

# Determine never to be idle: extracts & commentaries

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## Excellent scientists can have life balance

I came across this quote about the work-life balance of Joël Scherk, who was one of the leading talents of mathematical physics in the 1970s:

“He [Scherk] used to come to his office around ten o’clock. He then took up his pad and wrote continuously except for a lunch break up to five o’clock when he put down his pad in his desk and went home. In the evenings he often studied Chinese history or some similar subject very remote from physics.”

– Lars Brink in the preface of L. Brink, D. Friedan, A.M. Polyakov. *Physics and Mathematics of Strings*. World Scientific: New Jersey, 1990.

Comment: Joël Scherk was an extraordinary mathematical physicist whose impact is still felt by mathematicians, string theorists and phenomenologists despite his untimely death in 1980 at the very young age of 33. I am too young to have met him, but I have met his work. In his short career he published 8 papers that have over 500 citations and 27 papers with more than 100 citations. These were in the days where citations were harder to come by, no less. My intersection with his work has been mainly in the realm of Scherk-Schwarz supersymmetry breaking (Scherk & Schwarz 1979), which found a very nice application in supersymmetry compactified from higher-dimensional space down to 3+1. The idea is still used today to make interesting theories of weak scale supersymmetry (e.g., Craig & Lou 2014).

Students often ask me if they can be excellent scientists without 24/7 total absorption in their work, and have a life with other interests (family, hobbies, etc.). The answer is yes. The key is discipline and moderation, as this nice quote from Brink about Scherk exemplifies.

### References

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## Successful people work insanely hard

Before students get too comfortable from my last missive “Excellent Scientists can have Life Balance”, here are words of advice from Ben Stein on what it takes to be successful:

“I know a lot of really successful people — in finance, in government, in politics, in Hollywood, in journalism, in literature. Their common denominator is a modicum of talent and a capacity and an eagerness ... to work like Trojans to get ahead. I don’t know of one really successful, famous man or woman who didn’t work insanely hard to get there and stay there.

“Don’t make excuses. Don’t shirk. Just get to work and stay there until it’s not work any more, but your life. That’s success in and of itself.”

Ben Stein. “Success is All in a Day’s Work.” Yahoo! Finance. December 22, 2006.

Comment: There is no doubt that this is good advice, especially when you are trying to establish your career path or reach high education goals. However, despite the exaggerated word “insane”, I don’t think it is necessary to have an imbalanced life to be successful. As with most good things in life, discipline is the key. Working hard takes discipline and maintaining balance takes discipline.

## No success without total devotion

“Still, few people, even those hugely gifted, are capable of the application and focus that Mozart displayed throughout his short life. As Mozart himself wrote to a friend, 'People err who think my art comes easily to me. I assure you, dear friend, nobody has devoted so much time and thought to composition as I. There is not a famous master whose music I have not industriously studied through many times.' Mozart's focus was fierce.”

“Without the time and effort invested in getting ready to create, you can be hit by the thunderbolt and it'll just leave you stunned.”

“I don't want them merely involved. I'm looking for insane commitment. I'm no less strict with myself. I'm always taking temperature readings of my commitment to a project and pushing myself to be more committed than anyone else.”

Comment: If you want to be creative, you can't just be “gifted”. You have to have total dedication and work extraordinarily hard. In my experience it is more rare to find somebody who is willing and capable of extreme devotion to their calling than it is to find a “genius” or a somebody extremely talented. Talent alone does not go very far in this world. It is merely a necessary condition, but not sufficient.

From Twyla Tharp. *The Creative Habit*, 2003 (2006 Simon & Schuster paperback).

## Genius is infinite capacity for taking pains

"Thomas Carlyle in an after-dinner speech stated that genius was an infinite capacity for taking pains."

Somerset Maugham. *Cakes and Ale*. Vintage Books, 2000.

Comment: All extraordinary achievement comes from this. The great painters, the great athletes, the great physicists, the great novelists, the great dancers, the great mathematicians all have one thing in common : they have "infinite capacity for taking pains."

## Five characteristics of successful people

Jeffrey Mayer has made a list of the top 5 characteristics of successful people:

1. They have a dream
2. They have a plan
3. They have specific knowledge or training
4. They're willing to work hard
5. They don't take no for an answer

From Jeffrey J. Mayer, *Success is a Journey*, 1998.

