

Greatness:
How The Great Become Great...
and You & I Don't

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Note to Users

Greatness is written for Anyone who is interested in the question of *How The Great Become Great... and You & I Don't*. This includes the general public, university students, and academics as well. How so? Simple. The Text of this book is written almost in story form, with barely a hint of academic research to be seen, so it can be easily read by anyone. As for the academic research, it is thoroughly discussed and easily accessible in the book's Notes, when and if you're interested. But you don't need to read a word of the Notes to understand the entire analysis, and in fact experience it coming to life for everyone from Einstein to Elvis, Mozart to Marilyn, or for that matter, Serena, Madonna, or Marie Curie. Anyone can also easily apply the book's analysis to their own development and success / or lack thereof.

If you are a Student, like the hundreds of students I taught while writing this book, you can apply the book's analysis to understanding how your favorite great became great. In fact you can send me your work to put up on the book's blog, alongside, eg, Lady Gaga and Novak Djokovic (www.greatnessbd.com)

If you're an Academic, teaching any of a wide range of courses related to human development and achievement – eg in psychology, communications or business – where the question of how individual development / creativity is influenced by interpersonal, organisational, institutional, even societal factors – you might want to consider *Greatness* as a free supplementary eBook for your students to use in project work relating a topic of immense personal interest to all students, ie the *How* question. Just contact me via the blog and I'll send along info re how other academics are using *Greatness*, plus a copy of the book.

Blog and Reading Tips

My Blog - www.greatnessbd.com - related to this book may be worth a visit; especially if you'd like a few photos, curious details and asides; plus a chance to post your own (and read others') comments, queries, and observations. You can also check out my responses to these, and download a free PDF of the book.

Re the question of **How to Read this Book**, here are my thoughts:

- * The Text is quite short as social science research goes (102pp), and it is written almost in story form. So hopefully many of you will read it straight through.
- * Another possibility is to simply jump ahead to the short summary of the overall analysis ("And as for Heroes?", p99+), and then go back into the Text and chase up the bits that irritate you the most.
- * Likewise you could go to any of the sections in the analysis, as outlined in the Contents, and zoom in there as this will give you case studies illustrating the relevant analysis.
- * Another possibility is to simply start out with the stories related to any Greats who interest you – eg Einstein, Elvis, Mozart, Marilyn, etc. If you go to the Greats Index, you can find the pages you want, in both the Text and the Notes. (some of the longest case studies – for eg, Darwin and Monet – are in the Notes). Over 40 Greats, across many generations and fields,

are considered in the book. These range from the classic fields of music, art, science and literature to the likes of popular culture and sport.

* If you are interested in the academic research which underlies the entire analysis developed in the Text, go to the Notes (p115+) These are considerably longer than the Text and consider how the existing academic research is relevant to the arguments made in the Text.

* Finally if you want to try out the analysis in relation to your own greatest achievements, or lack thereof, go to the section entitled "And You & I" (p107+). There, by way of illustration, I analyze in detail how it was that I ended up writing this book.

Brief Bio and Endorsements

I have a Ph.D. in Social & Clinical Psychology from UCLA, and have published in *JPSP*, *J. Pers*, and other APA-refereed research journals. Early on I was a member of the Psychology Faculties at the University of Massachusetts, Amherst, and Mount Holyoke College. Later I worked as a family systems therapist in the States and Ireland for several years. Inbetween times I wrote and presented a radio program on WMUA in Amherst ('Dr Bill's Myths, Lies, Facts, and Songs'). In more recent years, in addition to a course on 'Social Systems, Communications, and Psychology', I've been teaching the likes of 'Creative Writing' and 'Dramatic Authoring for the Web' at Dublin City University. And yes, I once tried moving to Nashville, but I'd say that was well before I met Mairéad or Utah Phillips.

I spent about 15 years sorting the initial version of this book, entitled: *The Arrival of the Fittest: How The Great Become Great* (Dorris, 2011). It received very strong endorsements from a number of internationally prominent academics. For example, here's a starter, or as you baseball fans would have it, a closer. Well actually – if you know anything about the research literature on genius & greatness – the closer:

"*Arrival* is a truly fascinating book. It's not only highly informative, but also equally inspiring!"

Dean Keith Simonton, Ph.D.
Distinguished Professor
Department of Psychology
University of California, Davis

Since then several editors have offered me very helpful advice re rewriting my work in a style which would make it publishable as academic research... which I suppose is reasonable since over half of it is still brand new to the research literature. And after that?? I'd no doubt get stuck into working up a few sets of exam questions and next thing you know.. hey.. we'd all be nodding off.

So instead I've added some new faces - Marie Curie, Darwin, Mark Twain, Bob Marley, the Williams sisters, etc. - and gone for a new, and hopefully "Google-friendly", title: *Greatness: How The Great Become Great... and You & I Don't*.

Acknowledgments

In addition to many of my colleagues and students at Dublin City University, I'd like to thank a number of extremely busy academics – who didn't know me from Doris Day – for taking time to read the earlier drafts of my work, for raising a number of very helpful queries, and for giving me such positive feedback regarding the theoretical arguments. My favorite comment though, I have to admit, was about the writing style: "Do you by any chance have a revivalist background?"

My sincere thanks to Professors Robert Albert, Anders Ericsson, David Henry Feldman, Ravenna Helson, Robert Plomin, and John Sloboda.

Also I want to thank a large number of authors whose works have been essential to the analysis developed in this book, essential to documenting it. There is of course no way I could have presented the theoretical arguments of this book without using information from numerous biographies and related works as data. I have cited every quote and bit of information that I used, but in order not to disrupt the flow of the presentation, I rarely cite sources within the text. The numerous sources and their authors are however fully documented in the book's extensive Notes. Beyond this I especially want to thank those authors whose works were essential to documenting the major case studies presented in this book. After fifteen years myself on this one, I know something of the chase. Still whatever about my own marathon, thanks to them, it feels like my feet barely touched the ground. So my sincerest thanks to:

Donald Spoto, John Russell Taylor, Albert LaValley, and Tanya Modleski re Alfred Hitchcock;

Joe Klein, Henrietta Yurchenco, and Woody Guthrie re
Woody Guthrie;

Donald Spoto, Fred Lawrence Guiles, Carl Rollyson Jr,
Richard Dyer, and Marjorie Rosen re Marilyn Monroe;

Ernst Schenk, Edward Holmes, Michael Levey, and
Nicholas Till re Mozart;

Peter Guralnick, Charlie Gillett, and Albert Goldman re
Elvis;

Robert Katz & Celestine Dars, Carla Rachman, and
James Rubin re Monet;

Bill Russell & Taylor Branch re Bill Russell;

Abraham Pais, Ronald Clark, Roger Highfield & Paul
Carter, John Gribben & Michael White, and Albert
Einstein re Einstein;

James Watson, Francis Crick, and Harriet Zuckerman
re Watson & Crick;

Sharon McGrayne re Marie Skłodowska Curie;

Richard Williams & Bart Davis, and Serena Williams &
Daniel Paisner re the Williams sisters;

Ron Powers re Mark Twain;

Loren Eiseley, Alan Moorehead, and Arthur Koestler re
Charles Darwin.

I might also mention Mairéad re a few small matters
here and there along the way. Like, for instance, my

life, plastic bathtubs, and 'course the time I tried to slip a final draft of Norma Jeane / Marilyn past her:

"Nice... especially that bit about Marilyn in Hollywood. Joe Schenck, Natasha, Freddy... Johnny Hyde. That outline there at the end..."

6 months later I finished the proper research.

Introduction

The basic argument of this book is simple.

Those who arrive at the top of any field, who become its stars, geniuses, and eventually greats, develop unique combinations of characteristics (versions of intelligence, personality, and self) which allow them to solve the key problems of their field and sometimes, symbolically at least, of society.

This book attempts to show how this happens. How it is that particular individuals – the Elvises and Einsteins, the Mozarts and Marilyn's - rather than millions of others with sufficient genetic potential happen to develop just the right combination of Key Characteristics over the course of their development to take on and solve key problems of their generation.

Since such development - the creation of the creator as it were - inevitably involves everything from genetics and family dynamics to institutional ties and cultural forces, there is no easy way to describe it. The analysis presented here will focus on the heart of this development - on gaining access to what I've termed The Right Kind of Problems. These are the kind of problems that challenge the individual's strengths – intelligence, personality, self – and in the process develop them over and over and over again. The question this book addresses is simply how it is that the greats of every generation, rather than millions of others with sufficient genetic potential (ie You & I), happen to gain access to The Right Kind of Problems over the course of their development (& beyond). That is, how they happen to be the right person in the right place at the right time, after time, after time, after time...

As far as I am aware the analysis presented in this book is unique. There is no other such analysis of how the great become great, an analysis which not only incorporates the existing research literature, and in the process considers everything from genetics to cultural crises, but equally is accessible to anyone reading this page. An analysis which has implications – devastating or liberating, depending on your point of view – not only for the likes of Einstein, Mozart, and the rest, but far more importantly, for anyone who's ever dreamt about becoming great, famous, etc., spent years in the chase, or perhaps even now is lining up one or two of the next generation for a shot at the title. Since that seems to include a fair wack of the Western world these days, well like I said implications, devastating or liberating. (1)

How The Great Become Great – The Analysis

Where to start? How 'bout this: Take your heroes, your greats. Well take one of them. Beethoven, Little Richard, or maybe Emily D, with those amazing funerals in her brain.. or how 'bout Ali or Usain, or maybe Serena or Steffi.. or maybe Shakespeare, rewriting the English language, or was that Bill & Paul, and Steve, and Mark, and the rest of those code poets, rewriting them all...

Take whomever you want, one of your all time greats. (2) What did e do that makes m great? (3) Those symphonies or sunflowers or Super Bowls... those gigs at the Fillmore, at Woodstock.. or maybe at Minton's with Dizzy and Bird ...or was it Marie picking up that first Nobel back there in '03..?

Now ask yourself, what did it take to pull that off? In terms of talent or intelligence, in terms of personality, in terms of self or identity... what did it take? How many years of taking on problems / challenges at the keyboard, on the mound, at the palette, in the ring... cross the dinner table from mom and dad and granny and that damn brother.. through those dark, crashing, shattering nights, and fights.. that smell of vodka.... how many years of days and nights.. of taking on those problems over and over, eventually over those 20+ years of creating unique elaborations of genetic biases, of turning them into those incredibly complex, powerful, and compelling versions of intelligence, of personality, of self, into those Key Characteristics that allowed your greats and mine to do their stuff, that allowed Hitch to create his movies, Norma Jeane to become Marilyn, that allowed Mozart to..

In fact, let's start there. Let's start with Mozart...

and Woody Guthrie.

Woody...?? No, not Arlo. Woody, the old man, who – in the early '60s – was slowly dying, invisible in a greystone New Jersey mental hospital, while the young Bob Dylan, who “knew more Guthrie songs than Guthrie”, kept coming by to sing one more time for his idol. The Woody Guthrie who wrote the ever-alternative U.S. national anthem, “This Land is Your Land”. The Woody Guthrie ever present behind the songs of Dylan, Seeger, Springsteen, Judy Collins, Joan Baez, the Indigo Girls, Tom Waits, Ani DiFranco, Ry Cooder, Holly Near, and so many others still, guitars in hand, troubled by the worlds around them, ever discovering the legacy of Guthrie, roaming and rambling.. and following his footsteps. (4)

so Let's start with Woody... and Mozart.

Those "Dust Bowl Ballads" with their simple 3 chord melodies... take "Talkin' Dust Bowl":

"... We got out to the West Coast broke
so dad gum hungry I thought I'd croak
and I bummed up a spud or two
my wife fixed up a tater stew
we poured the kids full of it... mighty thin stew though
you could read a magazine right through it
Now I always have thought and I always have figured
if that stew'd been jusssstt a little bit thinner
some of these here polllli-TISH-uns couldda seen thru it ..."

What do you think, any chance Mozart could have penned that?

Key Characteristics

The Key Characteristics that Guthrie needed to write/perform his "Dust Bowl Ballads", and in the process become (in John Steinbeck's words), "just a voice and a guitar, singing the songs of a people... harsh voiced and nasal, his guitar hanging like a tire iron on a rusty rim... (and before long becoming) that people". . . Think about it, did Mozart have those characteristics?

The Key Characteristics which were essential in this case involved much more than the obvious two, ie Guthrie's abilities as a *flat picker* and a *wordslinger*. Clearly among the couple 100,000 "Dust Bowl refugees" of the mid 1930s, there were probably at least a couple 1000 who were superior to Woody as

musicians. In Woody's personal experience in Pampa alone there was, eg, his Uncle Jeff, the "finest country fiddler on the Texas panhandle", and Woody's pal, Cluster Baker, who "really could play guitar". No doubt Mozart would have easily topped the entire list.

But Woody also had three other characteristics - tied to the legacy of "family tragedies in his own childhood" - three characteristics that were essential to him not only living the life of a "Dust Bowl refugee", but thriving on it. Three characteristics which made the disaster of the Dust Bowl, in particular the massive migration to California, ideal conditions for stimulating Woody's creativity as a *flat picker* and *wordslinger*. The Dust Bowl guaranteed continual disruption and unpredictable change in people's lives. For Woody - already an experienced *street hustler* with a massive *terror of intimacy* - this meant a continual flux of intense, short-term, transient relationships - intense transient relationships with 100s, 1000s of people he fully identified as 'his own'. In short, given his ability as a *flat picker* and a *wordslinger*, the Dust Bowl was perfectly matched to Woody's three other Key Characteristics, ie, his abilities as a *street hustler*, his *terror of intimacy*, and his *total identification with the Okies*.

By way of contrast try to imagine Mozart with a "guitar slung over his shoulder", a "cap on his head", stubbed and scuffed worse than a "lost dog in a hard rain". Mozart passing the applejack and watching the "coffee boil up in the can", and singing bout them "hard, hard, hard ole hard times", o'er and o'er, and o'er again.

Mozart, just like Guthrie, was of course equally yoked with his own past, including, for eg, the "providential will of God" which had bestowed upon him "the gift of genius"; a gift which was his "God-given responsibility" to "display to the world" - a display which by the age of

ten had already taken young Wolfgang through four years of performing for "the foremost personages of Europe" - from Vienna to Versailles to London – through four years of being "treated by them as equals". It was a gift which, when combined with "hard work" and "virtuous" living, would earn him "dignity and honour", and "financial reward" - the just dues of every "professional artist" and "free man".

As a result, whatever about his musical genius (or capacity for writing lyrics), there is no way that Mozart who, as an adult in Vienna, "rented the most expensive apartment, kept a horse, bought many expensive clothes, and had a hairdresser come to his house every day", could have tossed off lines like: "It has been my hard luck many times to choose between what I thought was the truth and a good paycheck, that's why I go around so truthfully broke, I reckon". Or more to the point in relation to writing the "Dust Bowl Ballads": "I slept under every *important* bridge out there". (5)

The creative productions of the 'great' are never about 1 or 2 Key Characteristics, about Woody's *wordslinging* or Mozart's *perfect pitch*. It's always much more complicated. In my experience it's always five Key Characteristics, the interplay of all five, that allows the person to take on and solve key problems of s generation.(6)

The Right Kind of Problems

The processes by which Key Characteristics develop have been studied by numerous researchers. (7) In simple terms all that's involved is gaining access to

The Right Kind of Problems, over and over and over and over again. These are the kind of problems that play to your strengths and stretch them over and over, over the 20+ years of development that's required to elaborate initial genetic biases into those incredibly complex, powerful, and compelling versions of intelligence, personality, and self which will be required to solve generational problems of a particular field/society, ie into Key Characteristics. (8)

These are the kind of problems that Mozart faced practically from day one. (9) The kind of problems that came from having perfect pitch and a 40 yr old father sand-bagged in a musical backwater like Salzburg. Perfect pitch and Leopold ever hoping, ever working away at his symphonies, his concertos, his grande serenades, his oratorios; Leopold ever frustrated, ever denied his "honour", ever looking to escape. Perfect pitch with Linz and Vienna just waiting, with Versailles and London and Munich ever ready, ever hungry, ever eager to see God's next tiny "little miracle". The kind of problems that came from having perfect pitch and Leopold for your old man. Leopold Mozart, author of *The Violin School*. Leopold Mozart, possibly the most knowledgeable music teacher in all of Europe.

The Right Kind of Problems are the kind of problems little Wolfgang got when he ambled in one morning to find Nannerl and Papa doubling on the clavichord. Nannerl and Papa just waiting for the little maestro to start "striking those thirds".

The kind of problems that Wolfgang found in Papa's little lesson books. In Nannerl's packed with minuets and allegros and scherzos, with Agrell and Fischer and Wagenseil, with marches and themes and variations. Playing, singing up and down the keys, with Papa and Nannerl, and every half and quarter and quaver, every

nuance of a note right there on the strings.

The kind of problems that came with every little game, with master Andres smiling, tuning, waving his bow. Ready to play. Go. Puppets, birds, toy soldiers flying, bouncing round the cart, almost singing, trying to march... and 1 and 2 and 1 2 3 and . . . laughing, chasing Andres, Nannerl; chasing every note off that 'butter fiddle'.

The kind of problems Wolferl found in his own special little book, the one Papa stuffed with Bentgen and Telemann, and master Bach's inventions; with suites and dances and serenades; with Grafe's odes, Hasse and Sperontes. The one that Papa filled with Domenico Scarlatti and all his "virtuosities". Fingers and hands, jumping, juggling, crossing, doubling; going a whirlwind 'round the keys.

The kind of problems that came with Papa's desk. Quill tip dipping deep and dripping black; scribbling dots and blots and puddles and wings, loops and links right 'cross the sheet.. . c, and b, and c, and c sharp to d. . . "No, Mein Herr Papa, a concerto. A concerto, the 1st part. For the clavier. Just like you do. See..."

The kind Wolfgang got for 3 years in Salzburg, 3 years of day, after day, after day. . . of minuets and allegros and Wagenseil and Bach and Telemann, of the clavier and violin; of Nannerl and Papas quill, and master Andres' butter fiddle; of Schoberth and Eckart, all the difficult pieces; singing odes and choir and Eberlin's *Sigismundus*.

The kind of problems Wolfgang got on his travels in Bavaria, in Germany, in France and Italy. In Wassenburg, in the cathedral, pulling back the stool and 'That's it Wolferl, left, right, yes, both feet'. Treading the pedals, playing the bass, *stante pede* .

In Stuttgart and Schwetzingen with Nardini, his violin singing; with Wendling, master of the *flauto traverso*, the new German fiddle. In Paris with Schubart, and in the chapel at Versailles, soaking up motets from the king's gallery. In Rome, in Bologna, with the great Padre Martini, Italian opera, learning the *stile antico*.

The kind of problems Wolfgang got at the court in London, playing Wagensail, Abel, and Handel; snug on the bench with Johann Christian Bach, right between his knees, trading bars across the clavier, just Wolferl and Bach -- one pair of hands playing an entire sonata, a sonata for the Queen.

The Right Kind of Problems are the kind of problems that Mozart got, that Picasso got, that Einstein got, that Hitch, and Woody, and Marilyn got. (10). The kind of problems that all of the greats get over and over and over again. (11)

Flow Activities and Escape Activities

The Right Kind of Problems are often the kind of problems whose solution requires what Mihaly Csikszentmihalyi terms "Flow Activities". This is nearly always the case with regard to developing characteristics related to intelligence, e.g., those of an Einstein or a Mozart, of a Jane Austen or Serena or Ali. It is also often the case with regard to socially approved aspects of personality, e.g., the intense competitiveness of a Bill Gates or a Michael Jordan.

The activities involved in either case "have rules that require the learning of skills", which "set up goals, provide feedback and make control possible". These

activities provide challenges that are appropriate to the person's level of skill and "facilitate concentration and involvement" in the activity, with the result that the person's skills improve and s sense of self is "transformed" so that over time e is able to take on increasingly more difficult challenges and in the process repeatedly have the same "optimal"/ "autotelic"/ intrinsically rewarding experience at ever higher levels of "complexity" - that sense of intense/ total "concentration", of "discovery", of being "transported into a new reality" - what Csikszentmihalyi terms the experience of "Flow".

Anyone who has ever learned to play an instrument or shoot hoops; or more to it, found themselves hooked, literally addicted to such, will know the process, and the truth of Csikszentmihalyi's description. And likewise will know that the structures which facilitate such learning – often in the form of competitions or games – can equally be seen to operate in the development of socially approved personality characteristics, such as a becoming highly cooperative or competitive; and when these characteristics start shining in the public arena, you can make a pretty fair guess what sort of games the next emerging great's been playing off camera for years.

These are the kind of games Michael Jordan played on that little home court against his older brother.. the kinda games he played for years of day after day after week after month, years of taking on Larry, sky walking, hot talking, slamming, jamming, and pounding him down that little dirt court in Wilmington. Day after week after year of slamming, and jamming, of up & down, and brawlin' 'round, and round, that little dirt court in Wilmington.

These are the kind of games Bill Gates played night after night, right after dinner - 9, 10, 11 year old Trey,

fighting it out with Gam, with mom & dad & Kristi. Night after night of fish and gin and bridge; of double solitaire, of jigsaw competitions; of risk and hangman -- night after night of thinking quick and thinking smart, of taking over the world. Or better yet, sticking someone else with the dishes. (12)

Such problem solving is equally involved in the development of other forms of personality and self, ie the likes of Norma Jeane's *hunger for love*, Woody's *terror of intimacy*, or Hitch's *massively conflicted and repressed sexuality*. Only here the problems involved are far from socially approved. In fact they're just the opposite. They're covert and stigmatized, skeletons in the family closet. In contrast to Flow Activities, the challenges provided here are seriously inappropriate to the person's level of skill - e.g. the challenges a 13 day old Norma Jeane faced when her mother "dropped her off" for 7 & 1/2 years at the Bolenders; the challenges a 7 year old Woody faced "standing around the house for hours, lost in silence", in "mortal fear that something he'd do or say would trigger" that "low grumbling voice" and start his momma's "face to twitch and snarl", her body to convulse in "epileptics, arguing at every stick of furniture in the room, shrieking for hours at the top of her voice".

Instead of "facilitating concentration and involvement" in the activity, these problems trigger avoidance, uncertainty and fear, seeking elsewhere for a solution, an escape - like Norma Jeane looking to the smiling man in the slouch hat, the decent man with the thin moustache, the missing father she knew would return and love her, the man "she dreamed of a thousand times", the man in the photograph; or Woody, "drifting" out into "running and laughing", punching and scraping, "fishing, swimming and playing hooky"; out into anything "just to try to forget for a minute that a

cyclone had hit his home, to forget how it was ripping and tearing away his family, and scattering it to the wind".

While Escape Activities definitely facilitate the development of new skills, as well as the 'transformations' of self that accompany them, such skills often have little to do with the likes of learning scales or shooting hoops. They often have more to do with the like of street hustling, or purring up to men, or in Hitch's case, fantasizing about his "favorite character" in all of fiction, thinking back to "the ball", to the "Viscount in his low-cut waistcoat", "sweeping her" across the cotillion floor, her "skirt swirling out against his trousers".

Over time, just as with the likes of classical music or physics or basketball, given the opportunity the person learns to take on and solve increasingly more difficult and complex challenges, such as posing for photographers with "nothing but the radio on", or "opening a film with a murderous rape", or turning thumbing through freezing "wind and snow", "rotgut whiskey", and "foggy bottom" Appalachian roads into ". . . This land was made for you and me".

And at the end of the day, when and if the person gets the chance to take on The Right Kind of Problems for both mself and a field (e.g., in film or music or science or sport), the prior years of painful Escape Activities, the activities that developed, e.g., Woody's *terror of intimacy* or Hitch's *massively conflicted and repressed sexuality* now contribute Key personality Characteristics which are essential to the Flow Activities (e.g., Woody's songwriting, Hitch's moviemaking) for which they become famous. (13)

How Many Potential Greats?

Which raises the next question. How many people could potentially develop the Key Characteristics necessary to become great in a given field, to become an Einstein or an Elvis, a Mozart or a Marilyn? Who knows? Even in a hugely specialized field such as classical music we have the 70 musical prodigies of the 1920/30's "San Francisco Cohort". Of these 70 childhood prodigies, two (Yehudi Menuhin & Issac Stern) became internationally famous, and 4 others became well known within the field of classical music. Whatever happened to the rest?

Even if we take the relatively conservative view that only the top 2 to 5% re genetic bias relevant to the core problem solving in any domain could potentially make it to the top, that still leaves us with 20,000 to 50,000 people out of every million who could potentially become great. (14)

Take another example. Take Irish writers. On the island of Ireland today we've got a population of around 5 million. But for most of the last century it would have been around 4 million. So let's say three generations at 4 million. Now even if we take the tough cut, the 2% figure, that still gives us 80,000 potential greats per generation in any field. You multiply that times 3 to cover the 100 years... and what you got? Almost a quarter million potential greats in any given field. And great Irish writers... what have we got? Shaw, Yeats, Joyce, Beckett, Heaney.. maybe two or three others.

How is it then that only the Einsteins and the Elvises, the Joyces and the Becketts make it to the top, while the rest of the genetic wannabes get scuppered along the way?

How is it that those who eventually become the greats of any generation manage to gain access to The Right Kind of Problems over and over again over the 20+ years of development it takes to elaborate initial genetic biases into the Key Characteristics that will be required to solve the key problems of their generation?

Generational Problems

Every generation in every field/ society produces its own greats, ie those whose productions/ image solve key creative and ideological problems currently challenging the field/society/culture. (15) It is not difficult to see where these generational problems come from. A couple of examples should suffice.

In America in the early 1950s, white, urban teens became the first generation since the 1920s with money and time to spend. Needless to say they were looking for something a bit more upbeat than Perry Como and the Lennon Sisters to give voice to their feelings. And they started finding it in the likes of Amos Milburn, and Junior Walker, and Big Boy Crudup, in the Negro R & B artists of Chicago and LA, of New York and Cleveland and Houston; in R & B artists whose "vocal styles were harsh", songs were "explicit", and rhythms were "emphatic". In the R & B music whose "prevailing emotion was excitement". But they needed something more than this. What they needed was a "personal version of this style", a "sound that suggested a young white man celebrating freedom, singing high and clear, varying his rhythmic emphasis with confidence and inventiveness, his singing matched by the urgent rhythm of the bass and guitar; a young white man breathless and impatient,

ready to do anything, go anywhere, pausing long enough for apologies and even regrets and recriminations, but then hustling on towards the new". What they needed was an Elvis. (16)

Likewise back in the late 1400s Leonardo's generation was facing problems of their own. In Florence, Venice, Milan and Padua, and the other city states of Italy, public art was practically the mass media of the day. "Pictures, statues, and beautiful buildings" were all part of the "everyday life of ordinary people". As Michelangelo put it, a statue "would be judged by the light of the public square". In fact when it came to art, "nothing seemed impossible". The society was out to recapture the "grandeur that was Rome", the grandeur that was theirs long ago, before the invasions of the barbaric Goths and Vandals. This was the rebirth, the Renaissance of Italy, and Italian artists were going to prove once again that they were the "centre of the civilized world". (17)

Beyond the issue of national identity, there was also a major artistic problem to be solved. The greats of previous generations, from Giotto right up through Brunelleschi, Donatello, and Botticelli, despite their momentous creations, still had not achieved a sense of "spontaneity" - that "spontaneity which enables the artist to enhance his work by adding a pervasive beauty to what is merely artistically correct". What was missing was that "lightness of touch", that use of "finer points", through which "charming and graceful facility is suggested rather than revealed in living subjects". This is the problem Leonardo finally solved, perhaps most impressively over the four years he spent on his portrait of Francesco del Giocondo's wife. A portrait with a "smile so pleasing that it seemed divine rather than human", a portrait so real that "those who saw it were amazed to find that it was as alive as" Mona Lisa

herself. It was a problem Leonardo addressed in all his work, from the dewdrops dripping off the flowers in his *Madonna*, to the "tormented anxiety" of the apostles in the *Last Supper*, to the very texture of the tablecloth itself. "Spontaneity" was the key artistic problem of Leonardo's generation, and he was the one who solved it. (18)

And there was one final problem for Leonardo's generation: The very status of the artists themselves. It was almost two centuries since Giotto and yet in the late 1400s the Italian artist was still seen by many as a mere "decorator or builder", a "craftsman among craftsmen", expected to be "ready to carry out commissions for shoes, or cupboards, or paintings, as the case may be". Sick of being treated as "penny painters", the artists of Leonardo's generation were determined to have their "unique and precious gifts" recognized. Happily the solution was at hand. By Leonardo's time the massive wealth of Florence and Venice and the other city states (not to mention the "many small courts in Italy which were badly in need of a splendid tomb", a "great cycle of frescoes", a "painting for the high altar" (anything to secure the "honour and prestige" of the patron) played straight into the artist's hands. As "there were now many centers competing for the services of the most renowned masters", Leonardo could pretty much choose his own commissions. And not only that. He could afford to work at his own pace. He decided how, when, and if he would finish them, *Mona Lisa* included. As a frustrated Pope Leo once put it, Leonardo was the man who "will never do anything". (19)

Leonardo, Elvis; Madonna, Darwin, Einstein, Ali - it doesn't take a huge amount of research to figure out what problems they solved or where these problems came from. The problems are always generational - the key creative and ideological problems in every field

and every society; the key problems that keep changing with every generation.

The question here of course is not where problems of each generation come from - ie what forces in field/society interact to produce them - but rather where do the 'greats' who solve them come from. What forces in a society combine to produce them, ie to ensure that the 'greats' start learning how to solve the right kind of problems - ie the key problems that will face their generation - years before anyone even has an inkling as to what exactly these problems will be.

Community of Birth

First off, let's consider a few general points re how it is that future greats come to be matched up with The Right Kind of Problems during their development, ie, how it is that future greats are selected and socialized for particular types of problems.

The most obvious point, hardly in need of mention, except for the tragedy of it, is clear: A massive majority of the world's potential future greats in every generation are denied the essential developmental opportunities practically from day one. Even the most determined are way too busy, eg, most recently this side, dodging drones and climbing razorwire. Or, more to it, getting washed up dead on European beaches "with soothers (hanging off) their life jackets".

For the rest of us right from the outset the problems a child learns to solve pretty much come with the territory, with the Community of Birth, meaning the

family and the various communities it is linked with overtime. (20) Thus it's not surprising to discover that the greats of the classic fields of 'genius' - art, science, literature, classical music, philosophy, etc - tend to start out pretty much the same way Voltaire and Darwin and Picasso did, ie growing up on the right side of the tracks - a fair "distance from necessity" - in a "world of taste", a world where - in Bourdieu's words - "what is acquired in daily contact with ancient objects, by regular visits to antique-dealers and galleries, or, more simply, by moving in a universe of familiar, intimate objects 'which are there', as Rilke says, 'guileless, good, simple, certain', is of course a certain 'taste', which is nothing other than a relation of immediate familiarity with things of taste, a sense of belonging to a more polished, more polite, better policed world, a world which is justified in existing by its perfection, its harmony and beauty, a world which has produced Beethoven and Mozart and continues to produce people capable of playing and appreciating them".

On the other hand, the almost all of the greats of boxing - the Tysons and Dempseys and Sugar Rays - grew up on some other side of the tracks, in worlds where they would have acquired a different sort of 'taste', where they would have learned about different kinds of problems, the kind of problems that come with growing up in a "world of pain", in a world where your daddy worked all night at a "produce market" and your mama worked all night in a "convalescent home", and there still wasn't "enough lunch money" to go around; in a world where you "slept in your clothes when the heating bill couldn't be paid" and "put cardboard in your shoes to cover up the holes", where kids in the street "beat you up for your lisp, for your shoes, for whatever you had in your pocket"; in a world where "all your life, when you got mad you fought", or "you lost respect"; where you were "fighting grown men" by the time you

were fourteen; where you knew all about pancake noses and "cauliflower ears" and "bruises the size of icebergs" long before you ever stepped into a ring. (21)

Of course learning how to box or paint or write or shoot hoops is only the half of it. That's the half every kid's after, that every parent would happily pack their kid off to boxing club or music school, to summer camp or talented youth program to have a wack at. That's the public bit. The gold stars and merit badges, scholarships and trophies. That's the easy bit. But there's another half and it also comes with the territory, either side of the tracks. But nobody's after that half, leastwise not in public. That's the "schizoid" thinking of a Newton or a Kafka, the "manic-depressive" traits of a Balzac or a Michelangelo, the "obsessional" behavior of an Ibsen or a Stravinsky. What you might call the hazy shrouds and thunderclouds, the black and broken nights of it. In short, the personality and self that's also got to be cultivated, just as surely as the intellectual skills, in every generation of greats. It's the personality and self it's gonna take to solve the key problems of a generation. Same as with intelligence, the only way to socialize the next generation of greats is to match them up with The Right Kind of Problems. The kind of problems that, eg, gave Hitch his *fear of an overwhelming and chaotic world*, that gave Woody his *terror of intimacy*, that gave Norma Jeane her *perfect self doubt*. In short the kind of problems nobody's after - the kind that only a family can provide. (22)

Matching the Person with the Right Kind of Problems –

The Arrival of The Fittest

Not surprisingly the process of selection and development of the next generation of greats in any field is far from orderly, systematic or predictable. In fact it is just the opposite. It's "surprising", "messy", and "unpredictable"; and largely invisible. It isn't about the individual bits we see - the Marilyns, the Mozarts. It's not about their unique struggles and talents. It's not about their brilliance. It's about the rest of it, the parts we don't see. It's about the person and the organization, the endless matching of the person with the organization, the endless sequence of fits between the person and the organization; the person ever looking to try out, test, extend mself; the organization (for its own reasons) ever selecting, stimulating, guiding, resourcing this development. It's about a process of matching; a continuous, ongoing pervasive process; a process that's always there - like the weather, like the seasons - always there, ever present, ever changing, ever powerful; always there, but often scarcely noticed, heard or seen.

It's a "surprising", "messy", "unpredictable", and mostly invisible process - a process which involves the Continuous Matching and re-matching of a huge number of developing/ changing individuals with the problems of a huge number of developing/ changing organizations (eg, family, school, sports team, film studio) over the course of many years in attempts to solve the problems of innumerable organizations, attempts which result in accelerating the development of Key Characteristics of the individual involved. (23) It is this matching process which occurs repeatedly throughout the lives of those who eventually arrive at the top of a given field/ society, ie the greats of the field/ society. It is this Continuous, Cumulative, Catalytic, Chaotic Matching process; this process repeating itself generation after generation - just like the seasons - ever producing the same result over and over again in every generation, ie. the arrival at the top

of each field/ society of those who get the right kind of matches/ fits over and over and over again throughout the course of their development, ie., The Arrival of The Fittest. (24)

Organizations and Teams

The Organization (family, school, etc) which matters in terms of accelerating the development of the individual's Key Characteristics by providing The Right Kind of Problems is a combo of the intensive, sustained, typically small, interpersonal, problem solving units of which the person is a part, and the support structures surrounding them. Examples of such Organizations which provided a perfect match between the characteristics of the individual which were later crucial to s success in a particular field (ie. Key Characteristics) and the problems which the Organization needed to solve would include, eg,

* Hitchcock's extremely enmeshed relationship with his mother accelerating the development of his *active inner life* and *fear of an overwhelming and chaotic world* while at the same time solving some interpersonal problems in the Hitchcock family, presumably related to the family's social isolation, parents' interpersonal relationship, mother's loss of mothering role vis a vis the older children;

* Norma Jeane's role as Aunt Grace's protégée accelerating the development of her *ability to present herself as the next Jean Harlow* while solving Aunt Grace's problem of finding outlet for her frustrated ambitions to become a Hollywood actress; and

* Woody Guthrie's multiple roles as class clown,

leader of a gang of rejects, and backdoor busker in his early teens in Okemah all accelerating the development of his *street hustling* and *wordslinging* skills, while simultaneously solving the problems of providing an outlet for the authority conflicts inherent in relationships between teens and high school teachers, support and leadership for low status, low esteem peers in his gang, and a means for various adults (eg the banker's wife) in the community to feel engaged in helper roles.

Such a small, sustained, intensively engaged problem-solving unit can be termed a Team to distinguish it from the larger, less intensive, less interpersonally continuous organizational support structures within which the Team always operates. (25)

Continuous Matching

Re the Continuous nature of the Matching process – The matching of the individual with the Right Kind of Problems (and hence Teams associated with them) must be continuous if the person is to continue to develop s Key Characteristics at a rate which will keep m in the game vis a via s peers. This is true of all Key Characteristics, but it's perhaps most useful to focus on self and personality here, as their development - intensively focused development - starts practically from day one. The intensive development of intelligence-based characteristics - learning how to box or paint or write or code or shoot hoops - not only starts later, but is much easier to follow as their learning and performance is not only public, but often trumpeted as such. Not so with personality and self, and often with good reason.

Norma Jeane's development of her *perfect self doubt* provides a clear illustration of such - of how the matches between the individual and the various Teams e is a part of over time continuously accelerate/ powerfully elaborate the development of the characteristic involved, in this case Norma Jeane's *perfect self doubt* – without which she could never have become Marilyn. (26)

First off, with regard to the development of a person's sense of self, it's worth noting that two basics are essential to the innumerable potential elaborations of self which may occur during the course of development, i.e., you matter and you have influence. (27)

You matter - now, next week, next year. You are loved and hated. You are connected to people who care and will continue to care about you, people who define themselves in term of you. You are not a pet rock.

You have influence. You can affect the world around you, in small ways, in bigger ways. Your hopes and feelings, your thoughts and plans and actions count. You make choices and act on them. You cause things to happen, important things. You are not a dish cloth.

No so for Norma Jeane. Practically from day one she grew up in a world where as Marilyn later put it, everyone "lied about about everything from soup to Santa Claus" - in a world which continually denied her self - a world which continually claimed that she mattered, but acted as if she didn't; a world which continually denied her influence over anything of consequence. (28)

Recall a few highlights of Norma Jeane's childhood, her experience of growing up, day after day, after week, after year. Her experience of discovering over and over that when it came to what really counts, she

didn't matter, she had no influence. Remember Ida? Ida Bolender. Norma Jeane's caretaker for her first 7 1/2 years. Ida was always there. Day after day doing her diapers, her meals; sewing up her blouses, marching her off to Sunday school. Ida was always there, but she was '*Not her mother*'. And Albert Wayne, Ida's husband who was forever answering Norma Jeane's questions about God and where He lived, and all the people in the world. Albert Wayne who had to be her daddy. Had to be, but wasn't. And the redhaired woman. The woman who seldom spoke, who used to take her to the beach sometimes, who didn't come much anymore. The redhaired woman she "was told to call mother".

And Jesus. maybe Jesus, The Jesus she could sing to anytime, any place - in the church, in the crowded cafeteria, on the roller coaster ride to the beach - the Jesus who loved her, who would always love her. Jesus, high up over the altar. And Tippy. Tippy with his warm body and pattering feet. Tippy who followed her to school and waited at recess. Tippy, that little tuff of fur who worshipped her. Tippy... blown away in the night. And that smiling man. The man in the slouch hat. That gentle man with the thin moustache. The man the redhaired woman said was her father. Who had to be her father. The man Norma Jeane "dreamed of a thousand times afterwards". That man in the photograph on the mantle.

Then suddenly Ida and Albert Wayne are gone. No more meals and chores and brushed and scrubbed, and early to bed so tidy. Suddenly there's just cigarettes and beer and sweet lotion, just the redhaired woman, and 'Aunt' Grace, and chipped beef & melted cheese & hash on toast, and all those actor friends and spicers, and partying day and night.

And suddenly there's Gladys shrieking, laughing,

stalking the hall. Her mother's "insane" but "nothing's wrong". Aunt Grace'll take care of her. Aunt Grace'll "fix things up". Aunt Grace and the Griffens, and Emma Willette over on Lodi Place, and Doc and Nora. Or maybe the "cousins" out in Compton. Or the LA Orphan's Home. But, "Not to worry", there's always Fred and Ginger dancing, singing, cheek to cheek; the Pantages and Grauman's Chinese, and sitting all day and half the night. And there's "cousin" Jack and his frisky little wank; and Aunt Grace poppin in, five pairs of shoes and a brand new hat. And there's highlights and peroxide and lavender rinse and twirls. "Now, Norma Jeane, show your mother your little curls".

Days and weeks and years. Not really mattering to anyone. Having no influence over anything of consequence in her life. Days and weeks and years - a continuous experience of developing a *perfect self doubt*.

Links

The question of what process provides for the continuous arrival of problems, whether of the right kind or not, for the developing person, comes down to a matter of Links -- the Links the person has within various Organizations (initially the family), and from them to other communities/ organizations to which they are linked. (see 20) In this regard it is useful to note that the person is always - like a snowflake in a storm - a tiny part of the much larger, ever changing worlds around it. In terms of relative power, I find it useful to think of several worlds embedded one within the other like Russian dolls - what I call The 4+ Worlds. Here we'll focus on the four most obvious of these - ie, the personal, the interpersonal, the institutional, and the

societal. (29) The person's position and power to influence these worlds can vary sizably over time, and in the case of those who become greats within a field or society, such influence can be considerable. However, early on in the crucial early years of development, when the person (child, adolescent) is still hugely dependent upon its closest interpersonal organizational ties (usually family) and the contacts which these provide to other Organizations (eg extended family, neighbors, schools, church, camps, clubs, community groups), it is the Organization - not the person - which determines the sorts of problems/teams which are accessible to the person. While the child will inevitably seek out those problems which fit best with s interests/ characteristics, the extent to which e gets exposure, let alone continual exposure, to what eventually turn out to be The Right Kind of Problems, will depend upon what paths are taken by the larger Organizations (family, school etc) to which e is tied. (30) These paths are taken in response to the complex and ever changing problems faced by the organizations and the worlds they are embedded in, of which the individual child/ adolescent is but one of many, and typically not a dominant one.

Thus, for example, the sequence of 'aunts', temporary placements, and even eventual marriage to James Dougherty - all of which were crucial in providing Norma Jeane with continuous exposure to The Right Kind of Problems for accelerating the development of her *perfect self doubt*, *hunger for love*, and *survivor morality* - was due to Norma Jeane's ties/ Links with her legal guardian, Aunt Grace, and the contacts which this provided. These Links were driven not by Norma Jeane, but by the decisions Aunt Grace made in relation to her own life, eg re pursuing her own personal interests and her relationship with Doc. Equally, the years of intense daily exposure to Uncle Jacob and his "merry little science" of algebra which

Einstein got at just the right time in his childhood, was due not to anything about Albert but rather to his father and uncles' personal and business relationship which resulted in their two families sharing a house.

In short, the kind of problems the developing person is exposed to will depend upon s Links - The basic, interpersonal Links that e has within the family and the kinds of problems this brings overtime by virtue of s positioning here; and the looser external Links to various Organizations in the external worlds which are made possible by virtue of s family's positioning and repositioning within them.

Cumulative Matching

Continuous Matching of the person with The Right Kind of Problems - as in Norma Jeane's case re *perfect self doubt* - will result in continual development of characteristic involved. To become great in a field of performance that uses this characteristic (ie in which it becomes a Key Characteristic) requires much more than Continuous Matching. It requires continuous matching in an area that is valued, monitored, and promoted by your culture/ subculture and the institutions within it, ie by your territory. It requires continuous matching in an area where there is "little room at the top", in which - as Ellen Winner puts it - "the funnel is small" (31)

Achieving greatness requires Continuous Matching in an area in which there is competition and selection, in an area in which each match gives you some advantage over peers who do not obtain such a match, in which each match increases your capacity with regard to the characteristic involved, and in process

increases other's awareness of your changing status, ie increases your visibility and hence chances of gaining access to a higher, more advanced, challenging level of problem solving relevant to the characteristic involved, should the opportunity to take on such problems occur.

In short achieving greatness requires Cumulative Matching, a continual cumulating process of being in a position to take on problems valued by your culture/ subculture and hence organizations within it; resulting in obtaining a cumulative advantage re access to opportunities and resources not available to others on each occasion, with the result that the development of your Key Characteristics accelerates relative to peers who did not get such organizational advantages, as does your credibility /visibility/ positioning re gaining access to other organizations and taking on related but more challenging problems, thus further accelerating your cumulative advantage re development of Key Characteristics involved. (32)

Woody Guthrie's early development as a *wordslinger* – as a musician whose "favorite instrument" was the typewriter – gives us with a clear example of this Cumulative Matching process. (33) By his mid-teens Woody was already a mega-wordslinger. Harmonizing night after night with Tubba and Red and the rest of Tom Moore's family in Okemah on those "old Tennessee church songs", he'd be popping out "funny new verses" right as they were singing along. And a few years later in Pampa, Woody was playing "house parties and barn dances and local radio" and fronting the Corncob Trio on their weekend gigs at "the Tokyo" - "telling jokes, mugging, dancing", with the words "rolling and flowing so easily you just had to sit back and find out where he was going".

How did Woody get so far ahead of his peers, a fair few of whom surely would have started out with at least equal genetic potential for such word play? We can only guesstimate of course, but in Woody's case that's not too hard.

In the rural Southwest of 1912, how many boys were born to a father like "One- Punch" Charley, writing in the Okemah *Ledger* that he was "as happy as a lobster" cos he had a brand new "inhabitant of lapland", a "morning caller, a noonday crawler, and a midnight bawler"? How many were born to a father who was pulling a crowd "every morning" down at "Parsons' drugs", 'round ten - "just to hear him talking over coffee" , a crowd that would "invite him home to dinner", just to hear him talk again? To a father who had a "reputation as the best storyteller and quickest wit in Okfuskee County"?

