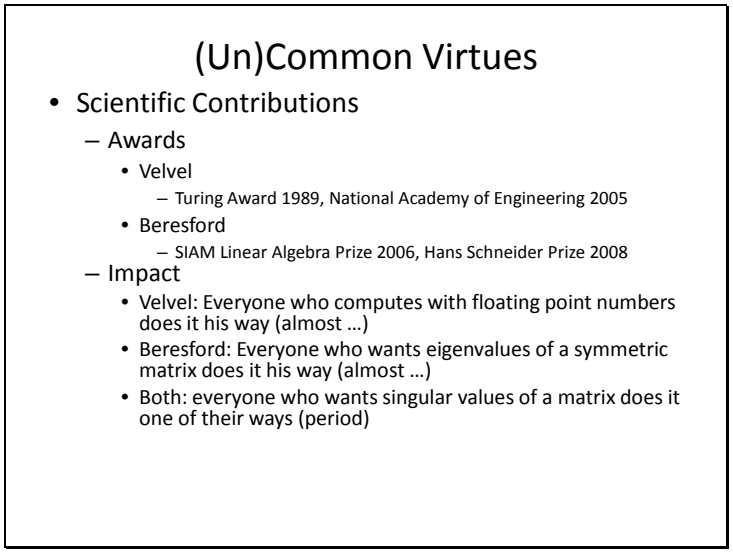
Indeed, some called the algorithm the Holy Grail, in inspiration at its wondrous properties, and in despair that it would ever be found. But brave Beresford was not daunted by this task, and together with the intrepid Inderjit Dhillon, they sought, and found the Grail, for which they became duly famous, as you can see by the movie they made…

Slide 7



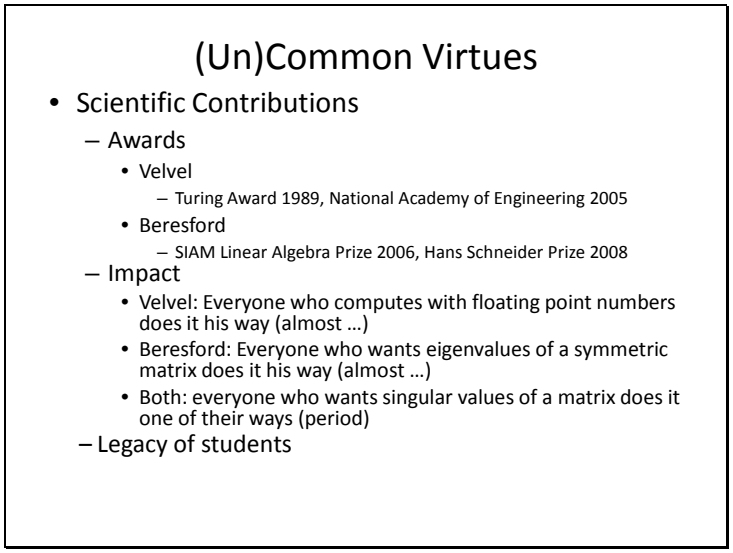
Here's a closeup of our heros.

Slide 8



Finally, everyone who wants the singular values of a matrix ends up using an algorithm either of Velvel's or of Beresford's at some point, without exception. Golub and others share credit, but much of it goes to Velvel and Beresford.

Slide 9



Their final common contribution is the legacy of their students. I'll come back to this in detail later.

Slide 10

I'd like to talk about three more of their uncommon virtues.
(CLICK)
The first is ***generosity***. Many of us here have benefitted from their generosity with their time, helping us as students, or as colleagues, or friends.

Beresford has also been exceptionally generous with his house, inviting students to live there free during the school year; of course they may have had to do dishes and laundry and so forth, but it was still a good deal.

But it is Velvel's generosity with his advice that is most striking. I need to tell a few stories to illustrate. The first one was told to me by Brian Ford. Early in their careers Velvel and later Gene Golub went to Cambridge University and attended lectures in Numerical Analysis. The main lecturer was Maurice Wilkes, who was soon to win the Turing Award himself, so very famous. Early in the first lecture Velvel already had his hand up (the British way) to ask a question or to make a comment! Wilkes failed to notice and Kahan commented at the end of the lecture. At the second lecture Velvel was again early into action and made a public comment when his hand was ignored. "Mr Kahan perhaps you would come to my room after the lecture",said Wilkes. Velvel went, and when they were seated ,Wilkes said to Kahan"Mr Kahan you must remember that to help all the students present the lecture is simple!". "That doesn't mean it has to be simplistic" responded Velvel. The reason we know about this is that Wilkes liked to tell the story.

Velvel's generosity also extended to Gordon Moore, the head of Intel. One day in the early 1990s Moore was giving the EECS Department Distinguished Lecture at Berkeley,

and at the end of his talk he and Velvel got into a discussion about the importance of software. Moore said his background was in physics, he thought materials science was what was important, and software really didn't engage him. Velvel responded that hardware design was increasingly dependent on software needs, from solving PDEs to the operating system, and since appreciation of SW was essential, perhaps it was time for Moore to retire. Moore said "On that note, I end my talk!"

One reason I tell this story is to tell Velvel that I expect him to show every bit as much deference to me during my talk as he did to Wilkes and Moore.

Now this discussion between Velvel and Moore did not settle the question of the importance of software. For that, fast forward to an article in the NY Times 10 days ago announcing that Intel, and Microsoft, were awarding $10M to Berkeley for a center in parallel software, because they knew they needed help on this. So you could say Berkeley eventually won this argument. On the other hand, as part of this new center, the faculty has agreed to give up their private offices to work in cubicles with their students, so Intel did win part of the argument.

Velvel has mellowed considerably in his eagerness to offer this kind of advice, but his colleagues didn't realize this for a while. So I'd like to tell a story about my wife, Kathy Yelick, when she interviewed for a faculty position at Berkeley back in 1990. She gave a presentation of her PhD thesis work to the assembled faculty, which had to do with proving programs correct, and at the end Velvel put up his hand to ask a question: "What can you say about proving floating point programs correct?" Kathy thought for a moment, said that she hadn't thought about it, but it sounded interesting and would be happy to talk to him later about it. Velvel said ok. Kathy didn't understand until later that the funny sound she heard from the rest of the audience was a collective sigh of relief.

Velvel's generosity of advice was not limited to technical matters. Shortly after I joined the faculty, sometime in 1991, Velvel came into my office and started telling me it was time to settle down and find a wife. I thanked Velvel, and gave to understand that the situation was under control, although Kathy and I were early in our relationship and had not "gone public" in the department. Velvel said fine and left my office. A few minutes later Kathy came into my office, closed the door, and said "Someone just came into my office and gave me advice on when to have children!" I said don't worry, he means well.

(CLICK)

The next common virtue is ***frugality,*** particularly with respect to transportation. Many of you know that Velvel still drives cars that are 20-something years old. But just a couple of weeks ago he came into my office and said that he could no longer find anyone able to repair their 12 year old tires, even though they had plenty of miles left on them, and he finally had to put on new ones.

But this frugality with transportation actually pales next to Beresford. Do you know how much it cost him to get from Europe to Palo Alto when he came for graduate school? $55! How did BP end up in the US? Short answer: unrequited love. After a relationship did not work out, a friend suggested that Beresford "come to America and start again." So following a long line of European adventurers who sought out new frontiers in the west, Beresford decided to apply to graduate school in America. He followed his friend's advice, and rather than applying to the top tier math departments such as Harvard, Princeton, Chicago and Berkeley, he had a better chance at the second tier, namely UCLA, which rejected him, UW, U Michigan, and Stanford, which even offered him a teaching assistantship. The TAship at Stanford started in Fall 1958. He quit the family business in March, giving himself 6 months to get to California.

In the meantime, with 6 months to kill, Beresford wanted to study the math he had forgotten since graduating 3 years before, but also wanted to live in Paris. So he went, and penniless, gave himself a week to find a job. On the 6th day, he got a job at the English school of Paris that needed a teacher of English geography, American history, and trigonometry (closely related subjects) for one term. He had so much fun he almost stayed, but fortunately for everyone in this room, he didn't.