Comment: Mayer goes on to say that successful people are very focused and cannot be sidetracked from their focus. They also learn that there is a connection between success and happiness. Mayer echoes the social science research in telling us that happiness does not come from what you acquire or own, but rather through “doing and achieving.” Setting worthy goals and achieving them leads to success and happiness.

## All have will to win but few have will to prepare

Maureen Mahoney, on success:

"Mahoney said her preparation began at Indiana University and the University of Chicago Law School. Along the way, Mahoney heeded the advice from her legal colleagues and said she even listened to former Hoosier basketball coach Bobby Knight, who said that most of his players had the will to win, but not the will to prepare. 'Success is first and foremost the willingness to prepare,' she said."

From Maureen Mahoney's 2003 Elizabeth Charlotte Mullin Lecture on October 22, 2003 at the Power Center in Ann Arbor, MI. This quote is from the newspaper article: Liz Cobbs, "Attorney points to U-M case as peak of career", Ann Arbor News, October 23, 2003, page B1.

Comment: You are not special because you want to succeed, whether that be at physics, mathematics, basketball, art or business. What makes you special is if you have the willingness to do what it takes to succeed. In sports, that is the willingness to run sprints all out during a practice when no one is watching. In physics it's doing the extra supplementary homework problems to sharpen your brain and problem solving skills. Don't stop at strong desire. Got the extra step and have strong work ethic.

## Non-cognitive skills as the ‘dark matter’ of success

The high school dropout rate in the United States is about one in ten. Lack of high school diploma is a serious impediment to gainful employment, and also leaves highly ambiguous what level of educational competency an individual may have. During the height of World War II in the early 1940s the American Council on Education (ACE) developed a test for the military to assess skill levels of their incoming draftees. This test was redesigned in 1988 and is now known as the GED test (General Education Development test), or just “the GED.”

The GED has been lauded as a chance for high school drop outs to gain a new lease on life who can prove their cognitive skills by passing the test, or can work to obtain the necessary educational skills to pass the test. Many jobs and educational/training opportunities list “High School diploma or equivalent” as necessary, and “equivalent” means GED.

You might think that those who were former High School dropouts and then went through later effort to take and pass the GED would be people on a higher track to success than dropouts who never bothered with the GED. Surprisingly, however, the data suggests the opposite.

“Controlling for measured ability, however, GED recipients earn *less*, have lower hourly wages, and obtain lower levels of schooling than other high-school dropouts.” (Heckman & Rubinstein 2001).

How can this be? As explained by Heckman & Rubinstein (2001) and Heckman et al. (2011) and summarized by Tough (2012), the answer is in noncognitive skills. Success is a complicated mix of cognitive abilities (intelligence, roughly) and noncognitive skills (conscientiousness, responsibility, perseverance, etc.). It’s the noncognitive skills where GED recipients often fall short.

“Dropouts who take the GED are smarter (have higher cognitive skills) than other high-school dropouts and yet at the same time have lower levels of noncognitive skills. ... The GED’s are ‘wiseguys,’ who lack the abilities to think ahead, to persist in tasks, or to adapt to their environments. The performance [annual income, unemployment rate, divorce rate, use of illegal drugs] of the GED recipients compared to both high-school dropouts of the same ability and high-school graduates demonstrates the importance of noncognitive skills in economic life” (Heckman & Rubinstein 2001; see also Tough 2012 for bracket insert comment).

Despite Heckman & Rubinstein’s partial identification of the non-cognitive skills in the statement above, they do not identify the noncognitive skills, and draw a parallel to astrophysics research:

“This paper is written in the spirit of ‘dark matter’ research in astrophysics. We have established the quantitative importance of noncognitive skills without identifying any specific noncognitive skill. Research in the field is in its infancy.”



In subsequent years there has been much effort put into this question of what traits are required for high achievers (Wells 2016), which is a very related issue. Success is correlated with intelligence (cognitive) and conscientiousness (non-cognitive). Likewise putting too much emphasis on the cognitive side at the expense of noncognitive skill development is detrimental to children's success later in life (Tough 2012).

It strikes me that Heckman et al.'s studies may be showing that non-cognitive skills are more important than cognitive. It is much better to be less intelligent but responsible than it is to be more intelligent and irresponsible, when it comes to getting and holding on to decent jobs, having stable home life, etc. Perhaps Woody Allen was right when he said, "Eighty percent of success is showing up" (Peters & Waterman 1982).