How many 3, 4, 5 year olds would "sit on the front porch in the evenings waiting for the sound of his father's horse on the hard clay street"; waiting to go running down the road when those hooves come a clomping, to 'woooop' and being scooped, right up to daddy's lap, and "How did y'r saddle horse do today?", "He et all my oats, an he et my hay"?

How many 4, 5, 6 year olds spent night after night listening to papa singing "apart and together" with mama on "hymns, spiritual songs, and songs about how to save your lost and homeless soul and self"; songs that were "lots better" cos he'd "put in a little of the wild running fighting sounds and monkey shines that made your ears stand away out and wiggle for more"?

How many boys at that age got all of mama's best hours while Clara and Lee Roy were gone, off down the "muddy" little "wagon road" to their clapboard

school? How many got day after day, and month after month, up on the "grassy hill" with the "cedar and pecan and blackjack trees", with mama in the "warmth and security" of Gramma Tanner's "brand new house", with its "window seats and paneled walls" and endless "nooks and crannies" - month after month with mama "chording on the piano" and singing her "maudlin, old-time country ballads" "over and over" in her "high-pitched nasal twang", and "then all over again", "til it sounded like a nice ripe and a juicy strawberry in her mouth"?

How many boys in Woody's Southwest spent their childhoods "hopping around the house, making up snatches of rhyme" just like daddy, and then "trying to sing them just like his mother"?

How many of these boys would have followed up this childhood with three straight years of street schooling? With three straight years, from 8 to 11, just as Woody's "intellectual curiosity", his desire "to know" and take on "parental roles", were all skyrocketing. Three straight years of scrambling round, from sun up and down; from "oil derricks to peddler, preacher, and punchup the street, to girly house, pool hall and brawl". Three straight years of bobbing up and down in the whole "flood of gypsy wagons, stray musicians, street singers, and cement men"; in the "wild tribes of bootleggers, horse traders, rollers, rousters, and pimps". Three straight years of "seeing it, sighting it, sucking it down".

How many of Woody's peers would have gotten three straight years of "leaning back against the bank window", of leaning back and pulling out a few choice bits for later -- A few choice bits for the kids who'd wanna know bout all the places they couldn't see, couldn't go; for all the kids still under the thumb, under

the rule; for all the kids still bricked up in school?

And how many boys in Woody's Southwest would have followed this up with yet another three years, this time getting the best of both worlds - the street and the school? Three straight years of chawing down the market, round the barbershop, sitting in the front door of some crumpled tin shack. Three straight years of "old lady Atkins" in her "silks and satins", of Gantz with his guitar, "Stewball" & "Stagolee". Three straight years of Billy the Kid & Belle Starr, and that bearded old geezer the sheriff pulled in. . . "same bullet holes as Jesse James". Swear it. and Pretty Boy Floyd, who was "just by" for a trim.

How many would have gotten three straight years of dropping by the other school, to tell a few jokes and stories? Dropping by while Matt and Nick and all his old friends - all the scrubbed up kids who "wouldn't talk to trash like him" - were stuck in Latin or English or maybe flunking algebra again. Dropping by to put in a few days pulling 'A's in the typing class. Pulling 'A's writing bout the "wild rush of wind" that "whined for a minute like a puppy under a box and then roared down the alley, squealing like a hundred mad elephants". Bout the "phone wires whistling" and "the rain burning hot", the "bales of hay" flying up and "splitting apart, and blowing through the sky like popcorn sacks". Writing about the 1000s of lives he'd already lived and heard and seen.

Fifteen short years and Woody was a *wordslinger* without peer, maybe in the whole of the rural Southwest. Fifteen years of Cumulative Matching and Woody'd gone from "hopping around the house, making up snatches of rhyme" to the words "rolling and flowing" like a "wild rush of wind", to typing away on his "favorite instrument".

And a few more years of that same process, that same Cumulative Matching in Pampa, in Raton and Dodge City, on that "old, dusty road to California..."; a few more years of Cumulative Matching and Woody'd be walking on to that stage in New York, a "Shakespeare in overalls". (34)

Catalytic Matching

Continuous and Cumulative Matching alone are not enough for attaining greatness. Alone they would take forever and might never sufficiently distinguish one particular person from other potentially great peers in the same field, not to mention in the society.

A third form of matching is also essential, Catalytic Matching, in which the individual is suddenly, rapidly and vividly accelerated in his development/ visibility in comparison to competitors in the field/ society. In this process of matching the characteristics of the ever changing person with the problems of ever changing organizations, the person acts as a catalyst in pulling together the resources/ activities of a network of individuals into a system, a system which serves to massively accelerate the development/ visibility of the person within a particular role, and hence his Links to wider opportunities - an acceleration which becomes self-reinforcing as the increasing success of the person (ie, star) stimulates ever more growth (increasing involvement/ commitment of existing and new members) in the system.(35)

This accelerating catalytic process is most easily seen in the case of child prodigies such as Mozart, whose

family along with loads of nobles, court officials, intelligentsia, clerics, promoters, groupies & hangers-on all jumped in to accelerate the development and visibility of "the little wizard". This accelerating development in turn hugely enhanced social standing of the Mozart family - going from invisibility in backwater of Salzburg to the courts of Vienna, Versailles, London - and no doubt brought major kudos to the escalating list of counts, ladies, archdukes, bishops, barons, vice chancellors, & court councillors who had the cop on to promo God's "tiny miracle" at their venue, get their names up on the marquee, or at least manage an invite to the opening night. (36)

Mozart's "first brief concert tour" to Munich early in 1762 "evidently satisfied" his father. The following September - hopeful of bigger things to come and well aware that the key to success lie in gaining entry to and then capitalizing on "family relationships among the nobility" - Leopold set off for the nearby "ecclesiastical court of Passua". As he always planned with the "greatest foresight", Leopold knew he'd have a fair chance of getting a foot in the door here. And sure enough "after a wait of several days", Leopold finally "succeeded in obtaining an audition before the Bishop" for his 6 year old son. The "proceeds in hard cash" were zilch - "a single ducat". But the ball was rolling, and the Leopold's family proceeded "down the Danube to Linz" - accompanied by their first groupie, "the Dean of Passua Cathedral, Count Ernst Herberstein" - to the now wide open door of "Count Leopold Schlick and his wife".

The word quickly spread from Schlick to their latest visitor, Count Pálffy, who at "twenty-seven was already the Court Councillor in the Ministry of Commerce at Vienna". Pálffy, knowing a good thing when he saw it, "delayed his journey long enough to attend the concert of the Salzburg child prodigies". "Overcome with

wonder and enthusiasm", the Count hurried on to Vienna to "announce the marvels he had heard and seen". Not to be outdone, Count Herberstein likewise continued on to "the metropolis", intent on "making a great noise about the Mozarts". For their part "Count Schlick and his wife urged their guests to make haste to Vienna" promising to "obtain the support of Count Durazzo, the almighty supervisor of music at the Court of the Imperial Majesties". And sure enough, a few days after their arrival in "Maria Theresa's capital", a "command had come for the musicians to appear before their Imperial Majesties at Schönbrunn". In the words of one "eyewitness", "Those in the audience could scarcely believe their eyes and ears when the children played. In particular the Emperor Francis I was delighted with the little wizard, as he jokingly called him."

Within two days of the Schönbrunn performance, "the Imperial Paymaster drove up to the simple tavern where the Mozarts were staying and handed over two gala costumes for Nannerl and Wolfgang". That afternoon their first gig ran from "half past two" to nearly four, then it was "immediately off to perform for Count Johann Hardegg", after which "a carriage brought them 'at full gallop to a lady'". By six the two "Prodigies of Nature" were at "the home of the Chancellor, Count Wenzel Anton Kaunitz-Rietberg, where the performance did not end until nine o'clock" that night. In short, Mozart's catalytic acceleration had well and truly 'taken off'.

The next day they were back at the Imperial Palace, this time playing for "the two youngest archdukes, 8-year-old Ferdinand and Maximilian Franz, whose gala dress the little wizard was now wearing". And within a month Leopold's dreams of "European repercussions" had become reality - the French Ambassador "extended an invitation to Versailles".

And in Paris, the city "long recognized as the capital of literate, luxurious and cultured Europe"? No surprises. The "Vienna success was repeated, but this time on a more public, publicized scale". The "little wizard" was now the star at the heart of a major catalytic acceleration.

What the person/ star gains from the sort of catalytic acceleration Mozart experienced during his first 'Eurotour' can only be described in terms like 'mega', 'exponential', or 'quantum'. These 'exponential gains'/ 'quantum leaps' in development are of course a result of the self-reinforcing nature of catalytic systems in which the increasing success of the star at the center serves as a catalyst in stimulating ever more involvement/ commitment by others in the system. The resulting accelerations in development for the person come in at least three areas, all of which are central to the new role of being treated as a star. These three areas involve mega developments in relation to Key Characteristics, visibility, and Links. Which of the person's Key Characteristics are accelerated and how will of course vary depending on such things as s age & experience, the specific demands of the star role, and the personal & managerial support available

In Mozart's case - given his age - development of all of his Key Characteristics would inevitably have been hugely accelerated in line with the experiences associated with his new role as a 'star' performer. (37) Consider, for example, his musical ability and his self concept.

Early in tour Wolfgang was "playing sonatas, trios, and concertos manfully on the harpsichord" and improvising from his head, now cantabile, now with

chords." A few weeks later (shortly after Vienna) he was now also playing "in the violin key, and in the soprano and the bass keys as well, on a small *violino piccolo* made especially for him" .

By the time he reached Paris, late in '63, the "little wizard" had clearly gone up another level yet: "A lady asked him casually to accompany her by ear on an Italian cavatina" Mozart had never heard before. Yet right from the first note he accompanied her. When finished he asked her to sing it again, this time "not only playing the entire melody with the right hand, but adding the bass with his left hand without the slightest uncertainty". He then asked her to sing the song another ten times, and "with each repetition he changed the character of his accompaniment". He would have continued through another twenty variations "had he not been asked to stop".

And a few months later, by March of '64, Mozart had published his first works, two *Sonates pour le Clavecin*, two "entirely serious" works which took the "form of a dialogue between harpsichord and violin". As Leopold put it at the time: "God daily works new wonders through this child". God, with a little help from his friends.

The accelerated change in Wolfgang's self concept was, if anything, even more spectacular. This should come as no shock, given that in a few short months he went from being the unknown 6 year old child to becoming the 'little wizard' of the imperial courts of Europe. A few examples will do.

In early October of 1762, the day before leaving Linz for Vienna - knowing that "failure there would be the end of every dream of fame and prosperity", Leopold wrote his good friend Hagenauer in Salzburg, asking

him to "quickly have four masses said". Less than two weeks later, after the Emperor Francis I had shown the boy his musical ignorance by delighting in him playing with a single finger or with the keyboard covered, Mozart "sat down at the clavier to play a concerto" and asked the Emperor standing beside him to get Herr Wagenseil because "he understands". And when the author of the concerto appeared, Mozart instructed him to "turn the pages for me".

Not much over a year later - New Year's Day of 1764 - and the young child's sense of who he was had now expanded far beyond the keyboard. The Mozarts had been invited to dinner at Versailles with the King and Queen of France, and "Master Wolfgangus was requested to stand all the while beside the Queen". Even more "extraordinary" throughout the dinner he was "talking constantly with her and entertaining her, frequently kissing her hands, and eating right beside her of the dishes which she graciously handed to him from the table." Later when the "all powerful" Mne de Pompadour "fended off" one of Wolfgang's kisses, he "asked sharply: 'Who does she think she is, not wanting to kiss me? Why the Empress herself kissed me'".

Not surprisingly the boy who had already had his portrait painted in a "lilac coloured court costume" of the House of Habsburg, "with cocked hat and small sword and a clavier as well", "whiled away the long hours of coach journeys" living in his own "personal Kingdom of 'Rücken'", a kingdom with "its own laws and its own subjects", its own "towns and villages"; a kingdom where "everyone was good and happy, under their King". Their king was of course none other than the "boy who dictated the names of the towns and villages", the boy who "required maps of his kingdom to be drawn" by the Mozart family servant, the boy who

was himself "travelling toward a great inheritance".

As regards the acceleration in visibility - and hence further acceleration of opportunities for performance/development within the star role - consider the following:

After Leopold's children, "especially the boy" had "astonished everyone" with their concert at Linz, no less than three counts set out to broadcast the "marvels they had heard and seen" to the "nobility of Vienna".

By late February of '63, a mere 4 months after setting out from Salzburg, "stories about the children's success in Vienna" had been "published" and had "gradually disseminated" all the way back to Salzburg, with the result that Leopold himself was promoted and now traveled as "the Prince-Archibishop's vice-*Kapellmeister*".

Less than a year later, after the children's appearance at Palace of Versailles, the French nobility began to "vie with one another for the privilege of having them".

And beyond this -- having attracted the attention of the "best of publicists", Melchior Grimm, with his "infallible instinct for everything sensational, novel, and interesting" -- the "fame of the child prodigies" (esp the "extraordinary phenomenon" of the 6 year old "genius") quickly spread "all over Europe".

As for the acceleration in Links - ie ties/ contacts with individuals & organizations which provide access to further resources & opportunities - consider the following developments as the catalytic Euro tour

proceeded:

The "young Count Pálffy" still filled with the "wonder" he had heard in Linz, organized an early concert for the prodigies upon their arrival in Vienna, and there after continued to be "one of the most notable heralds of Wolfgang's fame", a herald "whose support ultimately opened many doors for him". Shortly afterwards, at yet another concert in Vienna, the Mozarts "met Countess Wilhelmine Thun. She and her husband, Count Franz Joseph (whose house by the 1780's had become "a center of intellectual life") were later to be unflinching in their aid to Wolfgang". Similarly, in Paris "Wolfgang gave a performance in the palace of Prince de Conti" and as a result came to know Mne Adrienne-Catherine de Tesse, with whom the Prince "entertained tender relations". Mne de Tesse "soon became one of the chief patronesses of the Salzburg prodigies". And so it went from concert to concert throughout the tour.

At another level, the creation of such Links was even more substantial. In Paris Leopold's "great new friend", Melchior Grimm, was far more than a publicist. He was like a spider when it came to spinning Links. As the hugely influential secretary of the Duc d'Orléans, "a key position in Parisian social life", Grimm "favoured and helped Leopold" in countless critical ways. He "managed their business at court", "provided instructions on how to leave notes for people of rank whom Leopold could not see", arranged their first public concerts, distributed hundreds of tickets and even paid for "the illumination". Grimm had a hand in, a contact, everywhere. In short he was the kind of Link every prodigy wants, but few in fact get, ie, the kind of Link to whom Mozart "owed everything".

Catalytic Accelerations to Greatness

The same catalytic system dynamic can equally be seen in more 'loosely coupled' systems such as might occur in a sports, art, film, political, or scientific community whose members pull together to accelerate the development of a particular person in a star role, an acceleration which in various ways - economically, strategically, interpersonally, etc - enhances their own positions within the community. Such loosely-coupled systems typically occur later in a person's development and - unlike, eg, Mozart's Euro tour - are not closely tied to existing family dynamics. Norma Jeane's acceleration from an unknown assembly line worker to one of the hottest cover girls in America provides a clear example of one such loosely-coupled catalytic system in action. (38)

Once David Conover made his chance discovery of Norma Jeane at Radioplane, signed her on for some still color shots, and put her on to Emmeline Snively and her Blue Book Agency, word of the "photographer's dream" who gave herself to the cameras - "shy, breathless, helpless, anxious to please" - spread like wildfire among the L.A. photographers, all eager to get their lenses on her. And once Emmeline saw the potential of her agency turning those flashing bluegreen eyes, in dresses and blouses and bathing suits that were always too tight, into something more than just another model, then the Catalytic Acceleration took off.

And Norma Jeane in little over a year went from her 10 hour days on the varnish spray to classes on "posture and makeup, grooming and carriage and lowering her smile"; from the assembly line at Radioplane to immediate assignments and photo shoots at Zuma Beach and Yosemite, Mount Hood and Mojave; from

the army 'shutterbugs' to Conover and Wolff and de Dienes, to Burnside and Moran, and Willinger and Jasgur; from folding chutes to the covers of *Pageant* and *Parade*, of *U.S. Camera* and *Glamorous Models*, of *Laff* and *Peek and See*.

Where any Catalytic Acceleration leaves the person in terms of potential for further development (ie further matches between own Key Characteristics and the problems of organizations available to m), depends on where the person ends up at the end of the Catalytic Acceleration. That is, where e ends up in terms of development of Key Characteristics, positioning vis a vis organizations/ teams which can match m with The Right Kind of Problems for continuing s development, and equally in terms of the 'star image' which e now has on offer.

In Mozart's case the Catalytic Acceleration of his first Eurotour simply left the "world-famous boy" stuck back in Salzburg, just another "socially disdained" musician - soon too old to be a prodigy, and still way too young and unconnected to gain a foothold elsewhere. In Norma Jeane's case her Catalytic Acceleration left her right where she wanted to be - walking poised and confident, "radiating sex" in every frame of her first test for Zanuck and Fox, her first test for the silver screen. Not that it did her much good. A year later and Marilyn was still eager, still hungry, still desperate to learn, still asking, "How do you become a star?". A year later and Marilyn was still a walkon in *Scudda-Hoo! Scudda-Hay*, a 14th credit in *Dangerous Years*; still invisible at the bottom of Zanuck's photo pile, still a "no call", still going nowhere.

Yet it is exactly such loosely-coupled systems which are the key to acceleration to the eventual stardom of the great. Only in contrast to Mozart's acceleration to the top of field which could only be stepping stone to greatness (ie, musical prodigy) or Norma Jeane's acceleration to the top of a culturally inconsequential field (ie, cover girl of the mid 40's), these Accelerations to Greatness must also include alignment/ fit/ match of the person/ image with powerful institutional forces capable of influencing the public in the midst of sizable societal/ cultural change. In short this Acceleration requires a fit across all 4 Worlds: the personal, interpersonal, institutional, and societal.

This process is perhaps most clearly seen in the rapid acceleration of Elvis Presley from the Southern country & western circuit to become the first mega star of Rock n Roll. By the early 1950's evidence of major cultural change was starting to show up from LA to Houston to Cincinnati, from Chicago to Newark to New York. It was starting to show up in all those cities that took the influx of 1 and 1/4 million Negroes who left the South for the expanding war industries of North and West in 1940-50 decade - cities that now had their own small labels like Speciality and King and Chess, small labels that were producing 'race records' for the growing "Negro market". It was this evidence that "amazed" the "quality music" disc jockey, Alan Freed, on his visit to Leo Mintz' record store in downtown Cleveland early in '51 - the evidence he saw in the "excited" white teenagers "dancing energetically" to the "tenor sax of Red Prysock and big Al Sears", to the "blues piano of Ivory Joe Hunter". It was the same evidence which would soon be "squeaking itself silly over this fellow in an orange coat and sideburns", which would put "dollar marks" in Colonel Parker's eyes the first time he saw it in "thundering" across the stage after Elvis.

It was the same evidence that the parents of those teenagers saw - parents who spent their own teen years growing up in the Great Depression - evidence that their children were listening to "unspeakably vulgar", "obscene junk", or worst yet, that they were becoming lovers of - as Ira Louvin put it a wee bit more forcefully to Elvis back stage one night in North Carolina - "nigger trash".

In short, it was evidence of a massive shift in musical taste, a shift reflecting an equally massive underlying societal change - "the emergence since the Second World War of a new phenomenon: the adolescent or youth culture".

As for the equally critical need for the person/ image to fit/ match with the interests of powerful institutional forces capable of influencing the public in the midst of such a sizable societal/ cultural change, consider the following:

Prior to November of 1955, despite his records selling like hotcakes from New Orleans to Memphis, to Little Rock and Shreveport and Dallas, and "all over West Texas", the high point of Elvis' career so far was signing up as a regular on the Louisiana Hayride and touring with the likes of Hank Snow, Faron Young, and the Louvin Brothers.

Then on November 21st that essential institutional power came into play. Sam Phillips signed over Elvis (and his Sun recordings) to Colonel Parker and his RCA backers for "highest contract release price ever paid for a country-western recording artist" -- a deal which, in Phillips' own words, would give Elvis a chance to enter "the largest organization of its kind in the world, so his talents can be given the fullest

opportunity".

Within two weeks, just as *Billboard* was "trumpeting" the RCA signing "hurling Presley into Stardom", the new label released its own issue of Elvis' current Sun hit and that "fullest opportunity" came into play - "I Forgot to Remember to Forget" went to number one and stayed in the country charts for another 28 weeks.

And by early January Elvis had recorded his first album for RCA, including 'Heartbreak Hotel', a song that he "clearly believed in". As Anne Fulchino, RCA's new head of pop publicity, put it at the time: "*We got him!* The guy that we've been looking for".

Barely 2 weeks later Elvis was up in New York City, "looking like he'd been shot out of a cannon. Wearing a black shirt, white tie, dress pants with a shiny stripe, and a tweed jacket so loud that it almost sparkled as he launched into 'Shake, Rattle and Roll'" - opening the first of his six national tv appearances on the Dorsey Brothers' *Stage Show*.

Within two months "Heartbreak Hotel" was set to top all 3 charts (pop, country, and R&B), RCA had its first million dollar album, and Elvis out on the West Coast singing "Blue Suede Shoes" just the same way he always did -- with "electricity bouncing off the walls... like an earthquake in progress". Only this performance wasn't for screaming teens at Overton Park or the Gator Bowl. It was for Hal Wallas, the producer of *Casablanca*, *The Maltese Falcon*, and *Yankee Doodle Dandy*. It was for Elvis' first Hollywood contract -- a three picture, 1/2 million dollar deal the Colonel signed with Wallas a week later.

Massive cultural change just waiting for the likes of an Elvis to come along and mega institutional backing dying to cash in on the possibilities -- the perfect match

for that Catalytic Acceleration to Greatness. In less than 5 months Elvis was on his way from The Hayride to Rock 'n Roll history. (39)

Chaotic Matching

Regardless of individual's Community of Birth, the opportunities and Links this provides; regardless of s talents, efforts/ struggles, persistence, plans, and aspirations, the dynamics of the matching process are always embedded in the ever changing, never fully knowable/ predictable interactions between The 4 Worlds of which person is ever a part: the personal (goals, motivation, level of development of Key Chars, etc), the interpersonal, the institutional, and the societal. As a result many of the matches which occur (ie, matches between the individual's characteristics and organizations offering problems to be solved) will inevitably be chaotic. Many of the steps in this developmental process - from Norma Jeane first looking in the mirror, from Mozart first "striking those thirds", from Michael first eyeing the hoop on that little dirt court in Wilmington, to Einstein finally penning those "three Rembrandts" of 1905 – many of these steps will inevitably be laced with coincidence, laced with chance events that start out too tiny to notice and end up being too big, way too big, to ignore.

The Chaotic nature of this Matching process is much like the process by which a snowflake is created over the course of a couple hours blowing across winter skies. Because individuals and organizations are continually changing on the basis of past experience/ structure and ongoing internal and external influences on them, the process by which a particular individual's characteristics will become available to fit with

particular organization's problems over a given period of time is inevitably chaotic. It's much like trying to predict the weather, ie we can predict the general overall pattern over a short period of time (2-3 days) but cannot predict the "small pieces of weather" within this. In any generation we pretty much know where the greats of, eg, science, boxing, ballet, are likely to be coming from. What we can never know is just who exactly they are going to be. Likewise from point of view of the individual involved - the person who is trying to find and take on organizational problems which perfectly match with s own characteristics (int, pers, self) over a given period of time - the process is like "walking through a maze whose walls rearrange themselves with each step you take". Scientists, artists, jocks - it's all the same. Greatness, to borrow Bill Russell's words, always comes at the end of "a whole string of unlikely events". (40)

Bill Russell?? Bill Russell – or Russ as his teammates knew him – was the "greatest defensive center" and the most successful player in the history of professional basketball. (41) But he didn't exactly start out that way. In his own words, Russell was an "easily forgettable high school player". He was "the kind of player who tried so hard that everybody wanted to give him the 'most improved' award - except that he didn't improve much.

No matter. Bill Russell had two things going for him. He played for McClymonds and he was a "splitter". So when Brick Swegle got around to selecting players for his 1952 "California High School All-Stars" team, Russell was a cinch. Why? Because Swegle was trying to build up the prestige of his All-Star tour. So he had to have someone from McClymonds, the powerhouse of Northern California high school basketball. Since the tour took place in January, it was

"designed exclusively for graduating 'splitters' - students whose school year ran from January to January". And Bill Russell, that "mediocre", "easily forgettable" player? He was the only graduating 'splitter' on the McClymonds basketball team.

How did Russ spend his time on the All-Star tour - barnstorming across 1000s of miles of Oregon, Washington, Idaho, and British Columbia, from Seattle and Victoria to the likes of Brinaby, Penticton, Nanaimo, and Trail? He spent it mostly sitting on the bench, or more precisely "sitting on the bench, watching Treu and McKelvey". Actually he wasn't watching, he was studying. You see, a few years earlier, when he first moved to the San Francisco Bay Area, basketball wasn't Bill Russell's first love. Fact is, he used to hang out in the Oakland Public Library. And worse yet, when he wasn't there, he'd be sneaking prints home, prints of Da Vinci and Michelangelo, "rolled up and tucked under his arm to keep other kids from seeing what they were" In those days Russ was gonna be an architect and he figured the best way to get there was by "memorizing the paintings". Once he got home and unrolled the prints, he'd be "spellbound". Russ "would study a Michelangelo for hours, trying to memorize each tiny detail, working on one section of the painting at a time." He'd spend weeks on a print, before he was ready for the "acid test: drawing the painting from memory".

Russ always failed those tests. He couldn't get the details, they always came out "cockeyed and jarring", like "Michelangelo had sent his work down to the nursery for completion". But when it came to studying Treu and McKelvey, it wasn't the tiny details that mattered. It was the way Treu moved with the ball, the way he "hardly ever went anywhere in a straight line", the way he would "cut and weave, his head and eyes scissoring back and forth in a constant fake as he

dribbled, hesitated, switched hands, changed direction", and spun "repeatedly while still controlling the ball".

That's what Russ was studying, working it over in his head, just like Michelangelo, bit by bit, Treu and McKelvey, until he had an "accurate version of each technique in his head". Then Russ would "start playing with the image right there on the bench, running back the picture several times and each time inserting a part of himself", until finally he could see himself "making the whole move over and over" in his head. With McKelvey - another tall, frontline player - it worked perfect. When Russ "went into the game and grabbed an offensive rebound, he'd put it in the basket just the way McKelvey did. It seemed natural, almost as if he were just stepping into a film and following the signs." (42)

But with Treu it was a different story. Bill Treu was shorter than Russ, and "he handled the ball like a guard". It "didn't take long to figure out that he couldn't dribble through crowds the way Treu did, or twist his way to the bucket at high speeds". "On the bus at night Russ would still watch Treu go through his paces. It was frustrating to think that all of the images he had assembled were useless, so finally, more or less as a lark, Russ started imagining himself in plays *with* Treu. He be spinning in for a lay-up, and Russ'd be shadowing him on defense... it was as if they were dancing, with Treu leading".

And it was more than that. It was the perfect dance for Russ because from Penticton & Brinaby & Trail all the way to the Boston Garden, it turned out that Bill Russell could dance with almost anyone, because almost always he was the only left-hander on the floor.

So when Russ sat on the bus imagining himself

guarding Treu "it was easy to see his left hand working against Treu's right". And later on - 6, 9, 12 years later - it was the same dance, the same mirroring, with Russ taking "a step backward for every step (Pettit or Johnston or Baylor) took forward". And when Wilt went "up to take his favorite shot right-handed, Russ'd go up on the mirror foot to block the shot with his left hand".

High school, college, pros... it was just like "slapping a Michelangelo right on the canvas".

Spwins

And that's just a small glimpse of the "whole string of unlikely events" which, as Bill Russell noted, was essential to the development of his basketball career, ie, a whole string of seemingly irrelevant, often tiny, coincidences which turn out to have massive consequences in relation to accelerating the development/ use of the Key Characteristics of a person who eventually becomes great. In short what you might call the Spwins of Change. (43) The term, 'Spwin', is of course simply a combo of two words, 'spin' and 'wind', which hopefully are evocative of the dynamics underlying this concept, ie, chance 'winds' / forces in the societal, institutional, interpersonal, and/or personal worlds of the person resulting in an accelerated 'spin' / development of the person's Key Characteristics. This is of course a conceptual parallel to the developmental process of a snowflake as it spins across the winter sky with it's own molecular growth ever being influenced by the continual changes occurring in the skies around it.

In Bill Russell's case over the course of just the couple months we considered, there are at least 4 such Spwins - starting with the fact that he happened to play for McClymonds, and happened to graduate in January. These two tiny, seemingly irrelevant coincidences were of course the only reasons why such a "mediocre", "easily forgettable" player was selected for an All-Star team in the first place. As a further result of this, rather than playing much of the time on the tour, Russell was sitting on the bench - the perfect place for him to be, given his third Spwin, ie all those months and weeks and hours he's spent "memorizing" Michelangelo prints back in his early teens. Instead of wasting most of his time running up and down the floor with the real All-Stars, Russ got the opportunity to study them over and over and over again from the perfect vantage point, ie the bench. In short, in our terms due to three essential coincidences, he got the chance to work on The Right Kind of Problems over and over again. And as a result after a few intense weeks of being "nearly possessed by basketball", as Russ put it: "Suddenly I knew that I could do on the basketball court what I had not been able to do with painting. I got the details right, and repeatedly they fell into place. When I pulled off one of McKelvey's moves I'd try to review what I'd done while running back up the court. I could see the play I'd just made, and if there were an extra jerk in my arm or a faulty twist in my body, I'd try to correct it the next time. The long bus rides never bothered me. I talked basketball incessantly, and when I wasn't talking I was sitting there with my eyes closed, watching plays in my head. I was in my own private basketball laboratory, making mental blueprints for myself. It was effortless; the movies I saw in my head seemed to have their own projector, and whenever I closed my eyes it would run. I was having so much fun that I was sorry to see each day end, and I wanted the nights to race by so that the next day could start".

Then came the problem, the impossible problem, of Bill Treu, of realizing that "it was fruitless for me to insert myself in his place", that "I couldn't dribble through crowds that way he did, or twist my way to the bucket at high speeds". And with this realization, "more or less on a lark", Russ began "imagining myself in plays *with* Treu, shadowing him on defense". And hence came the fourth Spwin - the fluke coincidence of Bill Russell's newly acquired "awesome mental camera", his inability to mimic Bill Treu, and the fact that he happened to be left-handed all coming together with the result that Russ started to "concentrate on defense". As he put it: "Defense came to me more or less accidentally. It fit well into the peculiar way I studied the game on that trip. I was the only left-handed player on our team. When I imagined myself guarding a player on the court it was easy for me to see my left hand working against his right one. I blocked a lot of shots on that tour mainly because it was fun to carry out some of the designs I had made up to use against Bill Treu; but nobody, including myself, thought of the blocked shot as much of a defensive weapon; in fact, nobody thought much about defense at all". Nobody until 5 years, and many Spwins, later when that "mediocre", "easily forgettable" player led the Boston Celtics to their first NBA title.

Ok, but does it go any further? Can we go from basketball to, say, physics? From the Boston Garden to the universe? No problem. The same Spwins keep showing up over and over again, this time opening doors for a young Einstein on the road to relativity -- a road we'll pickup back in the 1890s when Einstein was still a teenager in Munich, and physics... well, see for yourself.

During "the last decades of the 19th century" there was a crisis looming in "the world of Newtonian physics". Newton's Laws, the very "foundations of classical science", were being "undermined by a score of experimental physicists tunneling along their own separate routes from a dozen different directions". In particular there was the problem of "the luminiferous ether" - that "ghostly medium" which was essential to a Newtonian explanation of light, magnetism, and electricity - the ether through which "Maxwell's electromagnetic waves (were assumed) to be transmitted like shakings in an invisible jelly", the ether which no one could find, the ether which - as Michelson and Morley showed in their "almost legendary" experiment of 1887 - simply did not exist. (44)

And It wasn't just the "awkward results" of Michelson & Morley that "permeated the scientific climate of the 1890s". By the time Einstein had entered his teens in the early 1890s, Newton's Laws were getting littered with footnotes. Recent "technological advances" had opened the door for a whole "new group of disturbing discoveries" - discoveries which simply could not be explained by "Newtonian mechanics". There was that little problem with "Mercury's orbit", that "obstinate planet" which simply refused to "conform to Newtonian calculations". There was Wien in Berlin, and Lorentz in Leiden, Thomson at the Cavendish, Becquerel in Paris, and these were only the worst offenders - finding inexplicable "discrepancies in the phenomena of heat and radiation"; atoms "containing electrically-charged particles"; "bits of electricity which not only had an existence of their own but a mass and an electric charge" to boot; a "metal which was giving off streams of radiation and matter".

Surely Einstein wasn't the only "precocious" student of

his generation who started pondering all the "worms in the apple" of Newtonian physics, pondering the "revolutionary implications of Maxwell's electromagnetic theory". Just think back to the discovery of evolution, or the takeoff of the computer revolution. The problem was in the air. Remember Peter Deutsch, Lee Felsenstein, Ed Fredkin, Bill Gosper, Richard Greenblatt, John Harris, Tom Knight, Alan Kotok, Efron Lipkin, Stewart Nelson, Ed Roberts, David Silber, Dan Sokol, Randy Wigginton, Ken Williams, Stephen Wozniak, Steve Jobs, Paul Allen, and Bill Gates? How about Patrick Matthew, Robert Chambers, Alfred Russel Wallace, and Charles Darwin? Exactly. If it hadn't been Allen and Gates, or Wallace and Darwin, it would have been someone else. (45)

Einstein came "on the scene at the moment physics was about to be revolutionized". If it hadn't been him it would have been someone else, maybe a bit earlier, maybe a bit later. It was all down to that "whole string of unlikely events", that flight of the snowflake, those Spwings of Change which happened to put Einstein - rather than one of his contemporaries - in the right place at the right time to go from his interest in "one of the most hotly disputed scientific subjects (of the mid 1890s), the relationship between electricity, magnetism and the ether" to his revolutionary paper of 1905. That right place was ETH, the "famed Zurich polytechnic", the "MIT of Switzerland". (46)

It was Einstein's 4 years at ETH that provided him with his first crucial sustained opportunity to accelerate his own development in relation to eventually solving the problem of relativity. It was here that he got the first perfect and sustained match between his Key Characteristics - both intellectually and interpersonally - and the resources/ opportunities on offer in the ETH university environment, a match which hugely

accelerated his development in two crucial ways. First, intellectually, it locked him on to the problem of "the electrodynamics of moving bodies", the problem which would eventually led to his 1905 paper on "the Special Theory of Relativity". This is not to say that Einstein saw it that way in his years at ETH. Clearly he did not. He was still miles from working out the problems raised by earlier explanations of "first-order aether drift effects", by the "observations on stellar aberration", and by "Fizeau's measurements on the speed of light in moving water"; not to mention his "rediscovery of all essential elements of statistical mechanics" and his "derivation of the Lorentz transformations".

What is crucial is that by the time he left ETH in 1900, Einstein had formulated his own ideas relevant to the electrodynamics of moving bodies, and come up with his own experiments to test them - ideas and experiments which, inadequate though they inevitably were, would push his thinking further and further along the path he'd now found for himself, i.e. the path to relativity. In short, as a result of his 4 years at ETH, Einstein was locked on to the problem of "the electrodynamics of moving bodies", locked on to the problem that would eventually be solved by his Special Theory of Relativity. (47)

Equally important in terms of accelerating Einstein's Key Characteristics with regard to relativity, the four years at ETH profoundly altered his conception of himself, not only in relation to the intellectual problem, but critically in relation to his peers, his fellow students at the "Switzerland's MIT". Over the 4 years at ETH he had become - at least to himself and the "three close friends" who mattered most - the Helmholtz among them - the guy with the "almost fanatical" fascination with physics who was going to bring a "freshness and

ruthless application of basic principles to fundamental problems", i.e. the Helmholtz of their generation.

How did these accelerations at ETH come about? Crucially, the "environment at the ETH was relaxed", so Einstein could be "highly selective about which lectures he attended". One suspects that was quite often when it came to the "excellent teachers" like Adolf Hurwitz or Hermann Minkowski, "a mathematician of the first order" who later provided Einstein with "a mathematical interpretation for the theory of relativity". When it came to the "top man in the physics department", Professor Heinrich Weber - or "Herr Weber" as Einstein liked to call him - and his "old-fashioned approach", Einstein took advantage of the fact that at ETH he had to "suffer far less under the coercion (of cramming for exams) than was the case in many another locality". A lack of coercion which left one free to "do just as one pleased". Moreover for Einstein "this was especially the case" because he "had a friend who attended lectures regularly and worked over their content conscientiously", a friend who "passed on his beautifully transcribed lecture notes" to Einstein just in time for him to "skim off the essentials" for exams.

As for being free to "do just as one pleased", Einstein, unlike most university undergraduates then or now, had an intellectual problem that was already focusing his attention, and hence his reading, thinking and discussions, i.e., that "hotly disputed" scientific topic of the 1890s, the problem which was "to remain constantly at the back of his mind for a decade", i.e. the "the relationship between electricity, magnetism, (light), and the ether".

Moreover, in addition to the excellent resources on offer in the ETH university environment, including most especially time and access to relevant knowledge,

Einstein had a superb support team of "three close friends" virtually throughout his 4 years at ETH. All three were students like himself at ETH, and hence had a common knowledge base and interests. Collectively they all served to accelerate his knowledge and engagement with the ideas which would eventually lead to his "three Rembrandts" of 1905. They were the key people involved in the ongoing process of study and rapping and thinking and rethinking and rapping again; the process that accelerated his ability to question and puzzle and rework the relationships and discrepancies among the ideas that were "constantly at the back of his mind"; the process that allowed Einstein to rework them into his own ideas, ideas which would then be further stimulated by the next round of intensive study, thought, and discussion with his "three close friends".

And beyond this collective dialectic, each of these three served a further individual role, a special complementary role that provided Einstein with essential supports - both intellectual and emotional - for his accelerated development. These roles could be roughly described as "assistant", "sounding board", and "mother". (48)

Einstein's 'assistant' was Marcel Grossmann, "a dedicated and studious young man" who not only provided Einstein with those "beautifully written, meticulously organized lecture notes", he also "regularly filled him in on what had been covered at college each day", leaving Einstein to "play truant and read what interested him". What interested him was of course the "works of Kirchhoff, Hertz, and Helmholtz", the "papers of Lorentz and Boltzmann", and most critically Föppl's account of Maxwell's electrodynamic theory -- in short the works of "the scientific revolutionaries" whose research and ideas would move

Einstein far beyond his initial "naive and incomplete" speculations about the relationships between "magnetic fields" and "currents" and that "elastic medium" called "aether".

The 'sounding board' was Michelangelo Besso, "an engineering student whom Einstein met several months after his arrival in Zurich"; the Michelangelo Besso who drew his "awed attention" to Mach's *Science of Mechanics* with its "critical attitude to the whole Newtonian framework", an attitude which had a "profound influence" upon Einstein's thinking at the time; the same Michelangelo Besso who became his "best friend", and who showed up nearly a decade later as only person whose help Einstein acknowledged in his revolutionary relativity paper of 1905. And what sort of help had his "friend provided"? Exactly the same sort he had been providing since their years together at ETH - the perfect sounding board for Einstein to do "battle on (theoretical physics) questions which were difficult for Einstein to understand".

And there was Mileva Maric, a fellow physics student who shared Einstein's classes on "mechanics and differential and integral calculus, and geometry - analytic, and descriptive and projective geometry"; the Mileva who appreciated Einstein's "pungent" critiques of both their textbooks and lecturers; the Mileva to whom Einstein would "pour out his ideas as they walked home from the laboratories", to whom Einstein would write of the "doubts that would later lie at the heart of his 1905 paper explaining special relativity" -- of his growing conviction that the "current thinking did not 'correspond to reality' in the key area of electrodynamics", that "the introduction of the term 'ether' into theories of electricity led to the notion of a medium of whose motion one can speak without being able to associate a physical meaning with this statement"; a conviction he elaborated in one letter

with "the help of a formula". She was the Mileva who "had become his intellectual confidante", who was the "first person to share his ideas", the ideas he "sketched out" in his letters to her, letters which were the "first evidence of Einstein making a sustained attempt to wrestle with the questions that would one day be answered by his theory of relativity".

And she was the Mileva who filled another essential role in the life of the "hopeless impractical" young man, who like his father, was "never able to make up his mind on everyday matters". She was the Mileva who became Einstein's "Dollie", his "sweet little one", his "little witch", his "little frog", "little angel", "little right hand", "little runaway", over their years together at ETH; the woman who exchanged "a great many letters" with Einstein when they "were frequently separated during vacation"; letters which clearly suggest that "Einstein did most of the running in their courtship", which clearly suggest that Einstein needed her for much more than "reading Helmholtz together" -- that he needed her for her "skilled hands", her "hen-like enthusiasm", for the "sense of order" she brought into his life; that he needed her to provide the "stabilising influence", the "maternal authority" his mother used to provide; that he needed her to be "decisive about everything". (49)

And so it was that Einstein's perfect match with the resources on offer in larger university environment, and more specifically with the complementary knowledge and interpersonal characteristics of his "three close friends", accelerated his development over those four years at ETH. He went from his "naive and incomplete" views of 1895 on the "State of Aether in a Magnetic Field" - the views of a "philosophical", "young fellow", who within a year would be entering the ETH to "study for a teacher's degree" - to those of the

"almost fanatic" young physicist who was going to bring a "freshness and ruthless application of basic principles to the fundamental problems" of the field; to those of the young Helmholtz who had his "doubts" about how physics was "dealing with the way that the motions of charged bodies such as electrons are influenced by electric and magnetic fields", doubts he conveyed to Mileva in his letters of 1899, doubts he intended to address with "experiments he had devised to test them". He went from his "naive and incomplete" views to the doubts of a young Helmholtz, doubts we've have no reason to mention if Einstein had never arrived at ETH in the first place - an arrival, it turns out, that in 1894 was about as likely as one special little snowflake fluttering down through the winter skies and landing right on the tip of Rudolph's nose. (50)

As for the Spwins that got him into ETH in the first place, Albert Einstein in the mid 1890s wasn't exactly the "greatest mind of the 20th century". Nor was he a 'shoo in' for university, ETH or elsewhere. In fact he was just another "precocious", 15 year old with a fascination for physics and maths and a "revulsion for regimentation", who was stuck in the Luitpold Gymnasium getting "the rudiments of Latin and Greek, of history and geography" and maths "drummed into" him, and not exactly looking forward to the further tightening of the screws he'd be facing a couple years down the road when he moved on to his stint of compulsory service in the German military. Whatever about his "mocking" eyes and "propensity to sarcasm", the budding "genius" wasn't exactly doing anything about remedying the situation.

No doubt with good reason. Because at 15 Einstein was also a quite "unsociable" and "introspective" boy; a boy with strong emotional bonds to his "close-knit family"; a close-knit family living in the comfort and

security of a "lavish two-story villa complete with rooftop sun terrace and landscaped gardens"; a close-knit family that ran very "smoothly" under the tight reins of the "powerful woman at its center"; under the "discipline" of Albert's mother, a discipline that had organized his life for years. (51)

The first of that "whole string of unlikely events", those Spwins of Change, which eventually opened the door to ETH came in the summer of 1894, when "the family business failed" and Albert's father accepted an offer to set up a new factory in Pavia, outside Milan. As a result the villa in Munich was sold, and the entire family moved south to Italy, leaving the fifteen-year-old Einstein behind to finish his education in Munich. Watching his family disappear and his home turned "into a construction site", then moving on his own into the "lodging" of some "distant relative", sent Einstein into a "deep depression". The thought of another "eternity" in the Luitpold "barracks", not to mention compulsory "national service" right afterwards no doubt booted him back into action. Knowing full well he was gonna be in deep shit if he showed up in Italy, cap in hand, with no official cover, Einstein managed to get himself a med cert from the local family doctor, stating that "because of a nervous breakdown he should join his parents in Italy". No matter, his "propensity to sarcasm" apparently got to the Luitpold authorities first. They "sent him packing" in the spring of 1895.

So thanks to his father's business failure, combined with the offer from an Italian associate, and hence the family move to Italy, Einstein was now started on his way -- not to another year and a half of "learning gabble by rote", not to boot-stepping round the much more serious "barracks" of "the Imperial Prussian Army", not even to whatever trouble his "caustic"

reactions to such circumstances would have brought him -- but rather Einstein was on his way to the ETH, to the "MIT of Switzerland". (52)

And what did Albert do once he arrived at the family home in Milan in the spring of '95? Try to relocate himself within the Italian school system and finish up his secondary schooling so he'd "acquire the diploma which would ensure entry to a university"? Well not exactly. His "Italian was minimal" so that was out. And The Swiss School in Milan, where his sister and cousin went? They "only took children up to the age of thirteen". Basically his formal education "halted mid-stream", and Einstein spent his time "enjoying the people and the air of freedom", and especially his solo "cultural" tour of Padua, Pisa, Siena, and Perugia, "the main art centers of Italy".