Beresford had little money, not wanting to take any from his father. An old school chum ran a shipping company, and let him hitch a ride in the owner's cabin from Dunkirk, France to Philadelphia. Beresford helped the captain, whose English was poor, to compose telegrams. After 1 day in Philly, he took the train to Washington DC. Based on an ad in the New York Times looking for drivers to drive a car to California, he went back to Newark, and with 4 complete strangers, began driving across the country to Los Angeles.

At this point, one wonders whether the better analogy is "Zen and the Art of Motorcycle Maintenance", or Jack Kerouac's "On the Road" but in any event Beresford was having the quintessential American road trip, including picking up random hitchhikers also escaping their old lives.

After 2.5 days of constant driving, Beresford arrived in Santa Monica at midnight, expecting to stay with his friends the Enthovens (in audience). They weren't in, so not for the last time, Beresford bedded down under the stars in Palisades Park overlooking the Pacific, in an old 2nd World War gun emplacement. Awaking early the next morning in a state of Euphoria at his arrival in California, he found his friends had returned. At this point Beresford did not know that Euphoria was a university located in northern California, not southern, and he would not actually reach it for several more years. After a few days, he took a Greyhound bus (spending money, at last) to Palo Alto.

After a comfortable first year in a dormitory on campus, Beresford decided that he wanted to spend his summer studying for quals, rather than earning money at a full time summer job. So he decided to work ¼ time at the computer center, and sleep rough for

the summer. He started outdoors in some bushes (I don't think there were any gun emplacements to hide in), but after enduring several dogs finding him at 5am, he decided to take advantage of an important gender inequality of the time: the woman's rest room across from his office, unlike the men's room, had a couch. And his office key happened to fit the door of the women's room. So Beresford kept his books in his office, his clothes in his office desk, his food in a fridge in the Stanford I-House, and his alarm clock set so that after the last police check at 11:45pm, he could go to sleep in the woman's room, and get up early enough to be out by 7:45 when the secretary arrived.

This routine worked very well until one morning when Beresford walked across the hall to his office and heard the woman's room door click shut and lock behind him, with his keys and sleeping bag locked inside. Fortunately, Beresford had the presence of mind to realize that if his office key worked, so would like that of any other graduate student, so he raced across campus to wake up a friend (sleeping in a regular dorm room) just in time to borrow his key and get his stuff out before the secretary arrived.

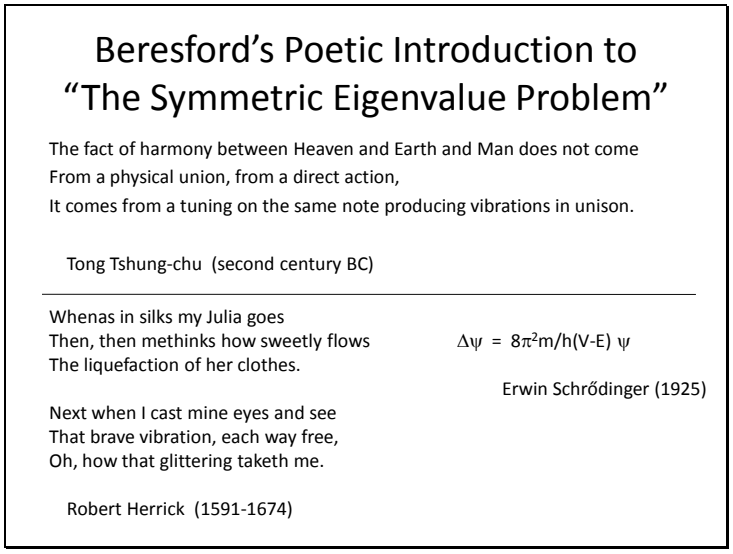
The happy ending is that the following April, he and 22 others took their math quals, and he was one of 5 that passed.

(CLICK)

And the last common virtue I want to talk about is their ***love of poetry***.
A few weeks ago at Gene Golub's memorial, Tom Kailath ended his talk by quoting a stanza of a poem by Solon. Then it was Velvel's turn to speak. Of course Velvel had no idea what Kailath was going to say, but he did correct Tom by quoting the poem correctly from memory.

I can describe Beresford's love of poetry no better than by showing you what poems he quoted at the beginning of his book.

Slide 11

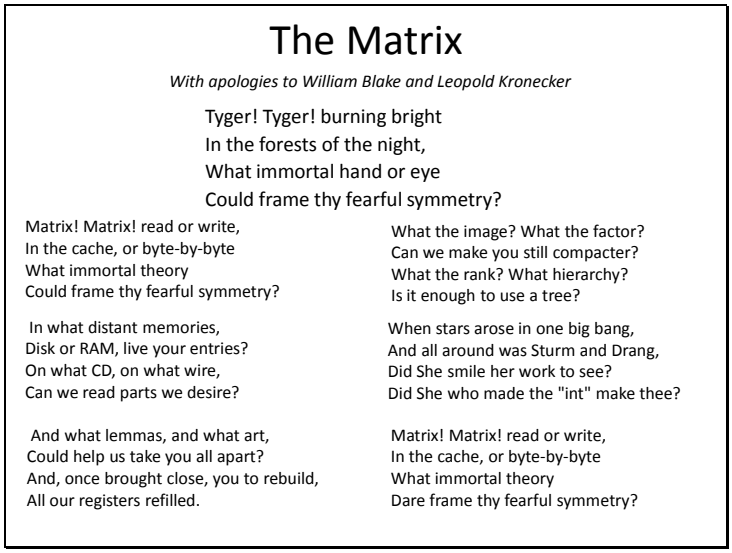


(read first poem)
To understand this poem, you have to know that vibrations have frequencies, how fast they vibrate, which are eigenvalues, and have shapes they make when they vibrate, which are eigenvectors.

Now to motivate students, it helps to have a more sensual example. So Beresford has a second poem
(CLICK)

(read poem)
If that poem doesn't motivate your students, then this is what you tell them. You, personally, are an eigenvector of the following equation
(CLICK)
Schroedinger's equation, which is poetry of its own kind.

Slide 12



But if you want to use poetry to motivate students to study symmetry, look no further than William Blake.

(read poem)

So instead of the Tiger, consider The Matrix

(CLICK)

(read poem, stanza by stanza)

Slide 13

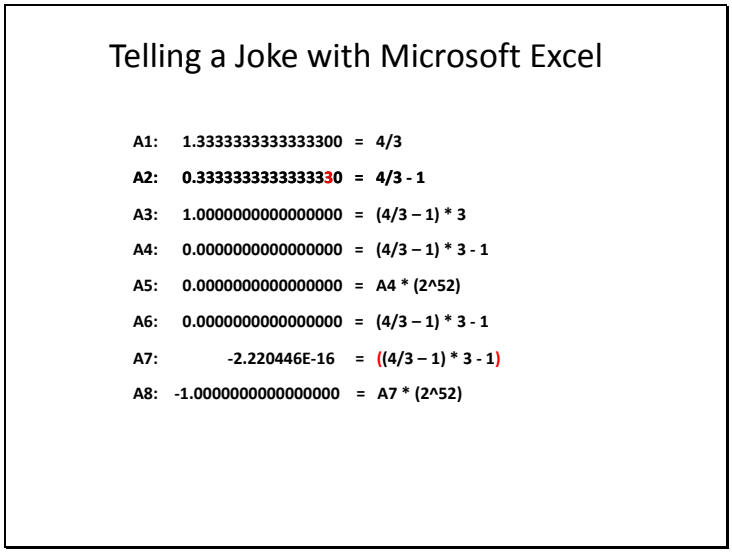
The final common virtue of our two honorees is that they have been lucky in love…

Slide 14

… as these pictures attest.

In addition to all these virtues, our honorees also share sense of humor, albeit of a somewhat nerdy kind.