The lessons learned from Heckman et al.'s studies point to a larger role of education than just imparting cognitive skills. Getting a degree, whether it be a high school degree or a college degree, requires significant noncognitive skills that are very valuable in work and life. Employers requiring a college degree may be just as interested in the student's demonstration of perseverance than in the actual knowledge they gained.

#### References

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## Suppress unnecessary impulses

Mikhail Baryshnikov, one of the greatest dancers of the 20th century, has this to say about modern dance:

“Modern dance is partly a matter of suppressing unnecessary impulses.” (New Yorker, 31 May 1999, p.105)

Comment: This is true in physics as well. There are many more ideas out there than you have time to work on. Choose wisely.

## Determine never to be idle

In a letter from Thomas Jefferson to his daughter Patsy:

“Determine never to be idle. No person will ever have occasion to complain of the want of time, who never loses any. It is wonderful how much may be done, if we are always doing.”

From J.J. Ellis. *American Sphinx: The Character of Thomas Jefferson*. Vintage Books, 1996.

Comment: There is probably no lesson more important that I have learned in life that idleness is one of the worst vices, and leads to many other vices. Killing time is killing life, and killing the joys of making goals and accomplishing them, and killing the chance to make a positive difference in life. Idle people are miserable, and they get more miserable in time, is what I have seen.

## Odious qualities bring progress?

The greater writer Evelyn Waugh had this to say about what it takes to be a great artist. The same presumably would apply in Waugh's mind to a great scientist, or any other great achiever:

"Humility is not a virtue propitious to the artist. It is often pride, emulation, avarice, malice—all the odious qualities—which drive a man to complete, elaborate, refine, destroy, renew, his work until he has made something that gratifies his pride and envy and greed. And in doing so he enriches the world more than the generous and good, though he may lose his own soul in the process. That is the paradox of artistic achievement."

From Evelyn Waugh, as quoted by J. Holt. "The Life of the Saint". New Yorker, August 13, 2001.

Comment: I have often heard people say that the truly greatest achievers of science and math (those once a generation types) are those who are a bit damaged psychologically. They are driven in part by forces that are darker than pure enjoyment. Waugh seems to come down on that side. However, I don't think it's necessarily quite as bad as Waugh says. Trying to earn the love of a parent, which is not so dark as being malicious or avarice, can be a powerful force for extreme achievement, for example. Also, permanent lack of security – a sort of lack of confidence instilled by childhood trauma perhaps – may also be a major force within super high achievers. This also does not reflect as badly on the high achiever as Waugh's speculations.

## Greatness requires change, improvement and renewal

“The spirit of Marriott lies in the concept that there is no finish line, no ultimate summit, no ‘having made it’. ... Core values and purpose alone cannot make a company great. It must also have an unceasing drive to change, improve and renew itself.”

From J.W. Marriott, Jr, K.A. Brown. *The Spirit to Serve: Marriott’s Way*. Harperbusiness, 1997.

Comment: Marriott Hotels are known around the world as one of the primary destinations of business travels. Marriott has much to say about what makes a company great.

The quote from Marriott’s book strike me as very important for the academic.

As academics or researchers we are in many ways a small business owner and our brand is our work. We have students and postdocs that are contribute and that we must manage properly. An academic never “has made it”. There is always more to do, more to discover, more to see. It is exhilarating when viewed the right way. But as Marriott says, successful long careers (successful businesses!) must always change, improve and renew.

## Advice for your work life

On January 2, 2004, Ace Greenberg, Chairman of Bear Stearns, was interviewed by Charlie Rose on PBS. It was a fascinating interview, and I took notes of some of the more interesting things Greenberg said. I like his views. Unfortunately Bear Stearns was one of the casualties of the 2008 financial meltdown, but I don't think that diminishes the importance of what he said:

"I don't believe in working 20 hour days. When I am done, I go home and rarely think about the business. But when I'm there, I give it 100%. I don't go to lunch. I bring my lunch and eat it at my desk."

"I believe in punctuality. It is selfish to be late. If you have a meeting and ten people are held up because of one person, that's terrible."

"If there is one piece of advice I can give young people it is to love what you do. Some guy with and IQ of twenty points below yours who comes to work loving what he does, and you don't, will murder you. I cannot overstate the importance of this. When you love it you're into it, and you find a way to make it work."

"We get rid of people who can't get along and have troubles. They eat away all your time and energy and we do not have the skills and training to deal with people like that. We ask them to leave."

