

## Traits of extraordinary achievers

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Recently I had dinner with young researchers in high energy theory who asked me what in my view were the key factors that led to success in scientific research. I told them that “extreme talent” combined with “extreme dedication” usually wins the day. People focus on the “freakishly smart” aspect of the highest achievers, but the commitment level, the dedication and focus, needed to get to the very top is just as “freakish” and perhaps more rare. The very best are brilliant and always “on.”

I also told them that in the past extreme talent with high (but not necessarily extreme) dedication was possible if you wanted to land a faculty position at a research university, for example, but the competition is so fierce now that I was not sure that was possible today. However, it was also my impression that today you can have high (but not extreme) talent with extreme dedication and make it. But having both always makes it easier.

So, over time, extreme talent has lost to extreme dedication for the number one trait that you just cannot go without. If I were forced to speculate on why I’d say it might have to do with the rise of experiments with many hundreds and even thousands of collaborators, where extreme talent and brilliance does not have to be present in *everyone*, but extreme dedication does (or “conscientiousness” as we will talk about below). Furthermore the increasingly high premium on constant and visible productivity signs (publications, talks, etc.) contribute to the shift for both experimentalists and theorists. But that is speculation and it would be interesting to see a study ask and answer that question.

I was also reminded of an undergraduate professor of mine at Brigham Young University who spoke about the traits of extreme achieving students he had seen over the years. And he said the biggest was tenacity. The very best of the best do not rest until they know everything there is to know about what is being said, and they have the mental ability to absorb it and sort it out, often on their own. They will not rest until every factor of 2 is understood, until every minus sign is certified, and until every conceptual input of the problem is precisely defined and understood. “They don’t let you get away with anything!” he said, like he had been injured badly by some. He claimed that he could tell in a student’s sophomore classes with high probability if they will succeed grandly or not. He could not tell if a student would be good, mediocre or bad, but he could tell that some would be great.

After the discussion with the young researchers I ran across a New York Times article (Hart & Chabris 2016b) on exactly this subject. What are the traits of extreme achievers who experience great success in life? Since it was right on my mind I have spend some time reading the

corresponding social science literature and sorting out the claims (as best as a physicist can do over a short time) to see how they match with the comments I gave the young researchers and with comments by my undergraduate professor on the topic.

### **Social Science Literature**

Hart and Chabris (2016b) opined on their study regarding traits that are most probable predictors of success, where success can be defined as those who “attain exceptional achievement”, defined to be “higher socioeconomic status”, which translates to wealth and status in the business sector and high distinction in intellectual endeavors.

Hart and Chabris, who published their work in a peer-reviewed journal (Hart & Chabris 2016), were drawn to the question when Chua and Rubenfeld (2014) put forward a theory in their best-selling book of 2014 that “attempted to explain why certain minority groups in the United States, such as Jews, Mormons and Asian-Americans, seem associated with extraordinary success (i.e., higher socioeconomic status) relative to other groups.” (Hart & Chabris 2016).

### **Chua and Rubenfeld Theory**

The Chua and Rubenfeld “Triple Package” theory of extraordinary achievers, which Hart and Chabris subjected to social science methodology and data, says that these high achieving groups possess three common characteristics:

- 1) a “sense of group superiority” (ethnocentrism or intergroup bias),
- 2) “personal insecurity” (e.g., due to vulnerability in society, or low self-esteem, or some other reason), and
- 3) highly developed “impulse control” (scoring very high on “Big five conscientiousness” to be discussed below)

Chua and Rubenfeld suggested that 1 and 2 lead to “drive” and 1 and 3 lead to “grit”, and the combination of “drive” and “grit” from the presence of all three traits leads to extraordinary success.

### **Hart and Chabris Findings regarding Chua and Rubenfeld’s Theory**

Hart and Chabris studied the question in controlled research environment. The main resulting message from their study is that the Chua and Rubenfeld theory is not a rigorously valid theory. The abstract of the paper is informative which I quote below:

“What individual factors predict success? We tested Chua and Rubenfeld's (2014) widely publicized “Triple Package” hypothesis that a tendency toward impulse control, personal insecurity, and a belief in the superiority of one's cultural or ethnic group combine to increase

the odds that individuals will attain exceptional achievement. Consistent with previous research, we found in two sizable samples (combined N = 1258) that parents' level of education and individuals' own cognitive ability robustly predicted a composite measure of success that included income, education, and awards. Other factors such as impulse control and emotional stability also appeared to be salutary. But despite measuring personal insecurity in four different ways and measuring success in three different ways, we did not find support for any plausible version of Chua and Rubenfeld's proposed synergistic trinity of success-engendering personality traits" (Hart & Chabris 2016).