Slide 15



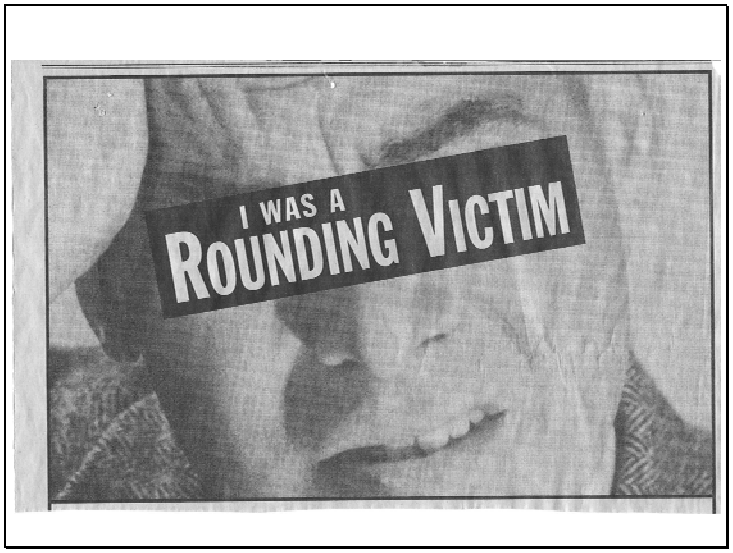
In fact, Velvel is the only person I know who can tell a joke *with* a spreadsheet. Now it's easy to tell a joke *about* a spreadsheet: Did you hear the one about the mathematician, the engineer, and the spreadsheet who walk into a bar to drink some beer? When it's time to split the bill, the Mathematician gets the result exact to the penny, the engineer rounds to the nearest dollar, and the spreadsheet doesn't answer, because its gone comatose while downloading "Old English Stout," which is a font.

That's a joke about a spreadsheet, here's a joke with a spreadsheet.

(tell joke, line by line, pointing out punch lines as needed on lines A2 and A7.)

Now the joke, or problem, shown here isn't because the computer hardware itself is wrong, it's just Microsoft trying to guess what you want the answer to look like. But hardware used to (and sometimes still does) bizarre stuff like this, so much so that it was very hard to know you were getting the right answer. And it wasn't just specialists who were concerned …

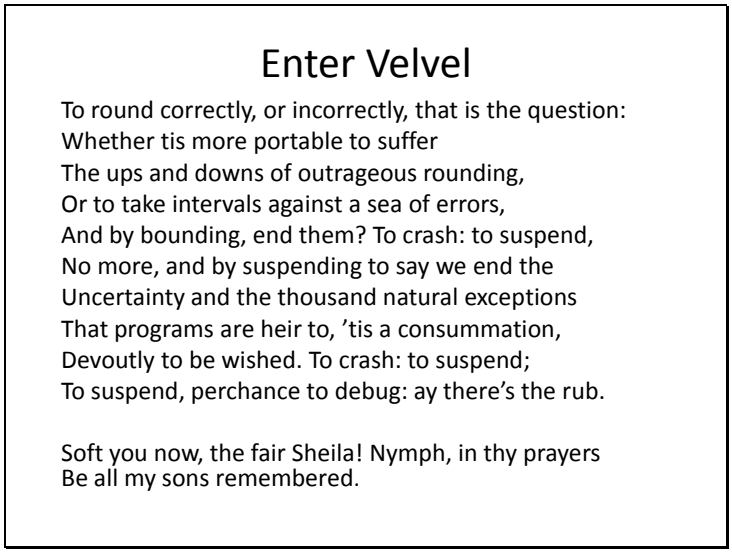
Slide 16



… these problems were even making their way into the popular press.

What was to be done about such a difficult problem? Who could solve it?

Slide 17



Enter Velvel. We can all imagine the mental struggles he was going through to fix these problems.

(CLICK)

(read poem)

We can also imagine the toll all this might have taken on Velvel's family

(CLICK)

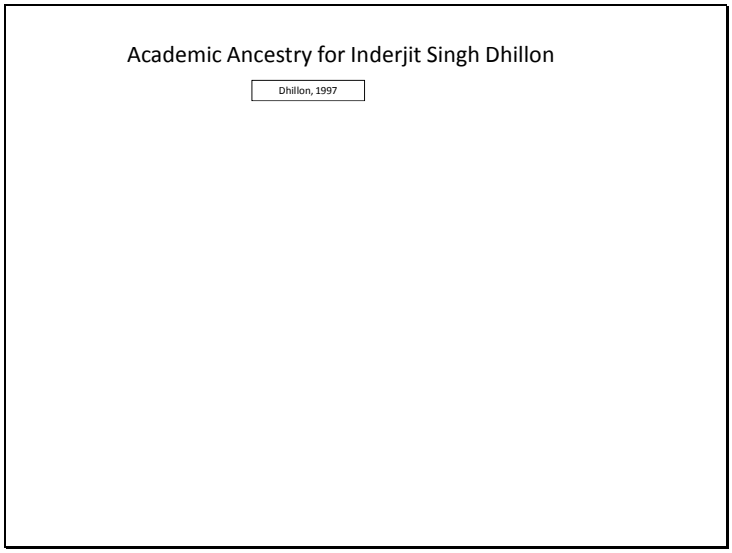
(read poem)

Unlike the original, this story has a happy ending, so I will not pursue this analogy further. But like the original, our story has a sequel, a similar one, which I can best illustrate as follows.

(flip bunch of pennies, look at each one, say "round up")

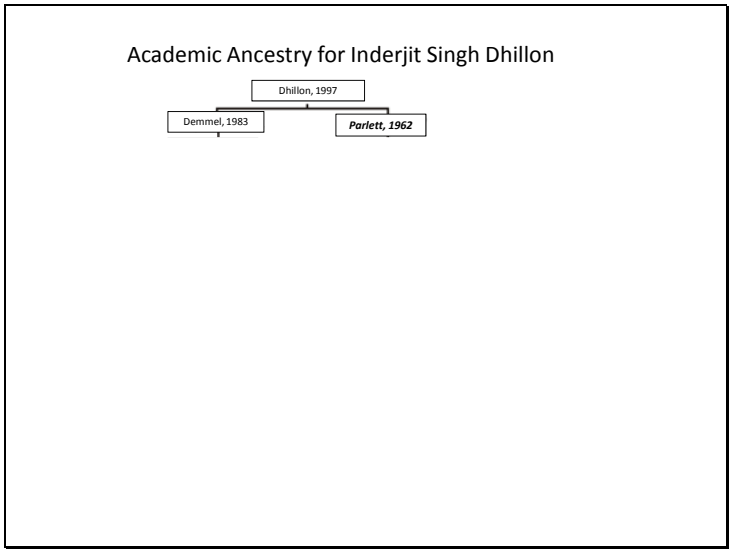
Unlike the sequel to Shakespeare, which only went on for half an act (92 flips) of "Rosencranz and Guildenstern are Dead", our sequel has been going on for seven long years, namely the IEEE 754 Floating Point Standard Revision Committee.

Slide 18



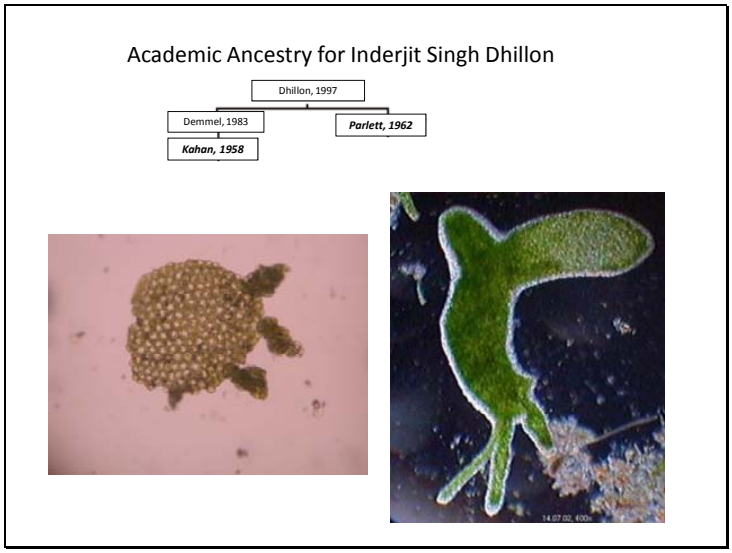
I'd like to go back and talk about where all ideas come from, because nothing is created in a vacuum. And a convenient way to do this is to look at the academic ancestors of one person, Inderjit Dhillon, who is in the audience.