While Einstein clearly did some thinking during this time about the problems of "electricity, magnetism, and ether", after his years getting "ramrodded" in the Luitpold Gymnasium, you can be sure the "prickly" 16 year old -- now "half-cocksure" of himself, "his head full of" - in his father's terms - "philosophical nonsense", "determined to renounce his German nationality and drifting further from parental control every day" -- wasn't about to sign himself on for another trip to the "barracks", German or otherwise. That was gonna take a little more help from his Spwins. This time starring with next round of "his father's business failures".

With the financial pressure jacked up again, his father after him to "apply himself to the 'sensible trade' of electrical engineering", and his mother "pulling strings" to get her son a shot at the "one possible way out" -- sitting the entrance exam for the only Polytechnic in

sight that "demanded no Gymnasium diploma" -- Einstein "was despatched over the Alps" to sit the ETH exam.

Although he had at best only a "vague idea" of what he might want to be in the fall of 1895, the "'sensible trade' of electronic engineering" (read "technician") was not part of it. So Einstein simply failed the exam, the "general-knowledge questions" anyhow. Not that it mattered. Despite himself, Einstein's "obvious scientific and mathematical abilities" so "impressed the principal of the ETH" that, with the "support of an old family friend" living in the area, they managed to get "the boy into the nearby cantonal school at Araru, where a year's study might enable him to pass the ETH entrance exam". (53)

At Araru the third and final round of Spwins occurred. Instead of another year of studying with the "obedience of the corpse", Einstein experienced "one of the happiest periods of his life". At the "small country school" for "the first time in his education", Einstein "found a school that perfectly suited his temperament". The principal, Professor Winteler, was "a liberal-minded man and highly respected teacher who treated his pupils as adults and approached education with a free thinking manner". And beyond that, Einstein lodged with the Wintelers throughout his time at Araru, developing a "close and lasting relationship" with 'Papa' and 'Mutti' who soon "became a second family to him".

As a result when next round of ETH entrance exams came up in the summer of 1896, the 17 year old was not only sitting right on door step of the only 3rd level institution that would consider him without a diploma, he was also ready and eager to sit the exams.

That gives us a quick glimpse of - to borrow Bill Russell's words again - the "whole string of unlikely events" which was essential to the development of Einstein's Special Theory of Relativity, ie, that string of seemingly irrelevant, often tiny, coincidences which turned out to have massive consequences in relation to accelerating the development of Einstein's ideas and capacity to think creatively about (and finally resolve) the contradiction between Maxwell's "world of electromagnetism where light was propagated at a constant speed which could not be surpassed" and the world of "Newtonian mechanics" where it was "possible to increase the speed of an object indefinitely by adding more energy to it". In short, the chance combination of circumstances which created the opportunity for Einstein to gain access to The Right Kind of Problems for him to accelerate the development of his capacity to think creatively about the Maxwell-Newton conflict and eventually develop his Special Theory of Relativity, what we are calling the Spwins of Change. (54)

Spwins from Beginning to End

Chaotic Matching occurs at all levels of development from birth through the attainment of greatness. We've seen plenty of early examples of chance events occurring at just the right time to accelerate the development of individuals' Key Characteristics - Norma Jeane being "dropped off" at the Bolenders (vs eg with the likes of Aunt Ana) right at the very beginning of her life; the oil boom hitting Okemah just as Woody's "intellectual curiosity", his desire "to know", to "take part in parental roles" were all skyrocketing;

World War I arriving just as Hitch was needing free access to a university education. The same is true when it comes to solving the final problems - the key problems of your field, of your generation; the kind of problems which can put you in the textbooks, the history books, the halls of fame; the kind of problems which with any luck will turn you into an icon, a living image, a part of the culture, the language. . . or at least, as Utah Phillips would have it, "a rumor in your own time".

The discovery of the chemical structure of DNA, ie of the double helix, by James Watson and Francis Crick in the early 1950s provides a compelling example of such Chaotic Matching in action - of chance events accelerating endgame problem-solving. We can start by looking at what Crick was doing before James Watson arrived at the Cavendish Laboratory of Cambridge University in fall of 1951. (55)

Prior to Watson's "arrival in Cambridge, Francis only occasionally thought about DNA and its role in heredity". Not that he wasn't interested. "Quite the contrary" - he was well aware of Avery's recent experiments which "showed that hereditary traits could be transmitted from one bacterial cell to another by purified DNA molecules", a finding which clearly suggested that DNA, not proteins, would "be the Rosetta Stone for unravelling the true secret of life". Still, prior to Watson's arrival Crick wasn't "working on DNA at all". And with good reason. For starters "his colleagues at the Cavendish were only marginally interested in the nucleic acids" - a situation Francis Crick was scarcely in any position to change. For one thing at 35 he was "still a graduate student" who had yet to finish his Ph.D dissertation, an activity he was not exactly rushing to completion. Not for lack of ideas. In fact Crick's interests "spread far beyond the confines of protein crystallography. Anything important

would attract him". He would "frequently visit other labs to see which new experiments had been done, quickly seize the facts, reduce them to coherent, clever patterns", and "almost immediately suggest a rash of new experiments that should confirm his interpretation". "As a result, there existed an unspoken yet real fear of Crick, especially among his contemporaries who had yet to establish their reputations".

And those who weren't intimidated by the Cavendish's "problem child", even if the finances had been readily available, were not about to invest the "two or three years it would take to set up a new research group devoted to using X-rays to look at the DNA structure". In contrast to the States where every scientific problem was open season for anyone qualified and resourced to take it on, England's scientific community in the early '50s was both tiny and "cosy" and, as such, governed by a "sense of fair play". As a result "at the time molecular work on DNA in England was, for all practical purposes" regarded as the "personal property" of Francis' friend and fellow scientist, Maurice Wilkins, who had already been "working on it for several years" two hours down the road at King's College, London.

In short, prior to Watson's arrival there was no way that Francis Crick (whatever "thoughts about DNA" he had lurking in the "back recesses of his brain") was going to turn his attention to the problem.

What happened to Crick as result of James Watson's arrival?

For the first time - not surprisingly given Crick's prior history and reputation at the Cavendish - he found a colleague who wasn't offended or intimidated by him, but in fact shared a "certain youthful arrogance, a

ruthlessness, and an impatience with sloppy thinking" - a style that "came naturally to both of them".

And beyond this, the two of them not only shared "thought processes which were fairly similar" but also an extensive and complementary range of specialist knowledge relevant to solving the problem. Crick knew "a fair amount about proteins and X-ray diffraction" and Watson knew "about the experimental work on phages (bacterial viruses) and about bacterial genetics", and both were knowledgeable about "classical genetics". And crucially both Watson and Crick had an "intimate knowledge" of how Linus Pauling had used "exact and careful model building" (which incorporated the "known interatomic distances and angles") to simplify the problem solving process in his recent discovery of the *alpha* helix.

Finally, like Crick himself, Watson was "looking for gold" and believed that "there might be a short cut" to the jackpot, ie "that things might not be *quite* as complicated as they seemed". In short, Crick had found a colleague who also believed that "the central problem in molecular biology" - "the chemical structure of the gene" - was there for the taking.

Not surprisingly, the two of them "hit it off immediately" - "within a few days after Watson's arrival, they knew exactly what to do: imitate Pauling and beat him at his own game".

Beyond their extensive and complementary intellectual backgrounds, their common interpersonal orientation - the one which resulted in Max and John Kendrew deciding to give them their own office so they could "talk together without disturbing the rest of us" - there were at least two other factors which were essential to Crick & Watson's success as a team.

For one thing there was "no external pressure to get on with the problem". It wasn't the work they were getting paid to do, or work that was being supervised like Crick's Ph.D. There were no deadlines for funding reviews or conference presentations. They "could approach the problem intensively for a period and then leave it alone for a bit". They could work at their own pace, in accord with the rush and flow of their ideas and developing knowledge.

Even more crucially - no doubt reflecting their "astonishingly similar" interests, complementary knowledge, and intellectual 'ruthlessness' - Crick and Watson soon "evolved unstated but fruitful methods of collaboration", ie "if either of them suggested a new idea the other, while taking it seriously, would attempt to demolish it in a candid but non-hostile manner".

Having the necessary complement of intellectual and interpersonal resources between the two of them, and having rapidly evolved into the right kind of Team, allowed Watson and Crick to take on the problem of the chemical structure of DNA. Even though they "could not at all see what the answer was", together they were able to "think about it long and hard" from any relevant point of view". Together they were "prepared to make (the massively) demanding and intellectually exhausting kind of intellectual investment" which would be required to seriously attempt to solve the problem of the chemical structure of the gene.

With such a Team they were able to sort their way through two years of "false trails" and "cul-de-sacs"; two years of gradually refining, narrowing, and re-charting their search. Two years which culminated with their paper of April, 1953. A paper which described the double helix and added - in a brief aside

- that "it has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material".

Chaotic Matching. In this case resulting in both Crick and Watson getting The Right Kind of Problem and the right kind of Team to solve it.... not to mention the right kind of Prize to boot. (56)

Where to Look for Spwins

Spwins obviously can operate at any point in a person's development and can work their influences in a multitude of ways, some less obvious than others. (57)

An easy way to check this out for yourself - in relation to your own greats, heroes, icons – is simply to look for them next time you're flipping through a biography or Wiki site. Every biography is laced with Spwins, but they are rarely flagged or spelled out in any detail. No way they're gonna be highlighted as the drivers of development. At best they'll be given as background / contextual information surrounding the person's individual efforts - striving, coping, struggling – to find mself, s direction, s future path.. ie the cause is in the individual, not in the interactions, not in the chance Spwins without which the development would never have happened. Afterall where would we be left for heroes if that sort of nonsense were allowed to clutter up our biographies...

So humour me for a few moments and we'll zoom in on the sorts of places where such Spwins are likely to be lurking, starting up close and personal, then spreading

out into the wider realms of society and culture. Let's look at three levels: Primary, Secondary, and Tertiary.

Primary Spwins – Chance events in personal and interpersonal worlds which accelerate the development of a person's Key Characteristics.

Take Herman Melville, the author of “The greatest book of the sea ever written”. How did this young man, born into “the highest aristocracy in the country”, manage to get himself “crammed for months”, as a “common sailor”, into the forecandle of a South Pacific whaling schooner, crammed into “one of the only places in (1840s) America where different races, even blacks and Indians, mixed on equal terms”, where “half a dozen languages” were spoken? How did Melville by his early 20s manage to get the personal lived experiences he needed to create Ishmael, Ahab, Tashtego, Daggoo, and the rest, whose stories are at the heart of *Moby Dick*?

Simple. The Melville family dry goods business went bust and Herman's father died when he was twelve. Following several “further financial reverses” his older brother, “now head of the family”, “secured him a berth as a cabin boy on a voyage from New York to Liverpool”. With this experience in hand, following several “false starts”, Melville's “life began” when he “like Ishmael.. again answered the call of the sea” and embarked for the South Pacific as a “common sailor” on the whaler *Acushnet* in January 1841”. (58)

Or how about Frida Kahlo, currently sitting here in front of me on the cover of *The Wiley Handbook of Genius*, alongside Einstein, Curie, and Mozart.. not to mention Jimi Hendrix and Bobby Fischer.

Although born to an upper middle class background not dissimilar to Mary Cassatt or Berthe Morisot, Frida Kahlo didn't exactly start her artistic career heading down to the Louvre. Fact is, she never had any such visit, or career, in mind. "In 1922, (she) was enrolled in the Escuela Nacional Preparatoria, one of Mexico's premier schools", with her mind set on a career in medicine.

Three years later, while "riding in a bus", Frida was nearly killed when it "collided with a trolley car". She suffered devastating injuries, including a broken pelvis, collarbone, and spinal column. Immobilized "for three months after her accident", and working with a "special easel" that her mother "had made for her so she could paint in bed", Frida began "paint(ing) to occupy her time", as "a way to entertain herself and express her pain".

At this point, after finding a new and totally unexpected escape from her daily miseries, Frida "abandoned the study of medicine to begin a painting career"; and from that time on the "self-portraits" for which she later became famous "were a dominant part of her life". (59)

Or how about Allen Ginsberg, in his early 20s when he wrote *Howl*, "The Poem that Changed America". No surprises... (see 60)

Secondary Spwins - Institutional and societal developments - events which at their onset and perhaps over a fair degree of their development have no relation to the individual - 'out of nowhere' suddenly create chance opportunities for accelerated development of the individual's Key Characteristics.

A couple short excerpts from two lives we've already considered:

The impending onset of World War 1 opened the doors to virtually free access to third level education in Britain in order to prepare many more people with skills that would allow them to contribute to the "war effort". A 15 year old Alfred Hitchcock - out of school and with "no special skills" or direction - enrolled in a variety of these evening courses. Starting with the likes of "navigation", "blacksmithing", and "screw-cutting", he eventually found his way to "art history", "drawing", and "painting", ie, the courses where Hitch discovered a "new part of his inner life", a part whose development started accelerating as soon he "took up his sketch pad".

As a result not long afterwards Hitch's "fifteen shillings a week office job at Henleys Telegraph and Cable Company" was suddenly transformed into a launch pad for his entry into film. Spotted by a supervisor sketching during "breaks at the office", Hitch was transferred from his job "calculating the sizes and voltages of electric cables" to "the advertising department", where "he could draw to his heart's content".

And so it was - some 3 or 4 years of daily sketching practice later - when Famous Players-Lasky (as in Paramount Pictures) opened its new, War delayed, London studio just down the road in Islington - that Hitch walked in, portfolio in hand, and was "hired at once" to "work on title designs". The rest as they say was.. well actually more Spwins. (61)

Similarly, would Bill Russell - that "easily forgettable

high-school player” - ever have reached a position to transform professional basketball if Brick Swegle hadn't been needing players from the major Northern California basketball powerhouses in order to establish the reputation of his California High School All-Stars tour back in the early '50s?

As Bill Russell was the only player graduating mid-year on the McClymonds team in January, 1952, Swegle had no choice – it was either Russell or no one from “the best team in Northern California”.

As a result, Russ was selected for the All-Star Tour and got to spend four intense weeks touring the Pacific Northwest, sitting on the bench game after game, studying the moves of the “real All-Stars”, and in process develop his unique, game-changing, abilities as a defensive center – becoming the first person ever to block shots in professional basketball, and in the process transform the way game was played.(62)

And what of the legendary Bob Marley??

When the 21 year old left Kingston to visit his mother in America in February 1966, he and the rest of the Wailers - in their “short Rude Boy haircuts” - were all still playing “soulful ballads, ska-rockers, (and) Rude Boy anthems”, with not a hint of Reggae to be heard.

By the time Marley returned to Jamaica – 7 months later in October 1966 - the country had changed massively both culturally and musically.

The Rastas had become more than “the spiritual alternative to the anarchy of the Rude Boys” in the ghettoes of western Kingston. “Rastafarianism had hit the headlines when His Imperial Majesty Haile

Selassie... made a state visit to Jamaica in April” of ‘66 and “prominent Rastas... were included in the official delegations” accompanying him on his visit.

Then, by July, ghetto life had plummeted back to normal, as the government bulldozed the huge “squatter’s camp at Back O’ Wall”, with thousands of Rastas losing their homes, and many being arrested or otherwise “brutalized by the police and army”.

Following on this and the race riots of the previous summer, the “temperature in Kingston” had risen to “a feverish pitch”. The “struggle for control of Jamaica.. was turning into armed conflict”, with “agents of the two political parties... pressing the previously anarchist Rude Boys into goon squads... Violence in the ghetto (had become) systemized, turning once open neighbourhoods into militant enclaves controlled by gunmen and party bosses.”

In the midst of this, inspired by Selassie’s visit, the “asceticism” of the Rastas – “shunning alcohol and salt, and eating only fruits, roots, grains, vegetables and fish – elevated the usual degradations of poverty and the.. hopelessness of ghetto life“ into a new “black consciousness”, a “black religion”.

Not surprisingly, “Bob Marley’s identity as an observing Rastafarian began to blossom after his return to Jamaica” in the Fall of ‘66. “His hair began to knot up and a sparse beard sprouted”. Not only his, but his fellow Wailers as well. “Peter Tosh also began to let his hair grow”, and Bunny was already a “Rasta enthusiast” by the time Marley returned.

And Rita Marley?

Bob’s wife had been there on the streets when “Selassie’s motorcade flashed past”, and she had

actually seen “the mark”, that “nail-print of the crucifixion” in the “centre of his hand”, as he raised it and “waved to her”.

The “*black* redeemer, the almighty ever-living God on earth” had brought a “new black consciousness” to Jamaica. “More than just civil rights and black power”, Selassie had brought a “black religion”.

And so it was that by early '67 the Wailers had become “the first of the Jamaican vocal groups to adopt the style of the Rastafarians, eating a fairly strict diet, smoking huge amounts of ganja, reading the Bible daily, and speaking in the esoteric patois of the dread adept”.

This cultural shift was also accompanied by “major structural changes.. in Jamaican music” - Changes triggered by the “extremely hot, uncomfortable summer of 1966”, a heat which “slowed down.. Jamaican dancing”, which “demanded a new beat”. “Almost overnight the quick bouncy ska step evolved into a beat whose “prevailing rhythm was.. much slower, more relaxed and sensual”, a “beat the musicians were calling rock-steady”.

The Wailers prior legacy of “soulful ballads, ska-rockers, (and) Rude Boy anthems” was now behind them. From now on it would be Rasta rock-steady. In Bob Marley’s words: “People like I... we don’t want to stand around playing and singing that ska beat any more. The young musicians, dem have a different beat. (It’s) rock-steady now, eager to go!” And so they did...

Barely 7 months out of Jamaica, only to find on his return that all had changed; and with it the lives and music of Bob Marley and the Wailers.

And so we have those *Three Little Birds* still *Stirring It Up*; the *Redemption Song*, those *Buffalo Soldiers*, that *One Love*, and all the rest still *Jamming* with us even today. (63)

Tertiary Spwins - Long term change processes in a culture/society which have major multifaceted effects on the development/ assessment of an individual's creative work, sometimes even transforming long-finished work into greatness.

We're already considered this in relation to the likes of Monet, Lincoln, and Darwin. It'd be easy enough to do same with, eg, Jane Austen, whose first edition of *Pride and Prejudice* "barely cleared a few hundred copies" back in 1813. Yet today she is "no longer a writer but a phenomenon", the same one who's about to bounce Darwin himself off the British 10-pound note.

Or how 'bout Van Gogh, who "had only (sold) one canvas at a decent price" before his death in 1890. Yet within thirty years his work was so valuable that it had generated a "proliferation of forgeries". Hint: think Modernism, World War I, and the perfect icing: A martyr who died for his art.

And today? No sweat. A couple million'll easily get you started on a bid at Sotheby's or Christie's. (64)

Now let's look at another life in some detail. Let's look at how changes in society/culture not only opened door for his work to be assessed as great, but likewise

opened the door for this work to be done in the first place – Mark Twain.

What was the man who “found a voice for his country” doing in 1860, when the bonanza boomtowns of the Wild West became the “only place” in America where a new voice such as his could have emerged: “Out west” where “there were no rules, no frowning Calvinist pieties”, no “dutiful Augustans”, no Civil War politics “casting a chill on the national literature”, stifling “aesthetic innovation” with “partisan polemics”. What was Mark Twain doing to cash in on this bonanza? Not much.. in 1860 he didn’t even exist.

But the twenty-five year old Sam Clemens did. He was piloting “paddle-wheel steamers” up and down the Mississippi, in his “riverman’s watchcap”, hoping, in his words, “to follow the river the rest of (his) days”.

Not that he hadn’t done any writing. Sam Clemens had in fact “been toying.. with storytelling.. since childhood. He was ever at it, writing for “recreation, venting, (and) showing off”. Sam was ever at it, but he’d never given a thought to “its depth or worth”, to writing as a way of life.

In February of 1861 when the Confederate States of America formed with Jefferson Davis as their President, Sam Clemens had no more interest in becoming an author than he had in the war soon to be raging round him; but, to paraphrase Leon Trotsky’s famous observation not so many years later, it wasn’t long before the war took an interest in Sam.

By the summer of 1861, Sam Clemens found himself “living virtually as a fugitive”, dodging recruiters from both the Union and the Confederacy, recruiters ever hungry for new riverboat pilots, pilots who were essential to controlling the Mississippi, pilots who were

now regularly being recruited with a gun to the head. Deciding a quick three month break from his riverboat piloting wouldn't do any harm, Sam "didn't stop running... until he reached Nevada".

And there he was soon at it, full throttle. No, not writing.. his other affliction: chasing the quick buck. Sam caught the "gold and silver fever", investing in, eg, timber fortunes he soon burned down, and 1000s of empty "mining 'feet'". And so it was that by the fall of '62 –fully conversant with iron pyrites, water rights, and underground springs, with selenite crystals, and mines that "did not exist" - Sam Clemens was completely "played out".

So he "hiked 120 miles north to Virginia City", where, "coatless in his slouch hat", with "his pantaloons stuffed into his boots", his beard "foliating halfway down to his waist", and "a navy revolver thrust under his belt", Sam Clemens walked into the 'offices' of the *Territorial Enterprise*, hoping to hustle up a few bucks with his pen.

Three years in existence, the *Enterprise*, was "easily the liveliest, if not exactly the most reliable, newspaper on the American continent". Well suited to it's boomtown audience, it was a paper where "much of what (was) printed could be summed up in a two-syllable phrase, had there been enough bulls in the region to support the metaphor".

So rather than "focusing on the facts that any fool could observe and report", the new "fledgling reporter" reported "facts that would have occurred in a better and more interesting world". And he wasn't alone. The paper was staffed with a "coterie of brilliant, adventuring young poets and misfit writers who (like Sam) had found their way to the *Enterprise* generally

by chance". Sam's "tutor", Dan DeQuille, for eg, had recently "turned in a piece about a fellow who invented a suit made of India rubber that would offer protection.. from the desert heat via a battery-controlled 'air compressor'. The inventor had launched out on a hike under the scorching sun of Death Valley", only to later be "found (dead) on the valley floor, frozen", with an "eighteen-inch icicle (hanging) from his nose". The unfortunate had apparently "flicked the compressor on, but.. forgotten to flick it off".

Clearly at home in such company, within a week of being hired Sam's news reports had "graduated from exaggerations to outright hoaxes". And before the year was out he had "lobbied" his way up to covering the "legislature beat" in Carson City.

The first of his reports back to the *Enterprise* came in a form of a letter, and offered little surprise. Sam, like DeQuille and the rest, was ever reporting on the world that "thrived.. transported and enlarged.. inside (his) imagination". In this case a "party hosted by former California governor J. Neely Johnson" at which a rival reporter, having stolen Sam's clothes, "stood and flattened his nose against the parlor window, (looking) hungry and vicious" until "Col. Musser arrived with some ladies (and) he fell in their wake and came swaggering in".. packing Sam's "heavy gold repeater".

The letter, which "ran in the *Enterprise* on February 3, 1863", was signed by the latest of Sam's pen names, one "Mark Twain".

Courtesy of the American Civil War, the boomtowns of the Wild West, and Sam's failure to hustle up a quick buck, "the true father of all American literature" had "finally (found) his calling". (65)

Women and Other Outsiders

That's it? Mark Twain, Marley, Mozart, Monet... Elvis, Hitch, Einstein, and Woody.... And the women?? Aside from Marilyn, barely a look-in, and with good reason. No surprises here. How'd Virginia Woolf put it back there in '29: All you need is "money and a room of your own.." And historically, even with cash in hand, those rooms for women were damm hard to come by.

Remember Maria Winkelmann - the most famous female astronomer of her era – who after "working together as a team" for almost 20 years with the top man at the Royal Academy of Sciences in Berlin, finally made it to the top office herself following his death in 1710.. well sort of. She was appointed to serve as her son's first assistant.

Or how bout Wolfgang's older sister, Maria Anna? touring those royal courts of Europe – Munich, Vienna, Paris, London – often as the top billing of the two "prodigies of nature".. And after that? Seems her career came to an abrupt end in 1769. She was, afterall, of "a marriageable age".

And so forth up til Queen Victoria's death in 1901. Well 2 years later to be precise, when Marie Sklodowska Curie became the first woman ever to achieve greatness in science. (66).

How did she get from birth to greatness? Exactly the same way Marie Winkelmann, Maria Anna Mozart, and so many others did not. Unlike them, Marie Curie, you might say, ended up in the "circle of men", or more

precisely, in several circles of a few key men. Circles of men who gave her access to essential developmental opportunities throughout her life; and beyond this critical support and leverage at key points in her scientific career. Much like Einstein, Elvis, Monet, Mozart, and the rest of the lads got over the course of their lives.

None of this takes anything away from Marie's obvious genetic potential which must have been there from the outset, or her intense struggles and efforts for that matter - bit like, say, Maria Winkelmann, Margaret Cavendish, Eva Ekeblad, Maria Sibylla Merian, Marie-Anne Peiret Paulze, Lauri Bassi, Caroline Herschel, Mary Fairfax Somerville.. You remember Mary... presenting her paper, "The Magnetic Properties of the Violet Rays of the Solar Spectrum" to the Royal Society back there in 1826. and after that..?? Exactly.

Aside from those handy circles of a few key men, some other familiar items keep showing up in Marie Curie's life: A cultural/societal crisis; massive, new creative opportunities opening up in her field at just the right time; and of course critical chance events in her own life – all happily arriving just as needed, and bringing with them key developmental opportunities for Marie. Bit like Einstein, Elvis, and the rest of the lads, now that you mention it.

Let's take a look.

Marya Sklodowska's mother was the "director of a prestigious private school for girls" in Warsaw, and her father the "director of two Warsaw gymnasia for boys", where he also taught "mathematics and physics". And they both "worshiped their profession". You can see where this is heading.. At four 'Manya' was already "quiz(ing) her older sister on her letters". Plain sailing.. well not exactly.. by the time she was eleven Marya's

“oldest sister had died of typhus and her mother of tuberculosis”, and beyond that by the 1870s, the whole of Poland had been divided up between the Russian Empire, the Kingdom of Prussia, and the Austro-Hungarian Empire. How’d Chancellor Bismarck put it: “Hit the Poles till they despair of their very lives... if we are to survive, our only course is to exterminate them”.

Not surprisingly, Marya’s early education was “in an atmosphere of political intimidation and oppression.” The Tsarist “Russians ran Polish schools like police states”. “Teachers were fired and children punished for speaking their own language. As Russians took over Polish teaching positions, Marie’s father - “eventually fired by his Russian supervisors for pro-Polish sentiments” - “moved from job to job, apartment to apartment”, finally ending up so poor he had to take in “student boarders for tutoring”. At one point it “became so crowded that Marya slept on a sofa”, and got up “early each morning to clear the room for the boarders’ breakfast”.

And her education? For starters she was still surrounded by a family who all “believed fervently in education”, and her father was still teaching physics and mathematics. In fact sometime back, when the Russians “eliminated laboratory instruction from the Polish schools”, he’d taken “much of the lab equipment home” from his gymnasium, and put it to good use - “instruct(ing) his children”. And beyond this...?? Talk about cultural/societal crises opening up key developmental opportunities... By the time she reached her early teens, Marya was studying in schools that were “centers of Polish nationalism and organized resistance”, where education had become “a patriotic duty and a moral imperative”. The sorta thing that might just crank up the motivation a wee bit.. especially as by this time the “responsibility for preserving Polish culture fell – not on Polish soldiers –

but on young middle-class Polish women like Marya”.

At fifteen, after graduating “first in her class in every subject” at her Warsaw gymnasium, Marya “collapsed”. So her father sorted a year off for her - “visiting relatives in the countryside and enjoying herself”. And after that? Join her brother at the University of Warsaw? well not exactly - “the Russian government prohibited women from attending any university”. And so? So Marya spent the next year “with her father in Warsaw”, doing “some tutoring” and getting involved in another “center of organized resistance”, the “Flying University”.

Set up by a “group of Warsaw intellectuals called the Positivists”, after the last armed uprising had collapsed in the mid-1860s, the “clandestine flying university” promoted - among other things - women’s emancipation, abolition of class distinctions, education of peasants, and science. . Here “anyone could attend secret lectures in return for teaching one”. Any guesses as to what Marya mightta been teaching. Needless to add, “women formed the backbone of the movement “. Talk about cultural/societal crises creating key developmental opportunities, and of all places.. in a ‘circle of women’.

At this point Marya made an agreement with her older sister, Bronya - first Marya would help pay Bronya’s way through medical school in Paris; then Bronya would reciprocate with Marya’s educational expenses. Then for what turned out to be the next 6 years.. Marya worked as a governess in several positions – as home tutor in Warsaw, with the landed Zorawski Family in Szczuki some 60 miles from Warsaw, then back in Warsaw again until late 1891.. all of these positions obtained via family contacts, or more to it, via being inside a small circle of a few key men.

As a result throughout all this time Marya continued to expand her scientific education, via reading books, studying the math tutorials her father sent in his letters, accessing the technical library available via her relative Zorawski at his sugar beet factory, which also provided her with twenty chemistry lessons from a factory chemist while she was the family's governess, then later back in Warsaw, beginning her "practical scientific training (1890-91) in a chemical lab at the Museum of Industry and Agriculture run by her cousin, Jozef Boguski, who had been an assistant in Saint Petersburg to the (famous) Russian chemist Dmitri Mendeleev." Needless to add in addition to her work as governess which involved extensive tutoring of the Zorawski's and other children, she continued studying at the Flying University.

Somewhere in the middle of her six years working as a governess, Marya happened into one of those chance events that ends up being a lottery jackpot - bit like Marilyn picked up when her mom dropped her thirteen day old daughter off at the Bolenders for seven and a half years, or Einstein cashed in on because his good buddy Marcel Grossmann's old man happened to be pals with the Director of the Bern Patent Office. Marya fell in love with the Zorawski's eldest son, Kazimierz. a mathematics student, home for the summer from the University of Warsaw. "Appalled that their son and heir was planning to marry a penniless governess", the Zorawskis "forbade the engagement", thus keeping the door open for Marya to eventually make it to Paris and hence to Pierre Curie.

Marie enrolled in the University of Paris in Nov 1891. Though "poor like most other students, she rented a sixth-floor garret room"; and like most anyone with a passion who finally gets that "room of one's own", that "precious sense" - in Marie's words - "of liberty and

independence”, she dove into her science and mathematics, barely noticing whatever scraps were on the table for the next few years, earning the “equivalent of a master’s degree” in physics and then a second in mathematics.

In 1894 Marie met Pierre Curie, who at 35 was already “an important physicist specializing in crystals and magnetic materials”. “An idealist.. teaching at a new technical school for talented working-class Parisians”, Pierre earned about the same as a “day laborer while conducting his famous magnetic experiments in the hallway between his lab and a staircase”. Marie at the time was “still dreaming of returning to Poland to teach physics.. in girls’ high schools”. Pierre wanted them to “share a life consecrated to scientific research”, arguing that she “could do more and better research in France than in impoverished Poland”. He even offered to make “the ultimate sacrifice.. (ie) to give up his research career and live in Poland with her”. At that she “gave in and agreed to marry him”, with Marie and Pierre’s father now “convincing him to finish his doctoral dissertation in order to qualify for a professorship and a laboratory”. Marie had now “found a new love, a partner, and a scientific collaborator on whom she could depend”, not to mention yet another circle of a few key men.

With his doctorate in hand – ground breaking research on “the relationship between temperature and magnetism (which) became known as Curie’s Law” – and a “strong recommendation of the great English physicist Lord Kelvin, Pierre was now promoted to professor”, with “the comfortable income of six thousand francs a year”.

Two years after their marriage and “a month before Marie’s thirtieth birthday”, the third family Nobel Prize winner was born – their oldest daughter, Irène. Marie

Curie at that point was "one of only two women working for doctorates in Europe". And who moves in with them, "to care for the child" so Marie can keep working on her doctorate - Pierre's widowed father.

Irène Joliot-Curie was born in September, 1897, and her mother started "looking for a research topic for (her) doctoral dissertation" three months later... 'round about the time one prominent German physicist was announcing that "Nothing else has to be done in physics except make better measurements". Not being all that interested in making a few better measurements, and preferring to "work in a totally new field where she could do laboratory research instead of library reading", Marie decided to dive into the brand new research area which had just opened up with "Henri Becquerel's discover(y of) radioactivity in uranium in 1896".

After all, if you're gonna become a great in science (a la Einstein), or for that matter Rock 'n Roll (a la Elvis), nothing beats being on the spot, fully geared up with tools in head and hand, just as a massive new area of exploration opens up in your field.

Becquerel "had shown that.. radiation emanate(s) from the element uranium.. and that uranium makes the air around it conduct electricity". Marie "realized that this phenomenon, called ionization, could be used to detect radioactivity in other substances", and "she decided to conduct a systematic search of all the known elements" to try to figure out the "cause of (the) radioactivity".

So Pierre secured "space at his college for her to work, and - using the "piezoelectric quartz balance", an instrument which Pierre had invented several years earlier - Marie was now able to "measure weak electrical charges" emanating from atomic elements

such as uranium.

“Within days of starting her project, Marie discovered that another element, thorium, produced the same powerful effects as uranium”. Following this, she compared the “electric current produced by different uranium and thorium compounds”, and “discovered a simple, but totally unexpected, phenomenon: the strength of the radiation depends only on the amount of uranium or thorium in the compounds”. Thus “she deduced radioactivity does not depend on how atoms are arranged into molecules” (if it did, different compounds of, eg uranium, would have given off different amounts of radiation). Radioactivity, she concluded, “originates within the atoms themselves”. “Intrigued, Pierre ..dropped his own beloved crystal research and joined Marie’s radioactivity project... never return(ing) to crystals”.

No doubt her doctoral dissertation supervisor – Professor Becquerel - found it equally intriguing.

From mid-1898 on Marie and Pierre worked together on their lab table, covered with “chemical apparatus”, in the only space available – “an abandoned dissection shed” at Pierre’s school. It was “stifling hot in summer and freezing cold in winter”, more or less a “cross between a stable and a potato cellar..” Here the two of them “shared physics and chemistry work, moving back and forth between the disciplines as they proceeded”, “handling radioactive material” and “breathing radon gas” and in Marie Curie’s words, spending “the best and happiest years of our life”; and by the time 1903 rolled around, Pierre got word from Magnus Gösta Mittag-Leffler, “one of the most powerful Swedish physicists” who was on the Nobel committee, and “a great supporter of women scientists”, that the Nobel Committee were figuring him and Becquerel for that year’s Nobel Prize in Physics. And Marie??

Seems the French Academy of Sciences had somehow forgotten to mention her in their recommendation. Ah you know the lads.. probably figured she's been tidying up or serving the tea.. as you would.. Only problem: Pierre wasn't all that hot on the tea service, as in: "car(ing) little about prizes himself, but want(ing) his wife to get credit for her work" he wrote back to Mittag-Leffler: "If it is true that one is seriously thinking about me, I would very much wish to be considered together with Madame Curie with respect to our research on radioactive bodies". That left only one slight hitch: "Marie Curie had not been nominated for the 1903 prize". No problem, she had gotten a couple nominations the year before.. a little bureaucratic tweaking here and there.. and zingo: The Nobel Prize for Physics in 1903 was awarded to Antoine Henri Becquerel "for his discovery of spontaneous radioactivity", and to Pierre Curie and Marie Sklodowska-Curie "for their joint researches on the radiation phenomena discovered by Professor Henri Becquerel".

Speaking of tweaking, changing the above citation from the originally proposed: "For their discovery of spontaneously radioactive elements", left the door open "to award the Curies a second Nobel Prize (in Chemistry) for the discovery of radium", maybe a few years down the line. And sure enough 8 years later, in 1911, Marie collected her second Nobel Prize, this time in Chemistry. And Pierre, "the dreamer who had made Marie Curie's research possible"? He was dead – killed in an accident - and, as Nobel rules prohibit awarding Laureates to the deceased, Marie "shared this award with no one". (67)

And all those other Outsiders?? The ones who'll never even get a shot at a decent Spwin. You know, those generations of slackers most recently spotted climbing

razorwire off Southern Europe? Well that's another book - the kind Chomsky, or Naomi Klein, or Piketty, or Varoufakis, or maybe Guy Standing might write. But in our terms I'd say best not be expecting too many of them to be stepping ashore and cashing in on a lifetime of Spwins anytime soon. After all when you've got 68, or was it 8, of those Forbes – you gotta love this one - “self-made billionaires” owning more wealth than half the world's population, well that tends to tighten up the razorwire a wee bit...

How The Great Become Great – Implications

And as for Heroes? (68)

And that's it? The end of my analysis? Well sort of. After all that final bit re Spwins, Chaotic Matching.. and more to the point, sheer luck, does leave you with the odd few questions about the likes of heroes, greats, icons... In fact, a couple years back I gave a synopsis of *Greatness* to a group of European university students who were visiting Dublin. It was about an hour's talk so I figured I'd covered all the main points well enough. But at the end, in the Q & A session, this guy in the front row - who'd been scribbling notes the whole time - his hand shoots up:

"Could you just summarize the main points... just in a few words, what exactly is the best way to become great?"

Fantasies die hard, especially when they're the core myths of your culture: Individualism, meritocracy... I mean it took me years, and I was writing the damn

thing. So let's give it another go. What is your best bet re becoming a 'great'?

No surprises here... just a two-cent rerun of the analysis. First off, get yourself born into the right kind of family. Not just one that gives you that top 2-5% genetic boost for starters – there's millions of those around – but equally and much tougher to come by, one that has right history, connections, values/expectations... what Robert Albert termed "eminence producing families". You know the ones that go full hog for it, for making the contacts, the Links, the ones who know where to look and know what it takes to get there, that organize themselves 'round putting the in hours, cash, sweat it takes to get junior geared up for say Harvard, or Oxford, or maybe the Dallas Cowboys. The ones that'll give you a fair shot of getting matched up with The Right Kind of Problems for years, at least as far as intelligence goes, whether that be on the court or the keyboard. Course that doesn't guarantee a whole lot, not when you consider where, eg, Elvis or Hitchcock or Newton or Haydn or Renoir or Louis Armstrong came from. Still we're talking odds, upping the odds.

Unfortunately that still leaves you with those other Key Characteristics that'll equally need developing, the ones related to personality and self. You remember Michelangelo's depressions, Ibsen's obsessions, Hemingway's little trips to the Mayo Clinic, Norma's Jeane's *perfect self doubt*... Not much problem getting the right kind of family. Plenty of those around. But getting it to match up with the one you've got pushing the piano lessons or math crams or sports camps... and even if you pull that off, where you gonna find that talented schzoids program? that essential obsessive personality coach?

And beyond this you've still got 20+ years of Chaotic Matching to deal with. Those handy little chance events happening in your world or the ones around you, or maybe the ones around them, those chance events which may or may not show up just when you need them to get/keep you on course, to give you access to those essential problems and resources, to give you that wee jump on the competition, time after time after time... You know, those lottery jackpots like Norma Jeane picked up when she was "dropped off" at the Bolenders for the first 7 1/2 years of her life; like Woody Guthrie got when that oil boom hit Okemah just as his "intellectual curiosity", his desire "to know", to "take part in parental roles" were all skyrocketing; like Hitchcock got when World War I handed him free access to a university education. Like Elvis and Dali and Van Gogh and Lenin and JFK and... got with the death of a brother. Like Einstein got from moving in with his uncle. Like Bill Russell got for being McClymond's only graduating 'splitter'. Like Marie Sklodowska picked up when she married Pierre Curie.

And beyond this what's the odds the culture, the nation, or even your field, is gonna be hungry, roaring, barking just as you happen along, Key Characteristics in hand, all honed up for action... like say Beethoven, Darwin, Newton, Einstein, and Elvis did?

Think about it, what's the odds of you getting the right kind of family on all counts, followed by all those match-ups with The Right Kind of Problems/ resources over and over and over those 20+ years of development, then ending up in the right time and place to have a shot at a key problem of your generation?

Well take something simpler, much simpler. Take golf. What's the odds of shooting a hole in one at the US Masters, or better yet, a couple of 'em?

Over the 80+ years of it's existence, with over 450,000 holes played, there have been 24 holes in one at the Masters, giving you odds of bout 1 in 19,000. And two such aces? Ha.. 19,000 x 19,000 .. that comes in at about 1 in 360,000,000. The likes of Tiger, Nicklaus, Hogan, Palmer, Player, Seve, and Rory have never even come close. And it wasn't as though they weren't trying. (69)

So given you've got the genetic goods to start with, I'd say the odds of getting that 20+ years of The Right Kind of Problems over and over and over, then ending up in just the right time & place to have a shot at the big one are definitely better than 1 in 360,000,000. I mean Elvis and Einstein and the rest of em pulled it off. So it's definitely possible. Only one hitch - That doesn't leave a whole lotta room for the likes of genius, struggle, and courage.

You know, the stuff heroes are made of.

What's It All Mean?

That's it??? No more heroes?!!! No more stars, greats, idols...???

Well that sure as hell wasn't where I started, but it's where I ended up. Fact is, when I started on the question of 'how the great become great', some 20 + years ago now, I spent the first few years trying to prove there were more greats, more than the usual

handful of Mozarts, Einsteins, Picassos. What I really hoped to show was that my guys were greats – greats of popular culture – the likes of Little Richard, and Bill Russell, and Woody. Just like Einstein and the rest of them. You know, greats of rock and folk and basketball. Only problem was after a few years I realized it didn't make any sense. Not Woody or Russ or Richard. Greatness. Those genetic marvels who were somehow born to rise to the top. It didn't make any sense. Talent and effort and struggle weren't the deciders. Sometimes they were barely the givens. The deciders were outside the person, often way outside. It wasn't down to talent, genius, struggle, courage, and the rest. It wasn't down to those core illusions of Western culture. More than anything, if you had to pick one key ingredient, it was simply down to luck. (70).

And as this seeped in on me, over the years I spent working on *Greatness* – those 15 years in the back of Burger King – I started thinking about the why's and what if's of greatness, of heroes, of stars, of celebrities... and especially about the costs of such illusions. About the crap that gets peddled in their names, the crap that kids' spirits, not to mention parents' wallets, and all of our lives, get yoked with for years, for decades, for generations.

I remembered reading Rollo May early on. May talking about the “most important courage of all”, that “one quality possessed by all geniuses”, the courage to “live out their imaginations”, the courage to do “active battle with the gods”... and me thinking about that 16 year old writing to ‘Miss Lonelyhearts’, that 16 year old who wanted “to go out on Saturday nites”, who wanted to “have boy friends like all the other girls”, that 16 year old who “was born without a nose”, who was born with “a big hole in the middle of my face”... that 16 year old

who really knew something about courage, about doing battle with the gods.

Then opening yet another Mozart biography to the author's claim that Mozart was the "best excuse ever for mankind's existence", or reading about Picasso commenting somewhere on how he "saw that look in Van Gogh's eyes", you know that look of determined genius...

And suddenly I see Beaner's old man with that look in his eyes. Up at Forest Hills pool pacing that poor bastard up and down... stopwatch, towel, whistle.. lap after lap, year after year. Beaner who finished second in the Foothill League finals.

And my nephews glued on the tube in their Arsenal and Man U gear, the next Messi or Ronaldo... or was it me and Bill Russell & Bob Cousy...

And those 15, 16, 17 year old Harlem kids, sky walking, hot talking, slam dunking down 111th Street, those future Dr Js and A.I.s living out their genius on some patch of tarmac, those kids now long gone, invisible, dead on the needle.. those kids with that look in their eyes.

And later I'm thumbing through one of Eysenck's paperbacks – *Know Your Own IQ, Check Your Own IQ* -- those handy little paperbacks that topped the British bestseller charts, giving everyone that essential chance to 'Know yourself!', to get yourself sorted in that final peaking order in the sky. and I remember Renee Andrews telling me about her piano lessons as a kid, 'bout the teacher looking at her hands, like there

was something wrong, something unfixable.. like she'd already been chalked up on some final score card for good.

And I remember the young Beethoven, and Picasso, and those kids in Texas junior highs, on that football career ladder – already spinning tales 'bout their age & achievements, fiddling a jump on the old genius ladder, born to be great and shining already...

And suddenly sixth grade comes rushing back, discovering I'm not the fastest in class anymore, not even third.. making that quick switch from the running broad jump to the standing, just in time for the Alhambra Relays, so I can still cop a blue ribbon. Still be the best.

And Detroit. Suddenly I'm back in Detroit. with those kids knifing each other... for what? for an Air Jordan jacket.

Then I remember something else. I remember *Stand and Deliver* - Jamie Escalante and his East LA barrio students cracking that ETS Advanced Placement Calculus Exam way back in '82. I remember Escalante and Ben Jimenez and their principal, Henry Gradillas. I remember that pipeline of junior highs offering Algebra I & II, East LA College offering those 7 week summer crams in Trig and Math Analysis... those 10 years of building a math enrichment program at Garfield High; 10 years of facing down spitballs and leather jackets, of building rep with those kids in their mascara and head nets, of standing together, in and out of class, for La Raza, for Chicano pride, for "the math in their

blood”; 10 years of standing together, teachers and students, for a way out of the barrio; standing and then delivering those kids, year after year, out of their short order futures, delivering them into the likes of MIT, Harvard, Yale, Berkeley, Cal State-L.A. - 10 years of standing and then delivering over and over again in that Super Bowl of high school math, the ETS Advanced Placement Calculus Exam.