However, the abstract seems to be worded much stronger than is warranted from the body of the paper. For example, the abstract seems to imply that the "Triple Package" theory does not correlate with success, but in fact all of those traits do correlate with success, which they do not necessarily disagree with in the body of the paper.

Here's one example regarding "insecurity". Social scientists have many ways to define that, but one way is "contingent self-worth". This is when "self-esteem ... is predicated on external sources, and hence presumably more fragile" (Hart & Chabris 2016). If that is how insecurity is defined, which is not inconsistent with Chua and Rubenfeld, then "the TP hypothesis fares somewhat better: participants whose self-esteem depended on their appearance, others' opinions, and on doing well in competitive contexts scored higher on the composite success measure, albeit only if they were also relatively high in ethnocentrism" (Hart & Chabris 2016). But "contingent self-worth" is plausibly consistent with Chua and Rubenfeld's "insecurity" criterion, and if so their claim that it goes with ethnocentrism is consistent with data, according to Hart and Chabris.

It is probably fair to say that Chua and Rubenfeld's Triple Package of traits is well correlated with success but may very well not be the most efficient and correlated statements one can make. There are different independent axes that are more important than their "Triple Package" despite the fact that those axes can overlap.

### **Hart and Chabris Theory of Success**

Hart and Chabris have their own ideas on what are the most important drivers for success. Surveying the literature and their own studies they put forward their theory : "The totality of the evidence suggests that the mostly likely elements of a triple package would be intelligence, conscientiousness, and economic advantage: the same factors that would benefit anyone, regardless of ethnicity." (Hart & Chabris 2016).

In a New York Times article (Chabris & Hart 2016b) the authors restate their theory of what are the key factors of extraordinary achievement : "our studies affirmed that a person's intelligence and socioeconomic background were the most powerful factors in explaining his or her success."

They also reiterate that conscientiousness is also key : “Long before ‘The Triple Package,’ [of Chua and Rubenfeld] researchers determined that the personality trait of conscientiousness, which encompasses the triple package’s impulse control component, was an important predictor of success — but that a person’s intelligence and socioeconomic background were equally or even more important” (Chabris and Hart 2016b).

### **Synthesis of the literature**

Reading the ones listed above plus forays into the other articles cited suggest that there are three key correlations for extraordinary achievement : 1) high intelligence, 2) high socioeconomic background, and 3) high conscientiousness, in that order, but all three vital. And there are many other traits that are just not that important as key source indicators. In other words, even though conscientiousness may be third on the list, it is “key” and beat out many other extraneous characteristics.

Conscientiousness in the social science literature is very precisely defined as one of the “Big Five” personality traits. The “Big Five” are sort of basis vectors in personality space, and the basis traits are :

- openness to experience
- conscientiousness
- extraversion
- agreeableness
- neuroticism

The Big Five Traits are sometimes called OCEAN or CANOE, based on the first letter of each trait, and you can find yourself very far to the left (e.g., definitely not possessing X at all) or very far to the right (e.g., definitely possessing trait X in full). The claims are that none of the traits matter so much compared to conscientiousness when it comes to extraordinary achievement.

But what is “conscientiousness”? Here are the characteristics of conscientiousness as listed by three different sources.

“Lexical facets” (Saucier & Ostendorf 1999) :  
Orderliness, Industriousness, Reliability, Decisiveness

“NEO-PI-R facets” (Costa & McCrae 1992) :  
Order, Achievement Striving, Dutifulness, Self-Discipline, Competence, Deliberation

“CPI-Big Five facets” (Soto & John 2008) :  
Orderliness, Industriousness, Self-Discipline

Another description of conscientiousness helps put the trait in a fuller context:

“Conscientiousness (Efficient/Organized vs. Easygoing/Careless): This is a feature that expresses self-discipline and determination and desire for achievement. It expresses an intention to behave in a planned matter, goal-directed and thinking before acting. Such people follow norms and rules; they are always on time, study hard, and give their best to the job. They are not impulsive and show high values of thoughtfulness (John et al. 2008)” (Richter & Dumke 2015).

So, order and self-discipline is a key factor for extraordinary achievers.