Slide 19



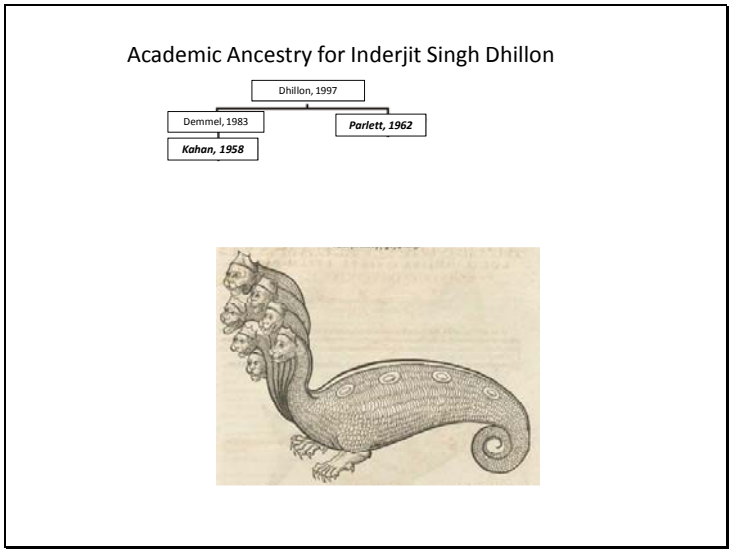
If you're familiar with family trees, this looks familiar, a child with 2 parents.

Slide 20



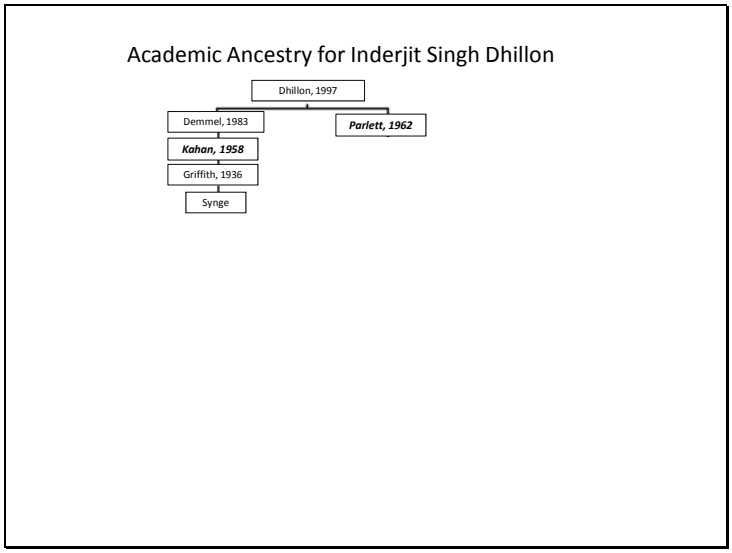
But actually, that's a bit unusual. Most academics have just one parent, as you can see here, where Velvel is my advisor. In fact academic reproduction is more like that of liverworts
(CLICK)
Or hydras,
(CLICK)
that is to say asexual, from a single parent. In fact we'll see that some academics are like hydras in 2 other important ways, First, they, or their ideas, do not age, i.e. are timeless, (hydras are unique among animals because they do not age).

Slide 21



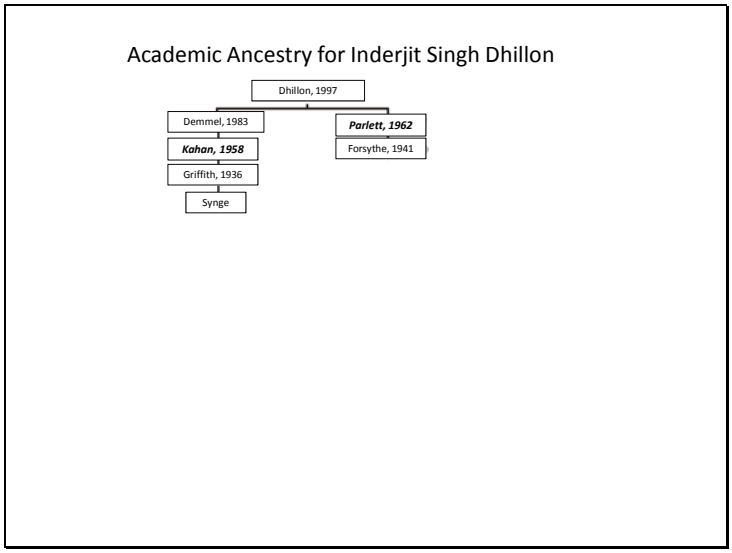
Second, academics, like hydras, can have very big heads.

Slide 22



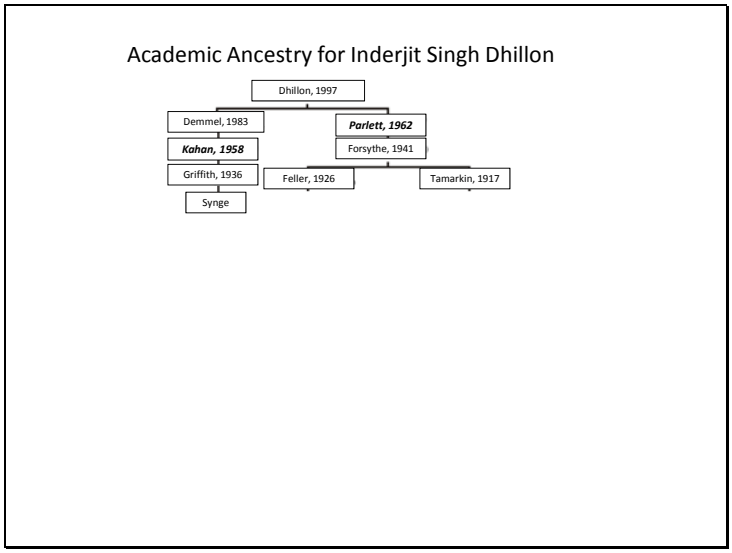
Let's look at Velvel's branch of the tree. It stops at John Synge. Why stop at Synge? He has no PhD recorded in Math Genealogy project, rather an MA from Trinity College in Dublin in 1919, which is where this data comes from.

Slide 23



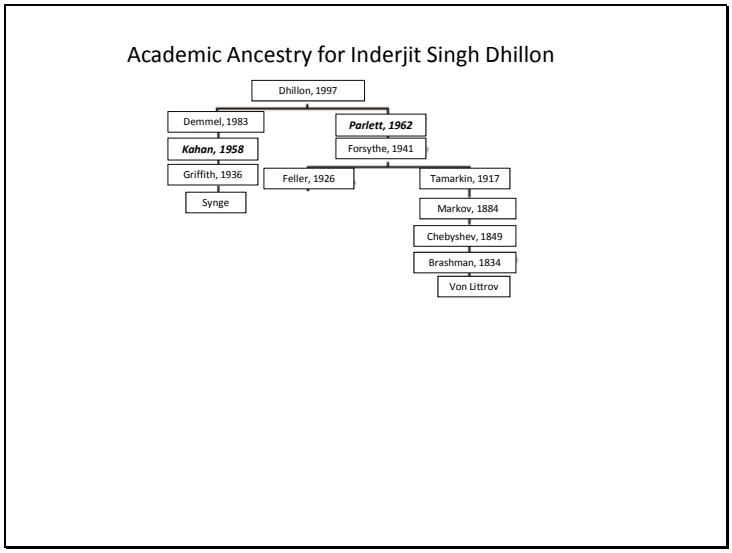
Forsythe is a familiar name, from Stanford.