And I remember last summer in Miltown. Martin Hayes in his father’s chair. 1, 1:30 in the morning, 400 dripping set dancers, sweat dancers. Martin, filling in his father’s chair with the Tulla... two, three fiddles, boxes, couple flutes, keyboard, drums. The lot of us driving, flying full clatter round that plywood floor in the Mill – the Plain, the Corofin, the Caledonian... 3, 4 hours of home, house, home, of battering, shuffling, scuffling, swinging, passing thru. Martin Hayes from east Clare, the international fiddle star of Irish traditional music, in his late father’s chair for that week in Miltown, the festival he prefers to all others becós there are no stars, no solo concerts, no autograph hunters. Becós Jackie Daly and Joe Burke and Anne Conroy, and Aoife and Paudie and PJ and Brendan Begley and ... might be at that session in Curtins or maybe Queally’s or maybe outside your B&B at 4am, with Four Men and a Dog... cos there’s a 1000, 2000 sweat dancers, fiddlers and broken bodhran box players from Tokyo to Salthill, from Detroit to Mullach jamming hammering Guinness and tea breaks round the Mill, the Armada, the Crosses of Annagh, that parking lot outside the Belbridge... cos the rubber man from Belfast and that bollix from Ennis will all be there, probably in your set.

And as I got further on with the writing of the book, particularly with the gradually letting go of one of my heroes, Woody Guthrie, I discovered some other things. You wouldn't wanna be Mozart at 12, or Keats at 24, or Van Gogh or Norma Jeane most anytime. And you wouldn't wanna miss the 'Aida' at Verona, or Delibes' 'Flower Duet', or Callas, or Dylan Thomas' "gandering hubbies moaning through Milk Wood for those naughty mothering arms, that body like a wardrobe", or Hardy's "sweethearts pinked in sables" or Stephen Dunn at 50, walking onto that basketball court, a "sloth in a country known for its cheetahs and sunsets"... or the first movement of Mozart's G Minor symphony, you know, the one with that wee bit of a gallop Wolfgang must'a needed, no doubt some rainy Monday morning, driving to work.

And I noticed something else, something even odder, suddenly I could watch a soccer or a gaelic match, or even a basketball game, without rooting for anyone. Just enjoying what they were doing and able for... in fact I wasn't even pissed at Billy Bragg anymore, you remember, for taking all the jump out of Woody's lyrics.
(71)

And You & I

No Golds, no Oscars, no Nobels... no Triple Crowns, no Emmys. No matter.

Why? Well check it out. What's the biggest thing you've ever done? The one that matters the most, that you put everything into – arts, sports, business, whatever. Check it out. Run your best work through the pages above, a bit like we did with Einstein and

Mozart, with Marie Curie, with Woody.. or perhaps simply do the final wrapup like we did with Watson & Crick. And remember, the trick is to look beyond yourself, way beyond, and simply check where and when the Spwins came into play for your finest hours.

By way of example, I'll take a look at my own work here, in particular the writing of this book. I'll skip the Key Characteristics and just go for the end game - the 15+ years of researching and writing and rethinking and rewriting..

Just as with Einstein, Elvis and the rest, my talents, efforts, struggles will turn out to be nothing more than the givens. The deciders as ever will be down to chance – down to those endless Spwins without which I never would have touched this work, much less completed it.

Here's how I happened to write *Greatness*:

I didn't move to Ireland back in the '80s to write *Greatness*. I moved here to be with Mairéad. Then, a few years later, while still doing radio and family systems therapy as I had been in Massachusetts, I heard about the Communications School at DCU, and went out just to have a look see.. a look see at what interested me, ie, their radio studios. Only to discover that one of their lecturers had recently resigned.. out of blue.. to take up a post elsewhere. One of their lecturers with exactly the same credentials as mine.. and no, we're not talking radio. He had a Ph.D. in experimental social psychology, and there weren't many of these floating round Dublin in the mid-80s. And sure enough I was back teaching psychology to university undergraduates for the first time in years.. still hoping to weasel my way into that radio studio. As

for *Greatness*.. it was just sitting there waiting for me to spot it.

You see, this time I wasn't teaching at UCLA, or U. Mass, Amherst. I wasn't teaching in a huge university psychology department, divided up into 10 or 12 sub-disciplines – social, personality, developmental, perception, cognition, etc – each with its own hierarchy of courses, and all geared to getting students thoroughly grounded in the theory, quantitative research methods, and developing research questions of the day.

This time I wasn't in a psychology department where every course syllabus was inevitably tightly constrained by its place in the overall psychology curriculum, and where the best students - ie those heading for a second or third credit on a published journal article (or two) before applying for graduate school - were soon handy with stratified random sampling, ANOVAs, and creating their own 2 x 3 experimental designs. And where the rest of the students – especially in intro classes - soon found themselves dosing off over Fybate lecture notes, purchased just in time for those inevitable all-nighters and short term memory crams at the end of every term, better known as multiple-choice exams. And where their lecturers - typically untenured assistant professors - spent their own 60-70 hour weeks getting well stuck into their own research projects, in particular into cranking out as many APA-refereed journal articles as possible in those brief few years before the department tenure committee tallied up the count, and basically gave your career the thumbs up, or more likely, down.

Not exactly the sort of place where you'd kick off your research career puzzling over a mix of biographies re the likes of, say, Einstein, Van Gogh, Malcolm X, and

Little Richard, trying to figure how these developmental accounts might match up with the research of, say, Terman, Albert, and Kroeber; or maybe Simonton, Bloom, and Gardner, or Helson, Feldman, and Winner, or maybe ...

Basically if anyone could have had a go at the core question of *Greatness* – How the great actually become great - in a major university psychology department, fat chance it'd still have been sitting there on a platter, waiting for me to happen by, well over a century after Galton first raised the query way back in '69.

And DCU Communications School? where I dropped in hoping to get a shot at some radio work in the mid-80s... talk about Spwins. First off, as this was a standard public service position in those days, I had tenure within a year without publishing a word. That settled, I was free to chase up my research interests as they developed in relation to my teaching and research supervision. And my students? Crucially they were not psychology majors, but Communications students – students with a wide range of interests across their field and beyond, but most especially in the creative aspects of it, as in becoming photographers, film makers, writers, radio producers, even professional musicians. Basically they were barking creativity, as in "How I can develop my mine??", "How can I get to the top of...??", "How exactly do the great become... ??"

And since production was central to the DCU Communications programme, my first-year psychology course - which was required for all students - was tiny compared to those in major university psychology departments, ie maybe 45-50 students, students I could meet with individually over the course of a term,

to help each prepare a project to write up and present in one of our seminars.

Project? You got it: Get a bio of your favorite great - a bio with solid material re early childhood/adolescent development, and likewise re wider institutional, societal influences on developmental opportunities later on. Then show how 2 or more characteristics which were essential to that person's eventual achievements gradually developed over time. And while you're at it, see if you can spot any chance influences which turned out to be crucial.

And the course this project work was central to? "Social Systems, Communications, and Psychology" - Not exactly the sort of intro course you'd come across in any university psychology department.

As my job was to apply relevant aspects of psychology to the interests and needs of my Communications students, I wasn't confined by existing sub-disciplines or quantitative research methods. I was free to integrate virtually the entire range of my past and current academic interests - a Ph.D. in social and clinical psychology, with a minor in developmental, not to mention several years working and researching as a family systems therapist. Then there was that handy research and theory from my newly assigned course for business students in "Organisational Communications". In short, between them practically every topic I needed was already there, rattling round like loose change in my pocket: The development of intelligence, personality, and self - normal or otherwise; group dynamics, interpersonal influence, and of course creativity; not to mention social systems, operating in families, schools, teams, workplace settings, all under the ongoing influences of institutional and societal / cultural forces. Talk about walking straight into Willy Wonka's chocolate factory.

Not surprisingly, my research and thinking re 'how the great become great' soon took off in a number of short papers written for my students, many of which are now scattered throughout *Greatness*, eg: "Genius for the Few", "Group Creativity", "How to Become a Genius: The case of Charles Darwin", etc, etc, until finally, "Hitch Goes to Hollywood" - the first of the three massive case studies underpinning the overall *Greatness* analysis.

All of these were of course written in a style designed to engage my first year Communications students, ie, with not a Chi Square in sight, hence (even though over half of the book is still brand new to the academic research literature) insuring that *Greatness* would remain forever unpublished.. well, 'cept here.

So that's me.. How about yourself??

Spotted those Spwins yet?

That of course still leaves us with one wee query.

What for?? What was it all about?

If I wasn't the driver of my own best work - the main man, the real Trumper... If I was nothing more than first loser to a load of Spwins, what was it all for?? Why all those years of struggle?

Struggle?? What struggle? We're not talking zero-hour dole queues or thirty-inch coal. We're simply talking buckets of privilege - in my case a job that paid me to

take on a creative problem I would have gladly taken on for free.

Not many get that chance...

And now just one final bit.

einstein and santa claus

Whatever bout You and I, or at least my generation - old lads, boots up.. learning the Gaeilge, maybe a tune or two on my 4 string mando.. *Geese in the Bog, Brosnan's, The Ballydesmonds...* who knows.. might even be up for a slow session come Clancy Week.

But what about those 8, 10, 12 year olds just coming on the scene, with their hopes and dreams, and more to it, heroes? Where would I have been at their age.. out in the back yard.. on that half court dad built for us over a plowed walnut orchard.. still practicing under the lights.. 10, 11 at night. Just me and Russ and Bob Cousy.. dribbling through the legs, whipping it behind my back off that sideboard.. then outta nowhere, suddenly we're up over the rim – me and Russ – flying up over Steggie, hell even Tommy Q.. jamming those jumpers back, straight out to me and Cous.. streaking for halfcourt, another fast break.. the crowd roaring... Yes! Yes!!! Another NBA title for the Celtics.

Of course they can keep their heroes, their hopes, their inspirations. Just the one tweak is all I'm asking, to give us the best of both worlds – reality and fantasy.

All I'm asking is that we tweak the names of our greats, heroes, icons, all of them, ever so slightly so that they, and they alone, acquire the distinction of having totally lower case names... like, for eg, michelangelo, mozart, einstein, & marie... vincent, maya, madonna, bowie, & beyoncé... or maybe elvis, serena, usain, ali, j.k., & che.

Thus as ever their names will capture the image, the vision of their uniqueness, of their amazing achievements, while at the same time flagging how little their own individual efforts, talents, courage, etc, had to do with creating that person, with attaining those achievements.

That way I can still be out there on dad's court in California shooting hoops with Russ and Cous.. leading the Celtics to their next NBA title.. and now, decades later, still be sitting here in my front room in Dublin, having a listen to the old boy, him and mom, still sitting there right in front of me.. still sitting there just off the court on that little wraparound bench I built for them under the last walnut.. just the two of them, still sitting there, still smiling through that frame...

Here, have a listen. See if you can spot the twinkle in the old boy's eye:

"What's the difference between Einstein and Santa Claus?..."

Adults don't believe in Santa Claus."

or was that santa claus.

Notes

(1) (p13 in text)

Before we start the analysis, let's look at a couple other matters which I suspect are puzzling some already.

First, why not use the term 'genius' as that is the standard terminology used in the psychology research literature these days, and it is defined in pretty much the same way as I'm using the term 'greatness' here (cf Simonton, 2009, p44-5). Perhaps the best answer is that I'm trying to address something both wider and narrower than 'genius'. Wider in the sense that the analysis being presented here can be applied to the achievements attained by anyone in any field over the course of their life, ie to greats, geniuses, celebrities, the famous, even the iconic, not to mention you and I and anyone else who might happen along; and Narrower in that historically overtime, as the names of the day get sorted and resorted further down the line - In the ever changing dynamics of culture, society, and field - there will be many geniuses left behind in the wake of the few remaining 'greats'; and the odd few stragglers of yesteryear - the Lincolns, and Van Goghs, the Kahlos, and Austins, and Dickinsons, not to mention Shakespeares - will find themselves - rebuffed and reframed - suddenly stepping out there on the big screen, and gliding down the red carpet.

And the other matter?? Probably more obvious: If this analysis is about greatness, what are Elvis and Marilyn doing in it, not only in it, but featured in it; and worse yet, right alongside Einstein and Mozart?!! Aside from the alliterations in the pairings of names, all four of these have a number of things in common. First off, in terms of the central focus of the book, all of them

solved key generational problems of their era, both within their fields, and within the larger society. and yes, that includes Marilyn, as we'll see below. Moreover all are still highly visible to young and old alike, and will continue to be, as all have become iconic figures in Western Civilization. This is in striking contrast to numerous greats of past generations whose achievements, remarkable as they were at the time, are now virtually invisible and of little interest to the wider non-specialist audience this book is aimed at. For instance, how many of us know anything about Goethe, Leibniz, Grotius, Wolsey, Pascal, Sarpi, Arnauld, Berkeley, Haller, or Laplace? In descending order of IQ, all ten of these, along with Melanchthon, are ranked above Newton in Catherine Cox's (1926) classic *Genetic studies of genius: Vol. 2. The early mental traits of three hundred geniuses*.

I'm not querying the achievements of Grotius, Sarpi, Haller, and the rest, it's just that there is both more information available, and undoubtedly much more interest among non-specialists re the likes of, eg, rock stars, actors, writers, scientists, film directors, athletes, politicians, artists, IT virtuosos, etc of the more recent past.. some of whom are now starting to appear – well at least make bit appearances - in the academic literature, eg John Lennon, John Coltrane, Janis Joplin, Jimi Hendrix, Sylvia Plath, Truman Capote, Bill Gates, Steve Jobs, Bobby Fischer, Muhammad Ali, Nolan Ryan, Martin Luther King, Mother Teresa, and most any U.S. President you can think of, including George W Bush. Not surprisingly, Elvis and Marilyn, not to mention Hitchcock, have also taken a bow or two..

So in keeping with my target audience, I'm going to focus in some depth on Elvis, Marilyn, and Hitchcock, as well a couple other less well known 20th Century greats, not to mention, eg, the Williams sisters, Bill

Gates, Watson & Crick, Michael Jordan, Louis Armstrong, Madonna, Bob Marley, and others... but not to worry, four of Cox's geniuses - Mozart, Darwin, Leonardo, and Lincoln – along with Einstein, Marie Curie, Berthe Morisot, Mark Twain, and a few other old favorites, will also be sharing center stage.. as well they should be... for all of these historic greats, like my more recent additions, have each gone through the same developmental process over the course of some 20+ years of development, a process which I have termed *The Arrival of The Fittest*.

And in a few years time when some.. most?.. of my greats have joined Grotius, Sarpi, and Melanchthon - virtually invisible and of little interest to anyone? No problem. They can easily be replaced by whoever's pulling the crowds, online or elsewhere. And whatever about designer genes and social platforms, we'll still need the same sort of biographical info to trace how they got there. You know, to figure how the next generation of greats – rather than so many others with equal potential at birth – happened to be in the right place at the right time, after time, after time... to make the same journey as Elvis and Einstein, Mozart and Marilyn, and all the rest, will soon be making in the pages to follow.

(2) (p 13 in text)

I've given no definition of 'greatness', much less one that includes Marilyn and Mozart in same breath (and hence in the analysis which follows). Clearly society makes such distinctions. For example, such things as the nature of the field (eg hard science vs pop music), of previous developments in the field (eg prior to Beethoven, to Darwin, to Einstein), of its position/ functions in society and the state of the society itself (eg jazz music pre and post 1920s; computer science

pre and post the mid-1970s; pro basketball pre and during 1990s) all contribute to determining how consequential its creative/ ideological problems and hence their 'solutions', and hence how 'great' those who 'solve' them, are seen to be.

Nonetheless, in terms of the analysis of how the 'great' become 'great' which is presented in this book, it makes no difference if Marilyn and Mozart are grouped together or not. The analysis comes out the same either way.

For purposes of clarity the definition of 'greatness' that I'm using is simply that the creations attributed to a 'great' person force others to rethink, re-evaluate, and rework their approach to related problems within the field/ society. Such creations and the problems relevant to them can of course relate primarily to ways of understanding and dealing with 'physical reality' (eg Newton, Einstein in physics; Bill Russell, Michael Jordan in basketball) or 'social reality' (eg, Luther, Kant, Elvis, Madonna). Not surprisingly a person's greatest works are always both physical and symbolic. Thus, for eg, in relation to my three major case studies, the films of Hitchcock or Marilyn and the songs/writings of Woody Guthrie carry their own unique symbolic meanings, meanings which are inevitably associated with the public image/persona of the person as well as with the works themselves, meanings which change overtime in relation to changes in the field and/or society.

My argument here is related to earlier thinking by Robert Albert in relation to defining 'eminence' (eg 1990, 1975). For example, he argues that "Eminence . . . specifically characterizes performances that are public in the sense of being observed by others and . . . that, once done, affect the performances and lives of others". (1990, p14).

Interestingly, my definition of 'greatness' turns out to be virtually the same as that which is currently being used to define 'genius', eg Simonton, 2009, p44-5; Winner, 2014, p297.

The terms "physical reality" and "social reality" come from Leon Festinger's social comparison theory (1950, 1954). In his own words, "...where the dependence upon physical reality is low, the dependence upon social reality is correspondingly high. An opinion, a belief, an attitude is 'correct', 'valid', and 'proper' to the extent that it is anchored in a group of people with similar beliefs, opinions, and attitudes." (1950, p272).

(3) (p 13 in text)

The likes of s/he, her/him, etc, have never worked for me. So throughout this book as regards Mr. Dylan's query – "How many roads must a man/woman walk down before they call her/him a person?" – I've mostly tried to avoid the question all together. But when forced, rather than give the full answer – that it depends a whole helluva lot on just what exactly that good/bad, old/young, boy/girl/other was doing in Mississippi in the first place – I've simply substituted 'e' for 's/he', 's' for 'her/his', 'm' for 'her/him', etc. This was the best solution I could come up with for myself. Hopefully it won't be too distracting for you as a reader.

Speaking of distractions, I should also mention a word or two about my writing style. Although this book is totally non-fiction much of it is written in an informal, almost story-like manner, with purpose of engaging the reader in the experience. Hence, as with stories, the language and spellings sometimes vary from standard usage. For instance, there are often phrases where one might expect a complete sentence.

Not surprisingly this style of writing may come across as 'loose' or otherwise unappealing to academic researchers, especially those who have done extensive quantitative research on any of the many aspects of creativity, developmental psychology, personality, intelligence, eminence, etc which are considered in this book. If this is the case, I apologize. I simply ask that you forgive my style for a moment and check the relevant Notes to see the extensive research and thinking behind each of the assertions in the text.

(4) (p14 in text)

Quote re Bob Dylan, who “knew more Guthrie songs than Guthrie”, from Scaduto, 1973, p62.

Names of singers / songwriters influenced by Guthrie from Flanagan B. (1990), pp 1-2, and Cray, E. (2004), pp 393/5/8/9. In addition to the information I've included here, Cray notes that Guthrie also influenced other famous singer-songwriters, including John Lennon, Paul McCartney, and Willie Nelson. Nat Hentoff, the fabled music critic of the *Village Voice* for some fifty years, argued that Guthrie's “influence on popular music” equated with that of Charlie Parker on jazz, ie “that after Parker and Guthrie, contemporary jazz and urban folk music were not the same” (p398 Cray). If you want to get a feel for where Woody may be lurking these days, check out, for eg, a few “This Land” singalongs at Bernie Sanders rallies on uTube

(5) (p17 in text)

Quotes here re Mozart from: Lenneberg, H, 1983, p 42 (re Mozart's spending in Vienna); Schenk, 1960, p95, &

Till, 1993, pp 10 -13 (re Mozart's socialization re the "providential will of God" which had bestowed upon him "the gift of genius"..etc.)

re Guthrie from: Welding, 1964 (re Guthrie 'truth vs paycheck' quote). The remaining information and quotes cited in this section (and further related information re Woody's Dust Bowl songwriting experiences) can be found in Klein, 1980, pp18-19, 23, 30, 33, 43, 66, 68, 78-9, 85, 98, 115-17, 135-6, 141-52, 413, 424-5; Guthrie, 1970, pp142, 210, 239, 248, 254-5, 277; Lomax, Guthrie, & Seeger, 1967, pp 88, 213, 218, 232; Yurchenco, 1970, pp 73-83, 87- 91; Guthrie, 1961; Guthrie, 1963, pp35, 76-77, 207; Guthrie, 1970, 177-8; Guthrie, 1975, p428; Guthrie, 1976, pp 41-48; Phillips, 1973b, pp 63, 93; Steinbeck, 1967, p9.

The complete case study of Woody's development over 20+ years is available in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF of this book, with extensive case studies of Woody, Alfred Hitchcock, and Marilyn, is available on my Blog: www.greatnessbd.com

(6) (p17 in text)

Over 10+ years of analyzing about 300 'greats' (in field and/or society) with my students at DCU (ranging from LBJ to Plath to Che, from Nabokov to Madonna to Lennon, from Van Gogh to Ali to Brando, from Emily D to Hendrix to Orwell, from Orson Welles to Picasso to Warhol), we discovered that once you identify the major works (physical and/or symbolic creations) for which the person became famous, it was always possible to identify the Key Characteristics which were essential to these achievements. While the Key

Characteristics involved were unique to each individual, overall they inevitably sorted themselves into two primarily related to intelligence (eg Woody's *flat picking* or Hitch's *ability to visualize drama*), two primarily related to personality (eg Woody's *terror of intimacy* or Norma Jeane's *hunger for love*) and one primarily related to self or identity (eg Woody's *total identification with the Okies* or Norma Jeane's *perfect self doubt*).

The method I developed for doing this research involved starting with the creations for which the person became famous – Hitch's movies, Woody's songs, Marilyn's acting (on & off screen) - ; then analyzing what characteristics the person would have needed to achieve such creations, esp given the conditions under which they were done; and then going back over the available records to analyze how each characteristic was developed over some 20+ years. Needless to say the amount of time required to develop this research perspective and then do even one such case study analysis would not have fit into the research career of any university social scientist these days – in psychology or elsewhere – esp one who was planning on keeping s job, much less getting promoted. (How I happened to do this is discussed in the text in the section entitled “And You & I”.)

So I won't be citing previous studies from the academic literature using similar methods to support my arguments in this book. There are however a multitude of research findings over many decades relevant to the analyses being developed here, and I will of course cite them. Here for eg, is a short quote I recently came across – published some 15 years after I finished my analysis of the development of Alfred Hitchcock's five Key Characteristics: “We take the perspective that creative genius in any domain is multidimensional and cannot be characterized as the extreme of any single

dimension (e.g., IQ). Creative genius requires that a number of traits be present simultaneously (Simonton, 2013)..." (in Johnson & Bouchard Jr, 2014, p269)

The Key Characteristics which were crucial to Hitchcock, Woody Guthrie, and Norma Jeane / Marilyn becoming greats in their fields are described at the outset of each of their case studies. These extensive, 20+ year, case studies are all contained in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF of this book is available on my Blog: www.greatnessbd.com

(7) (p17 in text)

Individuals are born with genetic biases toward various aspects of human functioning ('strengths') that have typically been studied under the separate headings of 'intelligence' and 'personality', (cf, Thompson & Plomin, 1993, re "cognitive ability"; Gardner, 1985, re "multiple intelligences"; Sternberg, 1997, re "thinking styles"; Halverson et al , 1994, re the "big five model of personality"; Feldman w/ Goldsmith, 1986; Winner, 1996, pp 36-42, 55-74, re extreme eggs of genetic bias; Winner, 2000a, pp 154-55, re a concise summary of research on the "role of innate talent" and "uneven cognitive profiles" in "gifted individuals").

Likewise it is clear that both maturation and experience contribute to developing these biases into powerful & enduring ways of perceiving, analyzing, & responding

to the world, including one's own self (see Plomin et al, 2001, pp 225,228-9, 231-2, re research on role of nonshared environments, genetic bias, and chance in contributing to differences in psychological development, inc. intelligence, personality, & self- concept. See also Gardner, 1985, pp296-8, & Pervin, 1996, pp245-49, re self; Rosser, 1994, pp312-14; Pervin, 1996, pp 142-56; and Gardner, 1985, pp 79-83, 108-115, etc, re role of nature/nurture in cognitive development).

What remains unresolved are the questions of precisely how genetic biases develop and how they operate (cf. Rosser, 1994, pp1-26; Eysenck & Barrett, 1993; Gardner, 1985, pp279-295; Winner, 1996, pp153-69; various chapters in Johnson, 1993; Obler & Fein, 1988; Halverson et al, 1994). One aspect which is clear is the crucial role of focused, intensive, on-going, problem solving experience -- what Ericsson and his colleagues, eg 1993, term "deliberate practice" -- in enhancing the development of genetic bias (cf. Gardner, 1993, pp 51-54, 90-95, etc; Bloom, 1985; Fowler, 1986, re great mathematicians; Feldman, 1993, p190-1, re prodigies; Ericsson & Faivre, 1988; Howe, 1992, pp 62-96; various chapters in Heller, Monks, & Passow, 1993; Ericsson & Smith, 1994; Ericsson, 1996). At a neurological level such experiences create synaptic and dendritic changes, ie altering the 'wiring diagram' of the brain, so as to, eg, make the relevant neural networks larger and more complex. in short, such experiences 'stretch' the genetic biases (cf. Rosser, 1994, pp16-18; Greenough, 1993, pp 319-322; Rosenzweig, et al, 1996, esp, pp 646-54; Elman et al 1996).

And beyond this at a genetic level, "it is becoming increasingly clear.. that anyone genotype can generally display not just one but a range of phenotypes, depending on environmental conditions,

and that the phenotype that is displayed in any one environmental condition depends importantly on particular timings of gene expression during development as well as on actual genotypic variation..” (Johnson & Bouchard, Jr, 2014, p288)

For theoretical accounts re the development of intelligence see, e.g., Feldman & Fowler (1997) re “change mechanisms” involved in cognitive development within a continuum of “nonuniversal domains”; Granott & Gardner (1994) re how the ongoing “coincidence” between “domain related interactions” in the home and those in wider environment results in the individual’s “genetic proclivity” towards the domain being “promoted”, ie in a continuous evolution of the relevant domain related intelligence; Bronfenbrenner & Ceci (1994, pp568, 570-79) re “mechanisms of organism-environment interaction” – “proximal processes” - by which “genotypes are transformed into phenotypes” & how enhancing both environments and proximal processes can increase the extent of this transformation; Elman et al (1996) for related, much more elaborated, “connectionist” account of this developmental process; Horowitz (1987, esp pp141-45, 149-159) re role of person’s “vulnerability” and environmental “facilitation” in the development of “non-universal behaviors”.

Re the characteristics of problem solving activities relevant to development of intelligence see, e.g., Resnick (1987, pp13-16, 18-19) re common features; Csikszentmihalyi et al (1997, pp12-16, 155-8+, 177-95) re role of “complex” families and teacher relationships; Sloboda (1990, p174, 1994, pp160-63) re jazz musicians; Feldman with Goldsmith (1986) re prodigies; Sosniak (1990, pp 158-161) & Bloom (1985, various chapters) re concert pianists, sculptors, swimmers, tennis players, mathematicians; Starkes et al (1996, pp82-3, 94-6, 99-105) re wrestling, figure

skating, & golf; Koch (1971) re writing poetry; Gardner (1991) re writing fiction; Tangherlini & Durden (1993, pp430-439) re verbal talents; Gardner (1973, pp242-292) re eggs from lives of famous artists. Re a conceptual model for analyzing the 'complexity and multiplicity' of 'types of interactions' that 'promote cognitive changes' see Granott & Gardner (1994).

For more recent elaborations the above research topics and the on-going conflicts (at times almost hostility) between researchers, see various chapters in Simonton (2014, esp pp 269 – 507); and John, Robins, & Pervin (2010, esp pp265 – 418).

(8) (p18 in text)

re: the kind of problems that play to your strengths and stretch them over and over, Anders Ericsson and his colleagues note that attaining the "highest levels of human performance" in any domain (e.g., in art, music, science, or sport) requires "around ten years of extended, daily amounts of deliberate practice activities" in order to acquire "the complex skills and physiological adaptations" essential to "elite performance". Throughout this book I'm using the longer time period of '20+ years' to refer to the actual life span, from birth onwards, within which such intensive, domain specific training actually occurs. (quotes from Ericsson & Lehmann, 1996, p273; and Ericsson & Charness, 1994, p725; see Ericsson, 2014, pp 321-349, re research related to 'creative genius').

Perhaps the clearest illustration of Key Characteristics being critical (and unique) to the individual is provided by Paisley's use of a "computer to determine the most common two-note transitions for the first four notes of a sample of 3,335 themes by Bach, Handel, Haydn,

Mozart, Beethoven, Mendelssohn, and Brahms". These "two-note transition probabilities" – just this minimal sample of variation – were sufficient "to identify the melodic style of the composers". With reference to the question of Key Characteristics, you could say that variations in at least one Key Characteristic showed up right down to "the first four notes". (quotes from Simonton, 1987, p88)

The five Key Characteristics of Hitchcock, Woody Guthrie, and Norma Jeane/Marilyn are discussed at the beginning of each of their case studies in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF of this book is available on my Blog: www.greatnessbd.com

(9) (p18 in text)

Thanks to Elke Kastner for explaining to me how little Wolfi might have addressed Poldi, including dropping the apostrophe in papas. The final guesstimate is of course my own mish mash (apostrophes included).

Information and quotes re Mozart having continuous access to The Right Kind of Problems (and organizational/team support to go with them) as a result of having a prodigy for an older sister as well as access to his father's unique teaching and travels, and hence intensive early exposure to the whole gamut of European music, playing and composing, come from

Schenk (1960), pp15-18, 20, 27-33; Holmes (1944), pp 3-10, 14, 16-18, 21-25, 33; Levey (1991), pp8, 16, 19-27, 29, 46-8; Till (1993), pp 12-16, 19-27, 29; Howe (1992), pp23-25; Davidson & Scripp (1994), pp176-183; Winner & Martino (1993), p268-9, 272. Ernst Schenk's account of Mozart's first 'Eurotour' (Sept, 1762 - Nov, 1766) is laced with examples of Wolfgang's musical development accelerating phenomenally in numerous directions due to his almost endless opportunities to study, perform, compose, and compete with "Europe's foremost musicians" - opportunities which would never have been available to him in Salzburg. As his father put it after a London concert with the Queen in May of 1764: "What he knew when we departed from Salzburg is a mere shadow of what he now knows. It surpasses all imagination". (1960, pp 37-95, quotes here from pp 44, 69, 95).

(10) (p20 in text)

Einstein, like Mozart, was blessed with The Right Kind of Problems practically from the day he was old enough to tackle them. Imagine the kind of problems 6 year old Albert got when his family moved in with Uncle Jakob to share that house in Adelreiterstrasse. When his family moved in for 4 years with Uncle Jakob, 4 years with Uncle Jakob and his "merry little science" of algebra (not to mention the kind of problems which were happily extended when Max Talmey showed up right afterwards to take a room as a boarder in the Einstein household, toting his handy collection of science and geometry books which the young Einstein soon "devoured".

The evidence from Einstein's childhood, scanty though it is, consistently points to three strong genetic biases – both logical-mathematical & spatial intelligence (Gardner, 1985, pp128-69 & 170-205; Gardner, 1993,

p91-2; Einstein, pp43-4, in Ghiselin, 1952) and acute sensitivity to (and hence desire to avoid, control, at least be able to predict) stimuli (Pervin, 1996, p44; Kagan & Snidman, 1991). In short, the evidence is of a “shy, taciturn, intro-spective” child who disliked running and jumping, was inclined to separate himself from other children, preferring solitary games of “patience and perseverance”. A child who “shuddered” at the sight and sound of soldiers synchstepping down the streets of Munich to the roll of drums and shrill of fifes, who dreaded the “sergeants” and “lieutenants” of teachers mechanically drilling him through Greek and Latin grammars. A child riveted by the “wonder” of a compass needle “isolated and unreachable, totally enclosed yet caught in the grip of an invisible urge that made it strive determinedly toward the North”. A child who “derived great pleasure” from the “ritual precepts of traditional religion”, despite being the son of “entirely irreligious parents”. The kind of genetic biases which, given proper development, might lead to an adult view of the world as containing “on one side the totality of sense- experiences, and on the other, the totality of conceptual systems”, logical systems whose aim is to “permit the most nearly possible certain and complete co-ordination with the totality of sense-experience”.

Imagine a 6 year old with such genetic biases getting four years of regular, daily contact with an energetic engineer of an uncle, living in same house, an uncle who ran the technical side of family’s factory just down the road, producing dynamos & arc lamps & electrometers, at height of the German electrochemical boom -- electric garters & curling combs, power stations, transatlantic cables, street lights & luminous neckties -- when the whole world seemed to be running on electricity.

Four years with an uncle who would have known all about Faraday’s lines of force and what they’d do to a

sheet covered with iron filings, all about batteries and wires and switches and how Oersted would have hooked them up right next to his compass. Hooked them up and watched the needle jump back and forth with the switch. An uncle who would have posed endless problems – sensory experiences which defied any visible logic, logical formulations just aching for sensory demonstration -- to show that 3 altitudes of triangle must intersect at a point, that squaring the 2 short sides of a right triangle will cover exactly the same space as the square of the long side. The sort of problems young Albert's logical-mathematical bent, his intolerance for chaotic stimuli, would drive him to solve. The sort of problems that would conflict "hard and intensively" with his "world of concepts", that would cause him to "wonder", cause him to work and rework his concepts til he eliminated that "wonder". The kind of problems whose solution would give him that "deep feeling of happiness". The kind of problems he would seek out over and over, ever developing his "thought world", ever causing that "side of his nature" to "grow more and more pronounced", in his "continuous flight from 'wonder'".

Information and quotes re Einstein above come from Clark (1973), pp24-31; Einstein (1957), pp5-13; Frank (1948), pp15-25; (Gardner, 1993, p91-2); Highfield & Carter (1993), pp 16-18; Hoffman & Dukas (1975), pp9, 18, 20-24; Pais (1983), pp35-39; Reiser (1931), pp26-31, 33-35, 37; Schwartz & McGuinness (1992), pp 10-23, 50, 57, 60-63; Storr (1983), pp85-93.

(11) (p20 in text)

The importance of interpersonal, institutional, & socioeconomic/cultural variables (ie Political Variables) in determining who ends up gaining access to The

Right Kind of Problems comes up over and over again in our studies of Hitch, Woody, and Norma Jeane. It is perhaps even more glaringly obvious when you consider who ended up in the classic psychological studies of 'genius' (ie practically all white, middle/ upper middle class, urban males of western European descent - cf Cox, 1926, McCurdy, 1983, Nochlin, 1973, Goldsmith, 1987). Not surprisingly, there has been a wide range of research relating such Political Variables to the attainment of eminence. Prime examples include Simonton, 1994 & numerous other publications, re 'greatness' (eg 2010, pp691-2, re "Individual versus Situational Determinants of Creativity") ; Csikszentmihalyi, 1988 & 2014, re 'systems view of creativity'; Chodorow, 1984 & 1989, pp 201-218, re 'great women psychoanalysts'; Helson, 1990 & numerous other publications, re 'creativity in women'; Amabile, 1996, pp 248-62, re 'social environments' that 'support and stimulate creativity' (p262); Sulloway, 1998, re the effects of birth order and family dynamics on the key players in political and scientific revolutions; Zuckerman, 1977, re scientific Nobel laureates; and various chapters in Albert's books on *Genius and Eminence*, 1992 & 1983. See Simonton, 2014, pp 96-99, for an overview of research confirming that the "emergence of genius" is affected by "interpersonal relations", "disciplinary contexts", and "cultural systems".

Despite all this research, the present study is the first that I know of which explicitly attempts to account for the development of individual 'greatness' in terms of the acquisition of power, that is, in terms of explaining how it is that individuals who attain 'greatness' are able over the course of their lives to gain access to the resources and interactions (ie learning and performing experiences) that are crucial to continually developing/ enhancing those capacities of the individual (ie aspects

of personality, intelligence, and self) which eventually turn out to be essential to achieving 'greatness'.

(12) (p22 in text)

Re "flow activities", see Csikszentmihalyi, 1991, pp48-77 (quotes here from pp67, 71-4). See also (1997).

Information and quotes re Michael Jordan and his "inspiration", competition, and year older brother, Larry, come from Krugel (1992) pp5-6, 8-9, 11-13; Naughton (1993), pp43-4, 48-9. Information and quotes re Bill Gates come from Manes & Andrews (1994) pp15, 17-19, 23, 25-33. See also Landrum (1993), pp124-30, who characterizes Gates as "driven" and "ruthlessly competitive".

(13) (p23 in text)

"Escape Activities" is my own concept. It does not exist elsewhere in the research literature. As mentioned in the text, the role of Escape Activities can be seen in some detail in my three major case studies of Alfred Hitchcock, Woody Guthrie, and Norma Jeane/Marilyn. These are presented in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF of this book is available on my Blog: www.greatnessbd.com

(14) (p24 in text)

Research indicative of the huge numbers of potential greats in any field, and the numerous pitfalls in attempting to identify early 'giftedness', much less predict future exceptional achievement in any field.

Re "San Francisco Cohort", see Goldsmith, 2000.

Re the ongoing argument as to whether or not "exceptional accomplishments depend on a special biological potential that can be identified in some young children but not others", see Howe, Davidson, & Sloboda, 1998a, 1998b, and all the "Open Peer Commentary" in between. Quote from 1998a, p399. See also various works by Ericsson, eg, 1993. For updates re continuing argument see various chapters in Simonton (2014, esp pp 269 – 507).

Re other evidence of the huge number of people who could potentially develop into 'greats' within a given domain - with regard to 'gifted children', as of 2000 the John Hopkins University Center for Talented Youth had "identified nearly one-half-million" and selected over 100,000 students (on the basis of aptitude tests (eg, SAT) given in elementary school) to participate in "advanced classes" in "their area of high ability" (in Winner, 2000b, pp163-4; see also: <http://cty.jhu.edu/>). Equally relevant is Simonton's (1999d) discussion of the "Skewed Frequency Distribution of Talent Magnitude" re the sizable numbers (eg top 5% of a normal distribution of a trait within a population) who could readily take on any given type of intellectual problem. For a comprehensive discussion of the numerous pitfalls in attempting to identify early 'giftedness', much less predict future exceptional achievement in any field, see Winner, 2014, pp297-320.

(15) (p25 in text)

'Generation' refers not only to changes in the demographics of the population, but equally to changes in the larger society/culture and the various social strata and fields of public performance (eg arts, science, sports, politics) within it - all of which interact to present new creative and ideological problems to every generation in every field. Obviously such things as the nature of the field (eg hard science vs pop music), of previous developments in the field (eg prior to Beethoven, to Darwin, to Einstein), its position/functions in society and the state of the society itself (eg jazz music pre and post 1920s; computer science pre and post the mid-1970s; pro basketball pre and during 1990s) will all contribute to determining how consequential its creative/ ideological problems and hence their 'solutions', and hence how 'great' those who 'solve' them, are seen to be. Re the centrality of jazz to massive ideological conflicts of postWW1 American society, see, eg, Ogren, 1992. Re the centrality of information technology to worldwide economic (hence cultural) restructuring by transnational corporations starting in the mid 1970s, see, eg, Harvey, 1990, pp vii, 121, 145-47, 159-64, 284-5; Henderson, 1989, pp 1, 3-6; Jameson, 1992, pp36-8; Levy, 1994. Re international marketing of pro basketball/ Michael Jordan in the 1990s, see, eg, Andrews, 1996; McDonald, 1996; Andrews et al, 1996; Vancil, 2000.

For more general theoretical formulations, see Csikszentmihalyi 's argument (with reference to, eg, Rembrandt, Mendel, Botticelli, and the art of early Renaissance Florence) that creativity is "the product of three main shaping forces: a set of social institutions, or *field*, that selects from the variations produced by individuals those that are worth preserving; a stable cultural *domain* that will preserve and transmit the

selected new ideas or forms to the following generations; and finally the *individual*, who brings about some change in the domain, a change that the field will consider to be creative". (1988, p325) For a recent update and extension of Csikszentmihalyi 's "Systems Model of Creativity", see his chapter in Simonton (2014, pp533-45)

Equally relevant is Martindale's book arguing that "a good bit of art history", esp variations in "primordial content" and "stylistic changes" can be accounted for by "the direct and indirect effects of a continual pressure for novelty - a pressure that operates on individual artists as well as across great stretches of time" (1990, ch 2, 8 & 9, quotes from pp69, 70, 73)

(16) (p26 in text)

Quotes and information in this paragraph come from Charlie Gillett's *The Sound of The City: The Rise of Rock and Roll* (1984, pp 10-11, 28). See his first two chapters re the numerous cultural, societal, and institutional forces which combined in postWW2 America to produce rock 'n roll, including the massive migration of 'Negroes' from the south to the north and west in the 1940-50 decade; the associated boom in small ('indie') rhythm and blues record companies in major cities across the nation; and the development of the first generation of rock 'n roll 'styles' (inc Elvis, Little Richard, Bill Haley, & Chuck Berry) which adapted R & B music and lyrics in various ways to accommodate the pressures of a white music establishment and the tastes of an emerging teenage audience.

(17) (p26 in text)

Quotes and information in this paragraph come from Gombrich (1981, pp167, 220) and Vasari (1987, p18). Re the importance of public art in the Italian city- states and the national concern with recapturing their former 'grandeur', see Gombrich (1981, pp167-69) and Kroeber (1944, pp347-56). Re the sense that 'nothing was impossible', see Gombrich's account (pp 81-2; 219-20) of Pope Julius II commissioning Donato Bramante's plan to "pull down the venerable Basilica of St Peter" and replace it with an "enormous", "circular church" - virtually a Pantheon the size of the Coliseum - with a "harmony as perfect as that in any temple of classical antiquity". Unfortunately for Julius, his massive hawking of indulgences to finance the project eventually "swallowed up so much money" that it "precipitated the crisis which led to the Reformation". Pity he didn't have the lottery.

(18) (p27 in text)

Quotes and information in this paragraph come from Vasari (1987, pp 250, 260, 262, 266-7). See Gombrich (1981, p228) re Leonardo's "true solution to the problem" of spontaneity, a solution which allowed him to "paint figures that moved and breathed" (Vasari, p252). The trick - "which the Italians call *sfumato*" - is to use a "blurred outline and mellowed colours that allow one form to merge with another and always leave something to our imagination". With regard to the *Mona Lisa* this worked out to using *sfumato* on "the corners of the mouth and the corners of the eyes", ie, on "precisely" the "two features" which determine the "expression" of a face, with the result that "we are never quite certain in what mood *Mona Lisa* is really looking at us".

(19) (p27 in text)

Quotes in text in above paragraph come from Vasari (1987, pp19, 268-9) and Gombrich (1981, p218). Re the status of artists and how it changed due to accelerated demand for their talents at end of 15th century in Italian city states, see Gombrich (1981, pp218+), Kroeber (1944, pp350-52), and Vasari (1987, pp18-19). Vasari also gives examples of Leonardo's control of his work (pp260-69); and indications of Michelangelo's status, as when in response to Pope Julius' constant pressure to finish the ceiling of the Sistine Chapel, he replied that the ceiling will be finished "when it satisfies me as an artist" (p353); or more generally noting that "the Pope invited Michelangelo to sit down when he came into his presence in case he did so without being asked" (p18).

(20) (p29 & p36 in text)

Quote re 'soothers hanging off life jackets' from O'Brien (2016)

Re Community of Birth, Links, and female greats

Clear historical illustrations of role of Community of Birth and Links from it in developing the greats in music are easily shown. All the great classical composers were born to (or, eg, Haydn, 'adopted' early on by) the world of scores and staves and figured bass; the world of legatos and oboes and continuos, of horns crooked in G; the world of *Faust* and Vienna and Versailles, the world of Prince Esterhazy (cf Warburton, 1987; Schonberg, 1992).

Likewise all the greats of American country music (prior to 'corporate country music' of 1990s) were born to the world of Shreveport & Tupelo & Butcher's

Hollow; the world of ham hocks & honky tonks, of flat picks & guitar licks, of coal tips & cheatin' hearts & choppin' cotton; the world of candy kisses & fessin' 'bout liquor & singin' to sweet Jesus for your supper (cf. Malone, 1974; Stambler & Landon 1969; Lynn with Vecsey, 1976; Flippo, 1989). Re the territory of Jazz greats see, for eg, Collier, 1984: Carr, Fairweather & Priestley, 1988; Kofsky, 1972; Jones & Chilton, 1988; Holiday with Dufty, 1976.

The early years of Louis Armstrong's life at beginning of 1900s in New Orleans give a nice example of how accessing The Right Kind of Problems can be literally a cake walk, given the right Community of Birth. Born in the heart of the most prominent community involved in the early transitions to jazz, the right kind of problems for Louis were those he had to take on to get his ears around the tunes and rhythms of the new music; and these were precisely the kind of problems little Louis was chasing round Brick Row, up Liberty and Perdido, all over the Third Ward. Peaking in the Funky Butt, the Tin Type, in LuLu White's; the walking bass, piano roll, the "Praline" and Spanish tinge, duple rhythms. Coming outta Cemetery No 1, Baby Dodds' snare drum, starting slow; cornets & clarinets & horns cuttin in, socking it out, starting to sing. Papa Celeston, sister Cordelia, all the True Friends up front, radiant, kicking up dirt and dust, shouting, wailin', "Lord, dn't he ramble", "dn't he truck".

