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Age and the entrepreneur, part 1: Some data

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A short time back, several smart bloggers engaged in an enthusiastic debate about age and entrepreneurs -- some taking the position that kids have a leg up on older entrepreneurs at least for certain categories of startups, and others theorizing that age is largely irrelevant (or as Ali G would put it, "geezers is good entrepreneurs as well, man").

I have opinions on this topic, but rather than just mouthing off like I would normally do, I decided to go get some data. This post presents that data -- the next post will have the mouthing off.

I'm not aware of any systematic data on age and high-tech entrepreneurs. As far as I'm aware, all we have are anecdotes. However, a professor of psychology at University of California Davis named Dean Simonton has conducted extensive research on age and creativity across *many* other fields, including science, literature, music, chess, film, politics, and military combat.

Dr. Simonton's research is unparalleled -- he's spent his career studying this and related topics and his papers make for absolutely fascinating reading.

For this post, I'll be concentrating on his paper *Age and Outstanding Achievement: What Do We Know After a Century of Research?* from 1988. I haven't been able to find a PDF of the paper online but you can read a largely intact cached HTML version courtesy of Google Scholar.

Let's go to the paper:

> For centuries, thinkers have speculated about the association between a person's age and exceptional accomplishment: Is there an optimal age for a person to make a lasting contribution to human culture or society? When during the life span can we expect an individual to be most prolific or influential?

You can see why I think this is relevant.

> Here we adopt the product-centered approach, that is, our focus is on real-life achievements rather than performance on abstract... measures. ...
>
> [A]chievement [takes] the form of noteworthy creativity... the goal is to assess how productivity changes over the life span... [I] focus on individual accomplishment in such endeavors as science, philosophy, literature, music, and the visual arts. ...
>
> [Studies like these focus] on three core topics: (a) the age curve that specifies how creative output varies over the course of a career, (b) the connection between productive precocity, longevity, and rate of output, and (c) the relation between quantity and quality of output (i.e., between "productivity" and "creativity").

Dr. Simonton also discusses leadership as distinct from creative production, but I'm ignoring the leadership part for now since it's quite different.

> One empirical generalization appears to be fairly secure: If one plots creative output as a function of age, productivity tends to rise fairly rapidly to a definite peak and thereafter decline gradually until output is about half the rate at the peak.

This is the centerpiece of Dr. Simonton's overall theory across many domains. And is probably not unexpected. But here's where it gets really interesting:

> [T]he location of the peak, as well as the magnitude of the postpeak decline, tends to vary depending on the domain of creative achievement.
>
> At one extreme, some fields are characterized by relatively early peaks, usually around the early 30s or even late 20s in chronological units, with somewhat steep descents thereafter, so that the output rate becomes less than one-quarter the maximum. This age-wise pattern apparently holds for such endeavors as lyric poetry, pure mathematics, and theoretical physics...
>
> The typical trends in other endeavors may display a leisurely rise to a comparatively late peak, in the late 40s or even 50s chronologically, with a minimal if not largely absent drop-off afterward. This more elongated curve holds for such domains as novel writing, history, philosophy, medicine, and general scholarship.

Well, that's interesting.

> It must be stressed that these interdisciplinary contrasts do not appear to be arbitrary but instead have been shown to be invariant across different cultures and distinct historical periods.
>
> As a case in point, the gap between the expected peaks for poets and prose authors has been found in every major literary tradition throughout the world and for both living and dead languages.
>
> Indeed, because an earlier productive optimum means that a writer can die younger without loss to his or her ultimate reputation, poets exhibit a life expectancy, across the globe and through history, about a half dozen years less than prose writers do.

You know what that means -- if you're going to argue that younger entrepreneurs have a leg up, then you also have to argue that they will have shorter lifespans. Fun with math!

You may not be surprised to find that in creative fields, the power law rule -- also known as the 80/20 rule -- definitely applies:

> A small percentage of the workers in any given domain is responsible for the bulk of the work. Generally, the top 10% of the most prolific elite can be credited with around 50% of all contributions, whereas the bottom 50% of the least productive workers can claim only 15% of the total work, and the most productive contributor is usually about 100 times more prolific than the least.

Here's where it gets really interesting again:

> Precocity, longevity, and output rate are each strongly associated with final lifetime output -- that is, those who generate the most contributions at the end of a career also tend to have begun their careers at earlier ages, ended their careers at later ages, and produced at extraordinary rates throughout their careers. ...
>
> These three components are conspicuously linked with each other: Those who are precocious also tend to display longevity, and both precocity and longevity are positively associated with high output rates per age unit.

OK, so on to the main question, which is, when's the peak?

> Those creators who make the most contributions tend to start early, end late, and produce at above-average rates, but are the anticipated career peaks unchanged, earlier, or later in comparison to what is seen for their less prolific colleagues? Addressing this question properly requires that we first investigate the relation between quantity and quality, both within and across careers. ...

This is a very complex topic and Dr. Simonton goes into great detail about it throughout his work. I'm going to gloss over it a bit, but if you are interested in this topic, by all means dig into it more via Google Scholar.

> First, if one calculates the age curves separately for major and minor works within careers, the resulting functions are basically identical...
>
> Second... minor and major contributions... fluctuate together. Those periods in a creator's life that see the most masterpieces also witness the greatest number of easily forgotten productions, on the average.
>
> Another way of saying the same thing is to note that the "quality ratio," or the proportion of major products to total output per age unit, tends to fluctuate randomly over the course of any career. The quality ratio neither increases nor decreases with age...
>
> These outcomes are valid for both artistic and scientific modes of creative contribution. What these two results signify is that... age becomes irrelevant to determining the success of a particular contribution.