Slide 24



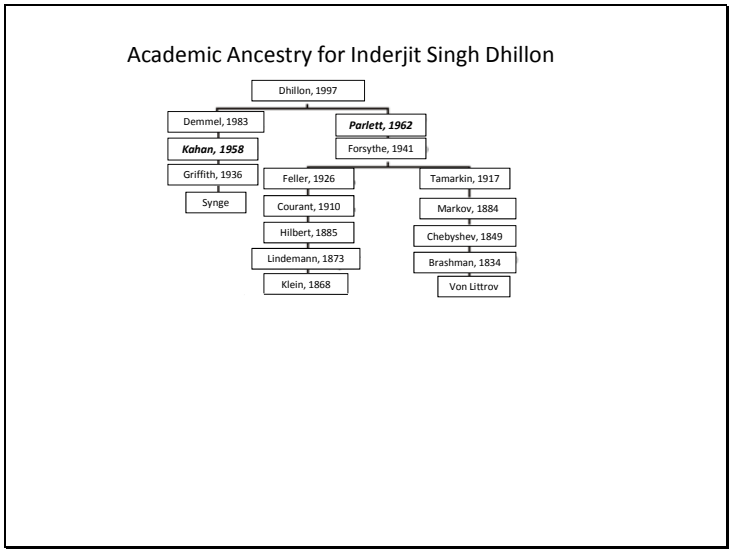
Another bifurcation, 2 parents.

Slide 25



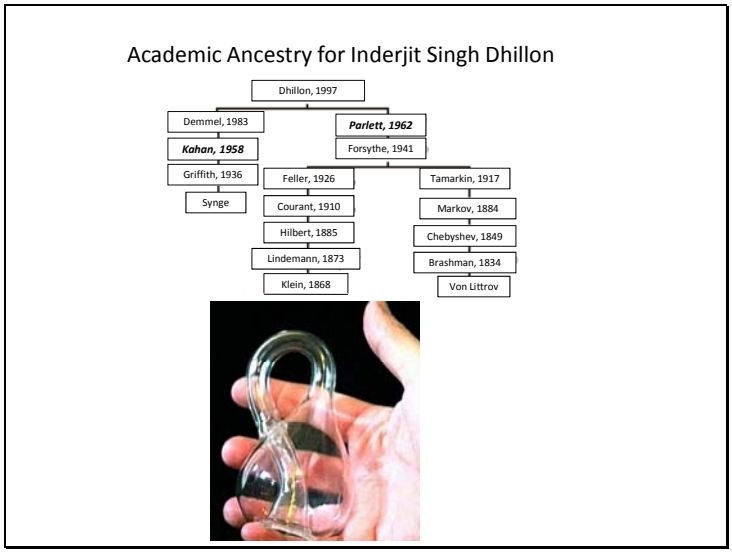
Pursuing Tarmarkin's ancestors to the end, Markov and Chebyshev are familiar names.

Slide 26



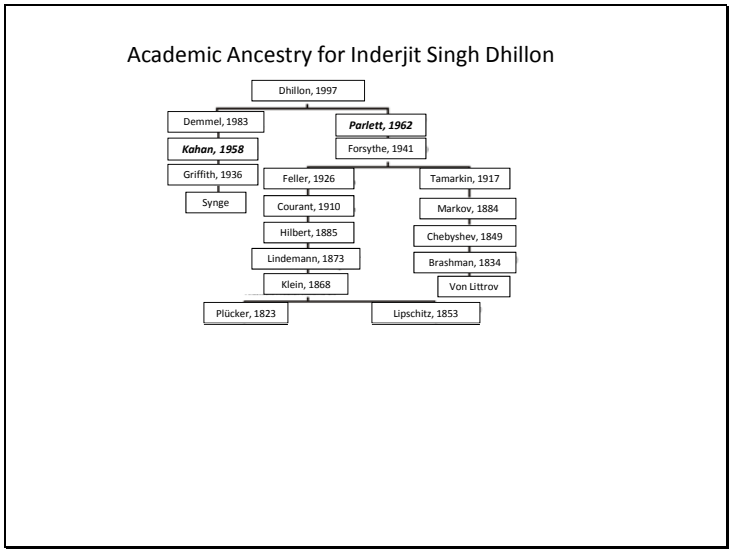
Courant and Hilbert are all familiar, but who is Klein?

Slide 27



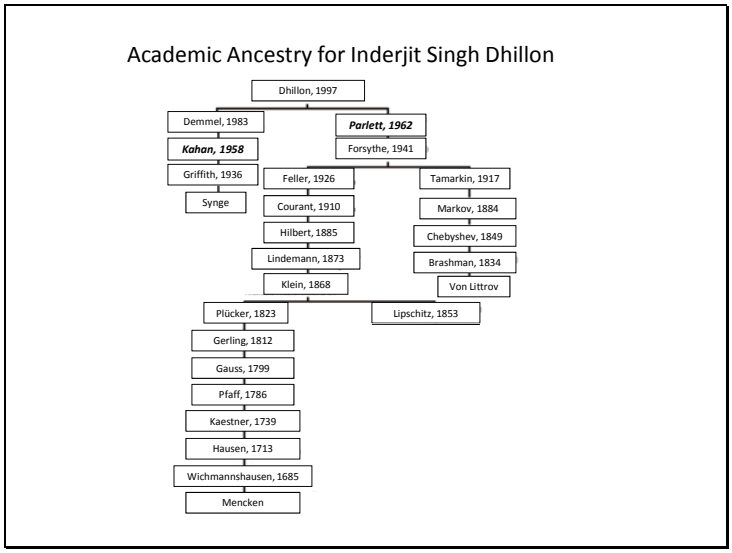
He invented the Klein bottle! We thought about serving wine in these tonight, but decided it would be too messy.

Slide 28



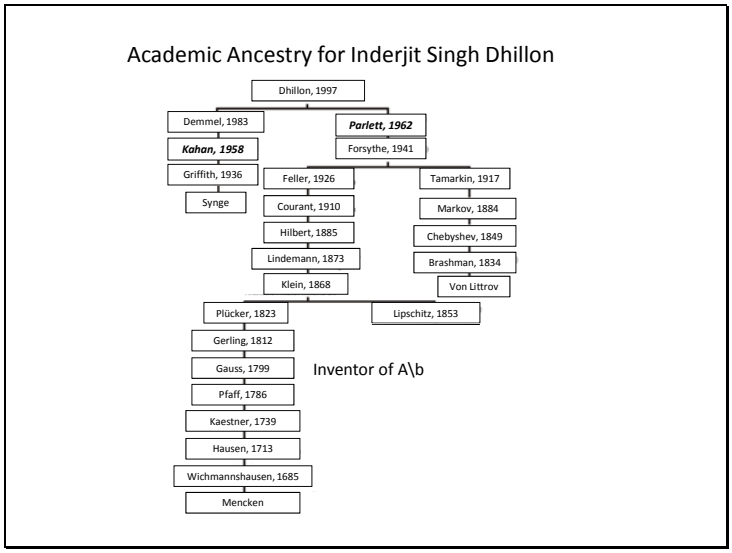
Another bifurcation.

Slide 29



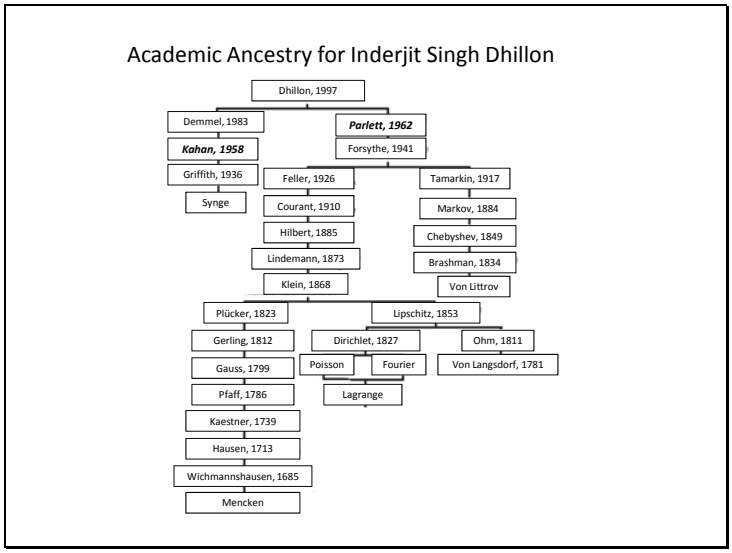
And we see someone named Gauss. That sounds like a famous name.