Problems come with the territory, and in Louis' case the problems on offer were exactly the right kind. Information and quotes come from Collier (1984), pp 61-71, 142-43; Jones & Chilton (1988), pp 43-48; Stearns (1970), pp 55-75,145; Harris (1954), pp 56-59; Byrnes & Byrnes & Woodward (1974), pp9, 12.

Equally consider another, somewhat larger, Community of Birth – the island of Cuba. In 11 summer

Olympics between 1908 and the 1st year of the Cuban revolution (1960), Cuban athletes won a total of 1 silver medal (star class yachting, 1948). Since the mid-1960s, with the introduction of the Cuban government's integrated national sports program, there has been a "phenomenal" increase in athletic competition, with nearly 25% of the entire population participating in 26 nationally sponsored sports. In the next 11 summer Olympics they competed in since then (1968, 72, 76, 80, 92, 96, 2000, 2004, '08, '12, '16), the Cubans won an incredible total of 203 medals (72 gold), and produced a string of repeat gold medalists in boxing, baseball & volleyball, not to mention 'Olympic greats' such as Alberto Juantorena, Javier Sotomayor, Felix Savon, and Teofilo Stevenson.

(cf. Greenberg, et al, 1992, pp 21, 23-35, 93, 119, 166-207, 209, 212-215; Black et al, 1976, pp224-27; re Cuba in Summer Olympic Games see: https://en.wikipedia.org/wiki/Cuba_at_the_Olympics#medalists ; and https://en.wikipedia.org/wiki/List_of_Olympic_medalists_for_Cuba . Both Jan 2017.)

Re American basketball coming with the territory in urban black ghettos since 1970s (& some devastating consequences of this) see, eg, Ballinger, 1981, pp55-58, 61-2, 89-91; Michener, 1987, pp183-217; and Peoples, 1997.

For academic analyses of how variations in cultural/ societal factors influence the intensity and success with which the problems that come with the territory are pursued, see, eg, Simonton, 1978; Simonton, 1999c, pp204-215; Sloboda & Howe, 1991, pp4-5.

Re Links (see also related Links discussion in text)

What appear to be exceptions to the Community of Birth determining what sorts of problems the

child/adolescent will have access to, under closer inspection turn out to be examples of how Links between the community of birth/family operate to provide access to other communities, ie examples of Links providing/determining access to sorts of problems child/adolescent will have access to. The critical role of such Links from community of birth to the 'world of taste' is clearly shown, for eg, in the early years of Newton and Haydn.

Isaac Newton "descended from yeomen on both sides" and had "no record of any notable ancestor". Newton's father died before he was born, and Isaac was raised by his grandmother in the "hamlet of Woolstrophe near Grantham in Lincolnshire". In 1653 when he was eleven, Newton's stepfather died and his mother returned to Woolstrophe. She "withdrew him from school, intending to make him a farmer". It was only due to the intervention of "John Stokes, master of the Grantham School (which Isaac had attended) and William Ayscough, Newton's uncle and rector of Burton Coggles", that it was "decided to prepare him for the university". Thus it was that Newton entered Cambridge "as a subsizar" in his late teens, ie entered the world of Kepler, Descartes, Galileo, and the rest. (Youschkevitch, 1980, pp 42-3).

Franz Joseph Haydn, born near Vienna in 1732, was "one of twelve children". His father was "a wheelwright" and his mother was "a cook". As a result of being adopted by a cousin, Haydn "learned musical rudiments of ordinary instruments" early on; and at the age of eight was chosen by the Vienna Court Kapellmeister to enter the "select choir group". Here for the next ten years he was able to, eg, "study the piano and violin under superior masters". (Quotes and info from Cox, 1926, pp288-89; Warburton, 1987, p135).

Re Ali's (then Cassius Clay) Links from his southern

“black middle class” family to Joe Martin’s gym down on South Fourth Street, see Remnick (2000) pp81-2, 91-2.

The critical role of Community of Birth and Links (to individuals/ organizations which provide access to further resources & opportunities for development) becomes immediately obvious when you consider how demographic – eg, socioeconomic, religious, urban/rural, gender - variables come into play at key transition points in development, eg access to elite educational institutions. For instance, in her classic study of 71 American scientific Nobel laureates, Harriet Zuckerman concludes that “the social origins of Nobel laureates remain highly concentrated in families that can provide their offspring with a head start in access to system-recognized opportunities” (1977, p68). Similarly as regards religious origins, she notes that the huge “overrepresentation” of Jews among the laureates (27% vs 3% of U.S. population - p68), and especially of New York Jews (“74% of all the Jewish laureates” came from New York City - p81) is probably down to a number of factors, including the “great value” which the Jewish tradition places “upon higher learning” (p71), and the fact that “Jews have always been urban people” (p81). When you combine these demographic factors, ie Jewish community of birth and Links associated with this in relation to Zuckerman’s findings, the answer is probably not far off the observation of “one laureate”, ie “that living in New York in the 1920s and 1930s fostered an interest in science because of the “availability of first-class education in science in many public schools and particularly in the city’s elite high schools, which had predominantly Jewish student populations.” (p81)

Of course there are Links and Links, as in the case of Nobel laureate, Julius Axelrod, who “turned to science only after he tried and failed to get to medical school”:

'The problem was getting into a medical school in 1933. At that time, I think about 90% of the City College graduates were Jewish and most medical schools, in fact all, had a sort of unwritten quota system that they will accept only a certain percentage of Jews in their class and this meant that you had to be extraordinarily good or the son of a doctor to get in". (Zuckerman, 1977, p73)

Nowadays the process of creating Links between the Community of Birth and the 'world of taste' is often undertaken a bit more systematically than in, eg, Newton's or Axelrod's day. In many urban areas this is done through the likes of 'talented youth' and 'gifted education' programs. (see, eg, Tannenbaum ,1993, and Gallagher, 1993). Not surprisingly, creating such Links is typically seriously constrained by the fact that "limited resources and space availability often take precedence over theory and educational philosophy in the admission process" (Louis et al, 2000, p295); and even when created, the process of sustaining such Links is likely to be fraught with difficulty (see, eg, Butler-Por, 1993).

Re Female greats (see also "Women and other Outsiders" in text and Note 66)

A few brief intro comments here:

The role of the Community of Birth and the Links it provides overtime is probably most visible in the historic lack of "great women artists". Historically there were very few women artists, and as Linda Nochlin points out, they were "almost without exception, either the daughters of artist fathers, or generally later, in the nineteenth and twentieth centuries, had a close personal connection with a stronger and more dominant male artistic personality". In short there was

little support for or Links to an artistic career from their Communities of Birth. And "as late as 1893" there were no Links at all to that final essential prerequisite to "creating major works of art", ie to the "ultimate stage of training" in the "youthful work of artists from the time of Seurat well into the twentieth century", ie the "detailed, painstaking studies of nude studio models". Female art students simply weren't admitted to the classes. (All info and quotes from Nochlin, 1972, pp494, 501).

In stark contrast to art, there were many women novelists, and at least five 'great' ones - "Jane Austen, the Brontes, George Eliot, and Virginia Woolf" - born in Britain prior to the twentieth century. This is not surprising when you consider the expectations and Links within and from their Communities of Birth, ie virtually all of them grew up in 'middle class' homes; and, in contrast to art, as Nochlin notes (1972, p497), everyone "has to learn the language" (and if you happen to be the daughter of, eg, an editor, a clergyman, or an estate agent) "can learn to read and write, and can commit personal experiences to paper in the privacy of the home". See Showalter, 1988, p7, re "great novelists", and more generally for "an invaluable record of generations of women writers". See Simonton, 1999c, pp215-21, for a concise discussion of how cultural biases re gender, and hence sex differences in socialization and Links, have historically resulted in a "dearth of female genius".

See Note (66) below for much greater elaboration re this dearth.

(21) (p30 in text)

Worlds of taste vs worlds of pain

Quotes in paragraphs re worlds of 'taste' and 'pain' come from Bourdieu, 1986, pp53, 77; Haskins, 1991, pp 12-13; Illingworth, 1992, p4; Hauser, 1987, pp19-20, 2.

Re the classic 'geniuses' coming from the 'right side of the tracks' - while they varied re the extent of their "economic capital" (eg Voltaire or Darwin vs Picasso), what they crucially shared in common was an abundance of "cultural capital" (Bourdieu, 1986, eg 128-9). All 'sides of the tracks' - however unequally resourced - have their own domains of interest (in eg art, science, music, sport, etc) and associated organizational structures designed (among other things) to select and socialize youth who will later become the 'greats' (local, national, or otherwise) of their generation. Ditto for the emergence of new domains - eg, extreme sports, electro-acoustic music, rock, jazz, film, aeronautics, psychoanalysis, baseball, opera, experimental physics, etc - which quickly generate their own organizational support structures (see Csikszentmihalyi, 1988. See also, eg, Becker, 1984, re worlds of art, and Bourdieu, 1996, re worlds of literature).

Re "eminence-producing families", their "historical" orientation, "relationships to the wider culture" and awareness of "opportunities possible to their members", see Albert, 1978, 1983a (quotes 1983a, p142). For examples of early lives of 'greats' who grew up in world of 'taste', and hence had access to the associated domains (eg of art, science) and their support structures, see McCurdy (1983). Re similar role of Community of Birth in lives of more recent eminents, see, eg, de Beauvoir (1974); Richardson with McCully (1992) re Picasso; Gleick (1994) re Richard Feynman; Stevenson (1990) re Sylvia Plath. To get a feel for the early lives of boxing 'greats' and how this domain and its support structures were linked

to their lives, see, eg Roberts (1987) re Jack Dempsey; Haskins (1991) re Sugar Ray Leonard; Illingworth (1992) re Mike Tyson; and Ali (1977) re himself. Since (unlike other 'greats') the early lives of athletes (from the 'other sides of the tracks') never get more than a few pages in any biography, you might want to look at Rubin (1976) to get a real feel for growing up in *Worlds of Pain*. To get well "inside the world of professional boxing", see Thomas Hauser's (1987) *Black Lights*.

(22) (p30 in text)

re Extreme variations in personality

"Family" of course is not limited to biological families. This is simply handiest term to refer to whatever constellation of 'parenting' is provided or not provided for the growing child / adolescent however stable or unstable this may be. Norma Jeane being a good example of the unstable side of such.

Quotes and information re Newton et al in Storr (1983), esp pp 76- 82, 94-98, 105-06, 113-119, 131-34, 134-36. Re recent attempts to define, classify, understand the role of extreme variations in personality and self to achievements of the 'greats', see, eg Eysenck (1995), Jamison (1993), Ludwig (1995), Rothenberg (1990), Simonton (1994, pp284-311), and Weisberg (1994). See Simonton (1998a) for an overview of the research; and Simonton (2000b, p153) or Winner (2000, p165) for concise summaries of findings to date. Re the history of the "mad genius controversy", see Becker (1978). See Carson (2014) for discussion of research relating "Big-C" Creativity and Psychopathology.

Re family role in development of extreme variations of personality see also Notes 23 and 25.

The complete developmental case studies of Alfred Hitchcock, Woody Guthrie, and Norma Jeane / Marilyn are presented in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF is available on my Blog: www.greatnessbd.com

(23) (p31 in text)

Re repeated matching of individual's characteristics with organizations' problems driving the development of Key Characteristics. Includes in-depth considerations of development of, eg, Mozart, Norma Jeane, Woody's Key Characteristics, of role of family systems dynamics in development of Key Chars related to personality and self. Many research sources cited.

Quote re “surprising, messy, unpredictable” is from Waldrop, 1994, p329.

Re how it is that one person (eg Guthrie) would be able to acquire the essential intensive development of not one but five Key Characteristics relevant to solving a key problem of a given generation (eg, giving a voice to the outcasts of the 1930s Depression), have a glance at Note 20 (re Community of Birth and Links), Note 24 (re selective recruitment), and Note 25 (re organizations and teams). The basic argument is this: Every Community of Birth and the organizations/ social networks the person accesses via Links available over time will promote a particular range of values and orientations to life, as well as the interpersonal and problem solving skills that go with it. While the

emphases and specificity of training, and selectivity re

participants, will vary over time across organizations/ social networks, the overall package on each occasion will cohere as a whole. Thus for example the intense specialized musical training which the young Mozart received first from his father and then from "the best masters of the day" in the likes of Paris, London, and Bologna was closely tied to his father's whole package of bourgeois beliefs, values, aspirations and hence simmering frustration and desperation to escape the tiny petty "patrician" world of Salzburg. In this case the overall package driving and giving coherence to the development of the young Mozart included the "providential will of God" which had bestowed "the gift of genius" upon his son, a gift which Leopold "conceived as a God-given responsibility" to "display to the world". And beyond this was Leopold's "profound sense" that "dignity and honour" and hence "financial reward" were the just due of every "professional artist" and "free man" - honour and reward which were earned through "hard work" and "virtuous" living, and in particular through "assiduous" cultivation of "our greatest wealth which is our head", a cultivation which in Leopold's life and hence in his young son's was to be achieved through "the broadest education possible" - an education which included not only the "mastery of every possible form and style" of music, but also "sound schooling in the classical educational disciplines such as grammar and rhetoric", the study of science and languages, and the "ardent" pursuit of literature and theatre.

While the coherence of Aunt Grace's world view (and hence her "profound sense" of what was essential to attaining "dignity and honour") had a wee bit more to do with the likes of eyeliners, hi-lites, perms and curls than with nuancing Molière, Diderot, and the "materialist *philosophes*" of the French Enlightenment, she, like Leopold, was obviously copped on to Hobbes, or more to the point, to the "essentially bourgeois

relationship between honour and financial reward" - a relationship to be had, if not for herself, then for her niece, for her Norma Jeane, not in courts of Vienna or London, not in the Palace of Versailles, but rather, handily, just down the road in the courts of Hollywood, in that palace up on the silver screen. (Quotes from Till, 1993, pp 10-13).

Re the coherence of those aspects of Key Characteristics related to personality and self - eg Guthrie's *terror of intimacy*, or Norma Jeane's *perfect self doubt* - in any community/ organizational setting the person will actively seek out whatever combination of close/ intimate relationships is feasible to sustain/ augment their development. Early developments in this regard are arguably tied to both genetic biases and intense socialization experiences – eg, in relation to mom, whoever she may be, have been, or out of nowhere become a la Guthrie or Norma Jeane. Not surprisingly, latter developments are also - eg in case of Norma Jeane developing her *perfect self doubt* first in relation to Ida Bolender and her mother, then continuing it in similarly conflictful relationships with Aunt Grace, Natasha Lytess, and others; or Woody 's *terror of intimacy* resonating throughout his adult life and hence sustaining itself either in the form of spontaneous, short term/ fleeting adult relationships with women, relatives, and fellow musicians, ie, relationships which involved none of the risks associated with commitment; or in the form of commitments which virtually guaranteed him intense intimacy with the minimal risk of conflict, pain, or lost - most obviously in the case of his second wife, Marjorie and their children, or for that matter any other children who happened by and joined in (cf Klein, 1980, p307+).

Probably the strongest evidence for such patterns of "personality sustaining relationship processes" comes

from the observations and theorizing of family systems therapists such as Minuchin, Haley, Watzlawick, Palazzoli and their associates. The relevant argument here, based on intensive case studies of assessment and intervention in 'dysfunctional' family systems (and social service networks, eg O'Brien et al, 1981), is that ongoing patterns of interpersonal communications - which are the basis for defining interpersonal relationships - cast family members into distinctive, but mutually interdependent, roles and in the process sustain/ accelerate particular patterns of behavior in each of the individuals involved, patterns which overtime become identifiable as personality/ self.

In contrast, quantitative research focusing on the role of "person-situation interactions" in "shaping personality development" (Scarr et al, 1981, p886) has had very little success in demonstrating the extent of such influences (eg see, Plomin et al 2001, for update). As Scarr and her associates conclude, "most of the variance in personality measures is not accounted for either by genetic differences or by environmental differences among families. Most of the variance in personality must lie with individuals within families. That is, the experiences of siblings must be sufficiently different that personality development proceeds quite differently for even biologically related members of the same family" (p897). From a family systems perspective the obvious place to locate such "sufficiently different" experiences among siblings is in the patterns of implicit/ analog communication among family members over time, patterns which are simply unattainable by academic researchers. The Scarr et al study of "personality resemblance among members of biologically related and adoptive families" (1981, p885), for example, recruited a total of 235 families to provide an adequate sample sizes for the types of statistical comparisons they wanted to make, eg comparisons of "introversion- extraversion" or "neuroticism" ratings due

to differences in sex, generation, and family type (eg p894-5).

Such studies - using "newspaper stories and ads" and "assistance of the Department of Public Welfare" - would have enough trouble "recruiting" families to fill out "a large battery of cognitive, personality, and attitude measures" (p889). There's no way such inducement is ever going to "recruit" any of these families to sit in front of a camcorder for several hours of intensive, emotive, often embarrassing, interpersonal discussion and disclosure. And from the other side, who is going to pay for the expertise and time which would be required to organize and conduct such family interaction sessions, much less to decode, analyze, and then quantify the patterns of communication captured on the memory cards? Yet it is precisely such patterns - along with initial genetic biases and prior personality/ self development - which (from perspective of current argument) underlie the development of the likes of Norma Jeane's *perfect self doubt*, or Woody's *terror of intimacy* - ie, Key Characteristics tied to patterns of relationship which inevitably fluctuate with changes in family structure/ dynamics (eg death of parent) and which in any case would at best be only tangentially reflected in the sorts of standardized personality scales used in quantitative psychological research.

The use of intensive face-to-face interviewing with eminent creators in many domains has yielded fascinating and useful information re the processes involved in adult creativity, most especially, those ongoing internally with the creators. Re any useful information re the role of developmental relationship experiences, most esp the sort yielded by family systems therapists' interventions, no surprises. All eminent creators could possibly provide – and they are virtually never asked to do so – would be memories of

these. And as a recent review of the major research projects “Interviewing Highly Eminent Creators” over the past 60+ years notes: “The issues concerning retrospective reconstruction of formative influences are well known” (Nakamura & Fajans, 2014, p36).

At the end of the day the succession of organizational/relationship experiences the person has will determine the cluster of (key) characteristics that person acquires and hence what sorts of problems these are suited to solving. Problem solving in any given domain will require certain types of intelligence (eg Howard Gardner’s (1993) book illustrating the operation of 7 of his types of intelligence in relation to various greats in poetry, physics, dance, politics, music etc), with the emphases in any case further varying among specialties within such domains, eg jazz, country, classical. Also in any field there are often further biases toward other types of characteristics (eg personality traits, physical attributes) being favorable to solving problems within the field (eg, being successful as a scientist, vs artist, vs athlete, vs film star). But beyond this the actual combination of Key Characteristics which will be required to achieve ‘greatness’ in a particular field is pretty much unpredictable in advance of the event, and down to the particular requirements of the key problem when it occurs – eg Woody re becoming “the voice” of the “Dust Bowl refugees”, Einstein re spotting and resolving the conflict between Newton and Maxwell, Norma Jeane re creating Marilyn Monroe.

In each case when such a solution is achieved, the requirements of the key problem will always match up with the Key Characteristics of the person who solves it. These Key Characteristics (typically 5) will inevitably reflect the person’s prior history of organizational/relationship experiences, experiences which will have impacted on all of the characteristics simultaneously

(albeit with varying intensity and emphasis each time).

Finally it's worth remembering that the organizational experiences which provide access to developing the necessary cluster of Key Characteristics are often neither anticipated nor desired. 'Parental loss', for eg, critically changed the nature of family experiences in relation to developing interpersonal, emotional, self, identity, and intellectual characteristics among a fair percentage of the 'great', especially in the field of literature (cf Simonton, 1994, pp 153-56). Likewise Norma Jeane's experiences while under the 'care' her various 'aunts', esp Aunt Grace, were ideally suited to developing Key Characteristics which were later crucial to her success in becoming famous as Marilyn in the very similar world of a Hollywood starlet, ie her *perfect self doubt*, her learning to *present herself as the next Jean Harlow*, and her development of a *survivor morality*. Similarly, as noted above, Woody's experience of family disintegration on both sides of the 3 year Okemah oil boom accelerated the development of all of the Key Characteristics which were later crucial to his success in becoming "the voice of a people" in the very similar world of the Dust Bowl almost two decades later, including one critical characteristic he neither sought nor desired, i.e., his *terror of intimacy*.

The complete developmental case studies of Woody, and Norma Jeane / Marilyn (as well as Alfred Hitchcock) are presented in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF of this book is available on my Blog: www.greatnessbd.com

(24) (p32 in text)

Re the Arrival of The Fittest, Sibling Position, and Selective Recruitment.in the Attainment of Greatness

Re the Arrival of the Fittest: Darwin's finches, Mozart, Elvis

'Fit' is not about 'pumpin' iron' or 'the tough getting going when the going gets tough'. It's about complementary matching of the needs/resources of the individual and the organization to the benefit of (from our perspective re eventually becoming 'great') the individual. We're talking about the evolutionary meaning of 'fit' as in the famous finches of Darwin's 1835 visit to the Galapagos - the finches which "on one island had developed strong thick beaks for cracking nuts and seeds, on another smaller beaks for catching insects", on "another again a beak adjusted to feeding on fruits and flowers", and on yet another, a finch "that had learned how to use a cactus spine to probe grubs out of holes". We're talking about the finches whose beaks "differed so much among themselves" that they "amazed Darwin"; the finches whose beaks had evolved over time to fit with the "different foods available on different islands"; the finches whose beaks came to symbolize the core argument of evolutionary theory, ie the "survival of the fittest". Quotes from Moorehead, 1969, p202.

Such matches/ fits between the individual and organization can occur at any level of development. The case of Mozart's musical development being hugely accelerated at very early age is clearly such a fit. Even given the young child's obvious delight in music and evidence of perfect pitch, there was in fact no guarantee this would lead to such rapid development. The essential fit which triggered and sustained this development was his father's massive frustration with own career in the musical backwater of

Salzburg, his father's awareness of the massive interest in musical prodigies across many prominent courts of Europe at the time, and of course his father's vast knowledge of classical music.

A similar fit can be seen later in the developmental process with Elvis' arrival at Sun Studios in fall of '53. Elvis' own musical development wasn't exactly unique. He wasn't the only white boy in town who'd picked up his "musical education" flipping the dial from Bob Neal's 'Hillbilly Hoedown' to 'Howlin Wolf', from 'Sleepy Eyed John', to 'Daddy-O-Dewey', the "man who just happened to be white". In fact by time Elvis hit his teens radio in Memphis, like most of the South, was the one place where "integration had already taken place".

The key to Elvis career taking off wasn't down to Elvis. It was down to the fit between his musical interests and what Sam Phillips knew from "his experience recording blues, from his fascination with black culture", ie "that there was something intrinsic to the music that could translate, if you could just find white performers who could play and sing in the same exciting, alive way".

Whatever about his hopes of being discovered, Elvis wasn't exactly expecting to crack the big time when he showed up at Sun's Recording Service to do his 2 covers of the Ink Spots. Aside from forking over 4 bucks to cut those two sides, the only public singing he'd done lately was the odd spot filling breaks for Johnny Long's western swing band over at the Eagle's Nest. Fact is, Elvis' "Gosh mam, sorry to be here... I just wanted to... a ... well, you know..." approach to the session came out just about like you'd expect - "gauche", with his guitar sounding like "somebody beating a bucket lid". No matter. Marion Keisker knew what her partner was looking for, and sure enough, 9 months later, after a crap audition, Elvis was in.

Sam Phillips had his boy. He wasn't gonna "make the world forget about Eddy Arnold or Hank Snow", but then that's not what Sam was lookin' for. What Sam was lookin' for wasn't gonna be found on any of the "hillbilly charts", even with Scotty Moore providing the country riffs and blues lines, or with Bill Black on that slap back bass. It was gonna be found after hours in Sam's studio, after hours of Elvis "feeling that nothing was ever going to happen", of "getting more and more frustrated" with each take, after hours of seeing "his chances slipping away". It was gonna be found in a Coke break, in a song that suddenly "popped" into Elvis' head from way back, in a song that that got him up "singing" and "jumping around", that got Bill Black joining in, slapping that bass and "acting the fool". It was gonna be found in that song that brought out a "*chemistry*" between them, a song that "flung Elvis into the recording process", "fresh, loose and free and full of confidence", a song that gave Sam Phillips exactly what he was looking for -- that white boy who was gonna make him a million bucks. That white boy who - how'd they put it over at the Eagle's Nest - sounded "just like a nigger".

Information and quotes re Elvis come from Guralnick (2000), pp 38-40, 59-65, 84-6, 89-97, 106; Goldman (1982), pp 94-5, 110-11, 114, 122, 125-33; Pearlman (1986), pp58- 69; Marcus (1991), pp11, 141-48; Hopkins (1975), pp51-61. Re Sam Phillips' critical role in creating "That's All Right (Mama)", see Guralnick, 2000, pp93-101.

Re Sibling Position: LBJ, JFK, and First-born Presidents

Even further on in development, the curious relation between sibling position and presidential politics

illustrates how a person's position in s original Community of Birth can prepare m for a particular position in a much larger – national – community many years later, should the needs of the latter community happen to match/fit with the characteristics e developed by virtue of s developmental position over many years in the first. Thus we have Louis Stewart's research showing how variations in “sibling position” within the family can provide “unique experiences in dealing with power and authority”, and hence “promote unique views of society”. First borns, for eg, would be “uniquely in touch with the demands of an expanding society” and well practiced in “high power tactics”; while middle borns would be more than aware of the problems of the underdog and experienced in “mediation and accommodation”. These are the sort of differences which, given the proper developmental opportunities, might well prepare the first born for presidential office should the nation's political *Zeitgeist* favor aggressive expansion, say for eg, between 1796 and 1824 when 8 straight 1st borns were elected to office (Stewart, 1992, pp46-50, 60-64).

For eggs of contrast between 1st born and middle born U.S. president's childhoods, see eg Caro (1992, pp 66-78) re LBJ taking over his cousin's donkey cos “ah wanta ride up front”, lifting the meringue pie outta Hugo Klein's lunchbox cos “ah was just hungry”, and signing Miss Kate's privy list by scrawling his name in huge block letters across 2 blackboards; and Hamilton (1992, pp 45, 55) re young JFK being pulverized by his older brother, Joe, then hustling marbles off his classmates by betting on him to win playground punchups.

For a compelling historical analysis of the effects of birth order and family dynamics on the major players in political and scientific revolutions, see Frank Sulloway's *Born To Rebel* (1998).

Re Selective Recruitment: Elvis, Carl Perkins, Little Richard, Nobel Laureates, Hitchcock, Louis Armstrong

As the examples above suggest, it is important to note the critical role of what Harriet Zuckerman (1977, pp107-113) refers to as "selective recruitment" in the career development of future scientific Nobel laureates. This can be a powerful force in creating and sustaining matches between the goals/ resources of the organization and the Key Characteristics of the person, as for example in the selective recruitment by Leopold of his son, or Sam Phillips recruiting Elvis (not to mention Jerry Lee Lewis, Carl Perkins, and Johnny Cash). Equally Stuart Kauffman makes similar arguments (1993) with reference to "self-organization" (p16), "integrated response to the environment" (p286), and "lookahead" (p398) in relation to processes of perpetuation and expansion of all living systems, from *E coli* to IBM. From another angle, Clarke et al (1983) describe "the 'culture' of a group or a class" as being a "peculiar and distinctive 'way of life'" that (among other things) serves to "shape the on-going collective existence of groups" and to "limit, modify and constrain how groups live and reproduce their social existence" (p53-4). In short, "selective recruitment" and "self-organization" by the various organizations/ systems undoubtedly plays an important (and recurring) role in the development of those who eventually become the 'greats' in every field (whether or not the eventual 'great' is aware of potential or even seeking it at the time of recruitment).

Equally there can be no doubt that the efforts, and resources, devoted to such recruitment are reflective of the organization/ system's own power/ influence/ resource bases within the wider society. Compare, for eg, recruitment efforts of the elite institutions of science

- eg Harvard, Columbia, Berkeley, Johns Hopkins, & Princeton which produced 55% of American scientific Nobel laureates between 1901 & 1972 (Zuckerman, 1977, p88) - with the experience of, eg, a Hitchcock walking into Player-Lasky unnoticed in the early days of film; or better yet, with the fact that on the very night of Paul Whiteman's famed Aeolian Concert - aimed at "dignifying jazz" for New York's elite - "a few blocks away at the Roseland Ballroom" in "his thick-soled shoes and box-back jacket" - virtually unknown outside of "Negro jazz circles" - was the first 'genius' of jazz, Louis Armstrong, "probably playing close to his all-time best" (Stearns, 1970, p166, 170).

What will become clear in course of this analysis is that while such "selective recruitment" - however greatly varied across institutions/fields - is often hugely influential in determining who remains in the game - ie setting the odds on anyone of the remaining players as it were - it is clearly not the decider re who goes on to the next level of development and eventually to the top, as one of Sam Phillips other Sun Studios stars might be the first to tell you. After all, the first million seller in Rock, "Blue Suede Shoes", wasn't recorded by Elvis. Neither was "Tutti Frutti". Who knows what would have happened to Carl Perkins or Little Richard, if it weren't for a few tactical errors just there at the last hurdle. You remember. Carl smashed up in that hospital in Delaware, and Richard, that wee bit over the tint for '55. (Guralnick, 2000, p257; Winner, 1992, pp 52-9).

Note (25) (p33 in text)

Re teams and organizations in developing of Key Characteristics and solving key problems. Numerous research studies / examples are considered in relation to various stages of development.

'Organization' typically refers to larger, more formal organizational unit - eg family, school, athletic club, university, film studio - which ensures provision of resources and sufficient stability for the problem solving unit ('team') to operate effectively. Such larger organizational structures typically provide access to numerous, often related problem clusters for the individual, and sometimes the necessary resources, and teams to solve them. Needless to say, the organizations involved are not only formal/ institutional ones, but also informal/ community-based ones such as the Okemah of Woody Guthrie's childhood or the New Orleans of Louis Armstrong's (or the working class district of Paris where Pierre-Auguste Renoir grew up in the 1850s, the one that just happened to have the Louvre round the corner).

Teams in childhood and later in person's development are critical to the development of the Key Characteristics of 'greats' in every field, not only intellectual characteristics but those related to personality and self as well. And these teams keep showing up every step of the way from early development, through specialized refinement, to the eventual creations that lead to greatness, not to mention the canonization process itself..

By the time you're finished this book.. finished with Hitch and his mom, with Norma Jeane and the Bolenders, and Aunt Grace, with Marilyn and Fred Karger, or was that Johnny Hyde.. with Mozart and his old man, and Master Andres.. with Mary Cassett and her mom, and Edgar Degas, with Einstein and Uncle Jacob, and his 3 friends at ETH, with Marie Skłodowska and Pierre Curie, Bill Gates and his buddies at C Cubed, with Elvis and Sam Phillips, with Michael Jordan and his brother, with Richard Williams and his daughters, with Watson and Crick, with Woody and Alan Lomax... with Darwin and his Knights of the

Roundtable. Let's face it, basically by the time you've finished with this lot, not to mention the rest of the teams in *Greatness*, you'll be well able for the big snooze.. not to mention the next pop quiz. Let's have a look at all stages of development starting with childhood and adolescence..

In early years of development the teams and organizations inevitably overlap greatly, both with regard to intellectual characteristics and those related to personality and self, as all of this early development is tied up with family and related the institutions, organizations and networks. In this context it's worth noting that all children develop their own unique characteristics through exactly the same sort of process. In relation to greatness, of course, for most children either the initial genetic biases aren't sufficient and/or the teams which they engage with re problem solving aren't sustained, resourced, and/or focused on The Right Kind of Problems.

As Robert Plomin and his colleagues note "with regard to psychological development (including intelligence, personality, and self), environment makes siblings no more similar to one another than to children picked at random from the general population." What accounts for the differences is each child's intense engagement with the environments that affect it, ie with "effective environments which are not shared". Thus, for eg, "ostensibly shared events such as parental illness, education, poverty, unemployment, or neighborhood can result in nonshared environmental effects". That it, they engage different siblings differently as a result of differences in "children's characteristics, such as age, sex, personality", and sibling position. Moreover such differential engagement is likely to be affected by genetic variations and chance, or as Francis Galton once put it, by "tangled strings variously twitched, soon

getting themselves into tight knots" (in Plomin et al 2001, pp 225, 228-9, 231-2).

Translation: check the early life of anyone you know well and compare it with s siblings'..

With regard to the role of organizations and teams in driving the development of intellectual characteristics, there is plenty of systematic research. A few examples:

Benjamin Bloom's (1985) research team (which focused on concert pianists, Olympic swimmers, mathematicians, etc) observed that "the most striking finding in talent development is the very active role of the family, selected teachers, and sometimes peer group in supporting, encouraging, teaching, and training the individual at each of the major stages in his or her development" (1982, p511).

Mihaly Csikszentmihalyi & his colleagues likewise argue that "complex families" are crucial to the development of "talented teenagers". Such families provide both the resources (abundant materials/lessons, private work areas, freedom from chores, etc) and the intensive personal relationships with "high levels of support and challenge" which serve to "enhance children's investment of attentional energy in growth- producing activities" (1997, p156).

Robert Albert's analysis of "Families as Ongoing Systems", with particular reference to the Brontes, discusses many ways in which families operate as both team and organization in promoting the development of particular types of characteristics in their children (1996, pp307-15).

Such overlap between team and organization is further evidenced, for example, in the numerous father-child

teams which fill the childhoods of the classic geniuses (eg, McCurdy, 1983). In more recent times one need only look to, eg, Tiger Woods & his father in golf or Venus & Serena Williams and their father in tennis.

Ravenna Helson's research on creative women (eg 1971, 1985) similarly illustrates the operation of the same 'father-son' team dynamic, only here of course there was no son, so the daughter got a shot at the role instead. There are of course historical examples of mother-led teams, such as Marie Curie and her daughter, Irène, or D.H. Lawrence & his mother, and, nowadays, of course, many more to come.

For detailed examples of the crucial role of teams of child, parents, coaches, and teachers in the childhood of eminents, see Sosniak (1985) re "One Concert Pianist", Kalinowski (1985) re "One Olympic Swimmer", and Gustin (1985) re "One Mathematician: 'Hal Foster'". (all in Bloom, 1985). For an overview of recent research relating to "The Role of Families" in the development of gifted children, see Winner (2014, pp309-311)

With regard to research on the role of organizations and teams in driving the development of characteristics related to personality and self.. good luck. There is plenty of research demonstrating the central role of both, esp personality, in Big-C creativity (and creators – eg, why did Van Gogh cut off his ear?, or why did Elvis have so much aggro singing "Are you Lonesome tonight"?). There are thorough and evocative overviews in Simonton, 1994 (Ch 10), and 2009 (Ch 5), and more recently in the *Wiley Handbook of Genius* (2014) which he edited (eg Chs 2, 5, 12, 14, and 23); but almost none of this research focuses on the role of organizations and teams in driving the development of characteristics related to personality or self, ie, the

focus we'll be taking here. Why? well probably no big surprise if you think about it for a moment.. basically where are you gonna get the data...

With regard to historic 'greats', any thorough biography will have plenty of evidence – well enough to give you a fair hint anyhow - re the roles of teams in childhood and adolescence in promoting unique developments of personality and self, but there is virtually no systematic research in the creativity literature re such. Storr's *The Dynamics of Creation* (1983) provides brief analytic frameworks and some short commentaries re understanding how parent/child teams operate with regard to such developments in the case of Newton, Einstein, Ibsen, Balzac, Stravinsky, and others. Ditto you can get a good sense of such development, though little systematic analysis of it, in McCurdy (1983) whose 'geniuses' – like Storr's and all those historic greats - are after all long since safely departed.

When it comes to detailing those “skeletons in the family closet” underlying the development of, eg, NJ's *perfect self doubt*, or Woody's *terror of intimacy*, or maybe Hitch's *fear of an overwhelming and chaotic world* – not much chance anyone was invited in, camcorder in hand, to zoom in for a few hours of live data collection. Ditto unlike Bloom and his colleagues (1985) recapturing participants detailed memories re 10-15+ years of the development of intellectual characteristics of concert pianists, Olympic swimmers, etc., no one's been spotted lately interviewing, eg, Andy Warhol's or Charlie Parker's mom, or Jim Morrison's or Michael Jackson's old man, or Sylvia Plath's *Daddy* for that matter. The best you can get are analyses of biographies, sometimes by biographers themselves (eg, McCrae & Greenberg, 2014, p234-37 re John Coltrane) or psychobiographic estimates (Schultz, 2014). There is virtually nothing which attempts to systematically follow the dynamics of

personality / self development within the families and related organizations/ teams, over many years, as we'll be doing here.

You can, of course, get a pretty fair hint (hint, not analysis) of how this works, by looking at your own private memories of such family dynamics over many years in relation to what you consider to be one or two of your own key personality/self characteristics.. or perhaps have a dip into the early family systems therapy literature.. eg, Minuchin's account of Dede, the "superlabile diabetic", triangled into her parents conflicts to such an extent that fluctuations in their aggro could be "measured in her bloodstream" (1979, p7-9); or Palazzoli et al's case of the 22 year old daughter of a Italian family whose "delusional ideas and psychotic behavior" held everyone together inside a family that "everyone wished to escape". "psychotic behavior"? well how bout, jumping up in the aisle, cursing her anal rash and scratching it like a "he-man truck driver", on a family train trip to Milan, clearing the compartment of all other passengers in the process (1978, pp138-46).

Given you've got the essential genetic bias to get you tilting in the right direction, you also need one of those specially dedicated families (a la Albert's "ongoing systems" or Csikszentmihalyi's "complex families"), one that will keep you focused, on target, fully geared up for your particular affliction. A family that will provide the you, "like any artist", as Jay Haley puts it, with "several hours a day of practice over many years." (1971, p151). Say if you're hoping for poetic mastery.. what type of family might this be? Haley, one of the early giants of family systems therapy, gives us a thumbnail of one such constellation:

"The type of family one must come from to become schizophrenic has been extensively described in the

professional journals. One can summarize these scientific reports by saying that as individuals the family members are unrecognizable on the street, but bring them together and the outstanding feature is immediately apparent – a kind of formless, bizarre despair overlaid with a veneer of glossy hope and good intentions concealing a power-struggle-to-the-death coated with a quality of continual confusion." (p148-9)

And the child's role in this formless veneer of a glossy power struggle to despair?:

"to hold the family together" through a "lifetime balancing conflicting family triangles" by learning to "communicate in a way that satisfies everyone by saying one thing and disqualifying it with a conflicting statement and then indicating that he didn't mean any of it anyhow."

How 'bout: "My parents and I are involved in the eternal triangle" (p152)?

Ok, not exactly Plath or Ginsberg but still not bad for 16.

Admittedly, schizophrenia's bit extreme, but countless other variations of family constellation are of course possible, each providing its own developmental opportunities for the future creator; e.g., for a Collins, Smart, Cowper or Blake, the four great English poets of the eighteenth century, who, as Housman put it, shared but one thing in common: "They were mad" (1952, p86); or as Simonton might phrase it a bit more circumspcctly, great creators "are always hovering at the brink of madness" with "just the right amount of weirdness," (1994, p294) i.e., they're just mad enough.

Teams outside the family - in later childhood and

beyond - are equally critical to the continued development of Key Characteristics. In their extensive study of talent development in teenagers, Csikszentmihalyi and his colleagues devote almost an entire chapter to the crucial role of teachers in this process. Their focus is on the characteristics of "reciprocal relations between the practitioner master and the apprentice pupil", a relationship whose "ultimate success depends on the fit between two unique and often incompatible individuals" - ie., on how well the student and the teacher work together as a team (1997, p178).

Examples of such master/ apprentice teams are abundant in every field of human excellence. In relation to art, for instance, Csikszentmihalyi et al note the transgenerational master/ apprentice Links among five Renaissance artists from Donatello through to Raphael (p178). Simonton's extensive study of interpersonal relationships of eminent artists makes this point even more powerfully. He found, for eg, that "the more masters and the more paragons" that the artist has relationships with, "the greater the artist's eminence" (1984, p1277, 1286) - ie the more styles and teachers the artist has the opportunity to learn from (vs others who have less opportunity), the better s chance of developing s talents, confidence, visibility, etc. In short, not only the live master, but the long dead paragon can be part of the team. For a compelling example of this visit Musée Picasso in Barcelona to see the huge range of styles the young Picasso had the opportunity to study, practice, play with, and modify in the course of accelerating the development of his artistic talents.

In relation to science, Zuckerman's study of American Nobel laureates finds that the key factor in the "socialization of the scientific elite" was the relationship between the doctoral student and s supervisor (1977,

pp122 -132). While obviously not as intense as the likes of undertaking a joint discovery would be (eg Watson, 1986), the teamwork involved in these "apprentice"/ "master" relationships often extended over a period of 3 or 4 years of specialist scientific study. Zuckerman summarizes the benefits of such teamwork: "For young scientists as talented as these destined laureates, great advantages accrue from being apprentices to elite masters. Their confidence is reinforced in the course of a demanding apprenticeship, by comparing themselves, to 'the best' in the field and finding that they measure up reasonably well. Once internalized, standards of performance and scientific taste do not generally depreciate with use. Moreover elite masters usually recruit cohorts of apprentices of unusually high quality and the young scientists advance one another's development as well as, each of them, learning from the master. So combined with the special access to resources that often comes from being sponsored by eminent scientists, the basic orientations and the skills and knowledge that go with them contribute greatly to the process by which advantage accumulates for young scientists moving into the elite" (p130-31).

Re the role of teams/ organizations in adult productions of the 'great': It is worth noting that such productions, eg those which solve the key problems of a field, require access to not only the right kind of problem (ie one which engages the Key Characteristics of the particular individual in solving the key problem of the field) but also to the right kind of organization, and the right kind of team within it (ie, one which complements/ supports/ stimulates the person's sustained engagement in the problem solving process) - eg Fred Astaire & Ginger Rogers (vs Fred, or for that matter Ginger, and any other partner); Watson & Crick at the Cavendish Laboratory; Bill Russell, Bob Cousy & the Boston Celtics; Paul McCartney, John Lennon, and the

Beatles; Michael Jordan, Scottie Pippen and the Chicago Bulls. When this happens the inevitable result is a sequence of intense problem solving (a la Csikszentmihalyi's 'flow activities') interspersed with periods of integrating new knowledge and/or refocusing to get back on track to solving the now redefined problem (eg, see Crick, 1990, ch 6).

Gaining access to the right kind of organization – eg, an elite university research laboratory or a professional sports team - in no way guarantees access to either The Right Kind of Problem or the right kind of team to solve it. This is powerfully demonstrated, for instance, in the case of Francis Crick at the Cavendish before James Watson arrived, and that of Maurice Wilkins and Rosalind Franklin at King's College, London, re finding the chemical structure of DNA in the early 1950s (Watson, 1986, pp 26, 46+; Crick, 1990, pp62-71; Sayre, 1975, pp94-107. Re Franklin and Wilkins and their "clash of personalities", or more to it: "one of the great personal quarrels in the history of science", see McGrayne, 1996, p313). In fact the odds of attaining (& sustaining long enough to get 'a major result') the right combination of person, team, and problem even near the top of any field is so low that virtually every serious aspirant spends a fair bit of their adult productive life struggling to attain/sustain such a fit.

But then again maybe, like T.S. Eliot, you might get your timing just right. You might end up in London, "ever marginal" and "uncertain as to who or what you wish to become" (Gardner, 1993, p238), toting a Harvard philosophy Ph.D., with all the "expectations of your Puritan ancestors", and the literary ambitions of your failed poet mother (p229) – and in the course of 7, 8 years, compile your own fair stack of poetic "fragments"(p241), speaking in a "welter of voices reflecting the consciousness of actors and objects drawn from the broadest sweep of time and space."

(p242)

Like I said, given proper timing, and an editorial team or two - say Ezra and Viv - to turn your "bloated" manuscript – with "too much indecisiveness, repetitiveness, and monotony: too many voices and too little sense of overall direction, control and locale" (p242) – into a powerful poem half that length. Who knows, you might even find that your own personal "depressed, impotent, marginal" (p246) wasteland happens to "fit exactly (with) the feelings of (an entire) population at the end of long and largely fruitless war" (p247) – the sort of happenstance that could stitch you up in Stockholm some frosty night in December, buried in yet another heroic struggle for the myth of individualism.

How'd Eliot put it?

"The Nobel is a ticket to one's own funeral. No one has ever done anything after he got it." (in Simonton, 1994, pp57-8)

Still, I suppose it could be worse. I mean, imagine ending up on your death bed with English Girl Guides reciting your legacy up and down the country, from Hartlepool to Penzance:

"This Be The Verse: They fuck you up, your mum and dad . . ."

Note (26) (p34 in text)

Csikszentmihalyi and his colleagues, for eg,

emphasize the importance of continuous engagement in an intellectual domain (eg art, science) if a "talented teenager" is to "remain competitive" (1997, p200). The same is obviously equally true in relation to the development of personality/self characteristics which eventually turn out to be key to success in a given domain.

The complete developmental case study of Norma Jeane / Marilyn (as well as those of Woody Guthrie and Alfred Hitchcock) are presented in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF of this book is available on my Blog: www.greatnessbd.com

Note (27) (p34 in text)

The research "literature on the self" over the past few decades is "enormous" (Robins, et al, 2010, p423). For a review of research related to the development of self, see for eg, Robins & Trzesniewski (2005). Some early studies which I found particularly helpful in formulating my ideas re Continuous Matching, and whose arguments remain relevant, are noted here.