### **Discussion on intelligence**

Regarding intelligence, which is often listed as the leading indicator of success, it is often very tricky to talk about it, since one normally does not have much control over it, except the ability to damage it (through drug and alcohol abuse, etc.). Subconsciously perhaps that is why I use instead the word “talent” since it isn’t such an aggressive word, and implies the possibility that there is something you can do about it. However, recognizing that intelligence is a component of an individual’s future success is good for society and institutions for several reasons that should be considered. For example, for society, it is well known that early childhood education and nutrition is key to enhancing intelligence, or at least not diminishing intellectual capacity. There are important public policy priorities that can be affected by understanding the key role of intelligence.

### **Discussion on socioeconomic status**

Regarding the socioeconomic indicator of success. This did not occur to me within the realm of scientific achievement. I have read before that your income at age 40 is more correlated with your parents’ income at age 40 than anything else, including educational level. So in the business world I am more apt to agree that this is important, for reasons that I admit I do not fully understand. In academia, however, I naturally resist thinking that this is as important as the other two criteria (intelligence and conscientiousness). I can imagine that it is correlated with many good things, such as good nutrition, good education at school, parental investment, etc., and so it makes sense that it is very likely to be a positive benefit, but the implication in the studies is that it is more than a nice nudge, it is quite important, and it is a needed addition to the mix of success “traits” in addition the other two. I don’t understand it, and I didn’t think of it, since I am not privy to my student’s socioeconomic background, but it is interesting.

The other reason why I question socioeconomic status as a strong independent factor is an analogy with the weather. Imagine somebody said that the three most important indicators of the temperature reading at some location on January 23<sup>rd</sup> are 1) its latitude, 2) its altitude, and 3) the temperature reading on January 22<sup>nd</sup>. Well, sure, the temperature on January 22<sup>nd</sup> (socioeconomic status of the parents, previous generation) is a very good indicator of the temperature on January 23<sup>rd</sup> (socioeconomic status/success of the next generation), but the real reason is the latitude and altitude that is applicable to both (conscientiousness and intelligence). Obviously the analogy is not perfect, in part for the reasons stated in the previous

paragraph, but I remain curious to know more why it is considered a strong independent variable.

It does remind me from when I was filling out applications to graduate school. Yale asked me to fill in a detailed report of my parents earnings and jobs and positions, despite the fact that basically no Physics PhD student at Yale (or Michigan or any other good place) needs to pay a dime of tuition (all comes through teaching or research assistantships or scholarships). I was appalled and said that that had nothing to do with whether somebody should accept me to a physics PhD program and refused to fill it out and withdrew my application. (Alas, the brashness and idealism of youth...) I was from a privileged background but I did not think that should be used for my advantage. But maybe Yale was on to something and they just wanted to use it as a predictor? I still don't like the thought of it though, and I'm going to guess that Yale doesn't do it anymore, even though I haven't checked.

### **Discussion on Conscientiousness**

Regarding conscientiousness, in the “lexical facets” of “conscientiousness” stated above, the term “reliability” is included. Some might say this is decidedly not the trait of some of our most successful researchers in the field. They may not care to show up for faculty meetings, or they teach poorly, or basically ignore everything in their lives except their research — laser focus on that aspect of their jobs, and letting go everything else. And when it comes to service assignments in the department, perhaps they are not so reliable.

But anecdotally I can think of no cases like this of an “unreliable” extraordinary achiever without the individual being completely off the charts in intelligence and research dedication, and without them coming from excellent socioeconomic backgrounds. Extreme outliers in both intelligence and dedication may be immune, therefore, from personality trait requirements, it might be said, whereas most others need strong conscientiousness to be an extraordinary achiever. However, it should be said that there are extreme outliers of intelligence who are reliable professionally, so unreliability is not a definitive marker for extreme intelligence (let's not tempt colleagues to lay down on the job!). It's just that it appears some can *survive* high unreliability if their intelligence and dedication is extreme enough.

Lastly, it strikes me that conscientiousness is the most important trait since it is the one trait that an individual has the most control over when attempting to become extraordinarily successful. Its position as third on the list may be true for outsiders predicting whether or not an individual will be successful, but it surely must come in first place among areas to work on for those who want to climb the latter of success. I see how outsized this trait is in success in academia, and I am not surprised to see that the social science literature finds it to be outsized compared to other personality traits.

### **Summary**

If you remember one sentence from this discussion, and you want to know what you can do to be an extraordinary achiever, it is this : Your extraordinary success will require high intelligence (let's hope you have it) and high conscientiousness (let's hope you get it).

## References

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