Slide 30



That’s because he invented A backslash b !

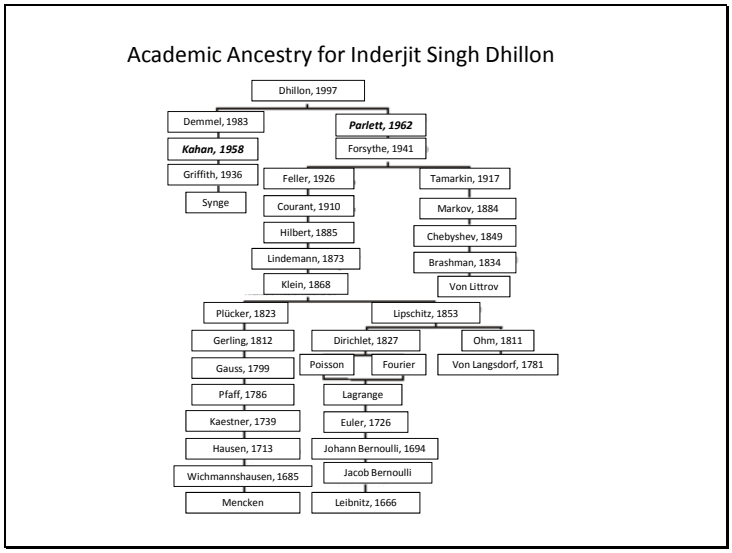
Slide 31



Incest is also a possibility in academic reproduction. As we see here with the siblings Poisson and Fourier, children of Lagrange, giving birth to Dirichlet.

Since Beresford also signed my thesis, there may be even more of that stuff not shown here.

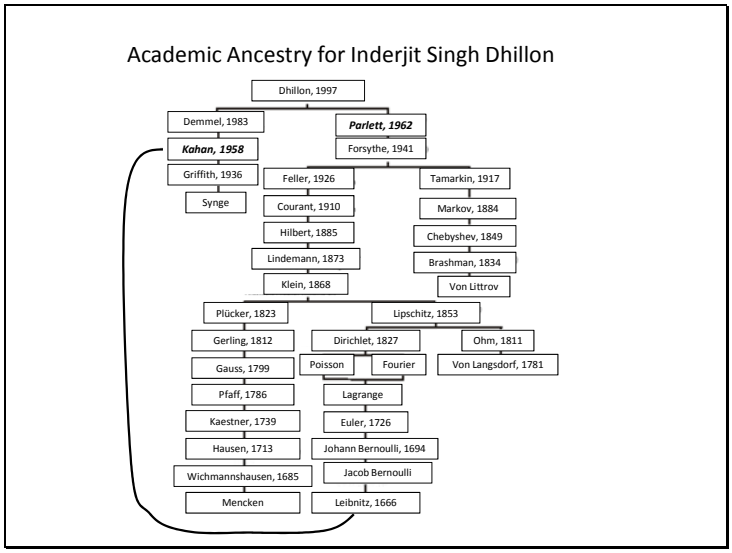
Slide 32



Finally, at the end of the tree, we reach Leibnitz. If anyone here ever studied calculus, you can blame Leibnitz, he invented it, along with Newton, but we use Leibnitz's notation, dy/dx and all that.

I brought you all the way to the bottom of this tree because there is one important intellectual connection not yet shown …

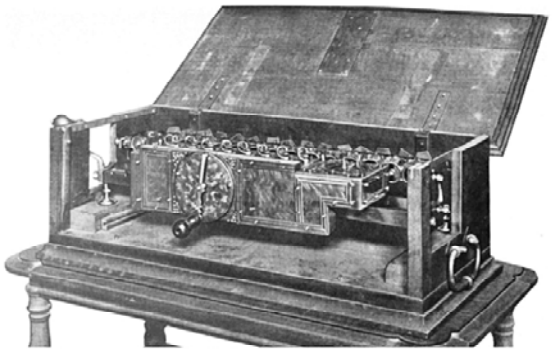
Slide 33



… namely this one. What is this connection? It turns out that Leibnitz and Velvel both built calculators.

Slide 34

Leibnitz's Staffelwalze ("Stepped Reckoner") 1694



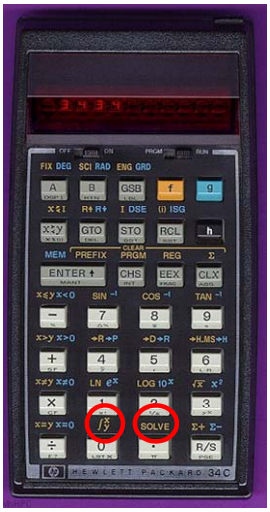
"For it is unworthy of excellent men to lose hours like slaves in the labour of calculation which would safely be relegated to anyone else if machines were used."

(read quotation)
It could add, subtract, multiply, and divide. Leibnitz even attempted to bring this to market, but it took 21 years to complete. Fortunately, Hewlett-Packard was quicker, thanks in part to Velvel.

Slide 35

HP 34c
1979 -1983

Today: HP35s



This is the HP 34c calculator, introduced in 1979. Velvel's contribution was

(CLICK)

these two buttons, integrate and solve. So how did Velvel come to work on this?

There was an advertisement about this time from Texas Instrument for their competing calculator: They said to type in your 10-digit phone number, take log then exp: does your phone number change? No, just as you'd expect. But their point was that it did change on the HP45 calculator; the reason was that TI rounded differently (not necessarily better, but differently). So what do you do in a situation like this? Hire Velvel.

[In case anyone asks: TI had 13 internal digits, badly rounded, with 10 displayed, vs 10 internal and displayed on HP, well rounded .]

The manager for this project was Stan Mintz, who at first did not want to take Velvel's advice to add a "solve" key. So one time at a company party, perhaps when Mintz had too much to drink, he volunteered that he'd always had trouble doing integration in college, and if Velvel could design an "integrate" key, he'd let him do a "solve" key as well. So Velvel got to design it.

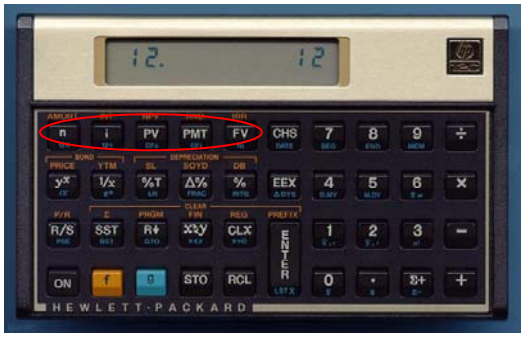
After the party Mintz doubted the utility and marketability either of solve or integrate. Still, he hired a programmer, in Corvallis, to code up the algorithms Velvel was devising in Berkeley. But Mintz noticed that HP engineers were always standing around her desk; she was very popular for some reason. Mintz discovered the popularity was because all

these engineers wanted to use the “solve” and “integrate” keys, which was much faster than coding up some Fortran code to do their circuit problems. At this point Mintz realize it was a good product and incorporated it into the HP34c.

True to form, Velvel talked the manual writers into writing good documentation including all the failure modes (like finding zeroes of functions without any zeros. When Mintz discovered this, he wanted to remove it, but it was so close to the scheduled time to market, that they decided they had to leave it in. It turned out to win a prize for best manual writing.