Re evidence of the centrality of the person 'mattering' (ie 'integration') and 'having influence' (ie 'differentiation') to the development of 'self' is available throughout the literature on 'self'. Re the critical role of "recurring issues of differentiation and integration throughout life" in the development of 'self', see Robert Kegan's chapter on "The Constitutions of the Self", where he overviews their appearance in the theories of Piaget, Kohlberg, Loevinger, Maslow, McClelland, Murray, and Erikson (1982, p75 & esp pp86-7). Re

clinical and academic research on the crucial role of "domains of self-experience" and "social relatedness" in the emergence and development of several "senses of self" during infancy, see Stern (1985, pp10-11). He notes, for instance, the centrality of a "sense of a core self as a separate, cohesive, bounded, physical unit, with a sense of (its) own agency, affectivity, and continuity in time". See Laing's (1969) chapters on "Complementary Identity" (pp81-97), ie., the "function of personal relations whereby the other fulfills or completes self" (p82); and "Confirmation and Disconfirmation" (pp98-107) where he provides examples of the "failure to recognize a person as an agent" - eg, Julie who as a child was treated by her mother as a "toll bell" or "tailored bread" (p101). In Burkitt's words: "It is only in relation to others and the material world in which we live, that humans come to realize their separateness from all that surrounds them. Human individuals can only make themselves into a subject to the extent they have realized their own existence through the effect their actions have had in the world around them," (and have had in) "making them into a distinct entity in the eyes of others" (1993, p189).

Note (28) (p34 in text)

Information and quotes cited in this section (and further related information re the development of Norma Jeane / Marilyn's *perfect self doubt*) can be found in Spoto (1993), pp 9, 12-56, 63-4, 92, 102-05, 200-01, 207, 230-33, 241-2; Guiles (1992), pp 27-37, 39-55, 66, 113-4, 128, 157, 160-1, 173-4, 187, 193; Monroe (1976), pp9-21, 24-7, 39-40, 72; Rollyson (1986), pp9-13, 28, 34, 36-7, 42-3; Miller (1988) pp9, 370-2, 379-80, 415, 418, 423; 435-6; Summers (1990), pp6, 25-7,

31, 44; Goodman (1961) pp225-6; Rosen (1974) pp 290-91; Dyer (1993) p48; Haskell (1975) p 255; Skolsky (1975), p220-222; Clarke (1989), pp 47, 101, 927.

Norma Jeane / Marilyn could perhaps be termed a 'borderline borderline', in that like a "borderline trait patient" she had the "same types of affective, cognitive, & interpersonal problems" as a borderline personality - eg "troubled interpersonal relationships" marred by "manipulation and extreme dependency", "transient paranoid/ dissociative experiences", "chronic dysphoria" (emptiness, loneliness, boredom) "impulsivity in a number of self destructive areas" - but without the same degree of impairment. The reasons for this no doubt include a lack of severe/ chronic physical & sexual abuse in her childhood, the absence of a "triggering event" after adolescence, and the presence of a continual stream of mentors, coaches, and nurturing relationships which sustained her in her early years in Hollywood. See Zanarini & Frankenburg (1997), esp pp95-6, 98-101.

See also the research on early parental relationships of female borderline personalities re "chronically devaluative and/or blaming statements" (Zanarini et al, 1989, pp20-23); "frequent experience of being shamed or humiliated" (Zanarini et al, 1997, pp1103-04); "hostile rejection of 'badness'" leading to an intensification of "negative self-image" in the child (Shapiro et al, 1975, pp399-402); overall pattern of "intrusive controlling" mothers and distant or hostile fathers (Soloff & Millward, 1983, pp576-7, 82-3, 85-6). Re general analyses of development of negative/ unacceptable self, see Erikson (1959), pp65-70, 80-82; Epstein (1980), esp pp103-07; Harter, 1978, esp pp38, 47, 51, 57. Re adult experience of self rejection in borderline personality, see Westen et al, 1992, esp pp388-89, re "markedly inconstant" and negative self-

concept/esteem; Perry & Cooper, 1986, pp872, 77, 79, re “own needs and anger being unacceptable” & “pervasive sense of self loathing” whenever aware of them. See Lindsay-Hartz, 1984, p694, re shame making the person feel “small and worthless” with a “shrunk self”.

For further research relevant to the development of a related dimension of NJ/M's personality, ie her *hunger for love*, see Note 13, in "Norma Jeane Becomes Her Dreams", in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF is available on my Blog: www.greatnessbd.com

Note (29) (p37 in text)

re The 4+ Worlds

What I initially termed The 4 Worlds - for sake of convenience in focusing our attention on the locations of major influences on development which reside outside the control and often even awareness of the developing person – can be roughly described as the Personal (inc genetics), the Interpersonal, the Institutional (both inc Organizations), and the Societal (inc cultural). In the past century with, for eg World Wars, and more intensively in more recent times with the emergence of International and Global Commercial / Financial / Military / Political Institutions - not to mention the accompanying accelerated development of Information and Communications Technology - it makes no sense to refer to simply The 4 Worlds. Or for that matter 5 or 6. After all, the race “to put a flag

on the moon” has gone well past Mars by now. Ditto with the ever-expanding worlds of Sub-Genetics, Bionics, Cryonics, etc, who knows what future tiny worlds may be dominating our development in time to come. So – as 2016 wraps up with robotic eye surgery, three parent offspring, bionic implants, and deep brain surgery without a slice (& 2020 sweeps in with COVID-19) - I’ll just go with The 4+ Worlds and leave you to suss their ever increasing influences on the development / redevelopment / etc of our future Einsteins & Curies, Marilyn’s & Mozarts.

Note (30) (p37 in text)

Sandra Scarr’s arguments re how “genotype -> environment” are obviously relevant here. Clearly any child will be “active” in attempting to select among (& modify) the various types of problems/teams on offer so as to play to the child’s own strengths. The success of such efforts will inevitably be sizably influenced by a multiplicity of other factors, including, eg genetic biases and relative power of other individuals who are involved. The “passive” effect of genotypes coming into play via parents genetic biases determining the environment in which their child lives, and the “evocative” effect of the child’s own genotype eliciting particular types of responses from others are also both undoubtedly factors in the process of determining what problems/teams are on offer to the child. The impact of “passive” and “evocative” genetic influences are plausibly greatest in relatively stable and highly resourced, “special focus” families such as those studied by Benjamin Bloom and his students (1985).

But even here such influences are likely to fluctuate considerably due to both internal and external pressures on the family, for eg the frequency of early ‘parental loss’ among historic greats (Simonton, 1994,

pp 153-55). To get a feel for what it might be like at the other end of the resource/stability scale, consider the range of 'parents', 'siblings', and reactions from them which Norma Jeane 'evoked' over the course of her first 10 -15 years.

See Scarr & McCartney, 1983, re Sandra Scarr's theory; Albert, 1978, pp 203-4 re 'special focus' families. For updates relevant to Scarr arguments, and supportive of above discussion, see, Pomerantz & Thompson, 2010, esp pp 352 – 355 re "Do Parents Really Matter?"

Note (31) (p38 in text)

Re the ubiquitous role of culture/subculture and institutions within them in defining, valuing, promoting particular ways of thinking and problem solving, see Raymond Williams' discussion of culture as "the general process which creates conventions and institutions, through which the meanings that are valued by the community are shared and made active" (1965, p55). Or, as Clarke et al put it, "the 'culture' of a group or class is the peculiar and distinctive 'way of life' of the group or class, the meanings, values and ideas embodied in institutions, in social relations, in systems of beliefs, in *mores* and customs, in the uses of objects and material life. These structures shape the on-going collective existence of groups and they also limit, modify and *constrain* how groups live and reproduce their social existence" (1983, pp53-54). In terms of current argument, they "limit, modify and *constrain*" the ways in which the characteristics of the child (intelligence, personality, self) are developed, as, for eg, Howard Gardner notes with reference to "the twelve-year-old male Puluwat in the Caroline Islands, who has been selected by his elders to learn how to become a master sailor, or the fifteen-year-old Iranian

youth who has committed to heart the entire Koran and is being sent to a holy city, to work closely with an ayatollah, or the fourteen-year-old adolescent in Paris, who has learned to program a computer and is beginning to compose works of music with the aid of a synthesizer" (1985, pp3-4, 202-03, 345-46, 364-66).

Re "little room at the top" and reasons why most child prodigies never become "big-C creators", see Winner (2000b, pp165-6); or as she put it more recently in her chapter summarizing the research findings: "Child Prodigies and Adult Genius: A Weak Link" (2014)

Note (32) (p39 in text)

Re: Cumulative Matching: Definition, research, and numerous examples.

Cumulative Matching in relation to becoming 'great' occurs any time the person matches with an organization/ team which results in an accelerated development of s Key Characteristics relative to those of peers who are not so matched. Or more generally, results in increasing the opportunities for such acceleration via access to contacts, resources, insider information, visibility, etc This is true regardless of whether the match is sought (as in Van Gogh seeking out the sun of Arles to paint in during the spring of 1888), fortuitous (as in Gauguin not showing up until 8 months later); or both (as in James Watson accepting a post doctorate fellowship to the Cavendish Laboratory of Cambridge University in the fall of 1951 and meeting up with Francis Crick in the process).

Equally cumulative advantage can occur at any point in the developmental process, from eg, Bill and Mary Gates sending their son to "Seattle's exclusive Lakeside School" to "straighten him out", and in the

process unwittingly booking him into the ground floor of the '70s info tech revolution, to, eg, Darwin having his claim to priority re the discovery of evolution saved by the fact that he, an “independently wealthy squire-naturalist”, was at the very heart of the tiny English scientific establishment (and a buddy of Hooker & Lyell) when Alfred Russel Wallace’s solution to the problem arrived in the post from “half-way around the world” one “quiet Friday morning” in June of 1858.

Information & quotes above are from Cabanne, 1985, p117, 148-53; Watson, 1986, p19; Manes & Andrews, 1994, p23; Desmond & Moore, 1992, pp466+.

Re the crucial early benefits of attaining Cumulative Matching - as for eg in the case of Woody Guthrie's *wordslinging* abilities being hugely accelerated during the Okemah oil boom - this process has been well documented in the studies of Bloom and his associates (1985). See for example, Lauren Sosniak's short, clear account of how the work of "sociologists such as Merton (1968), Cole and Cole (1973) and Zuckerman (1977)" on the ways in which "scientists, especially Nobel Laureates, achieve success" applies to the "development of concert pianists". She describes this process as "accumulating advantages" (1985d, pp489-97).

Zuckerman's conclusions re the "accumulating of advantage in the career of Nobel laureates" are worth noting. "Most get an early start by going to the most distinguished universities for graduate work. More than half study under Nobel laureates, and a large share of the rest study with occupants of the forty-first chair and the more extended elite. The development of scientific taste, standards, and self-confidence are the most beneficial (personal) results of their apprenticeships, (benefits not accessible to their peers for the simple reason that) none of these is easily taught, usually

being acquired by example rather than precept. It also happens that studying under members of the scientific elite located the laureates-to-be in the network of scientific communication, thereby improving their opportunities to publish and to acquire further facilities: good appointments and productive research milieus. Future Nobelists got their degrees and began to publish earlier and more copiously than other scientists and continued to do so throughout their careers. Some evidence, which is not nearly systematic enough, suggests, just as we would expect, that the career beginnings of occupants of the forty-first chair exhibit the same characteristics: they also studied under distinguished scientists, began research early, were rewarded early, and thus look much the same as the Nobelists" (1977, pp248-9).

Similar to Zuckerman's conclusions, Dean Keith Simonton's study (1984) of the correlations between various types of interpersonal relationships (e.g., master-apprentice, collaborators, rivals, friends, associates) among 772 artists over a period of nearly 9 centuries and their relative attainment of "eminence" (from Michelangelo on down) can be read as a powerful argument for the role of Cumulative Matching in attaining 'greatness'. Consider just a few of the main findings:

* As the number of "artist-associates" or "artist-friends" increased so did the artist's eventual eminence. Moreover this effect increased as the age gap in these relationships increased (p1281). That is, the more people who are your friends and work mates within the artistic establishment, the more insider information, access, visibility, clout, etc, you are likely to have in getting on with your artistic work and having it become known and valued. As the age gap between you and your artistic associates & friends increases, the more likely you'll be at different stages in your

career development and hence less likely to be competing for the same commissions/ niches/ resources/ etc.

* "Increasing the number of (eminent) admirers (or "distinguished apprentices") raised the level of fame achieved". Moreover this effect was decreased as the age gap in these relationships increased (p1281). That is, the more people in the artistic establishment who are your 'fans' or are indebted to you (apprentices) or both, the more opportunities this is likely to create for you and your work to become known and valued. Since your apprentices aren't likely to be competing with you for commissions/resources/etc, the closer they are in age (eg 10 years), the more likely they'll be in a position to promote your influence/ visibility/ opportunities within the field while you're still young enough to cash in on this (vs, eg, a 30 year age gap). The age gap between the artist and s eminent artistic admirers would operate in a similar way, only in this case primarily with reference to the completed or nearly completed body of work of a now known and established artist. This effect would operate at the level of institutionalizing your name, style, image, etc as part of the definitive artistic legacy. (see Becker, 1984, esp ch 10 & 11, re process of person's work becoming established, building a 'reputation'.)

* "The greater the number of fellow artists who were both compatriots and contemporaries, the lower the probability of artistic distinction" (p1282-3). That is, the greater number of eminent artists who are competing for positions/ commissions/ visibility/etc within the same limited pool of resources (ie the nation), the less likely any given artist will gain strategic advantages over the rest.

* "Artists who are highly eminent tended to enter into friendships with other artists who were less so, and

vice versa. Apparently greater artists accumulate a collection of lesser artists as a group of devotees" (p1278). Also "the actual presence of rivals at the individual level ("personal rivalry") seems to have had an advantageous effect" on the artist's eventual level of eminence. This effect "tends to increase with an enlarged age gap" between the rivals. (eg, Leonardo and Michelangelo, p1283). That is, each of the "highly eminent" artists has s own power base within the artistic establishment (and no doubt 'fan' base within the wider population). Moreover with age differences of eg 20 years or more the rivals can easily come to represent the values, aspirations, 'realities' of different generations, with the result that a lengthy public struggle for dominance between two outstanding but dissimilar artists can only serve to promote the visibility/fame of both.

Re systematic empirical research on the effects of Cumulative Matching, there is a small and not surprisingly - given the intense competition among the participants for the same scarce resources - hotly debated research literature on the topic of 'cumulative advantage' with relation to its effects on success in academia (cf. Keith et al, 2002; Huber, 2001; Prpic, 1996; Fox 1992).

One of the best known and documented studies of cumulative advantage in academia is termed 'The Matthew Effect' in reference to a passage in the Gospel according to Matthew (25:29). This research focuses on cumulative advantage in that those academics who are already known, prominent, eminent, gain more credit than deserved for, eg, collaborative work or multiple independent discoveries (and ditto for eminent institutions attracting more resources, human and otherwise). This is a gradual accumulation of advantage, unfair advantage in fact,

over one's peers. This is the sort of cumulating advantage which results in, eg, 5-6% of those who publish in any field eventually contributing about 50% of the publications. (cf Merton with Zuckerman, 1968; Merton, 1988)

If you step outside the infighting of academics, or better yet include that as yet another example, it's not hard to see that all politics (big or small 'p') is quite simply about accumulating advantage, with each competing side, faction, group, party, movement, trying to improve, maintain, extend its access to the relevant resources and opportunities. A few engaging historical reads re the politics of cumulative advantage / disadvantage might include: Boyer & Morais, 1980 (re: 100+ years of labor war in the States); Brown, 1971 (re: "an Indian history of the American West"); Domhoff, 1979 (re: "processes of ruling class domination in America"); Faludi, 1991 (re women rights ever being, in Dale Spender's words, "confined to cycles of lost and found" - p46); Harris, 1978, (re the "collective dreamwork" (p4) central to the perpetual societal politics of cumulative advantage & disadvantage); Josephson, 1934 (re: "the robber barons"); Kozol, 1975 (re: "death at an early age" in the Boston public school system); Olsen, 1983 (re the countless ways in which - in Maxime Hong Kingston's words – "the poor, the racial minorities, the women are condemned to silence"); Taylor, 1985 (re the secrets of accumulating advantages in the London underworld); Mars, 1983 (re "cheats at work", ie all of us?). Or perhaps go right up to date and zoom in on the endless benefits of having yourself fully commodified (Standing, 2014), or for that matter anonymous (Mayer, 2016)

(33) (p39 in text)

Information and quotes cited in this section (and further related information re Woody's development as a *wordslinger*) can be found in Klein, 1980, pp 8-11,16-38, 46-9, 53, 56, 58 68, 70-74, 77-80, 85, 87, 91, 94-5; 136, 143-9; Guthrie, 1970, 38-40, 46-7, 50-55, 61, 65-73; 86-7, 89, 91, 94-102, 104, 106+, 113, 135-43, 147-51, 158, 179+; Yurchenco, 1970, pp18-20, 23-35, 42-9, 60-66; Guthrie, 1963, pp11, 20-1; Guthrie, 1976, pp 35-6, 42-4, 50; Lomax, Guthrie, & Seeger, 1967, pp216, 219, 226-7; Guthrie, 1992, pp xxiv, 3, 24, 177; Dickey, 1976, p3; Lampell, 1972; Guthrie, 1961; Guthrie, 1964.

Woody's complete developmental case study, entitled "Woody Finds His Footsteps", is presented in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF of this book, containing extensive case studies of Woody, Alfred Hitchcock, and Norma Jeane/Marilyn, is available of my Blog: www.greatnessbd.com

(34) (p43 in text)

The benefits of Cumulative Matching are widely recognized by parents everywhere, but few are ever in a position to achieve such for their children in relation to the arts or sciences, or for that matter, chess or country music, ie creative fields in which early access and intensive training are likely to give your child a definitive advantage over s peers.

The history of every form of traditional music is of course littered with examples of the music being

passed on from one generation to the next via intensive early immersion in the music within the family and the surrounding community. The same is of course true of classical music and this history has been thoroughly studied, not just with reference to the classical greats such as Mozart, Bach or Beethoven; but even more systematically in more recent studies of prodigies and gifted children. If the child shows an interest, and there's a decent teacher within reach, there's a good chance that child is going to get a well-resourced shot at cumulative advantage.

Course it doesn't have to be music, there are plenty of examples, for eg, in the history of any sport. Take tennis. Given initial genetic bias, you might say, all it takes is an early start, a handy court, and the right kind of coach. 'Course in some parts of town such facilities and coaches aren't all that easy to come by.. well unless, of course, you happen to have Richard Williams for your old man.

One Sunday afternoon back in the late '70s, while flipping tv channels, he happened across Virginia Ruzici, a 25 year old Romanian, picking up a "forty-thousand-dollar check" for winning a professional tournament which, as announcer Bud Collins put it, was "not bad for four days' work". (p161) Not bad indeed. But Richard Williams had no interest in tennis, particularly women's tennis. and neither did any black people, at least none that he knew (p163). He "thought it was a sissy sport" (p163). But then he got to thinking.. "Could I turn that to our advantage?.. would the entrance of strong, fast, ghetto-bred black people into the game change it as dramatically as it had all other sports?" (p163)

The fact that he didn't live in a ghetto, and had no daughters of his own yet, was no big deal. He and his wife, Oracene, were both "terrific at sports" and both 6

footers (p187), and she “agreed gladly” (p164) with his plan.. well the tennis-playing part anyhow.. and sure enough, a little “more than two and a half years later both Venus Ebony and Serena Jameka were born. (p163, 189)

In the meantime, never having “picked up a racquet” in his life (p174), all Richard had to do was start building up his “library” of books, magazines, and videos(p171) and teach himself how to play. Then early on in the process of studying his books and videos, and speaking with “individuals from the National Junior Tennis League and the United States Tennis Association”, Richard discovered that he disagreed with everyone about one key thing: “the proper way the feet should go”(171). “Everyone agreed that the closed stance should be used on both the backhand and forehand” strokes (171). Everyone but Richard. If his girls were going to “dominate the game” (p162), and “take the world by storm” (p187); if they were going to take over from the past generations of Grand Slam heroines, from those “Powder-puff hitters with lots of spin” (p187), they were going to need something more powerful than closed stance strokes. They were going to need an “open stance” (p172).

By March, 1983, Richard “had (his) game and (he) had (his) girls”. Serena was one and a half, and Venus was almost three. So it was time to move from the “tranquil” seaside of Long Beach to South Central Los Angeles, to the Compton ghetto (p189-90), to the “world of crime and bloodshed.. and daily gun battles” (p190), the world where his girls would “grow up tough”, with “a fighter’s mentality”. Richard figured it would be “much easier to play in front of thousands of white people if they had already learned to play in front of scores of armed gang members” (p190)

Another 2 years and 10 teeth (p204) later - courtesy of

punching it up, pump shotgun and all, with 2-Evil's rock cocaine peddlers (p192) for control of the local open air drug distribution center – Richard had his court right where he wanted it - in the heart of the Compton ghetto (p207) - and he was already “pitching (the) balls over the net to (5 year old) Venus” (p201). Talk about cumulative advantage.. Wimbledon was practically a cinch.

Still there was the likes of Indian Wells and a few related matters to deal with.. eg by paying “busloads of kids” from the local schools to surround the courts” while Venus and Serena were working away on their strokes (p229) - paying them to call his little girls “every curse word in the English language, including ‘nigger’”. and sure enough another fifteen years or so and wasn't Serena beating Kim Clisters in the 2001 Tennis Masters Series Final at Indian Wells, with her father - “Mr Nigger”, who, according to the gentleman sitting beside him, oughtta have his “black ass.. skinned alive” - sitting in the packed stadium listening to the crowd booing his daughter (p250-57)

Venus and Serena, and no one else in women's tennis, learning that “open-stance’ stroke, and god knows what else, from their athletic father determined to turn his daughters into the conquerers of that “sissy game” - 15 years of Cumulative Matching that definitely paid off.

All above info and quotes are from Richard Williams' autobiography, *Black and White: The Way I See It* (2014). Serena's childhood memories of same are scattered throughout the first three chapters of her autobiography, *My Life: Queen of the Court* (2010); and her detailed account of the 2001 Indian Wells tournament is given in Ch 4.

(35) (p43 in text)

re: Catalytic Matching and the Dynamics of Open Systems

The term 'system' is being used here with reference to the research on complex/ open systems (families, organizations, social networks, economic systems, etc) which actively, often with apparent spontaneity, systemically organize themselves to promote and/or inhibit particular patterns of behavior. The idea of the person acting as a 'catalyst' comes from Stuart Kauffman's thinking about 'systemic' dynamics in microbiology, where "one molecule, the catalyst, grabs two other molecules as they go tumbling by and brings them together, so that they can interact and fuse very quickly, faster than they would have otherwise"; and further, where when you have the "right" combination of ingredients in the "primordial soup", they will form a "coherent, self-reinforcing web of reactions" (an "autocatalytic" system) such that "each molecule in the web will catalyze the formation of other molecules in the web - so that all the molecules in the web will grow more and more abundant relative to molecules that are not part of the web." The difference here is that the catalyst, ie the person whose development in a particular role is being accelerated, is both the trigger and the prime beneficiary of the 'catalytic system', ie the 'star'.

Quotes here from Waldrop, 1994, p123 - 4. See also Kauffman, 1993, re the importance of catalytic "self-organization" (p16) and "integrated response to the environment"/ "lookahead" (p286/p398), given the constraints of "insufficient time" for development (p16), with reference to, eg, the "spontaneous generation" of *E coli* bacteria (pp21-26), the "evolution of machine

tools" (p373) and the "technological evolution of economic webs" (pp395- 402).

A 'star' refers to person whose life becomes defined/ driven by a public image, an image whose continued success serves crucial functions in defining/ maintaining the lives/ careers of others. These others can be mediated relationships (as in fans, media agencies, production and marketing organizations etc) or personal ones (as in parents, partners, coaches, trainers, collaborators, etc).

With regard to the star's image, Richard Dyer's observations on film stars (1993, pp2-3) have obvious implications for all fields in which the "star phenomenon" occurs. In his words the star's image "consists of everything that is publicly available" about the person, "not just his or her films (books, paintings, theories, grand slam titles, etc) but the promotion of them and of the star through (e.g., in the case of film stars) pin-ups, public appearances, studio hand-outs, etc, as well as interviews, biographies, and coverage in the press of the star's doings and 'private' life; what critics or commentators say or write, the way the image is used in other contexts such as advertisements, novels, pop songs, and finally the way the star can become part of the coinage of everyday speech".

With regard to the star's economic functions, Dyer is equally clear. In "terms of the market stars are part of the way films (art works, sports events, books, political programs, etc) are sold". The "market function of stars is only one aspect of their economic importance. They are also a property on the strength of whose name money can be raised for a film; they are an asset to the person (the star), studio and agent who controls them; they are a major part of the cost of a film. Above all, they are part of the labour that produces film as a commodity that can be sold for profit in the market

place. Stars are involved in making themselves into commodities; they are both labour and the thing that labour produces. They do not produce themselves alone" (p5). The "people who do this labour as well as (e.g. in the case of film stars) the make-up artistes, hairdressers, dress designers, dieticians, body building coaches, acting, dancing and other teachers, publicists, pin-up photographers, gossip columnists, and so on" (p5-6) are all essential to maintaining the "inherent qualities of the material" (p5), including "body features, personality, and skills" which are central to the star's image. And beyond this there is the "further labour" crucial to creating the products/ performances basic to the star's image, e.g. in the case of film, "all of those personnel involved in scripting, acting, directing, managing, filming, editing" the film itself (1993, pp5-6).

Re the 'catalytic' qualities of the child who becomes the 'star' of the 'system', Bloom's research team, for e.g., used the term 'marker' to refer to the "attributions of uniqueness or special abilities" of the child which lead "the parents and teachers to create so many unusually supportive learning conditions in the talent area". Interestingly, whether or not a child (in our terms) 'catalyzes' the 'system' into action depends largely upon the parents' perception of what is "worthy of attention". Thus a "marker may be an *inherent gift* to which the parent or teacher attaches great significance" (e.g., perfect pitch); or it "may be something that parents *believe is special* in their child - even if the characteristic is noted by experts as possessed by many children at a particular age" (e.g., a keen ear for rhythm); or it could simply be "some quality that the parents regard as *worthy of attention*" (e.g., a "child's interest in music") (1982, pp 519-20).

Even more interesting in terms of the emergence of 'catalytic' markers in the child, the parents (of eventual Olympic swimmers, concert pianists, etc) typically

"regarded it as important that all their children have certain kinds of experiences and learning opportunities" (e.g., music lessons); and it was only "after a child had received instruction for some time in the talent field" that e was identified as having "special attributes". At this point the child became (in our terms) the 'catalytic' focus of "the parents' and teachers' mutually confirming beliefs about the child's special qualities", beliefs which then "led to the child, his or her parents, and the teacher to make special demands on each other" (1982, p520), ie, led them to form a 'catalytic system'.

In Bloom's words: "As the child made progress in the talent field, the teacher increasingly expected the child to learn well. The teacher expected the child to be well prepared for the next lesson and made this clear to the child and to the parents. In turn the parents saw to it that the child was well prepared and that he or she had put in the necessary time in practicing before the next lesson. Typically, the child also acquired a notion of the standards expected and became as concerned as the teacher and the parents that the standard expected was more than fully met. In turn, the tasks became more complex as the child met the standards. As the child progressed, he or she soon became the star pupil (for his or her age) of the teacher, who generally made special opportunities available for the child (e.g., in piano recitals or local swimming matches). In the home the child soon became the 'special' child because of his or her progress in the talent area. When friends and relatives came to the home the child was extolled and gave demonstrations of his or her progress. The parents gradually saw the child as special and increasingly in need of better and better teachers, in need of special resources such as a grand piano, the additional costs of attending swimming matches, special schools, etc. The child was given special treatment in the home in terms of release from duties

and chores expected of other children; and in turn, the special conditions were dependent on evidence of the child's progress and increasing time and commitment to his or her talent development" (1982, pp520-21). In short, what we have is a self-reinforcing, catalytic system accelerating the development of the child at its center.

See Robert Albert's work (1978, 1983) for related analyses of such catalytic processes in "eminence-producing families", where the "child's family position and capacities interact as *organizers* in family interactions" (quotes from 1983, p142-3). Re family systems promoting patterns of behavior, ie systematically providing "positive feedback" to accelerate the star's development within s role in the system, see for eg, Watzlawick, Beavin & Jackson's analysis of "the family as a rule-governed system characterized by the properties of general systems: time as a variable, system-subsystem relations, wholeness, feedback, and equifinality" (1967, pp 118-148; quote p148). For an insightful, tongue-in-cheek analysis of the role of the star in such a (dysfunctional) family system, see Jay Haley's account of how "the schizophrenic fulfills his primary responsibility which is to hold the family together" (1971, pp 147-176; quote p153).

Although my analysis of the central role of systems dynamics in driving the development of the Key Characteristics of eventual greats (or to use the preferred term in current research literature – geniuses) was first presented in *Arrival* 2002, to my knowledge it has never been cited in the academic research literature. Nonetheless, a number of very prominent researchers, as well as other academics, have read my work and sent me very strong endorsements it, including for eg, Professors Robert

Albert, Ravenna Helson, David Henry Feldman, Bertram Raven, and of course Dean Keith Simonton. Related arguments re the role of system dynamics in driving such development are now beginning to appear in the academic research literature. If you've an interest in chasing any of them up, and perhaps comparing them to the analysis being presented in the current text, a handy short summary is available in Wendy Johnson and Thomas J. Bouchard, Jr's discussion of "The Relevance of Dragon-Kings and Hopeful Monsters to our Understanding of the Emergence of Creative Genius" (2014, pp286-89).

(36) (p44 in text)

Information and quotes in this section re Mozart's first 'Euro tour' come from Schenk, 1960, pp 38-46; and Levey, 1991, pp 36-7, 41, 45. Re Linz & Vienna & their likely "European repercussions" -- if the Mozarts "were received at court foreign ambassadors would probably take cognizance of their existence", hence opening the door to "yet more ambitious travels to totally foreign European cities" -- see Levey, 1991, pp35-9 (quotes here from p36).

Re Mozart's further catalytic acceleration in Paris, see Schenk, pp 58- 67.

(37) (p46 in text)

All of the information and quotes in this section re Mozart's 'mega developments in relation to Key Characteristics, visibility, and Links' and being 'stuck back in Salzburg' come from Schenk, 1960, pp 39-43, 51-2, 59-64, 95; and Levey, 1991, pp 15-19, 36, 39,

43-44.

(38) (p51 in text)

Information and quotes cited in this section (and further related information re Norma Jeane's catalytic acceleration from an assembly line worker to one of the hottest 'cover girls' in America) can be found in Spoto (1993), pp69-115; Guiles (1992), pp61-3, 67-70, 73-81, 83-104; Summers (1990), pp13-8, 20-4, 26, 30, 32-3, 36-8; Rollyson (1986), pp15-21; Monroe (1976), pp 27-30; Dyer (1993), pp32-5.

Norma Jeane / Marilyn's complete developmental case study is presented in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF of this book, which also has extensive case studies of Hitchcock & Woody Guthrie, is available on my Blog: www.greatnessbd.com

Catalytic acceleration in "loosely coupled" systems such as sports, film, art or music worlds in which the 'star' becomes the focus of "investment" by multiple organizational/ economic interests is probably best illustrated by Brian Arthur's analyses of positive feedback/ "increasing returns" operating in relation to "knowledge-based" parts of the economy, such as the success of VHS video format, or the accelerated growth of "Silicon Valley" (1990, pp80-84; also in Waldrop, 1994, pp17, 35-6).

(39) (p56 in text)

Elvis, Monet, Madonna, Lincoln, & Darwin – Catalytic Accelerations to Greatness

Information and quotes re the Catalytic Matching of Elvis with the massive societal changes of the early 1950s and mega-institutional backing come from Gillett (1984), pp 10, 13, 15, 17, 19; and Guralnick (2000), pp 142+, 155, 170, 189-90, 233, 236, 239, 242, 244-5, 253, 257, 259-62.

Elvis's acceleration to greatness is probably as clean as it gets - ie The 4 Worlds aligned over a very short period of time at outset of his career - but regardless of how such a 4 World alignment occurs - quickly as in Elvis's case, or much more slowly.. even over many years / decades, sometimes long after the death of the eventual great - the process is the same, ie the problem solving driven by the alignment of the person's Key Characteristics with sufficient complementary resources to generate the solution (be that musical, literary, political, scientific or whatever) those two alignments eventually match up with institutional and to cap it all the essential societal/cultural interests/ resources to accelerate the person beyond s peers into greatness. Here are a few more examples, indicative of the range of time and space involved in Catalytic Accelerations to Greatness:

Elvis vs Monet

If we compare Elvis' with Monet's acceleration to greatness over a half century earlier, we can see not only how the 4+ World alignment is essential to such catalytic accelerations, but equally how problematic attaining such alignments has been historically.

While the emergence of the '50s youth culture was contained within borders of a single prosperous and stable country and occurred rapidly over a single decade prior to Elvis' rocket launch, the lead up to Monet's blastoff was a bit more complicated, about 20 years more.

Re cultural crises creating new societal forces demanding that art, that music -- that "WOP BOP ALU BOP A WOP BAM BOOM!" - with their name splashed all over it, in Monet's case – unlike Elvis' - there wasn't one, but two. The first was centered in Paris in the 1870s & 80s, the second some 3000 miles later in the 'gay nineties' of New York.

France like much of Western Europe took off economically in the third quarter of the 19th century, in that "age of capital" when railroads, steamships, and telegraph lines were spinning around the world like spider webs, turning the "entire globe into part of the (capitalist) economy". In the case of France, for example, between 1850 and 1880 "foreign investment multiplied more than ten times". In Paris, as in London, Hamburg, and Berlin, the winners in this global expansion, the urban bourgeoisie, were looking for art that sparkled like their lives -- for paintings that captured *le vie moderne* in the flick of a brush, like a shutter's click in the morning sunrise.

And in the early 1870s the hunger of the new Parisians was multiplied twice over: First by the disaster of the Franco – Prussian War with its "humiliating defeats", with the triumphant Germans marching through Paris; and then immediately afterwards by that "bloody week" of May '71, when French government forces overran the Paris Commune, indiscriminately killing "nearly 30,000" of their own. What better way to "erase" and "forget" than by painting the whole thing over like some "bad dream" – painting it over with those couples

swirling round the floor of the *Ball at the Moulin*, with the dignity of Viconte Lepic, in his black top hat, walking his children through Place de la Concorde; painting it over with the kind of art Baudelaire's *flâneur* could appreciate like a leisurely stroll along the rue de Riudi, through the Parc Monceau.

Not surprisingly the first Impressionist exhibition was the "critical *cause célèbre*" of 1874, bringing Monet much needed visibility – bit like what Elvis got for his coast-to-coast gyrations on the Ed Sullivan Show in '56. Unfortunately for Monet, he had no RCA contract to go with it -- no institutional Links to from studio to radio to those teens spinning his latest vinyl in every record shop from Canton to Cleveland to Weedpatch. In 1874 Monet and the rest of the Impressionists were caught in the chaotic transition from the historic system of state sponsored salons to the newly emergent "dealer- critic" system that replaced it.

Moreover the recession of 1873 -- the onset of that 20+ year bust cycle of the late 1800s -- put a skid under the wallets of the new Parisians, a skid which was further greased by the disaster of the Franco-Prussian War with its massive indemnity to Germany, the lost of Alsace and its textile industry, of Lorraine with its phosphoric ore, ore that was "essential" to the French steel industry.

As a result for much of the decade following the *cause célèbre* of '74 (by which time he was already being bought by Durand-Ruel), Monet was in and out of the public eye. There were no rocket launches. It was more a series of bursts, sputters, and gradual accumulations -- reflecting the fragmentation of the Parisian art marketing systems of the 1870s, and economic body blows to his potential buyers. The recession of the mid-70s especially affected Durand-Ruel, "forcing him to close his London gallery". For the

rest of the decade Monet often had to "rely on the largesse of others", leaving him "penniless and destitute" (well, if you can call pulling in 6 times the take of your average Parisian workingman 'penniless') In 1878, for example, Ernest Hoschedé, "an important patron of the Impressionists", not only suffered financial ruin, he (along with his wife and six kids) moved in with Monet. As Sisley put it re his decision to return to the traditional fold of the French Academy by submitting for the Salon exhibition that year – the same Salon whose rejections had triggered the Impressionist shows in the first place - while "our exhibitions have served to make us known, we are far from the moment when we are able to do without the prestige attached to the official exhibitions".

It wasn't until after the last Salon of 1880 – where Monet's *Seine at Lavacourt* was "hung so high up that it attracted little attention" – that the era of independent exhibitions finally emerged. Those exhibitions provided Monet with the sort of niche marketing he needed to accelerate the sales of his "rich varied brushwork", with its "sense of animation" and "immediacy" -- the kind of independent one-man shows where the "freshness" of his *Lavacourt* wouldn't "evaporate" in some "grand hall" of canvases "painted in shoe polish". Small independent shows, like the one Monet was "invited to hold at the offices of the periodical *La Vie moderne*" in April of '80, allowed the likes of Georges Charpentier and his "circle of cultivated and wealthy friends" -- the "new Republican élite who could make as well as follow fashion" -- to enjoy at their leisure that "feeling of vicarious participation" in the painting of those poppies, or lily pads, or *Floating Ice*. Just the kind of show where you could pick up a little something for the wife, say at 1,500 francs a throw.

And so it was that Monet started making "a comfortable

income from in his work", finally becoming the first Impressionist to have one-man show at Durand-Ruel's gallery in 1883. In short, a mere decade from the "cause célèbre" of '74 to the front line of the rue Le Peletier.

Still, that's not exactly greatness. Fact is, it took several more years before Monet finally got the full alignment between his ongoing production as an artist, the institutional support structure to market it, and a second cultural crisis his art could satisfy, this time not in Paris, but at the very heart of the coming world power of the 20th century -- an alignment which finally gave Monet that rocket launch to fame.

That rocket launch started in 1886 when Durand-Ruel – needing to "enlarge the pool of buyers in order finally to recoup on his decades of hair-raising investments" in the Impressionists -- sent "some forty or fifty" Monets to the April, 1886, "Impressionists of Paris" exhibition in NYC (over Monet's "grumblings" re selling to "tasteless Yankees"). Those "savage" Yanks were of course the perfect buyers. They couldn't tell a *Mona Lisa* from a meat patty, and for good reason. With the exception of the likes of Hearst, Mellon, and Rockefeller Jr, the rest of "the big spenders", from Frick, Huntington, and Carnegie on down, came straight out of the cornfields, hog pens, and machines shops of small town, rural America. These "emperors" of the "gay nineties" were the sons of drovers, dirt farmers, and tin-peddlers; and they didn't "care what it cost" to put that past behind them -- to feel, as "you drove up to your portecochere in Pittsburgh, that you were one with the jaded Renaissance Venetian who had just returned from a sitting for Titian"; to feel as you glanced up from "scanning last month's profit sheet for the Saginaw branch", that you were merely savoring the sun rays dancing off that Gothic Cathedral there in Rouen. When it came to those "'gilt-edge securities' of foreign

art", there was "a brisk market in immortality" - a market fuelled by the biggest "art spending spree in history", a market that finally rocketed Monet to immortality.

As Pissarro put it in 1891: "All people want at the moment is Monets, apparently he can't paint enough to meet the demand. The worse thing is that they all want grain stacks at sunset! Always the same story, everything he does goes to America at prices of four, five, and six thousand francs". Not to mention those poplars at "almost double the price" a year later, those cathedrals at 12,000 in '95.

Bit like Elvis really. Well, give or take 20 years.

Quotes and information re Monet come from Katz & Dars (2003), pp 20, 95-9, 101-2, 106, 119, 123-4, 222-23; Rachman (1997), pp 117, 146-7, 150, 152-3, 190, 252-3, 261; Rubin (2001), pp 26, 29, 124, 172-3, 190-1, 270-71, 331++, 347+; Hobsbawn (1977), cover, pp48-9, 62-3; Holohan (1988), p46; Behrman (1952), pp51-2, 54; Josephson (1934), pp33, 37; Cochran & Miller (1961), pp257, 259; Guralnick (2000), p338. Re "the big spenders", see Beebe (1966).

Madonna

Re the role of 4 + World alignments in the case of modern day accelerations to stardom, celebrity (& perhaps eventual 'greatness') consider the following: While multiple accelerations to top of a field are commonplace in era of transnational capitalism (in particular in the era of postmodernism with advent of digital technology and global communications systems), attainment of 'greatness' within this depends, as with historical eggs, on the work/image of the individual being seen as a solution not only to

problems within the field (eg Leonardos' *sfumato*) but to cultural crises of a generation (eg Renaissance of Italy as represented through art of Leonardo) -- solutions which are identified, sustained, and promoted by institutional forces central to promulgating the relevant domain and marketing it both inside and outside the field.

Madonna's acceleration to stardom and fame (and probably eventually 'greatness') provides a clear example of addressing a key generational problem both with the field of pop music and within the wider postmodern culture. In regard to the "media, beauty, and music industries", Madonna achieved a "high measure of success" by continually portraying herself as a "subversive culture-figure" in music videos (such as *Express Yourself* and *Vogue* which "poached elements from gay culture for mass distribution", and *Like a Prayer* and *La Isla Bonita* which "'pushed borderlines' in the areas of race and sexuality"). In the process she became a role model for "hoards of largely white, middle-class sub-teeners" and "wannabes who emulated and mimicked her moves and costumes".

Within the wider cultural crisis of "postmodern identity" Madonna created a "postmodern heroine" who (in Susan McClary's words) "slips in and out of every subject position offered within the videos' narrative contexts, refusing to deliver the security of a clear, unambiguous message or an 'authentic' self". In the process she has provided a prototypical model for personal fulfillment within the "most startling" aspect of "the postmodern condition", ie the fact that it "swims, even wallows, in the fragmentary and the chaotic currents of change as if that is all there is".

Quotes and information re Madonna are from Bordo (1993) pp 282, 286; Seigworth (1993) p304, and Schwichtenberg (1993) pp5-6, 9; Harvey (1990) p45.

Lincoln

Needless to say historical figures and the works accredited to them are continuously revised to suit problems of social reality both within fields and society, revisions which can accelerate even the long deceased to greatness. In the case of a society, such revisions require not only a massive cultural crisis to trigger them, but equally powerful, integrated and sustained institutional forces to promote them. Shakespeare provides a compelling historical example of such revision (Taylor, 1990). A more recent and accelerated version is provided by the case of the U.S. president Abraham Lincoln, who was assassinated in 1865.

Throughout the remainder of the nineteenth century Lincoln's popular image was as a "well meaning", "honest", but "indecisive", "wartime president who had little to do, as an agent in his own right, with the events of the Civil War". In the first two decades of the twentieth century this same man was reconstructed into a "national idol". How and why? Simply because Lincoln provided an ideal symbol for a major set of national powerbrokers in handling the key ideological issues of their generation. The "new Lincoln", especially as promoted during the Lincoln Centennial of 1909, served as a powerful symbolic tool for the Progressive Movement (including Presidents from Teddy Roosevelt through Harding) in selling their program of legislative (as opposed to revolutionary) change to the American people, their "moral movement in democracy" which was going to "transform the competitive jungle of the nineteenth century into the humane capitalist order of the twentieth". It achieved no such thing of course, leaving the "gap between rich and poor", for instance, even "greater at the end of the reform era than at its beginning". Still Lincoln's

transformation gave the country a new national monument (for a mere two million bucks in 1909), not to mention an "immortal folk hero", ie, "Abe Lincoln the rail-splitter", the "people's President", the "Saviour of the Union who takes upon himself the pain of his people...the great moralist, the prophet of democracy, the Great Emancipator, the giant who changes the course of history". Not bad for guy who was once better known for, eg, "selling liquor, telling dirty jokes, and making do without a handkerchief". Quotes from Schwartz, 1990, pp 81, 85, 87, 93-4, 97-8, 100-01. See also Current, 1983, p185; Holstadter, 1963, p36. Re the earlier Lincoln, see the account of his former law partner, William H. Herndon (1889).

Darwin

As noted above and illustrated in relation to Lincoln, Monet, and Elvis, the acceleration of an individual to greatness within a society depends on the work/image of the person being seen as a solution not only to problems within the field (eg Leonardo's *sfumato*) but also to cultural crises of a generation (eg Renaissance of Italy as represented through art of Leonardo). For such to occur, ie an acceleration to greatness, there must be a fit across all four worlds: the personal, interpersonal, institutional, and societal. But it takes more than a simple fit. Accelerations to greatness don't just happen because the conditions are right. The essential fits must also be identified, sustained, and promoted by institutional forces, in particular by Specialist Networks, central to promulgating the relevant domain and marketing it both inside and outside the field. (cf Csikszentmihalyi (1993 & 2014) re terms 'field' / 'domain'). These accelerations are driven by powerful institutional forces capable of influencing the public in the midst of sizable societal/ cultural

change.