Comment: Some people get frozen by this third comment, that you must love what you do. Nobody begins loving what they do with great passion. You must have a kernel of love and interest for your work, and from there it must be developed. The more you learn your trade, the better you are at it, the more you focus on what is great and important about what you do, the more you fall in love with your work, and the more effective you are. It is a continual activity to love and maintain that fervor for your profession, and when you do, the feedback is positive and you have a chance to become extraordinary at what you do, while at the same day enjoying such an important part of your life.

## Legendary boxing trainer's advice on becoming a champion

Teddy Atlas is one of the great boxing trainers of all-time give three steps for becoming a champion.

“Never lie to yourself. Face your weakness.”

“Take responsibility for everything in your life. Make yourself go beyond where you think you can go.”

“Live in the world of the absolute, not in the world of the relative. There is no compromise in the world of the absolute. It's sacrifice and obedience to the absolute that makes a champion.”

From “What makes a True Champion.” Parade Magazine. June 2, 2002.

Comment: I especially like the “live in the world of the absolute”. I tell that to students. If you're doing better than the student next to you, it's not enough. You need to go to the highest level you can. The student next to you might be a slacker, but the research calls for an all-out devotion to getting it completely right and exploring all the implications one can find. The world of relative does not make champions.

## Success through commitment

“... but when I said that nothing had been done I erred in one important matter. We had definitely committed ourselves and were halfway out of our ruts. We had put down our passage money— booked a sailing to Bombay. This may sound too simple, but is great in consequence. Until one is committed, there is hesitancy, the chance to draw back, always ineffectiveness. Concerning all acts of initiative (and creation), there is one elementary truth, the ignorance of which kills countless ideas and splendid plans: that the moment one definitely commits oneself, then Providence moves too. All sorts of things occur to help one that would never otherwise have occurred. A whole stream of events issues from the decision, raising in one's favour all manner of unforeseen incidents and meetings and material assistance, which no man could have dreamt would have come his way. I learned a deep respect for one of Goethe's couplets:

Whatever you can do or dream you can, begin it.  
Boldness has genius, power and magic in it!”

From W.H. Murray. *The Scottish Himalayan Expedition*, 1951.

Goethe couplet is from Goethe's *Faust*, lines 214-30 (transl. by John Anster, 1835)

Comment: Some of the saddest and most wasteful things I have seen in my life are when multi-talented people cannot decide what they really want to do, and so commitment is never fully there. Because of that they do not succeed. Listen, if you are really great at something, it usually means you could have been really great at something else too. But you won't be great at anything unless you choose one thing to commit to. Live your life deliberately and commit. Don't wait for something else to come along to show you which way to go, while you dabble in multiple directions. You will fail that way.



## How to generate luck

“My research revealed that lucky people generate their own good fortune via four basic principles. They are skilled at creating and noticing chance opportunities, make lucky decisions by listening to their intuition, create self-fulfilling prophecies via positive expectations, and adopt a resilient attitude that transforms bad luck into good.”

Richard Wiseman. “The Luck Factor.” *Skeptical Inquirer*, May/June 2003.

Comment: The basic principles are also manifestly on display for all of those who are “lucky” in “stumbling” on some great discovery in physics or mathematics. Their own actions and attitudes created luck, and made them successful.

## You can still succeed in science with a non-science background

Tony Leggett won the 2003 Nobel Prize in physics for his work on superfluid helium-3. Rebecca Tan interviewed him during his visit to Singapore last month:

Tan: “You took a rather unusual path to a career in physics, doing your first undergraduate degree at Oxford in classic philosophy, known colloquially as the Greats. If you could go back in time, what career advice would you give to your 17-year-old self?”

Leggett: “Do the same, I have no regrets at all. Had I gone into physics initially, I would have missed the enormous intellectual benefits I would have gotten out of my Greats education.”

– R. Tan. “A Word to Young Physicists in Asia.” *Asian Scientist* (2 Feb 2015).

Comment: Unfortunately the world is different now. Leggett describes in this interview how he was able to go into physics based on one individual seeing some promise in him despite having almost zero background. This was at Oxford in 1959. It is very unlikely that anything like that could happen today.

The implicit question that arises from Leggett’s response is whether we are greatly losing out as a field by not letting more come into the fold from alternative backgrounds. Smart people with different perspectives make a better and more energetic community overall. Who wouldn’t want to see what Lionel Trilling, or Maya Angelou or Edward Said would have produced if they had become physicists?