Slide 36

HP 12c - 1981-2008+

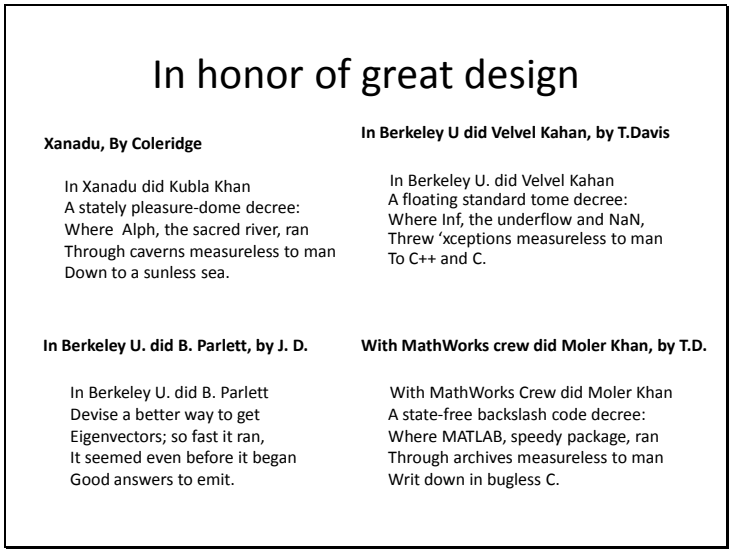


But Velvel's biggest impact on calculators was probably not the HP34c, a scientific calculator, but the HP12c, a financial calculator, which is HP's best selling calculator of all time, in continuous production since 1981. If you've ever bought a house and someone had to work out the payment and amortization schedule, chances are good it was done using this calculator.

Velvel's particular contributions were these keys
(CLICK)
for figuring out payments, interest rates and so on, which not surprisingly involve solving an equation. Velvel was in the right team here, because reliability was key to the success of this product, the numerical reliability required for certification by National Bureau of Standards for use in the banking industry, the battery reliability (I've never replaced the batteries in mine, and I can't remember how many years ago I bought it), and physical reliability. The best illustration of this is from a zoo keeper who used it to calculate feed mixtures. The zoo keeper dropped the calculator and it was consumed by a hippopotamus. The calculator survived the hippo's digestive process as well as the washing that followed and kept on working.

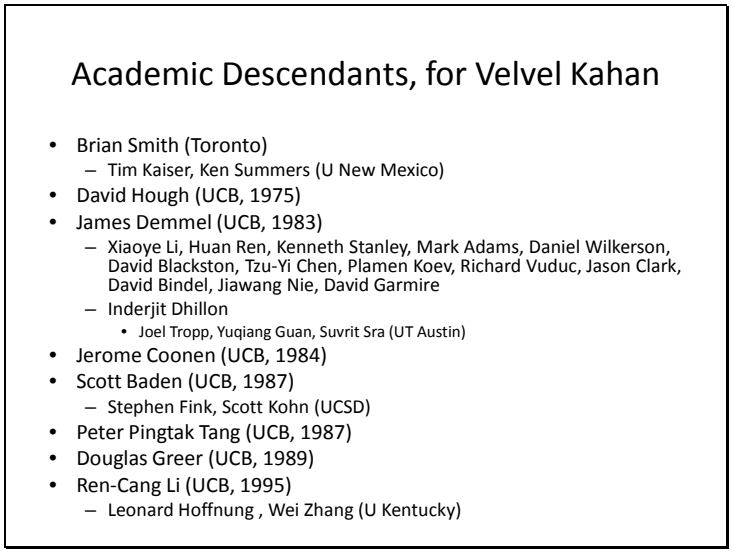
Even though this was HP's best selling calculator, it almost died as a product because of a numerical, or at least accounting error; the group at HP Corvallis responsible for this was considered to be losing money faster than any other HP unit, because HP mistakenly charged semiconductor fabrication line expenses to their account, which made them look like money losers. So even having the best financial calculator doesn't eliminate all such errors.

Slide 37



To do justice to the great designs Velvel and Beresford have given us all, I have to resort to poetry. In fact poetry has been used for a long time to praise great engineering, for example
(CLICK)
We all know this famous poem singing the praises of an ancient structure of such stunningly beautiful engineering it hard to imagine anyone could build it.
(read poem)
But we have our modern versions of this too, and Coleridge's words still seem well suited to sing their praise:
(CLICK)
Read 3 poems

Slide 38



Finally, I'd like to return to a virtue shared by Velvel and Beresford, their legacy of students, which is one of the most important ways an academic can try to leave the world a better place. Let's start with Velvel.

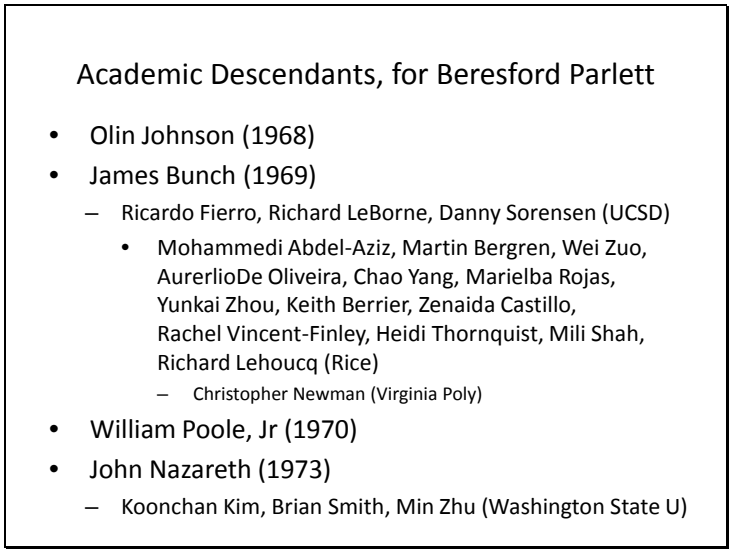
You can see that Velvel has had 8 students, 20 grand students, and 3 great grand students.

There are 3 more MS students at Toronto (Deb Chowdhury – despite Math Genealogy – as well as Derek Corniel and Jerry Gabel), 20 MS descendants in all.

Who is here tonight? (read names, ask for a show of hands).

A number of us have buns in the oven, and expect this list to grow.

Slide 39



On to Beresford's students, again in chronological order.

By looking at Christopher Newman, we see that Beresford already has one great great grand student.

Who is here tonight? (read names, ask for a show of hands.)

Slide 40

More Academic Descendants, for Beresford Parlett

- Nai Chen (1975)
- Chuan-Ying Wang (1975)
- David Scott (1978)
  - Ronald Morgan (UT Austin)
- Tsvi White (1979)
- Allan McCurdy (1980)
- Anne Greenbaum (1981)
  - Miguel Gomez (U Washington)
- Bahram Nour-Omid (1981)

And more of Beresford academic descendants.
Who is here tonight? (read names, ask for a show of hands)

Slide 41

Still More Academic Descendants,
for Beresford Parlett

- Horst Simon (1982)
- Derek Taylor (1982)
- Kwok Ng (1983)
- Jian Le (1988)
- Ching Li (1988)
- Yin Feng (1991)
- Zhi-Sun Liu (1991)
- Tzon-Tzer Lu (1992)
- David Day (1993)

Still more of Beresford's academic descendants. Who is here tonight?
(read names, ask for a show of hands)
Now a little quiz…
(CLICK)
Does anyone, not in this picture, recognize the happy graduate?
(Horst Simon).

Slide 42

And Still More Academic Descendants,
for Beresford Parlett

- Yao Yang (1994)
- Michael Parks (1994)
- Zhuang Wu (1996)
- Jian He (1996)
  - Richard Myers (U Houston)
- Inderjit Dhillon (1997)
  - Joel Tropp, Yuqiang Guan, Suvrit Sra (UT Austin)
- Eric Barszcz (UCSC, 2005)
- Carla Ferreira (U Minho, 2007)

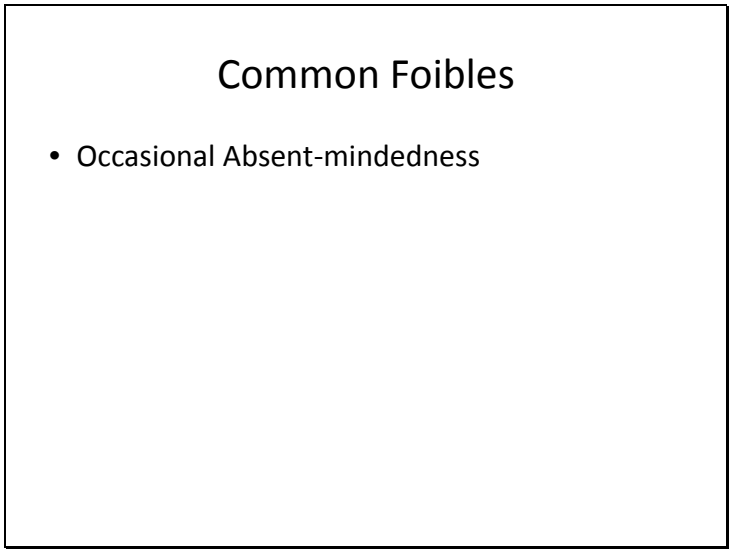
And still more of Beresford academic descendants, up to the present.
(read names, ask for show of hands)

If you've been counting, there are altogether 27 students, 12 grand students, 13 great grand students, 1 great great grand student, or 53 descendants in all.