Not surprisingly, the attainment of greatness under such conditions is never handed over on a platter. There are likely to be a number of potential candidates, and much like political campaigns the stakes are often massive. As such the outcome isn't simply down to the "best candidate". More typically it's down to the candidate with the best campaign team. And as for the losers.. ha.. what do we know about Carl Perkins who had the first million seller in the history of Rock ("Blue Suede Shoes" – written and sung by Perkins, not Elvis); or maybe Stephen A. Douglas, who beat Lincoln in the 1858 Illinois U.S. Senate race and then, as his party (the Democrats) completely disintegrated over the issue of slavery, lost the 1860 Presidential election to his archrival. Or for that matter Alfred Russell Wallace, who also lost a much longer 1860s campaign to yet another great - Charles Darwin. If we look at Darwin's acceleration to greatness in some detail, we'll see the same dynamics as with eg Elvis or Monet or Lincoln re the essential alignment of personal, interpersonal, institutional, and societal worlds – in this case around the question of evolution - but in particular we can zoom in on the central role of powerful Specialist Networks, in driving accelerations to greatness.

Darwin published the first edition of *On the Origin of Species by Means of Natural Selection* in 1859. It sold out on the first day. Within a year the book had "run through three editions", and the storm which had been brewing ever since day one finally came to a boil. Darwin's book was after all "heresy". Everyone knew that the earth and all living creatures had been created by God in the space of six days. It was all there in the Book of Genesis. Moreover many bibles in circulation at the time carried the exact date of God's handiwork: "9am on Sunday 23 October in 4004 B.C." – a fact

established through the collaborative efforts of those eminent scholars, Archbishop Ussher and Dr. John Lightfoot of Cambridge University. (Moorehead, 1969, 260-62).

Given the ideological (not to mention political and economic) issues at stake, the clergy were soon geared up for battle. Unfortunately for them, so too was Darwin, or more specifically, Darwin's colleagues – Charles himself not being much on the gladiatorial front. No problem, Round One went to Darwin with thunder. The clergy and their scientific allies arrived in force at the Oxford University Meeting of the British Association in late June, 1860, with the expressed purpose of “smash(ing) Darwin”. By the time they got around to it, on the third day of the Meeting, the proceedings had become a media event. It was at this point that the “formidable” Bishop of Oxford, Samuel Wilberforce, speaking in an “air of confident episcopal authority” with “his attendant clergy about him”, launched into his “ridicule of Darwin's ‘Causal theory’”. Somewhere in the midst of this euphoric eloquence, “Soapy Sam” overstepped his mark. He turned to T. H. Huxley, Darwin's foremost defender, who was sitting on the speaker's platform, and asked him “if it was through his grandmother or his grandfather that he claimed to be descended from the apes”. (Moorehead, p263). Huxley, an eminent scientist and not one to suffer fools gladly, spoke in “an undertone” as he rose to battle: “The Lord hath delivered him into my hands”. And so He had. The uproar that followed was sufficient to get both men caricatured in *Vanity Fair*; and, more importantly, to have the battle lines drawn publicly for the first time in fifteen years. After the Oxford Meeting you were either for or against Darwin. As the battle raged on for a full ten years and the contest was not clearly decided for almost five decades. it's little wonder that Darwin's name became synonymous with the theory of evolution. He was on center stage for a

damm long time. (1 - below)

As the above suggests Darwin's fame owes as much to the social circumstances surrounding the publication of his theory as to any unique intellectual contributions contained within it. How so? In this regard it's worth considering the fate of some of his more notable predecessors, and in particular the conditions under which they made their contributions. Loren Eiseley's (1961) discussion of these men shows that they surely merited far more than a footnote, yet few of them have gotten even that.

Comte de Buffon, writing in the middle decades of the 1700s, managed to "mention *every significant ingredient*" of Darwin's theory, except for the "mechanism of change" (1961, p39 & 45). Yet what do we know of Buffon today? If you glance at the back pages of a Webster's dictionary, he's the "Fr. naturalist" listed in between "Buisson" and "Buffalo Bill". Jean Baptiste Lamarck and Darwin's grandfather, Erasmus, held quite similar views on evolution, but Lamarck's exposition of these was by far the more thorough. His *Philosophie Zoologique*, published 50 years before Darwin's book, according to Eiseley, had but one major failing in comparison with the first edition of the *Origin of Species*. Lamarck thought that evolution was an active process in which the "modifying power within the living creature" in concert with "ecological" demands upon it, "induced modification of the animal structure". Darwin in contrast recognized the role of chance variations being "fortuitous" to the species in enhancing its ability to survive without the animal taking any part in their creation. Aside from this point there is sizable overlap in their theories of evolution; yet today Lamarck is largely "remembered (& ridiculed) as the perpetrator of the belief in the inheritance of acquired characteristics" – "an error which (most have long ago forgotten) was

also shared by his intellectual descendant, Charles Darwin”, in later editions of *Origin* (p200-204).

After Lamarck there were at least two men who completely anticipated Darwin’s theory and a third who may have. Even leaving aside William Wells’ 1813 paper which “contains (at least) an almost complete anticipation of Darwin’s major thesis” (p120 Eiseley), there remain the works of Patrick Matthew (1831) and Alfred Russell Wallace (1858), both of which thoroughly “anticipated” Darwin’s theory – so thoroughly in fact that the question arises as to how the theory came to be Darwin’s at all.

The answer to this question lies not so much in the quality of any of these men’s ideas as in the conditions under which they were propagated. To Darwin alone, in might be said, accrued the many “chance variations” necessary to insure his “survival” as “the fittest” of the evolutionary theorists. Buffon, whose fame was rivaled only by that of Linnaeus in his lifetime, died at the “end of an age”. Eiseley argues that the “impact of his evolutionary ideas” was lessened because they were “scattered and diffused throughout that vast body of his *Histoire naturelle*. Moreover, one could not “expect complete candor on the part of a man writing a century before Darwin”. There were certain “ecclesiastical exigencies” which had to be taken into account if one were to continue operating in the public domain. As a result Buffon “at times wrote cryptically and ironically. He brought forward an impressive array of facts suggesting evolutionary changes and then arbitrarily denied what he had been at such pains to propose”. Thus while “almost everything necessary to (formulate) a theory of natural selection existed in Buffon”, even with his great influence and aristocratic connections, the Count was in no position to do so. At least not with a straight face. (p39-45)

Lamarck, for his part went right to the heart of the matter, but he was “too old (65), too inept, too poor, and too ahead of his time” to get a fair hearing in 1809. (p203) Nearly two decades later his theory was still so “extravagantly heretical” that its early translations into English were made anonymously under such innocuous titles as *Observations on the Nature and Importance of Geology* (p146). But Lamarck’s biggest problem eventually turned out to be Darwin himself. though he was exposed to Lamarck’s work early and in many aspects replicated it in his own writings, Darwin seemed at pains to disparage Lamarck when it mattered most, indicating at various points that Lamarck was “part of the history of error”(p49) and that his work was a “wretched book” (p202), “veritable rubbish” from which Darwin had gotten “not a fact or idea” (Koestler, 1969, p134) One can easily imagine how Darwin would have fared had he gotten similar treatment from Lyell, Huxley, and the other leading scientists of his generation.

Patrick Matthew didn’t fare a whole lot better in Darwin’s hands, but his real problem was that he simply never became visible in the first place (Eiseley, p125-32). In fact if it hadn’t been for Darwin’s “not particularly generous” discussion of him in his introduction to the *Origin*, Matthew would scarcely have been in a position to have cards printed up proclaiming correctly, but futilely, that he, not Darwin, was the “discoverer of the principle of natural selection” (p126). Even though Darwin himself acknowledged privately that Matthew “most expressly and clearly anticipated my views”, the appendix to Matthew’s obscure 1831 “treatise on tree-growing” somehow never quite topped the charts in 1859. The fact is that Matthew had little chance from the beginning. His formulation of the principles of evolution was indeed very clear, but it was also “very brief” and not exactly trumpeted by the title of his book: *On Naval Timber*

and Arboriculture.

Moreover Matthew himself was an unknown in 1831, and unlike Darwin nearly thirty years later, obviously had no network of prominent scientists to do his PR work for him. As Eiseley notes, nearly a century after Matthew's death, "nothing seems to be known of his life" (p125). Finally Matthew suffered a nasty blow from one of Kuhn's (1970) "paradigm shifts". He was an adherent of the "catastrophist doctrine in geology", a paradigm that was "overthrown" by the "uniformitarian" school of Lyell shortly after Matthew's book was published (p127). That left Matthew in about the same position The Lennon Sisters were in after Elvis hit the charts. In short, if it weren't for Darwin, we'd probably never even have heard of the first man to correctly articulate the theory of evolution – Patrick.. Ah.. What's his name?

Alfred Russell Wallace certainly did better than What's his name. He hasn't totally disappeared; but in terms of fame or genius or greatness, he's a nobody (2 - below). Koestler (1981) maintains that the years of "donkey work" Darwin devoted to substantiating his theory before going public are the key to his success, that the massive array of evidence he had gathered in support of his theory prevented it from being smashed in the "storm" following its release. Thus, as Koestler has it, Darwin became a genius, whereas Wallace, who "made the same discovery" but omitted the "donkey work", remains a mere mortal (p137). Darwin, for one, didn't quite see it that way. When he received Wallace's essay, "On the Tendencies of Varieties to Depart indefinitely from the Original Type", in 1858, Darwin was real clear about how much good all his "donkey work" was going to do him. He sent the essay to Sir Charles Lyell, noting in anticipation of its publication, "all my originality will be smashed". (Moorehead, 1969, p260-1). It wasn't, of course,

because by 1858 Darwin was already a man of consequence in the English scientific community. As far back as the late 1830s he had a “close friendship” with the “great” Lyell, whose *Principles of Geology* had already alter(ed) the course of geological thought” (Eiseley, p179 & 98). Lyell and Joseph Hooker, another prominent scientist and longtime associate of Darwin’s, were well aware of Darwin’s prior “donkey work” and persuaded him to present a joint paper with Wallace at the Linnean Society in 1858, Thus the two men shared “priority” of publication, despite the fact that Wallace had “gone to press” first. This detail of timing is not of consequence in itself, but it illustrates the sort of benefits that accrued to Darwin as a member of the scientific establishment. If their positions had been reversed, for instance, Wallace would simply have presented his paper in England while Darwin working on Ternate, a remote island off New Guinea, probably wouldn’t have learned for months that all his “originality” had been “smashed”. Still all wouldn’t have been lost, because his “donkey work” could have come in dead handy in helping Wallace’s theory survive the subsequent “storms”.

These “storms” could use a bit of clarification themselves, especially as their development overtime lead up to the massive ideological crisis in English society re the question of evolution, which peaked with the publication of Darwin’s *Origin*. First off, it should be recalled that the battles of 1860 weren’t exactly breaking new ground. They were more like the fourth generation of the Hatfields and McCoys. Buffon had first tangled with Linnaeus way back in he mid-1700s, attacking his “rigid boundaries between species” and arguing that “species arose, transformed themselves, and became extinct according to climatic and other changes in nature”. The next generation fought it out around Paris shortly after the French Revolution. Lamarck got in on this one, but he missed the finale of

1830: The great public debate between Geoffroy Saint-Hilaire and Cuvier before the French Academy of Sciences. On this occasion Geoffroy did himself on a tactical blunder, and Satan's lads got routed again. As regards the import of this event, Goethe declared it to be "far more memorable than the French Revolution" (Koestler, p131-2). For Darwin however the crucial battle was yet to come. The anonymous publication of the journalist Robert Chambers' *Vestiges of Creation* in 1844 took the "public by storm". It was not only a best seller, but became a "national sensation", inspiring among other things "golden verses by Tennyson" and Disraeli's line, "I do not believe I was ever a fish". Paradoxically it was the vicious scientific attack on Chamber's anonymous book which triggered the public's curiosity. Rumors were rife regarding the author, and "names higher and higher in the ranks of society began to be mentioned. Finally it was whispered that Prince Albert, Victoria's consort, had written the volume". In the process the "world of fashion discovered evolution", and the "restricted professional worlds of science and theology both lost their ability to intimidate public thinking upon the matter". (Eiseley, pp35-9; Koestler, p133) Darwin couldn't have asked for a better opening. Or as Eiseley put it: "By 1859, when the *Origin of Species* was published, an aroused and eager audience was considerably prepared for the revelations of Charles Darwin" (p139). Robert Chambers, who not only set the stage for Darwin in 1844 but personally badgered Huxley into attending the critical Oxford Meeting 16 years later, has of course long since disappeared – yet another invisible cog in the social wheels that produced the greatness of Charles Darwin.

Even though the "storms" of 1860 may have been weakened somewhat by the work of Chambers and his predecessors, there's little chance Darwin would have survived them on his own. But then Darwin never was

on his own. He was riding with some of the fastest guns in the West, or as Eiseley calls them, the “Knights of the Round Table” (p142). Lyell was the heavy in this crew, but Huxley, Hooker and Professor Henslow weren’t exactly lightweights.

Moreover they didn’t wait for the storm to break. Lyell, famous, “world-wise”, and a “great mover of men”, saw to it that “a certain bodyguard of sound and experienced naturalists, expert in the description of species” were “privately” informed of the “tenor” of Darwin’s book before it was “given to a world which would be sure to lift up at it a howl of execration” (p203-4). Thus, for instance, it comes as no surprise that Huxley, Hooker and Henslow were all at the famous Oxford Meeting, with Henslow in fact in the Chair. Darwin for his part was at home, too ill to attend. And Oxford wasn’t the only time Darwin’s buddies bailed him out at the deep end. Huxley, who became known as “Darwin’s Bulldog”, was himself a “legend in his own lifetime” (p142), and continued on for years after the Oxford Meeting as Darwin’s foremost defender, at times relying on bluff, “sophistry”, and “delaying actions” when the facts at hand weren’t sufficient to stave off the legitimate criticisms of other scientists (eg., p239).

Interestingly, neither Darwin’s ‘genius’ nor his “donkey work” were sufficient to buttress him against the batterings he took from other scientists in the years after 1860, especially from the engineer, Fleeming Jenkin, and the physicist, Lord Kelvin. From the late ‘60s on these two had Darwin pretty well stitched up for the rest of his life. Jenkin “well-nigh destroyed the fortuitous character of variation” (Eiseley, p210), and Kelvin lopped off most of the geological time Darwin needed for natural selection to operate on these “fortuitous variations” in the first place (p240).

Darwin's original theory was eventually salvaged by research on genetics and atomic energy some two decades after his death.(1) In the meantime, desperate to keep his theory afloat, Darwin's 'genius' accelerated far beyond the narrow confines of his previous "donkey work". To salvage his "fortuitous variations" from Jenkin's attack, Darwin reworked an ancient "germ" theory of inheritance to obtain the notable benefit of allowing "somatic modifications (acquired) during an individual's lifetime" to be passed on to his offspring. In short he came up with a "Lamarckian device" which allowed for the inheritance of acquired characteristics "in unending succession" (Eiseley, p217). So much for Darwin having left Lamarck behind in the "history of error". Kelvin's attack, which Darwin acknowledged as being a "very formidable one", was handled nicely in the final edition of *Origin* by the simple expedient of including contradictory arguments consistent with both positions (p242). Eiseley notes that the "number of concealed contradictions" in response to both Jenkin and Kelvin "makes the later editions of the *Origin* instructive but difficult reading". For this reason he recommends the "first edition" as being "by far the most satisfactory" (p216). Interestingly, perhaps indicative of the power of established reputation, Darwin's "striking inconsistencies" in the later editions of *Origin* "for the most part passed unnoticed by even his enemies" (Eiseley, p242-3).

Finally in regard to Darwin's greatness, it's worth noting his 'contributions' to our understanding of human evolution after the first edition of *Origin*. Eiseley pretty much discounts Darwin's lapses in this area, noting that "little was available in the way of paleontological materials" (p288). This argument would be more convincing if no one else had made any major contributions in the face of this obstacle. but, as we'll see below, someone else did – The same guy who discovered the principle of evolution in 1858, Alfred

Russell Wallace.

In “attempting to bolster his scientific position” after the publication of *Origin*, Darwin developed a number of curious ideas, some of which succeeded in sidetracking subsequent research efforts for several decades. In his *Descent of Man* and elsewhere Darwin argued that the living races “in some manner represent a sequence in time”, with you guessed it, “western European man standing biologically at the head of the procession”. He also managed to eclipse Lamarck’s wildest fantasies with the notion that the effects of “cultural activities such as hunting and fishing techniques” could be transmitted to one’s offspring. Finally, Eiseley credits Darwin with “obscuring the whole problem (of language evolution) by not differentiating clearly between the signal cries of animals and the symbolism of true speech”. (p288-89).

Wallace, in stark contrast to Darwin, developed a “new conception of human evolution” that “was destined to influence profoundly all later thinking on the subject” (Eiseley, p296). Wallace’s first paper on this topic, written in 1864, impressed Darwin as being “most striking and original and forcible”. In a letter to Hooker he described it as showing “remarkable genius” (p305). In this and later papers Wallace elaborated a “two stage” theory of human evolution, arguing, “for the first time” that “with the rise of the human brain the whole nature of the natural selection process (had) altered” (p304).

Wallace was the “first evolutionist to recognize clearly and with a full grasp of its implications the fact that, with the emergence of the human brain”, the evolution of bodily parts became “outmoded” because “nature had at last produced an organism potentially capable of endless inventing” (p306). Among other things this approach allowed Wallace to account for the “apparent

long-term stability in the appearance of the human species” and to approach the study of racial variation in man without trying to rank the “skulls of the Chimpanzee, Idiot, Negro, and Kalmuck” in “ascending” order (p297-8; 304)

For his efforts not only in formulating the theory of evolution but also in extending it to begin accounting for the specifics of human evolution, Wallace at best has gotten a footnote alongside Darwin. At worst he’s been written off as a “mystic”. In his more specialized book on evolution, for instance, Eiseley is careful to distinguish himself from Wallace’s “religious beliefs”, noting that to “consider certain of Wallace’s ideas is to occasionally find oneself labeled, along with Wallace, a ‘mystic’” (p296). Koestler in his widely read paperback on creativity gives no account of the development of Wallace’s “most striking and original and forceful” ideas about the evolution of man. Nor does he make any mention of Darwin’s major intellectual follies after 1860. What he clearly does however is to leave one in little doubt about who was the *real genius* of the two: “If Darwin had an ‘amiable credulity’, Wallace believed, among other things, in phrenology and in the cruder forms of mesmerism and spiritualism. No wonder he had to dive into the depths of his unconscious mind to bring up the same trophy which Darwin spied drifting on the surface, and secured with a boathook” (1981, p143). The fact of the matter is that Wallace was no more of a “mystic” than Darwin when he made his major contributions to evolutionary thinking. Moreover he, like Darwin, had done his “donkey-work”. Wallace was a “convinced evolutionist with the same reading background as Darwin before he went to South America” for four years in 1848. After this he went on a second “collecting expedition” to the Far East in 1854. Here he spent eight more years “crisscross(ing) the innumerable islands of the Malay Archipelago” – “Eight years of passage, often in native *prau* among

dangerous reefs and shoals; eight years (of) fevers, leeches and ten-inch scorpions”, often completely dependent on the knowledge and good will of the native people. By 1855 Wallace had already unloaded what would now be termed the “racism” of his scientific colleagues, Darwin included. As he wrote to a friend: “The more I see of uncivilized people, the better I think of human nature, and the essential differences between civilized and savage men seem to disappear” (Eiseley, p291 & 303). This is the sort of “donkey-work” that allowed Wallace to achieve not only the first, but also the second major breakthrough in evolutionary theory. Perhaps Darwin would have accomplished as much had his vision not been blighted by the narrow confines to which he returned after his voyage on the *Beagle*, ie those of a comfortable gentleman living in Victorian England.

That Wallace became a “mystic” in his later years is irrelevant to the quality of his contributions to evolutionary thought. It wouldn’t matter if he became an ostrich. That his name and work has been largely forgotten while Darwin, despite his major conceptual failings, has been elevated to the rank of greatness, says little about the two men, but loads about the social processes involved in producing greatness. In this regard Darwin’s timing in terms of the development of evolutionary thought and the decline of the church’s power, as well as his connections within the scientific community (eg, with the “Knights of the Round Table”) have already been discussed. What hasn’t been so well spelled out are the sources of Wallace’s demise. The fact is that were it not for Darwin’s sympathetic response to his 1858 paper, Wallace might never have made it into the record at all.

The man was a complete outsider to the higher orders of English society where the likes of Lyell, Huxley, and Darwin operated in 1860. He had been “educated at an

indifferent grammar school” and started out working as a land-surveyor (Koestler, p141). In his own words Wallace was “shy, awkward and unused to good society” (Eiseley, p291). By way of contrast Darwin, a member of one of the most prominent scientific families in England, had been educated at Edinburgh and Cambridge, and got his position as a naturalist on the *Beagle* in 1831 “through the good offices” of Professor Henslow and his uncle, Josiah Wedgwood (as in Wedgwood china) (p148). While *both* Darwin and Wallace suffered greatly from ill health in their adult lives, much has been made of this fact only with reference to Darwin. Koestler, for example, mentions his “chronic illness” in relation to Darwin’s “heroic patience and effort” in assembling the “pillars” of fact needed to support his theory (p137). What he neglected to mention are little details such as the £ 1000 grant which Henslow and Lyell’s “influence” helped him to obtain to begin his “donkey work” after the *Beagle* returned to England, or the fact that two of them were “endlessly encouraging” to the young Darwin in his efforts. While there is little doubt that Darwin’s physical complaints plagued him continually over his years of “donkey work”, he did have a few minor compensations such as the £ 5000 per year he inherited from his father, a “genuine(ly) happy family”, including 10 children and his wife, Emma, of whom Darwin wrote after some thirty years of marriage: “In my whole life I have not heard her utter one word which I had rather had been unsaid”, and a sizable estate, Down House in Kent, where he spent three hours working every morning and the rest of each day “walking, riding, resting, thinking, answering letters, and (doing) long hours of reading” (Moorehead, p248-57). These were scarcely the conditions under which Alfred Russell Wallace labored through sickness and health to produce his scientific masterpieces. The 1858 essay for instance, was written “in a few feverish hours” over the course of two days while he was in the

midst of a “severe attack of intermittent fever” on an “island off New Guinea” (Koestler, p142). Given these differences in their social circumstances, it’s hardly surprising that Darwin produced the book required to stir up the massive public controversy over evolution, while Wallace was limited to a 4,000 word scientific paper. Nor is it any wonder that Wallace became one of Darwin’s “Knights” rather than a contender for the throne. Perhaps it is equally understandable that Wallace was eventually ostracized by the scientific community for his “mysticism”, while Darwin’s blunders, which “increasingly characterized his later years”, pretty much went unnoticed (Eiseley, p309). Interestingly, both men were led astray, albeit in different directions, by their attempts to sustain theoretical positions for which the necessary scientific evidence was simply not available. Darwin lacked the necessary information about genetics and atomic energy, and Wallace could scarcely have known some essential facts about human embryos which were not discovered until the middle of the twentieth century (p314). (1) But Darwin, with his “gift for compromise” (p216), at least had the decency to work with the coin of the realm and thus remain “inconspicuous” (p309) with his blunders, whereas Wallace clearly did not. Thus in the end Wallace, who saw by far the greater truth after 1860, like Buffon, Lamarck and the others before him, has all but disappeared from public view – meriting only a chapter from the sympathetic Eiseley in his book on *Darwin’s Century*. (2)

Notes re Darwin discussion above:

(1)

The evidence which was finally discovered in the early years of the twentieth century to substantiate the 1858 theory of Wallace and Darwin included Mendel’s work on genetics (rediscovered in 1900 being ‘lost’ for 35

years), Johannsen's research on mutations, and Curie & Laborde's demonstration that radium maintains a temperature above its surroundings. This latter discovery put pay to Kelvin's calculations from the 1860s regarding heat loss for both the sun and earth, calculations that had shortened the time available for natural selection to about 25 million years. As Eiseley observes, this finding would have "delighted and astounded Darwin", whose theory, in his grandfather Erasmus's terms, required "millions of ages" to operate (p233 & 253). The work of Mendel and Johannsen revealed the basic stability of the units of heredity and the fact that "incalculable events know as mutations" did sometimes occur in such units (p228). Thus Jenkin's argument from 1867 that any "single favorable mutations would soon be swamped" out of existence (p215) was finally overcome. Mendel's genetic units were stable and not subject to "blending" as had been believed during all the years his 1866 paper sat collecting dust. Moreover, as Johannsen's work showed, the mutations which did occur could be passed on to successive generations of the species, without being diluted by "blending" (p214-15)

(2)

There have been a number of books published re Wallace's life and contributions to evolutionary theory in recent years – egs, Raby (2001), Shermer (2002), Fichman (2003), Sloten (2004) - all arguing to return him to center stage along with Darwin, or even arguing for him to take precedence over Darwin re discovering the theory of evolution, eg, Brackman (1980). Some of these are thorough and wide ranging accounts of Wallace's life, eg, detailing his travels as a naturalist, his correspondence with Darwin over many years; and his intense involvement in, eg, socialism, land reform, spiritualism, phrenology, mesmerism, etc. thus giving us a much fuller sense of the man himself, both as a

scientist and a person. One (Flannery, 2011) even attempts to rope Wallace in as the forefather of Intelligent Design. But there have been no scientific controversies or larger cultural crises to which a reframing of Wallace's life/work has become central (vs, eg, Lincoln and the Progressive Movement in U.S. politics during the early 20th Century). So not surprisingly, Alfred Russel Wallace remains pretty much as ever - a footnote in Darwin's Century.

(40) (p57 in text)

Quotes re "small pieces of weather" and "walls of maze rearranging" come from Gleick, 1991, pp 20, 24. Quote re "whole string..." is from Russell & Branch, 1991, p60.

(41) (p57 in text)

Not unlike what the Williams sisters have done with their 'open stance' strokes in women's tennis, Bill Russell, with his shot-blocking, insured that professional basketball "would never be the same" again. During his 13 seasons as the Boston Celtics center the team won 11 NBA titles (vs eg, the 6 the Chicago Bulls won with Michael Jordan), and in the process he "revolutionized the role of center, and hence the nature of basketball". As Bob Cousy once put it: "Without him there would have been no dynasty, no Celtic mystique".

Prior to Bill Russell's first season in the NBA (1956-7), "nobody ever blocked shots on the pros". Russ (as his teammates called him) not only blocked shots, he "turned shot-blocking into a science". With his perfect

positioning and timing he would catch the ball on its upward flight just as it left the player's hand; and then, instead of swatting it out of bounds, he'd brush it or tip it, so the ball not only "remained in play but became a turnover, sparking a Celtics' fastbreak" toward their own basket.

Russ's effect on his teammates was immediate. From his first season on his "intimidating presence allowed them to gamble on defense". Heinsohn and Loscutoff, for instance, would "merely box out their men, then release quickly for the fast break while Russell was (blocking the shot or) snaring the rebound and whipping the outlet pass to Cousy".

Russ of course took it a few steps further with, for eg, his little pregame speeches out in the jump circle just before tipoff. "All right, guys", he's announce to the other team, "Ain't no lay-ups out here tonite. I ain't gonna bother you with them fifteen footers 'cause I don't feel like it tonite, but I ain't gonna have no lay-ups!" Or he'd "lean over to one of the forwards and say, 'If you come in to shoot a lay-up off me you'd better bring your salt and pepper because you'll be eating basketballs'".

As he explained many years later: "My little show was aimed at the guards and forwards on the other team; I wanted them to drive on me and try to beat me all night, even if it meant they made me look bad, because then they wouldn't be playing their game. They couldn't guard one of my teammates as well if they were thinking about humiliating me". Clear hints no doubt re a couple more of the Key Characteristics essential to Bill Russell's success.

All info and quotes in this section re Bill Russell come from Russell & Branch, 1991, pp 60-72, 148-9, 184, 203, frontcover, backcover; Hoppel, Nahrstedt, &

Zesch, 1989, pp 54, 64-68, 73; NBA Encyclopedia Playoff Edition: Bill Russell (January, 2017) at: http://www.nba.com/history/players/russell_bio.html; and Will, 1991, p228.

(42) (p59 in text)

re Bill Russell "stepping into a film and following the signs", in the process of developing his shot-blocking skills, there is a fair bit of research demonstrating the use of imagery training to enhance motor skills acquisition. See, for example, Waskiewicz & Zajac (2001), and Yaguez et al (1998).

(43) (p60 in text) (see also Note (55) and Note (70) below, re the role of luck/chance in attaining greatness)

Spwins of Change, or simply, Spwins – Extensive background research relevant to many aspects of Spwins; and short illustrations from the lives of various greats, including, eg, Tchaikovsky, Hitchcock, Bill Gates, the Beatles, Fidel Castro, and Van Gogh.

Re the “molecular growth” of snowflakes, see Gleick (1991), pp 309-14. He notes, for example, that “as a growing snowflake falls to earth, typically floating in the wind for an hour or more, the choices made by the branching tips at any instant depend sensitively on such things as the temperature, the humidity, and the presence of impurities in the atmosphere. The nature of turbulent air is such that any pair of snowflakes will experience very different paths, (and in each case) the final flake records the history of all the changing

weather conditions it has experienced. The combinations may well be infinite” (p311).

Re Spwins of Change.

As indicated in the text the term ‘Spwin’ refers to chance ‘winds’ / forces in societal, institutional, interpersonal, and/or personal worlds of the person which result in accelerated ‘spin’ / developmental change in a person’s Key Characteristics. In an earlier draft (2002) I used the term ‘whims of change’ to flag the chance nature of such events. However ‘whim’ did not convey the critical underlying dynamic, ie chance events accelerating the development of Key Characteristics.

So I’ve switched back to the term ‘Spwin’ to refer to those seemingly inconsequential events – events with no obvious connection to the future development of the key chars of the individual - which nonetheless put the person in a position to match up with the problems/ resources/ teams provided by relevant organizations; opportunities which then accelerate the person’s development relevant to s eventual success, eg, Einstein at ETH, or Bill Russell on his All-Star tour, or the "many successful painters who ruefully admit that the difference between them and hundreds of artistic 'failures' is not greater talent but contacts and accidental events that created visibility for their work - in short, blind chance" (Csikszentmihalyi et al, 1997, pp33-4).

Obviously the more resources at hand - eg early lives of classic geniuses (McCurdy, 1983) or those of concert pianists, Olympic swimmers, etc studied by Bloom et al (1985) versus eg Hitchcock, Woody Guthrie, or Norma Jeane/Marilyn - the more likely the environment will be structured to give the person a shot at getting The Right Kind of Problems just when e

needs them. (See, for example, Albert, 1983, pp142-3+, re "eminent persons" coming from "families of higher than average socioeconomic status" which "differ significantly from surrounding families" in, eg, being "singularly value- oriented", with particular "traditions and interests" being "priorities" in the family "for several generations", priorities which are "quite evident" in their awareness of "the opportunities possible to their members" and in the "intense socialization" of their children. Likewise at a later stage of development see Zuckerman, 1983, p241+, re scientific Nobel laureates who, "like other members of the scientific elite, studied in a comparatively small number of colleges and universities", a "concentration which resulted from the jointly operating processes of self-selection by the future scientists and selective recruitment by the academic institutions".)

Even so the chances of an individual continually having The Right Kind of Problems show up just when e needs them is ever complicated by the continual, often unpredictable, changes in the personal, interpersonal, institutional, and societal worlds the person lives in; and equally - for years - by the uneven, unpredictable, "highly dynamic" development of the person's "neurological, muscular, skeletal, and physiological structures" (see Simonton, 1999d, pp442-445, re variations in "Epigenetic Development").

The key point to keep in mind is the meaning of 'chance' in relation to these winds / forces. Chance refers to the fact of their impact re accelerating the development of the person's Key Characteristics comes out of the blue, and is unanticipated in terms of any prior planning or preparation on the part of the individual involved.

Needless to say what may be Spwins for the vast majority will be far from unanticipated by those relative

few who are 'in the loop', ie, part of the 'establishment', 'old boy network', the 'invisible college', LinkedIn, etc. Such insider information and hence ability to anticipate changes operates all the way from the corridors of power - re insider info re significant institutional, even societal changes - (eg Domhoff, 1979; Sklar, 1980) to the back streets & alleyways (eg Taylor, 1985; Pileggi, 1990). And of course it is the perpetual lack of such information (and the resources to act on it) which is associated with the chaotic lives of the poor and disempowered everywhere (eg, Rubin, 1976) – with what Raymond Carver once described as "...the destruction they must know lies in store just after the next cruel turn of circumstance, and then the next." (1997, p38)

Simonton's research (1983) on the impact of major societal changes (eg "civil disturbances", "political fragmentation") on adult productivity (vs creative development) is particularly relevant here. If you take into account the role of insider information re preempting anticipated disruptive effects of such societal changes (and the other cumulative advantages associated with prior success in a field), it is not surprising to find that nothing "tends to discourage productivity" except "balance of power wars fought close to the creative individual" (p234).

Regardless of the massive variations in prior knowledge re impending change across levels of development in a particular field and ditto across sections of society, even among the most advantaged Spwins are highly consequential in terms development for two reasons.

First, knowing that x or y is going to occur (or likely to) does not remove the massive element of unique/ at least highly selective luck involved for the individual who happens to be a position to benefit from it. For

example, Tchaikovsky's musical ambitions, which he had finally thoroughly forsaken, being fortuitously revived just in a nick of time by the opening of the Russian Conservatory in 1862 (Warrack, 1989, p26+); or WW1 delaying the arrival of Famous Player – Lasky Studios in London for several years until Hitchcock was at precisely the right point in his development to take advantage of it.

Secondly, even for those most clearly advantaged re prior access to information within a given field, numerous Spwins are always an essential part of their development. For example, a young Bill Gates gaining virtually unlimited access to the new DEC PDP-10 system, to playing 'anything goes" with hardware wizards, mad scientists, flash programmers; with BASIC, AID, and PIP, and FORTRAN, with DDT and MACRO-10, all because he was a classmate of the son of the corporate secretary and co-founder of Seattle's Computer Center Corporation (Manes & Andrews, 1994, pp23, 25-33); or the case of Francis Crick and James Watson coming together and being able to work on the riddle of DNA at the Cavendish in early1950s . Similarly would we have ever heard of the Beatles if the Hurricanes had accepted that offer from Hamburg; of Fidel if Lieutenant Sarria hadn't been dispatched to the hills above Siboney; of Van Gogh if Theo's widow hadn't started searching through his letters? (cf Norman, 1982, pp 107, 132; Szulc, 1989, pp293-98; Rewald, 1986, pp244-49).

Spwins in Selective Recruitment

Seen from the other side, from the point of view of the organizations which are doing the selecting of people to take on their problems - ie the deciding who will get the opportunity to further develop their key characteristics in conjunction with the organization - the same

chance, chaotic factors equally come into play.

Brian Arthur's work (eg 1989, 1990) provides examples of this process with regard to the role of "chance or historical small events" in determining the eventual winners in technological competitions. His focus is on "historical small events" (that "are outside the *ex-ante* knowledge of the observer - beyond the resolving power of his 'model'", and are "not averaged away and 'forgotten'"), "small events" which "may decide the outcome" of the process by which "agents choose between technologies competing for adoption" by an economy. Arthur's "historical small events" are, not surprisingly, quite similar in many ways to those which, as we have seen, repeatedly intervene to influence the course of development of every person who achieves 'greatness' - eg "political interests/ circumstances, whims/ prior experiences of developers, timing of contracts, unexpected successes in the performance of prototypes, decisions at key meetings", etc. (1989, pp116-118).

Arthur gives a brief illustration of the crucial role of such "chance or historical small events" with reference to the "US nuclear industry (becoming) practically 100% dominated by light-water reactors", when "much of the engineering literature contends that, given equal development, the gas-cooled reactor would have been superior".

These unmeasurable, unpredictable, invisible, "small events" which determined the outcome of the competition between 4 possible nuclear-reactor technologies in the 1950s and 1960s obviously parallel the same sort of unpredictable influences which consistently operate in the process by which one or another potential 'great' gains cumulative advantages over s peers at various stages throughout the process of development. In the case of the light-water reactor

they include their early "adaptation from a highly compact unit designed to propel the first nuclear submarine, the U.S.S. *Nautilus*, launched in 1954"; a "series of circumstances - among them the Navy's role in early construction contracts, political expediency, the Euroatom programme, and the behaviour of key personages - which acted to favour light water" by giving it "learning and construction experience early on which appear to have locked the industry in to the dominance of light water and shut other reactor types out" (1989, pp 117, 126).

Similar observations can be made re role of "small events" in the selection of any given individual (vs other equally capable or even superior peers) at any point in the process of development of 'greatness'. Bloom, for instance, notes that this process operated even within very early years of development of children who eventually became Olympic swimmers, concert pianists, etc - in this case with regard to what might be called, to borrow Arthur's phrases, the "political interests/ circumstances" within the family, "whims/ prior experiences" of the parents/ teachers, and "unexpected successes in the performance" of a child in the talent area – "small events" which "acted in favour" of one particular child by giving it "learning experiences early on" which "locked" the family in to promoting the "dominance" of that child.

Bloom notes, for instance, that "in homes where other children were also interested in the talent area, the parents sometimes mentioned that one of the other children had even greater 'gifts' than the individual (who got 'special' attention), but that the other child was not willing to put in the time and effort that the parents or the teacher expected"; that when there was "much sibling rivalry" with regard to some talent area, the child who "won out" in the family was "typically" the one who was chosen for special outside instruction;

and that "in the musician's homes, athletic abilities and interests were rarely noted, while in the athlete's homes, musical abilities and interests were rarely noted or encouraged" (1982, pp512-13, 520).

Thus it is not surprising that Arthur's conclusion re the role of "chance or historical small events" in determining the eventual winners in technological competitions is equally apt with reference to deciding the eventual winners in competitions for 'greatness'. In Arthur's terms: "To the degree that technological development of the economy depends on small events beneath the resolution of an observer's model, it may become impossible to predict market shares with any degree of certainty. This suggests that there may be theoretical limits, as well as practical ones, to the predictability of the economic future" (p128), or in the present case, to the predictability of 'greatness'.

(44) (p63 in text)

Einstein and the Michelson & Morley experiment

Michelson & Morley designed their experiment to discover what effect the earth's passage through the postulated ether had on the speed of light. What they discovered was that it had no effect whatsoever, leaving "science with the alternatives of tossing aside the key which had helped to explain the phenomenon of electricity, magnetism and light (in terms of Newtonian mechanics), or deciding that the earth was not in fact moving at all" (Clark, 1973, pp49, 88).

According to Pais (1983, pp 116-117) prior to his 1905 paper Einstein "unquestionably" knew about the experiment and was influenced by it (via "Lorentz's decisive investigation of the electrodynamics of moving

bodies (1895)"). However, in Einstein's own words (p117, Pais), "Lorentz's basic assumption of an ether at rest seemed to me not convincing in itself and also for the reason that it was leading to an interpretation of the Michelson-Morley experiment which seemed to me artificial". What was important for Einstein was not "the need to resolve the conflict between the Michelson-Morley result and the version of aether theory prevalent in the late nineteenth century but rather, *independent of the Michelson-Morley experiment* - the rejection of this nineteenth century edifice as inherently unconvincing and artificial."

Quotes in text between "During 'the last..." & "... did not exist" come from Clark, 1973, pp49, 88; and Highfield & Carter, 1993, p51.

(45) (p64 in text)

A few notes and sources re 'the problem being in the air'. In this case re the early computer programmers and designers of Bill Gates generation, and two of the men whose theories of evolution anticipated Wallace and Darwin

Names of the 'software artists' and 'hardware hackers' – the 'computer programmers and designers' - who "thumbed their noses at the *status quo* and changed the world" come from Levy, 1994. See pp 9- 13 for thumbnail sketches of 'the Wizards and their Machines'. Quotes here from p7 and backcover. Re discoverers of theory of evolution: Patrick Matthew in "his remarks briefly expressed in an appendix to his treatise on tree-growing", his 1831 book, *On Naval Timber and Arboriculture*, provided the "first clear and complete anticipation of the Darwin theory of evolution". Robert Chambers was the "philosophically minded journalist" and amateur biologist whose book,

The Vestiges of the Natural History of Creation (1844), "drew lightning upon himself" from the English "scientific world" -- attacks whose "belaboring of minutiae and amateurish minor errors" reveal "in retrospect" their "subconscious recognition that the heart of the thesis was unassailable". Quotes from Eiseley, 1961, pp 125-6, 132, 135, 138-40. See pages 125-140 for a discussion of these two men's versions of evolutionary theory.

Quotes in text from "And it wasn't just..." to "... someone else" come from Clark, 1973, pp 28, 35, 49, 50, 94.

(46) (p64 in text)

re Einstein coming on the scene at just the right moment, see Clark, p50; also Pais, p26, re 1895-1905 being the most 'abrupt', "unanticipated" and far reaching "period of transition" in "all the history of physics".

The 'someone else' in this section does not refer to the two men most often compared with Einstein (1879-1955) re their role in development of relativity, i.e. Hendrik Lorentz (1853-1928) and Henri Poincaré (1854-1912), who were both of an earlier generation, and whose experiences, ideas, and interests never quite allowed them to reconceptualize the problem in a way which would to resolve "the difficulties besetting the electrodynamics of moving bodies", i.e., by recasting it in "an all-embracing framework of a new kinematics" (p120 Pais). See Pais, 1983, pp 119 -134, & 163-173 for a detailed discussion of the ideas of Einstein and his "precursors", especially Lorentz and Poincaré.

Quotes in text from "Einstein came ..." to "...MIT of Switzerland" come from Clark, 1973, pp36, 50; Pais, 1983, pp 26; Russell & Branch, 1991, p60; Golden, 1999, p36.

(47) (p65 in text)

Sources for information re the development of Einstein's thinking which led to his 1905 Special Theory of Relativity

See Pais, 1983, pp 55, 116, 140, 143 for the quotes used in text (& adjacent pages for discussion) re what Einstein was "still miles from working out" when he graduated from ETH in 1900. See pp138-149 of Pais for a brief discussion of the ideas behind the development of the June, 1905, special relativity paper. See Einstein, 1957, pp 15 - 37 for his own brief recollections of influence of Newton, Mach, Hertz, Maxwell, and Lorentz on the development of his ideas prior to 1905. See Gribben & White, 1993, pp47-60, 80-100, for an easily readable account of the development of ideas behind Einstein's 1905 relativity paper.

(48) (p67 in text)

Comment on analysis of Einstein's relationships to his 'three close friends' and sources of quotes in text

Re the "special complementary roles" (my analysis), obviously as in any such close relationship there is much more involved than what is highlighted by the simple labels used here; but these serve to focus our attention on the complementary roles of team members which were critical to Einstein's accelerated

development. For further eggs in a range of areas, see Bloom (1985), and Donnelly's (1997) comprehensive analysis of the "effects of extensive cluster group interaction on the development of creative writers".

Quotes in text from "What is crucial..." to "...and 'mother'" come from Gribben & White, 1993, pp 38-40, 42, 45, 75; Highfield & Carter, 1993, 38, 40, 56; Clark, 1973, 36, 37, 72; Einstein, 1957, 15, 17; Pais, 1983, 44; Golden 1999, p36.

(49) (p69 in text)

Sources of information and quotes re Einstein's three special relationships while he was at ETH.

See pages 42-3 in Gribben & White (1993) and especially 33-58 in Highfield & Carter (1993) for a discussion of the relationship between "Johnnie and Dollie" while they were at ETH.

Quotes in text from "Einstein's 'assistant'..." to "... 'decisive about everything'" come from Highfield & Carter, 1993, pp 21, 40, 42-44, 47, 48, 50, 51; Gribben & White, 1993, pp 42, 43, 45; Pais, 1983, pp 44, 130-31, 138-39; Clark, 1973, pp 51, 52; Einstein, 1957, p21.

(50) (p70 in text)

Sources of quotes in text re Einstein's accelerated development over four years at ETH.

Quotes in text from "And so it was..." to "...Rudolph's nose" come from Highfield & Carter, 1993, pp 40, 50,

51; Gribben & White, 1993, 37, 42; Clark, 1973, 36, 42; Pais, 1983, pp 130-31.

(51) (p71 in text)

Sources of info & quotes in text re how Einstein got to ETH in the first place

Quote re the "greatest mind" is actually an amalgamation of numerous quotes which all indicate the same - e.g. from *Time* magazine issue with Albert Einstein on cover as "Person of the Century": "beyond genius" (p31), "embodiment of pure intellect" (p34), "first among the century's giants" (p3), "intellectual superstar" (p56) "name (is) synonym for genius" (p30) (December 31, 1999, *Vol 154*, No27).

Quotes in text from "As for the spwins..." to "... life for years" come from Clark, 1973, pp 26, 28, 30, 31, 35; Highfield & Carter, 1993, pp 8, 10, 11, 20; Gribben & White, 1993, p31; Pais, 1983, p 18. See also Pais, pp 35-38.

(52) (p72 in text)

Sources of info & quotes in text re the beginning of the "whole string of unlikely events" which eventually opened the door to ETH in 1894

Quotes in text from "The first of that..." to "... of Switzerland" come from Clark, 1973, pp 29, 30, 34, 35, 40; Highfield & Carter, 1993, pp 8, 15, 19, 20; Gribben & White, 1993, pp 31, 32; Golden, 1999, p 36; Russell & Branch, 1991, p60.

(53) (p73 in text)

Sources of info & quotes in text re the continuation of the "whole string of unlikely events" which eventually opened the door to ETH in 1894

Quotes used in text from "And what did... to ... ETH entrance exam" come from Clark, 1973, pp 29, 34-6, 38-40; Gribben & White, 1993, pp 31, 34, 35, 37; Highfield & Carter, 1993, pp 20, 21.