OK, *that's* interesting. Quality of output does *not* vary by age... which means, of course, that attempting to improve your batting average of hits versus misses is a waste of time as you progress through a creative career. Instead you should just focus on more at-bats -- more output. Think about that one.

If this sounds insane to you, Dr. Simonton points out that the periods of Beethoven's career that had the most hits also had the most misses -- works that you never hear. As I am always fond of asking in such circumstances, if Beethoven couldn't increase his batting average over time, what makes you think you can?

> [C]reativity is a probabilistic consequence of productivity, a relationship that holds both within and across careers.
>
> Within single careers, the count of major works per age period will be a positive function of total works generated each period, yielding a quality ratio that exhibits no systematic developmental trends.
>
> And across careers, those individual creators who are the most productive will also tend, on the average, to be the most creative: Individual variation in quantity is positively associated with variation in quality.

Wow.

OK, next step:

> [This] constant-probability-of-success model has an important implication for helping us understand the relation between total lifetime output and the location of the peak age for creative achievement within a single career.
>
> Because total lifetime output is positively related to total creative contributions and hence to ultimate eminence, and given that a creator's most distinguished work will appear in those career periods when productivity is highest, the peak age for creative impact should not vary as a function of either the success of the particular contribution or the final fame of the creator. ...
>
> Thus, even though an impressive lifetime output of works, and subsequent distinction, is tied to precocity, longevity, and production rate, the expected age optimum for quantity and quality of contribution is dependent solely on the particular form of creative expression.

Wow, again.

> Anyone who demonstrates... an age decrement in achievement is likely to provoke controversy. After all, aging is a phenomenon easy enough to become defensive about, and such defensiveness is especially probable among those of us who are already past the putative age peak for our particular field of endeavor...

I think Dr. Simonton is ready to start blogging.

His paper then goes on to discuss many possible *extrinsic* factors such as health that could impair later-life output, but in the end he concludes that the data is pretty conclusive that such extrinsinc factors serve as "random shocks" to any individual's career that do not affect the overall trends.

He then goes on to discuss possible *intrinsic* factors that could explain a relationship between age and creative accomplishment:

> G. M. Beard was not merely the earliest contributor [in 1874] to the empirical literature on age and achievement but its first theorist as well. According to him, creativity is a function of two underlying factors, enthusiasm and experience. Enthusiasm provides the motivational force behind persistent effort, yet enthusiasm in the absence of the second factor yields just original work. Experience gives the achiever the ability to separate wheat from chaff and to express original ideas in a more intelligible and persistent fashion. Yet experience in the absence of enthusiasm produces merely routine contributions. Genuine creativity requires the balanced cooperation of both enthusiasm and experience.
>
> Beard postulates, however, that these two essential components display quite distinctive distributions across the life span. Whereas enthusiasm usually peaks early in life and steadily declines thereafter, experience gradually increases as a positive monotonic function of age. The correct equilibrium between the two factors is attained between the ages of 38 and 40, the most common age optima for creative endeavors. Prior to that expected peak, an individual's output would be excessively original, and in the postpeak phase the output would be overly routine. The career floruit in the late 30s thus represents the uniquely balanced juxtaposition of the rhapsodies of youth and the wisdom of maturity.

Hmmmmmm...

> Beard's theory is not without attractive features... Beard's account, for all its simplicity, can boast a respectable amount of explanatory power. Besides handling the broad form of the age curve, this theory leads to an interpretation of why different endeavors may peak at distinct ages.
>
> The contrast between poetic and prose literature, for instance, can be interpreted as the immediate consequence of the assumption that the two domains demand a different mix of the two factors: poetry, more enthusiasm, and prose, more experience. Indeed, in fields in which expertise may be far more crucial than emotional vigor, most notably in scholarship, we would anticipate little if any decline with age, and such is the case.

Dr. Simonton, however, then goes on to explain that this theory does not really match the data -- for example, the data shows that quality of output in practically all fields does *not* decline systematically with age, which is what you'd expect from Beard's theory.

The paper then digs into possible correlations between intelligence as measured by such metrics as IQ, and creative output:

> [E]ven if a minimal level of intelligence is requisite for achievement, beyond a threshold of around IQ 120 (the actual amount varying across fields), intellectual prowess becomes largely irrelevant in predicting individual differences in... creativity.

So what have we learned in a nutshell?

- Generally, productivity -- output -- rises rapidly from the start of a career to a peak and then declines gradually until retirement.
- This peak in productivity varies by field, from the late 20s to the early 50s, for reasons that are field-specific.
- Precocity, longevity, and output rate are linked. "Those who are precocious also tend to display longevity, and both precocity and longevity are positively associated with high output rates per age unit." High producers produce highly, systematically, over time.
- The odds of a hit versus a miss do not increase over time. The periods of one's career with the most hits will also have the most misses. So maximizing quantity -- taking more swings at the bat -- is much higher payoff than trying to improve one's batting average.
- Intelligence, at least as measured by metrics such as IQ, is largely irrelevant.

So here's my first challenge: to anyone who has an opinion on the role of age and entrepreneurship -- see if you can fit your opinion into this model!

And here's my second challenge: is entrepreneurship more like poetry, pure mathematics, and theoretical physics -- which exhibit a peak age in one's late 20s or early 30s -- or novel writing, history, philosophy, medicine, and general scholarship -- which exhibit a peak age in one's late 40s or early 50s? And how, and why?

[Update: Naval Ravikant has written a particularly interesting response to this post here.]