One is reminded of King Henry the First, of whom we are still not sure how many offspring he had; in fact I'm pretty sure Beresford has had more direct academic offspring. I am also learning it is hard to keep track of your progeny. I was in an elevator once at a conference, and someone I didn't know was staring at me. He suddenly blurted out "You were my adviser's adviser!" We shook hands, but he didn't say his name. Fortunately Inderjit could later tell me it was one of his, Joel Tropp.

As one metric of Beresford's productivity, of all the mathematicians in world history who have ever produced any PhD students, only 1.5% have produced more than Beresford. The record holder is 101 PhD students, by Roger Temam in France. I find it hard to imagine reading and correcting that many theses myself.

Slide 43



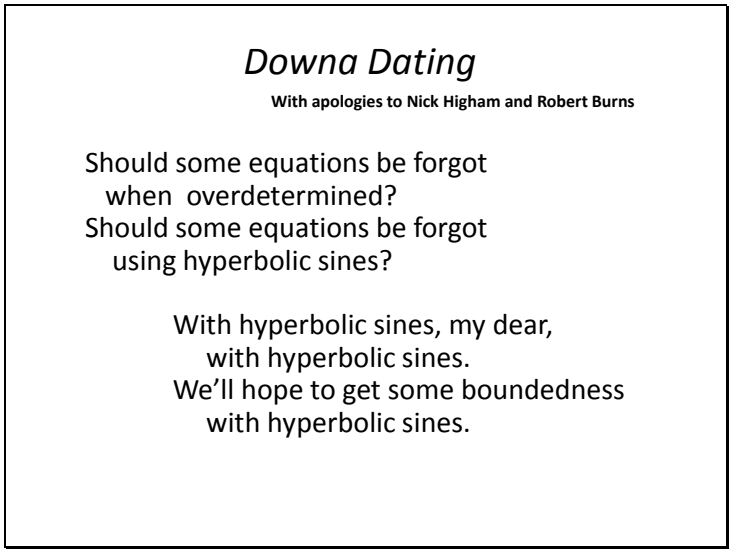
My talk wouldn't be complete without mentioning a few foibles of our honorees, however difficulty it may be to imagine them having any. In fact the only one I could think of was…

(CLICK)

occasional absent-mindedness. Perhaps the audience will think of more after my presentation. In Velvel's case, you have to know that horizontal space is a rare commodity in his office, and stacks of papers are rather tall. In fact he once suspended a helmet hanging from a stick in the bookcase to hang over his head, so that in case of an earthquake the helmet would land on his head before the piles of books. But in this case Velvel had a box of student records that he was reviewing, and for lack of horizontal space left it balanced carefully on the trash can in his office. It was gone the next morning.

In Beresford's case, I am indebted to Anne Greenbaum for this story of a conference that she, Daniella Calvetti and Beresford were attending in the Czech republic. There was a sauna in the hotel, and all the attendees were invited to a sauna in the evening. Anne and Daniella were there, and Beresford walked in, stark naked. Anne and Daniella tried to suppress their giggles, but Beresford said "Excuse me, I've forgotten something" and came back a little later with a towel, wrapped around his head.

Slide 44



I'd like to close my presentation with a poem, in fact a song that you all know. But I'd like to start with an admission. Fredrica, Kathy, I know I've never told you this, but I wrote this poem while lying next to Beresford in bed one night while we were away at a conference. This sometimes happens when husbands go on business trips. This was the 2005 Householder Meeting in Scotland, and I was lying in one twin bed, and Beresford was snoring in the twin bed right next to mine.

This poem was inspired by two things. First Nick Higham gave a talk about solving overdetermined least squares problems using something called down-dating with hyperbolic sines and cosines. Second, during my talk I told the audience that I didn't know any Scottish poetry, so I'd start my talk with something Irish, a limerick. This apparently offended the local Scottish organizer (Jennifer Scott), so that night at the banquet, each chair, 150 of them, had a book of Scottish poetry sitting on it. So that night I looked through the book and found a poem that I knew, in fact we all know, and sing regularly.

So I'm going to close my talk by singing my version now, in honor of Beresford and Velvel, and ask you all to join in after the first stanza, because I'm sure you won't want to listen to my voice alone.

By the way "Downa Dating" is a Scottish pun on "down-dating": "Downa" means "can't do it"
(sing)

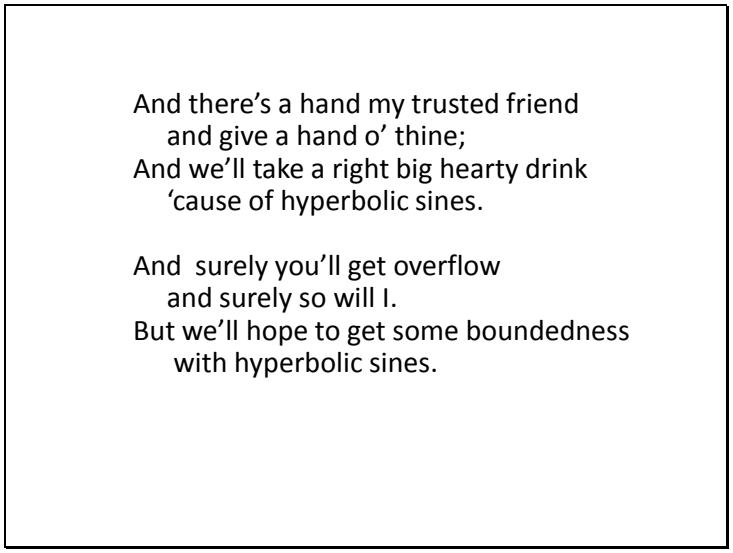
Slide 45

We two have run so many codes
and played with GUIs fine;
But we've wearied having to reboot
'cause of hyperbolic sines.

We two have programmed till we burn
from morning sun till down;
But the C debugger's blown its gourd
'cause of hyperbolic sines.

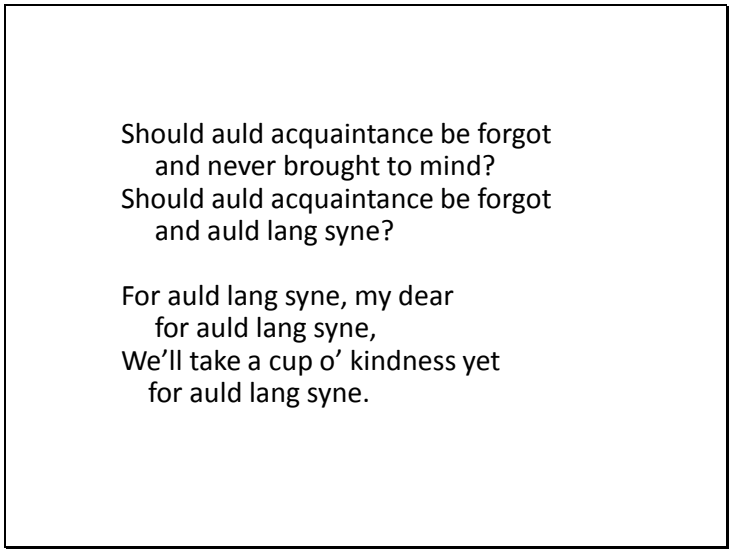
(sing)

Slide 46



(sing)

Slide 47



(sing)

Thank you very much for your attention!