(54) (p74 in text)

Sources of info & quotes in text re the finish of the "whole string of unlikely events" which opened the door to ETH for Einstein in 1894. This is followed by two short discussions.

The first shows how chance events were equally important in Einstein gaining access to the Bern Patent Office in 1902 where he eventually worked out his solution to the problem of the "electrodynamics of moving bodies". The second longer discussion considers the Provocative Implications of Chaotic Matching.

Quotes used in the text from "At Araru the third..." to "... calling the 'Spwins of Change'" come from Highfield & Carter, 1993, pp 15, 21, 29; Clark, 1973, 30, 42; Gribben & White, 1993, 35, 37; Russell & Branch, 1991, p60.

It is not clear from my sources whether Einstein resat the ETH exam "in the summer of 1896" (p42 Clark) or "obtained his diploma (at Araru) enabling him to enroll on a course at the ETH" (p37 Gribben & White). I'm

going along with the resit as that's what the ETH principal had in mind when it was arranged for Einstein to attend Araru after he failed his initial attempt at the ETH exam. (p39 Clark; p35 Gribben & White). In terms of the argument being made here it makes no difference.

How Einstein got to the Bern Patent Office

Einstein's access to the Bern Patent Office, where from 1902 to 1905 he eventually worked out his solution to the problem of the "electrodynamics of moving bodies", was itself a superb example of the way in which Spwins create ideal opportunities for accelerated development - in this case the development which produced Einstein's "three Rembrandts" of 1905. One of these Spwins - the one which kept Einstein available for the Bern job in the first place - was his public contempt for Professor Heinrich Weber, the head of the ETH Physics Department, a contempt which in the small world of European physics undoubtedly closed virtually every postgraduate door he knocked on after completing his ETH degree in 1900.

In Clark's words, "Neither Zurich nor any other Swiss university would have passed Einstein over had they seen in him anything more than an awkward, slightly lazy and certainly intractable young man who thought he knew more than his elders and betters". Having been denied access to Vienna, Leipzig, Stuttgart, Göttingen, Pisa, Bologna, and every other university physics position for which he applied, by 1902 Einstein and his now pregnant 'Dollie' were without any viable source of income, much less one which would provide Einstein with the time and "apartness" that would be critical to working through the likes of light aberrations, Fresnel drags, statistical mechanics, and Lorentz

transformations in the next few years.

The second set of Spwins which got Einstein into the Bern patent office was of course the happy coincidence of the father of his close friend, Marcel Grossmann, being a friend of Friedrich Haller, the Director of the Swiss Patent Office - a friendship which clearly took priority over the results of the two hour examination that disclosed Einstein's "obvious lack of technical training" when it came to selecting the best available candidate for the position of "Technical Expert" in June of 1902. Under such conditions Einstein's "unfortunate" results turned out to be merely a "minor detail which was no embarrassment to a man such as Haller, intent on helping an old friend".

Quotes and information used re access to Bern come from Pais, 1983, pp 39, 45, 47, 55, 116-19, 123-24, 143; Clark, 1973, pp 57-9, 72; Highfield & Carter, 1993, pp 64-5, 69, 70, 79; Gribben & White, 1993, p 63.

The Provocative Implications of Chaotic Matching

Way back at in the Introduction I mentioned that the analysis presented in this book "has implications – devastating or liberating, depending on your point of view – not only for the likes of Einstein or Mozart..., but far more importantly, for anyone who's ever dreamt about becoming 'great', 'famous', etc, spent years in the chase, or perhaps even now is lining up one or two of the next generation for a shot at the title."

Why is the concept of Chaotic Matching provocative? Well I doubt many of us were raised on the notion that the development of Einstein was down to nothing more or less than the same process as a snowflake being formed over a couple hours blowing across the winter

sky; or to return to the original title of this book, the play on 'survival of the fittest', that the development of any person who becomes 'great' is in fact no more than a parallel to the core argument of evolution. That is, that while certain characteristics are definitive of a species, potentially beneficial variations in them are not all that rare. All it takes to get started is a slight genetic mutation in the case of species or, eg, the likes of being in top 2-5% of the population in particular form of intelligence in case of humans. Given that these necessary but scarcely sufficient conditions are met, the key factors in whether or not a variation gets passed on to successive generations of a species (or a particular individual develops the necessary Key Characteristics to sufficient level to become 'great') is not down to the species (or person) striving to survive (or succeed). It is down to chance factors such as environment (Community of Birth), the Links this provides to food, shelter etc (The Right Kind of Problems, etc); and more generally it is down to the continual chaotic process of the species' slight genetic mutations matching up with the right kind of food, shelter, climatic conditions, competitors etc generation after generation.

Or in the case of an individual person - out of the 2 to 5% or more in a given society who started out with sufficient initial genetic biases - it is down to the chance processes involved in the interplay of The 4 + Worlds time after time coming up with The Right Kind of Problems to accelerate the development of the relevant Key Characteristics over the course of more than two decades of development. And even at the very end, during those defining episodes in the process of becoming 'great' - the likes of Watson and Crick solving the riddle of DNA, or of Einstein coming up with his Special Theory of Relativity - whatever about the individuals' struggles, courage, or genius, it is still down chance, down to Chaotic Matching processes coming

up with The Right Kind of Problems and the necessary resources to solve them.

Like I said, provocative.

We are not used to thinking of Einstein in terms of snowflakes blowing across the winter skies, in terms of finches' beaks evolving on the Galapagos. We're used to thinking in terms of genius, struggle, and courage. But if the present analysis turns out to be correct - if talent and effort turn out to be the givens, and not the deciders - then that raises some questions, painful questions, for all of us. Questions about greatness, about heroes, stars, and celebrities... questions about individualism and meritocracy. Questions that go far beyond the pages of this book. But questions which will keep reappearing throughout, especially in the latter portion when we consider the Implications of the present analysis.

See, for eg, Ch1 of Turner (2004) for overview of research relevant to larger social, cultural, and political functions of heroes, stars, and celebrities.

(55) (p75 in text) (see also Note (43) above and Note (70) below, re the role of luck/chance in attaining greatness)

The quote re “rumor in his own time” comes from Phillips (1973a).

Role of Chance / Chaotic Matching in Endgame of Scientific Discovery / Invention – Research and Case Studies.

The example to be developed in text at this point - re Watson & Crick and the Double Helix - will focus on the Chaotic Matching which sets up the final process of problem solving. To 'zoom in' even further, to get a feel of how chance/ chaotic factors operate at the final/ critical point of discovery, consider the following research studies:

Dean Keith Simonton's study (1979, pp1603, 1614) of 579 cases of "multiple discovery and invention" (eg, of calculus or theory of evolution) and 789 "scientists and inventors" (eg Newton & Leibniz, Darwin & Wallace) who were involved in these "multiples". Simonton concludes that "for any given potential contribution about 25 people are capable of the achievement, each having 1 chance out of 25 of succeeding". In terms of the present discussion this amounts to a tiny handful of scientists/ inventors who have developed far enough within the relevant field to have not only the potential ability, but also the information, experience, and resources to know what the key problems of the field are and to be in a position to solve them. In Simonton's terms they are "unusually intimate with the (relevant) techno-scientific zeitgeist" (p1615).

Whether or not anyone actually solves a given key problem depends upon who (if anyone) is "gifted with that inordinate amount of good luck" (p1615) which allow them (rather than any of the other equally gifted and resources competitors) to have a shot at solving the problem. Of Simonton's 579 "multiples", it's worth noting, only 26 were "quadruplets" or more, ie had 4 or more discoverers (p1610). In short, not many have benefited from that essential "inordinate amount of good luck" at the final/ critical point of discovery.

Similarly, Huber's research on patterns of inventivity

among 346 inventors (1998b) shows that 'invention and inventivity are substantially random processes for the vast majority of inventors', ie about 90% of them (p237, 239); and further that for this "majority of inventors who exhibit a random time pattern of invention, the vast majority fit the Poisson distribution" (p238). The inventors who deviate from this random, Poisson pattern to the greatest extent are the 'elite' of the sample, ie those with high number of patents, and those who have been recognized as being 'eminent'. While a sizeable majority of these 'elite' inventors still show the random, Poisson time pattern in their inventivity, about a third of them (between 29 & 32%) show surges of creativity, ie 'too few runs' (p 237).

The implications of these findings with reference to our discussion of chaotic influences still operating in relation to who ends up solving the 'final problem' (eg, discovering DNA, or in Huber's case, discovering a patentable invention) probably becomes obvious once you consider Huber's observation that "the Poisson distribution also describes a number of other common processes, including automobile traffic, occurrence of telephone calls and occurrence of accidents". (1998a, p67) These "common processes", like the weather (as noted earlier), can all be predicted in terms of their general pattern over a given location and time period, but can never be predicted with reference to specific occurrences, for the simple reason that - as Brian Arthur (1989, p128) notes with regard to "technological developments of the economy", and James Gleick (1991, p21) with regard to "predicting sun or rain on a day one month away" - they "depend on small events beneath the resolution of an observer's model"(p128), "hidden fluctuations that the computer will not know about, fluctuations (which in the case of weather prediction) will create small errors one foot away, errors which will multiply to the ten-foot scale, and so on up to the size of the globe" (p21). In short such

“small events” are chaotic in their cumulative effects upon the outcome, ie in our case upon who ends up solving the final problem.

The fact that the 'elite' inventors are able to achieve surges of inventivity (see pp63-4, Huber 1998a, re how surges/' too few runs' are calculated) is quite plausibly related to the fact that they (vs nonelite inventors who patent many fewer inventions) are much more likely to be working in organizational/ team settings which maximize the odds of getting The Right Kind of Problems to work on, including the resources/ personel to solve them.

Thus, for example, Watson & Crick's "key discovery" of "the exact nature of the two base pairs" of the double helix was down to the fact that the eminent "American crystallographer", Jerry Donohoe, was "sharing an office" with them, and "told Watson that some of the (standard) textbook formulas were erroneous", that in fact (contrary to the available textbooks) "each base occurred almost exclusively in one particular form" (Crick, 1990, p65).

As James Watson put it - "though my immediate reaction was to hope that Jerry was blowing hot air, I did not dismiss his criticism (of Watson's incorrect base model which relied on existing textbook information). Next to Linus (Pauling) himself, Jerry knew more about hydrogen bonds than anyone else in the world. Since for many years he had worked at Cal Tech on the crystal structures of small organic molecules, I couldn't kid myself that he did not grasp our problem." (Watson, 1986, p149). Re the overall outcome - of Watson & Crick, rather than, eg, Maurice Wilkins or Rosalind Franklin or Linus Pauling, discovering the DNA double helix, Watson had this to say: "The unforeseen dividend of having Jerry share an office with us, though obvious to all, was not spoken about. If he had not

been with us in Cambridge, I might still have been pumping for a like-with-like structure. Maurice, in a lab devoid of structural chemists, did not have anyone about to tell him that all the textbook pictures were wrong. But for Jerry, only Pauling would have been likely to make the right choice and stick by its consequences" (Watson 1986, p163).

Similar examples of the way in which chance/chaotic factors turn out to be critical at the final point of discovery can be found in Cannon's (1940) article on "The Role of Chance in Discovery". Consider, for instance, the pivotal event in Galvani's discovery of the "electrical effects of dissimilar metals" (and hence the "invention of the electric battery"). "Some frog legs were hanging by a copper wire suspended from an iron balustrade in the Galvani home in Bologna". They "swung in the wind and happened to touch the iron" (ie, the frog legs connected "two different metals, copper and iron" to each other, and - zingo - the legs began to twitch.) Either Luigi ("the anatomist and physiologist") or Lucia ("his talented wife") happened to notice, and suddenly we have "the beginning of a long series of researches by Galvani", resulting in the "principle of the galvanic cell" (p204; also, Ogburn & Thomas, 1922, p88).

Similarly, how did "the eminent French physiologist, Claude Bernard", happen to discover that "the passage of blood into different parts of the body" is controlled by the nervous system? Simple. In order to test his theory that "the impulses which pass along nerve fibres set up chemical changes which produce heat", Bernard "severed the nerve to a rabbit's ear". And sure enough, "deprived of its nerve impulses", the temperature of the ear plummeted. Well actually it didn't. In fact "to Bernard's great surprise the ear was considerably warmer! Without knowing what he had done, he had

disconnected the blood vessels of the ear from the nervous influences which normally hold them moderately contracted, and thereupon the warm blood from internal organs flushed through the enlarged vessels in a faster flow".

Now all Bernard had to do was investigate the workings of this chance "accident" and he would be credited with making "the most significant advance in our knowledge of circulation in over 300 years" (p205).

In short, despite the scientist/ inventor being in the perfect position to make the discovery and having, along with the necessary resources, what Cannon calls "the prepared mind" (p206), the final historic breakthrough is still dependent on 'some frog legs in Bologna', ie, on the occurrence of a chance/ chaotic event.

(56) (p79 in text)

Sources of information and quotes re text account of the role of chance in Crick and Watson's discovery of the Double Helix. Followed by related account in this note re the central role of chance in Watson ending up working with Crick in the first place.

Information and quotes in this section ("The discovery of the...." to "...the right kind of Prize to boot") come from Crick,1990, pp 58, 60, 64-8, 70-1, 74-5, 94h; and Watson, 1986, pp 19, 21, 23-5, 46, 55, 118h.

How Watson happened to end up working with Crick

How James Watson ended up at the Cavendish Laboratory is itself a powerful example of the usual combo of chance, Links, and problems coming with the territory that is commonplace in any such tale of greatness.

Watson "applied for admission to graduate school both at Cal Tech and at Harvard", and – luckily for him and Crick – "was refused admission to both". Then "guided by his mentor at the University of Chicago he applied to Indiana University where he was to find the "first-rate young geneticist, Salvador Luria", who became the supervisor of his doctoral research on bacteriophages.

When it came to doing a postdoc, Luria's abhorrence of the "profit-oriented organic chemists" in New York City resulted in him sending Watson to work with Herman Kalckar, a biochemist whose laboratory was in Copenhagen. Luria's plan was that Watson - his "first serious student" - would "learn the necessary tools to do chemical research", research that might lead to learning some "solid chemical facts about DNA", and hence to eventually "finding out what a gene was and how it duplicated".

The plan was a "complete flop". Herman's English was "impossible to understand", and the problem he was working on "did not stimulate Watson in the slightest". No matter, Watson fell in with Herman's "close friend", Ole Maaloe, whose English he could understand, and spent the next three months "cycling over to Ole's lab" to work on "conventional phage experiments".

Watson felt a little "ill at ease" about this, after all his "fellowship was explicitly awarded to enable him to learn biochemistry with Herman". Still Herman didn't seem to notice (having more pressing matters on his mind, like the fact that "his marriage was over"). So by

the time the spring rolled around - having collected "enough data for a respectable phage publication" with Ole - Watson was more than happy to take Herman up on his suggestion that they "spend the months of April and May" at the Italian Zoological Station in Naples. "There was no point doing nothing in Copenhagen, where spring does not exist. On the other hand, the sun of Naples might be conducive to learning something about the biochemistry of the embryonic development of marine animals".

As it turned out the first 6 weeks in Naples were 'constantly cold', and Watson spent "most of his time walking the streets (to keep warm) or reading journal articles from the early days of genetics. Sometimes he even daydreamed about discovering the secret of the gene, but not once did he have the faintest trace of a respectable idea".

As for "learning boring chemical facts", Watson remained as excited as ever. Since "chemists never published anything incisive about nucleic acids", there was nothing worth reading. The journal arguments about "structural analysis" of nucleic acids were based almost entirely on "X-ray diffraction techniques" and were presented in terms of the "complicated mathematical methods" of crystallographers. Over the course of the past 15 years this research, in the view of Watson's mentors, had produced nothing more than "soft facts", "wild ideas", "hot air", and "baloney".

Watson nonetheless "retained a slight hope that he might profit from the meeting on the structures of biological macromolecules", a meeting that was to be his first exposure to crystallographers' "spoken arguments", arguments which might be "more comprehensible than the journal articles, which passed over his head".

No such luck. The talks at the Naples meeting were "vacuous", unconnected "to the purpose of the meeting" and "fortunately in Italian so the obvious boredom of the foreign guests did not need to be construed as impoliteness". With one exception -- Maurice Wilkins' "X-ray diffraction picture of DNA", a picture which "showed much more detail than previous pictures and could, in fact, be considered as arising from a crystalline substance".

"Genes could crystalize?!" They "must have a regular structure"!!!

Suddenly Watson "was excited about chemistry". Within a week he was back in Copenhagen, where "the journal containing Linus (Pauling's *alpha* helix) article had arrived from the States." A "few days later the next issue of the journal arrived, this time containing seven more Pauling articles", and Watson "began worrying about where he could learn how to solve X- ray diffraction pictures".

"Cal Tech was not the place - Linus was too great a man to waste his time teaching a mathematically deficient biologist"; and his efforts to engage Wilkins' attention at the Naples meeting had gotten nowhere. That "left Cambridge, England, where he knew someone named Max Perutz was interested in the structure of large biological molecules".

So Watson wrote to Luria "about his newly-found passion, asking whether he knew how to arrange Watson's acceptance into the Cambridge lab. Unexpectedly, this was no problem at all. Soon after receiving Watson's letter, Luria went to a small meeting at Ann Arbor, where he met Perutz's co-worker, John Kendrew who "was looking for someone to join him in his study of the protein myoglobin" . . .

How did Watson get to Crick? Brilliance, struggle, foresight? How about the usual combo of chance, Links, and problems coming with the territory.

(All quotes and information from Watson, 1986, pp 28-39; except info re his arrival at Indiana which is from Zuckerman, 1977, pp111-112)

(57) (p79 in text)

See Notes 43 and 55 for extensive discussions and illustrations of the central role of chance in accelerating the development of multiple 'greats'

(58) (p80 in text)

Information and quotes re Herman Melville come from Sutherland, 2011, p131. Quote re "The greatest book of the sea ever written" is from D.H. Lawrence, 1923, p168.

(59) (p81 in text)

Information and quotes re Frida Kahlo come from:
http://en.wikipedia.org/wiki/Frida_Kahlo

(60) (p81 in text)

Finally, with regard to Primary Spwings, consider how Allen Ginsberg came to write *Howl*, "The Poem that Changed America" (Shinder, 2006).

Arrested in his early twenties, after a midnight police chase across Queens in a stolen car (Miles, 1990, p115), Ginsberg, whose apartment had been turned into a “center for bulgaries” by one of his friends, (p114) ended up, not with a stretch in the local slammer (he was a bit better connected than that (cf. Miles, p119)), but in the Columbia Presbyterian Psychiatric Institute. And who does he bump into literally coming in the door, towel wrapped round his head recovering from insulin shock therapy: Carl Solomon, as in *Howl for Carl Solomon*.

Solomon was “Allen’s double – a Bronx-born bisexual self-dramatizing left-wing intellectual” with “one important difference” - Solomon, though barely twenty-one, had already “lived in Paris” (Gornick, 2006, p5) with “a Pigalle prostitute”, seen Artaud perform live, and become “deeply involved with the European Avante Garde” (Miles, p118). From day one Ginsberg was scribbling furiously, “meticulously (taking) notes of everything (Solomon) said”, of his “deeds of daring”: his “potato salad Dadaist protest” (p118), “his crypto-bohemian boasting a la Rimbaud”, (p118), “his demand.. to be ‘suicided’ on the “steps of the madhouse” (p119) – and in the process getting immersed in “existential politics and literature”, in the likes of “Genet, Artaud, and Céline”, and other “mad writers with whom he (Ginsberg) instantly felt at one” (quotes Gornick, p5; influence on *Howl*: Miles, p123-4).

When Ginsberg emerged from his 8 months (p124) of “banging the ‘catatonic piano’” with Solomon (p122) in the Columbia psychiatric, “he had his metaphor in place” : “if Carl was mad, it could only be that America had driven him mad”..(Gornick , p5), not to mention a fair whack of *Howl*’s content as well: “I saw the best minds of my generation destroyed by / madness, starving hysterical naked, .. “ (Gornick, p5).

All quotes and information re Ginsberg from: Gornick, V. (2006); Miles, B. (1990); and Shinder, J. (ed) (2006)

(61) (p82 in text)

All quotes and information re Hitchcock from Spoto (1984), pp 37-9, 46-7.

The full case study of how Hitchcock developed his 5 Key Characteristics over 20+ years is presented in *Greatness: How The Great Become Great... and You & I Don't – Case Studies*. A free PDF of this book, which also contains similar case studies of Woody Guthrie and Norma Jeane/Marilyn, is available on my Blog: www.greatnessbd.com

(62) (p83 in text)

All quotes and information re Bill Russell from Russell. B & Branch, T. (1991), pp 61-2.

(63) (p86 in text)

All quotes and information re Bob Marley and the Wailers from Davis, S. (1989), pp 88- 98. For a sample of Bob Marley's songwriting and guitar playing changing from ska to reggae, see White, T. (1983), pp218-219. All songs mentioned contained on *Legend: The Best of Bob Marley and the Wailers*. BMWCD 1 (1984) Island Records.

(64) (p86 in text)

All quotes and information re Jane Austen come from Sutherland (2011), p57, and Google re replacing Darwin; those relevant to Van Gogh come from Heinich (1997), pp28-9 & Ch 2, pp35-58, re “The Golden Legend: From Biography to Hagiography”.. as in “Christ stopped at Eboli. Van Gogh stopped at Arles” (p45).

(65) (p89 in text)

All quotes and information re Sam Clemens becoming Mark Twain are from Powers (2005) pp 6, 77, 95, 100-01, 104-17. Eugene O’Neill’s quote re “the true father of all American literature” is taken from Sutherland (2011), p170. Dan DeQuille’s story re the “fellow who invented a suit made of India rubber” is also contained in Greever (1963), p141. As Greever notes this hoax news article also “deceived the *London Times* which seriously commented that the British government ought to buy the suits for its soldiers in India”.

(66) (p90 in text)

Re the Historical Lack of Female Greats

The historical dearth of female greats in any field comes as no surprise to anyone these days. There is plenty of research from various disciplines documenting this and discussing various reasons for it. In psychology alone a small sample might include, eg, Cattell, 1903; Cox, 1926, Goldsmith, 1987, Helson,

1990; Murray, 2003; Simonton, 2009, 2014. We're gonna take a bit wider focus here.

Historically few female children, even with proper class positioning, ever got the basics, ie access to The Right Kind of Problems to challenge and develop initial genetic biases within family and then in various external worlds of development via family and then other Links over time. The few who got such are so few, many of them are still visible, at least to academics. How even these few ever got past adolescence is beyond me, as – over the centuries - ever lurking behind the initial limits of family and childhood access were the constant cudgels of patriarchal culture, society and its many tangled institutions.

Not much chance the old boys' net, much less the Académie des Beaux-Arts or the Royal Society, was gonna get yoked with loads of skirts passing themselves off as artists, scientists, poets and composers, or worse yet Olympic pole vaulters, not when you got the likes of, eg, Aquinas, Hobbes, Bacon, and Kant ever rattling on about the critical reason for pure beards. Even in the late 1800s, as one German history professor put it: "Surrendering our universities to the invasion of women.. (would have been) a shameful display of moral weakness" (McGrayne, 1996, p68). Ok you get the odd exception.. exceptions which clearly demo what home and even later kick-starts could achieve, typically only to be scuttled by wider institutional and cultural forces later on. (Info re Kant et al from Women in Science Wiki: https://en.wikipedia.org/wiki/Women_in_science)

Let's look at a few examples.

Maria Winkelmann – the most famous female astronomer in (what is now) Germany in 1700s -

provides a perfect starter. Maria, who “had an interest in astronomy from an early age “, was educated by her father, and then her uncle, and then received further training working as the “unofficial apprentice and later... assistant” of Christopher Arnold, a “self-taught astronomer”. Through him, “Maria met astronomer and mathematician Gottfried Kirch, one of the most famous German astronomers of the time.” He “gave Maria further instruction in astronomy”, and despite their 30 year age difference, they married in 1692. They “worked together as a team” for nearly 20 years, (all above from maria winkelmann wiki) during which time he was appointed first astronomer of the Royal Academy of Sciences of Brandenburg in Berlin and Director of the Berlin Observatory (from Gottfried Kirch Wiki: https://en.wikipedia.org/wiki/Gottfried_Kirch). When Gottfried died in 1710, Maria applied to “..assume her husband's place as astronomer and calendar maker at the Royal Academy of Sciences”, as she had publications, had discovered a comet, and “had been carrying out most of her husband’s work during (his) illness...” (Maria Winkelmann Wiki). The Academy declined - afterall, “Mouths would gape” (Women in Sci Wiki). But not to worry, her son, Christfried, took over as Director in 1716, and sure enough, his first assistant? You got it. (Maria W Wiki: https://en.wikipedia.org/wiki/Maria_Margarethe_Kirch)

Few ever got that far, ie started out in the right kind of family with the right kind of color, class etc, and, better yet, had insider ties to the what Dorothy Smith terms the ‘circle of men’ (in Spender, 1992, pp9-10).. and those that did.. well don’t hold your breath..

How bout Maria Anna Mozart.. you remember, Nannerl. Her and the old boy gigging away on those minuets, allegros and scherzos right there in Salzburg, along with Agrell and Bach and Telemann (Dorris, 2011, p13-4). Just her and daddy before the young lad

arrived. Then touring those Europe courts - Munich, Vienna, Paris - often as top billing of the two “prodigies of nature” (Dorris, 2011, p37-9) .. And how many Kochel numbers did Nannerl end up with.. you know, tallying up her andantes, sonatas, and symphonies? Exactly. Seems those concert tours came to an abrupt end in 1769. She was, afterall, of “a marriageable age.” (Maria Anna Mozart Wiki)

Still not to worry, since 2001 Maria Anna has already starred in at least 5 novels, not to mention a book of poetry, courtesy of the brother’s fame. (M A Moz Wiki: https://en.wikipedia.org/wiki/Maria_Anna_Mozart)

Ok, How about female artists...? say Berthe Morisot and Mary Cassatt, the two foremost female artists of the Impressionists. As daughters of the upper middle class both started painting early. Morisot, in the amateur tradition of bourgeois European families, took private lessons and grew up along with her sister copying paintings in the Louvre. Cassatt started out across the Atlantic, in Allegheny City, with no handy Louvre in sight. No matter. Travel being essential to the proper education of a young lady, she spent five early years in London, Paris and Berlin, learning German and French and getting her first lessons in drawing and music (Mary Cassatt Wiki). And by fifteen Mary was back in Philly at the “prestigious” Pennsylvania Academy of the Fine Arts, rubbing shoulders with “feminist ideas” and “bohemian” males (Mary C Wiki), but mostly getting yoked with the usual ‘patronizing attitudes’ and ‘slow pace of instruction’ (M C Wiki). But not for long.. by the mid-1860s Mary and her mother – “intelligent, literate, fluent in French, and very much in charge”.. that’s her *Reading 'le Figuro'* (1878) – were outta there and back in Paris (Rubin, 2001, p231-2). Signed on with a ‘private master’, Mary, much like Berthe, was on her way down to the Louvre

for those daily copying sessions Not to mention meeting up with the right sort of avant-garde Frenchmen. (https://en.wikipedia.org/wiki/Mary_Cassatt)

Not a bad meeting place for French female students either. Morisot met Manet there in 1867 and married his brother 7 years later, just as the Impressionists were kicking off their first exhibition. At a time when women were still “excluded from official arts institutions and committees” (Rubin, p222), it was “an alliance that secured” the now Madame Eugène Manet’s “position both socially and financially” (R p222). She had already exhibited in 6 Salons (Berthe Morisot Wiki: https://en.wikipedia.org/wiki/Berthe_Morisot); and now she was also “a disciple of Manet and an authoritative member of the new association” (R p222). The following year her *Interior* (1872) “brought the highest price” at the Impressionist Exhibition - from Ernest Hoschedé, Monet’s future patron. (R p222). You might say Berthe Morisot now had the best of both worlds – well, the best a woman could get. While her subject matter continued to be “mostly domestic” and her “visualizations remained more or less within the conventions of contemporary.. feminine.. imagery”, (R p223), her “palette” and “handling of paint” (R p223) came to incorporate the many nuances of Impressionism, including, eg “Pissarro’s tonalities... Monet’s facture.. the cropping effect of Degas.. (as well as) Manet-like brushstrokes softened and liquified á la Renoir” (R p227) thus capturing, in her own unique style, scenes of “inner life and sensitivity”, (R p227), with an “informality of sketchiness” (R p224) - the very “spaces of femininity” (Griselda Pollock term, R p227) ie, just the kind of art to catch the eye of “eminent female patrons” (R p224).

Mary Cassatt’s access to the Louvre didn’t do her any harm either; but as a single woman with no family Links into Parisian Society, unwilling to “flirt with

(Salon) jurors to curry favor”, and continually “slashing” at their “politics” and “conventional taste” (Mary C wiki), she didn’t exactly gallop into the “circle of men”. Nonetheless, Cassatt’s paintings – still “every bit as domestic as Morisot’s” (R, p230) - appeared regularly at the annual Paris Salons from late ‘60s right up til Degas invited her to join the Impressionists in 1877. And at this point - now “enthusiastically” allied with new movement of “radical artists” (Mary C wiki), and “exhilerat(ed)” at “being freed from the jury” (R p230) – she turned a new eye on women’s lives – eg, her mother, wedding ring front and center, was captured not at the toilette, leaning on her elbow, or grooming her hair.. No, she was *Reading ‘Le Figaro’*; followed shortly by *A Woman in Black at the Opera*, sitting erect high up in her box, fan folded and glasses to hand.. turning the gaze straight back on the lads. And after that...? well *The Family*, *Little Girl in a Blue Armchair*, *Maternal Caress*, *Mother Holding Her Baby*, *Children Playing With A Cat...Mother and Child XI...*

After that Cassatt became “one of art history’s greatest observers of children” (R p236). Was this down to “the support of wealthy female patrons.. encouraging the production of these acute and seductive paeans to motherhood” (R p237), or maybe simply being drawn to the subject matter most readily available to her, or perhaps some “inner longing” reflected in her own statement “later in life that ‘Women are after all meant to bear children’”? (R p237). Whatever, one thing’s for certain, there wouldn’t have been too many of Duveen’s old boys lining up to splash out on another ‘*Figaro*’, so Mary’s mom could continue her reading up over the Boardroom (Behrman, 1952, p73), not with *Candaule’s Wife* or, say, one of those long haired Bathers on offer.

And today? Morisot’s *After Lunch* (1881) pulled down the highest price ever for a female artist’s work at

Christie's in 2013 – almost \$11 million; and Cassatt's *In the Box* (1879) cleared \$4 Million (\$5.9 in 2013 values) back in '96. (Mary C Wiki)

And the lads? Only four of them – Renoir, Cezanne, Monet, and Manet – managed to make the latest Top 50 All Timers list.. you know, up there with Gauguin, Picasso, Van Gogh, Warhol, Titian and the rest. And poor old Degas didn't even come close - pulling in a mere \$37 million for *Danseuse au repos* (1879) back there in 2008. (\$40 in 2013 values) (http://en.wikipedia.org/wiki/List_of_most_expensive_paintings)

The more things change...

For a fuller sense of the nuances of what would-be female greats were facing.. in whatever field .. let's zoom in for bit more detail on working worlds of Victorian women writers - a good hundred and fifty years after Maria Winkelmann signed on as her son's assistant, a hundred since Maria Anna Mozart hit that "marriageable age", and as it happens almost precisely the same time Morisot and Cassatt were taking their first steps down to the Louvre.

In Elaine Showalter's words: "Most periodical criticism, especially between 1847 and 1875, employed a double standard for men's and women's writing" (1988, p76). How could novels written by women be anything but "recognizably inferior to those by men" (Shw p76). Afterall, as Gerald Massey pointed out in an 1862 review: "It is very doubtful if the highest and richest nature of woman can ever be unfolded in its home life and wedded relationships, and yet at the same time blossom and bear fruit in art or literature with similar fullness" (Shw p76). And worse yet, given the "afflictions and liabilities" of "the female body" (Shw

p76) - being itself an “inferior instrument, small, weak and, in Geraldine Jewsbury’s (1848) words, ‘liable to collapses, eclipses, failures of power’ - what’s the odds of any woman writer producing a ‘steady stream of ever-recurring work’. Any decent Victorian physician could spot the problem - an excessive “expenditure of mental energy by women”, resulting in - you guessed it - that essential “supply of blood and phosphates” being “divert(ed)... from the reproductive system to the brain, leading to dysmenorrhea, ‘ovarian neuralgia’, physical degeneracy, and sterility”. (Shw p77)

Not surprisingly paralleling such pronouncements re women’s incapacity to write novels up to male standards, we have the familiar gender segregations of the era, in particular, the “vast preserves of masculine life – schools, universities, clubs, sports, businesses, government, and the army” (Shw p79) - being ever inaccessible to women. and with them, of course, access to the ‘circle of men’, who have been “describing and explaining, and ordering the world.. for centuries” (Spender, 1992, pp9-10), a world in which the Victorian woman’s “whole being (was) spontaneously mov(ing toward that) sweet domestic and maternal sphere”. so naturally, should this somehow be “thwarted”, causing her to “turn to literature” (or some) other sphere” (Showalter, p84-5), what could you expect. How’d E.S. Dallas put it back there in 1857: that “talent for personal discourse and familiar narrative, which, when properly controlled, is a great gift, ... too frequently (simply) degenerates into a social nuisance” (Shw p82) Bit like *Pride and Prejudice*, or *North and South*, or, say, *Uncle Tom’s Cabin* - you know, the kind of stuff those “lady novelists” kept churning out. (Shw p86)

You get the general idea.. no matter what field, it was going to take bit more than “money and a room of one’s own” to get a shot at greatness.

(V Woolf quote from p279, Patrick, 2009)

(67) (p98 in text)

All quotes and information re Marie Skłodowska-Curie come from: McGrayne, 1966, pp 12, 15-23, 25-7, & 31;

Marie Curie / Wikipedia:
https://en.wikipedia.org/wiki/Marie_Curie;

Women in Science / Wikipedia:
https://en.wikipedia.org/wiki/Women_in_science.

“circle of men” from Spender, 1992, pp9-10.

(68) (p99 in text)

This section, “And as for Heroes?”, and the next, “What's It All Mean?”, and the final short piece re “einstein and santa claus” are obviously my own observations, opinions, and viewpoints, and should in no way be taken to represent those of any of the academics who have reviewed/endorsed the analysis of ‘How the Great Become Great’ presented in this book and likewise in earlier versions which were entitled: *The Arrival of The Fittest: How The Great Become Great*. (eg Dorris, 2011)

(69) (p102 in text)

re: Odds of shooting a couple hole-in-ones at US Masters tournament

Calculation of odds of making hole in one at Masters:

From 1934 to 2014 = 80 years. four rounds of 18 holes are played each year.

Typically 100 players play the first 2 rounds (ie 36 holes). That gives us $80 \times 36 \times 100 = 288,000$ holes played.

The number of players playing the last 2 rounds (36 holes), ie making the cut, has varied over time. Here's slight underestimate based on info from Wiki Masters Tournament Url:

1) 1934 – '56 all players eligible to play last 36 holes:
 $22 \text{ (years)} \times 100 \times 36 \text{ (holes)} = 79,200$

2) 1957 – '60: 40 players: $4 \times 40 \times 36 = 5760$

3) 1961 – 2012: 44 players: $51 \times 44 \times 36 = 80,784$

4) 2013-'14: 50 players = $2 \times 50 \times 36 = 3600$

Total of all 4 = 169,344 holes played

So $288,000 \text{ holes played} + 169,344 \text{ holes played} = 457,344$

There have been 24 holes in one at the Masters. so rounding off a bit:

$24 / 450,000 = 1/19041 = \text{bout } 1 / 19,000.$

So odds of shooting a hole in one twice at the Masters = about $1 / 19,000 \times 19,000 = 361,000,000$

or 1 in 360,000,000

Tiger, Nicklaus, Hogan, Palmer, Player, Seve, and

Rory have never made a hole in one at the Masters, much less two.

Information above is derived from two websites:

- 1) Masters tournament:

https://en.wikipedia.org/wiki/Masters_Tournament

- 2) How Many Golfers Have Made a Hole-in-One During The Masters?:

<http://golf.about.com/od/majorchampionships/fl/How-Many-Golfers-Have-Made-a-Hole-in-One-During-The-Masters.htm>

(70) (p103 in text) (see also Note (43) and Note (55) above, re the role of luck/chance in attaining greatness)

Let's take a quick look explicitly at the myth vs the reality of the role of luck/chance in attaining greatness.

Curiously, no one - well almost no one – who's studied creativity, greatness, genius seems to be aware of the role of luck... at least not in print.

The influence of chance/luck/serendipity has typically been ignored/ downplayed/ reported as anecdotal asides by academics – a few eggs: Tannenbaum, 1983, p205- 209; Simonton, 1998b, pp161-2; Austin, 1978, pp72-78, 86-94; Getzels, 1979, pp385-7; Crick, 1990,

p66; Winner & Martino, 1993, p277; Csikszentmihalyi & Csikszentmihalyi, 1993, p201; Subotnik, 1996, pp346-7, 350; 1997a, p312; 1997b, pp104-08.

The traditional (implicit, if not always explicit) argument is that life is like a game in which every player takes on the same challenge - serving/ returning a tennis ball, hitting/ fielding a baseball, getting a hand of cards dealt off the deck, etc - under more or less the same conditions over and over again, with the result that over time the 'breaks' more or less even out. As a result while chance is always a component of exceptional achievement, it does not account for the differences among the players over time. Those who achieve the greatest results do so not because of luck - which is more or less equally distributed - but because they were better prepared (more skilled, intelligent, creative) to take advantage of the 'breaks' when they got them. For an early version of this argument see Cannon, 1940, re "the role of chance in discovery"; for a more recent version see Will, 1991, re "great athletes taking advantage of luck".

In his 2004 book - *Creativity in Science: Chance, Logic, Genius, and Zeitgeist* - Dean Keith Simonton gives chance a much more central role. Simonton considers evidence regarding four major arguments that have been made in the research literature re how it is that scientific creativity comes about, in particular with regard to the sort of creativity that matters, eg Newton, Einstein, Darwin, Curie, etc. His conclusion is that "in the end, it should become clear that the scientific creativity that produced *Principia* must be a joint product of logic, chance, genius, and zeitgeist - with chance as the *primus inter pares*". (p13). How does this 'first among equals' come into play?? Simonton argues that chance events are always present during the endgame of scientific discovery - chance variations in stimuli, ideas from colleagues,

Archimedes taking that bath at the right time, etc, etc. Their role is in influencing the incubation process (sort of unconscious brainstorming in the scientist's mind) which precedes that final 'Eureka!!' solution, and in this process "several attributes of highly creative scientists...affect the magnitude of this haphazard influence...". Thus "...for instance, the greater a scientist's associative richness, the more associations that are elicited by any given stimulus, and hence the more impressive is the quantity and diversity of associations that might impinge on the intellect during the incubation period...". As a result "... in the final analysis the mind of a highly creative scientist will be a virtual cauldron of chance, a boiling infusion in which Poincaré's 'hooked atoms of Epicurus' bounce and collide...", and "from that bubbling broth emerge scientific discoveries of the first order." (pp158-9)

This is certainly consistent with the present book's analysis. However, Simonton's focus is solely on the end game. He doesn't consider the lead-up to that final creative burst... ie how it was that Archimedes (Newton, Einstein, etc) happened to end up in that bathtub in the first place; or, for example, how he happened to end up there with the essential "logic" and "genius", ie, the "mind of a highly creative scientist", just as the "zeitgeist" was spot on for him to take advantage of whatever lucky breaks happened along. Simonton systematically addresses the question of end game problem solving, but he does not consider the role of chance over the long haul of development prior to getting there, ie, the 20+ years of gaining access to the necessary developmental opportunities in the first place – the opportunities which allowed, eg, Archimedes to become "the greatest scientist and mathematician of his time" (p146).

In sum, when it comes to the role that chance plays over and over and over again re attaining the

developmental opportunities which are essential to eventually having a shot at 'greatness', Simonton's 2004 book gives us a thorough analysis of the endgame of scientific discovery, while the traditional lucky break argument basically gives us nothing.

First off, unlike games, the 'breaks' in life are never handed out equally.. The players don't all compete under more or less the same conditions over and over again. Right from the outset the cards are never dealt from the same deck and the players don't compete on the same playing field. The competition's ever rigged via the usual demographics of class, nationality, gender, race, urban/ rural, etc. Beyond this there is the luck of the draw re the likes of age cohort (Elder, 1974, eg, if Michael Jordan, Wilt, Kareem, Bill Russell, Magic Johnson, Dr J, the Big O, LeBron James, and Larry Bird had all been born in the 1920s, then Larry Bird would be the 'greatest' basketball player who ever lived); parents (eg who would ever have heard of Charlie Parker, Andy Warhol, or J Edgar Hoover, if it weren't for momma?); sibling position (Stewart, 1992, eg, is there any chance Lincoln or FDR would have ever become President if they hadn't been only sons?); relatives (eg would we ever have heard of Newton or Einstein if it weren't for their uncles?); early parental death (Simonton, 1994, p154; eg, would we ever have read a word by Byron, Dante, Frost, Keats, Neruda, Wordsworth, or Poe if it weren't for the early death of a parent?). Would we ever have heard of Van Gogh, Dali, or Elvis, not to mention JFK or Lenin, were it not for the death of a brother?

And beyond these once off deals, there's the continual roll of the dice re the likes of parents' jobs, homes, communities, schools, friends, teachers, coaches, accidents, illness, chance meetings, etc. In life the outcome of each hand, or inning, or game, doesn't

simply change the relative positions of the players prior to the next hand or inning or game. It often changes the very nature of the game itself. As a result a particular 'break' in the game of life, rather than averaging out across the players over time, can have massive consequences for the player involved - negative or positive - consequences whose effects extend far beyond the current hand, inning or game; consequences which can influence the person's development for years to come. Would we ever have head of Ali if a 12 year old Cassius Clay hadn't happened to have his bicycle stolen? Of Elvis if he'd gotten the bike he wanted instead of that first guitar? Of Einstein if his father's businesses hadn't failed? Of Frida Kahlo if her bus hadn't plowed into that trolley car? Of Norma Jeane if the Army's 'shutterbugs' hadn't happened to march into her factory one day in the fall of '44 for a patriotic shoot? Of...

Luck/chance/serendipity definitely plays a part in achieving 'greatness', and we're not talking bad hops or lucky breaks.

We're talking lottery jackpots and *Titanic* tickets.

(71) (p107 in text)

Most of quotes and information in this section come from May (1985) re 'courage to create'; Goffman (1982) re 'Miss Lonelyhearts'; Ballinger (1981) re Harlem geniuses; Eysenck (1982) re IQ books; Dylan Thomas (1954) quote slightly changed; Stephen Dunn (2000) quote slightly changed; and Jerry Jesness (2002) re Stand and Deliver.

References

Note: The listing below includes all the sources cited in the Text and Notes above. This listing is in two sections: Print References, followed by URL References.

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Note: If you can't find a Great, Concept, or Author on the page listed below, just try one page earlier or later in the Text. Should be on that page.

Greats

The listing below includes greats who are discussed in either the Text or the Notes.

There are a fair number of other greats mentioned in the Text or Notes who are not included in the listing below, because they are not specifically considered in relation to the overall *Greatness* analysis. These would include, for eg, Giotto, p26, 27; Charlie Parker, p120, 164, 263; Steve Jobs, p64, 116; Bob Cousy, p113, 168, etc; Virginia Woolf, p90, 143, etc; Thomas Hardy, p107; Bob Dylan, 14, 119, etc; Tiger Woods, p102, 162; Little Richard, p13, 102, 158-9, etc; Emily Dickinson, p13, 121; Etc, etc. Likewise I have generally not indexed pages relevant to the greats below where they are mentioned without any specific analysis being made in relation to their own development or attainment of greatness. Thus, for eg, Alfred Hitchcock is referenced 9 times below even though he is mentioned on nearly 20 other pages in the Text and Notes.

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The listing below includes Concepts which are discussed in either the Text or the Notes. This is a very selective list. I have only included those concepts which are central to the *Greatness* analysis, and I have only indexed them for the pages on which they are being explained or illustrated... and not every single one of these as multiple examples of many concepts – eg chance, team, organization, complementary roles, flow activities, the right kind of problems, self-reinforcing systems, genetic bias, etc - inevitably occur together in the various case study examples which were chosen to illustrate a particular concept (ie, those listed in the Contents). In addition to this, a fair number of concepts from the existing research literature (esp in psychology) are not indexed here, even though they are cited and at times briefly discussed in the book. These would include, for example: Acute sensitivity to stimuli, Age cohort, The big five model of personality, Borderline personality, Circle of men, Complex / Special focus families, Cultural capital, Deliberate practice, Domain, Economic capital, Elite inventors, Eminence, Field, Gifted children, Growth of snowflakes, Historical small events, Imagery training, Insider information, Loosely-coupled systems, The Matthew Effect, Multiple discovery, Multiple intelligences, Non-shared environments, Non-universal domains, Parental loss, Physical reality, Proximal processes, San Francisco Cohort, Scientific elite, Selective recruitment, Sibling position, Social comparison theory, Social reality, Synaptic change, Talented teenager, World of pain, World of taste, etc.

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