

Advice for My Younger Colleagues

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When I was asked to write this article, I thought I finally reached the age at which you are asked to step aside and just give advice. Maybe I am told that I cannot hunt anymore and should philosophize. Reevaluating, I thought that perhaps some of the wisdom one accumulates with the years may become useful to younger colleagues. My father, a materials scientist of sorts (a jeweler, to be more precise), gave me advice which still guides my life.

I distinctly remember deciding to become a physicist at age 11, when one of my aunts asked me: “So little boy, what do you want to be when you grow up?”. I even remember the corner in my home town Cluj, Rumania, where I said this. What drove me to say this, escapes me: the recently launched Sputnik, some strange curiosity, the way pulleys work, the transistor radio I built, discussions with my childhood friends (two of whom are condensed matter physicists), bravado, . . . who knows. Since then the desire to become a good physicist has been a driving force much of my life, slowly becoming a passion. In fact, as the time went on my father’s advice to “do what you like, but above all like what you do” became something that kept me excited even during the times when I had to deal with extremely boring reports, equipment breaking, rejection of papers, scientific fights, negative results, etc. I firmly believe that the most important thing is to enjoy the process of doing science; like painting. I imagine that Picasso woke up every morning, anxious to go to his atelier to paint. Physics is like painting and if you want to do this you must have the “lust for physics”. It is not a job, it is a passion!

I started my life in Rumania under difficult political conditions, moved to Israel where I mostly had to work, got an undergraduate degree from the University of Chile and a Ph.D. from Northwestern University. Studied in at least six languages, moved from country to country, worked as a farmer, carpenter, jeweler, and teacher. At each stage I thought: if I can only finish high school, be admitted to the University, finish my Licenciado, get a Ph.D., get a “real” job, become a tenured professor, I would be infinitely happy. After each stage I had another aim which kept a new illusion in front of me. “If I could only do something important in physics” was the overarching force that drove me from stage to stage. Eventually I will accomplish it! So never lose the illusion. If you have the passion you will not lose it.

Once I got my Ph.D. at Northwestern I toyed with the idea of moving back to Chile or Israel, but realized that I wanted to do important science. This is not easy in smaller countries where the means, contacts and infrastructure are not easy to find. In addition to the usual “growing pains” a young researcher has to go through, working in countries where the support is much harder to get than in the US must be extremely difficult. That is why my admiration for researchers like Pedro Prieto is enormous. He was able to do first rate, internationally competitive fore-front research and publish in first rate journals, in Colombia, where at first sight it may seem hopeless. Not only this, but he was able to excite a cadre of young people into discovering the secrets of the universe. How does he do it? I do not know. All I know, I could not, and chose the easy way out and work in the US. However, with the globalization of science, I am convinced that as time goes on it will be easier and easier to do physics beyond the so-called developed world. Moreover, it is precisely in these countries where intellectual pursuits and the creation of new ideas are greatly respected. Not everything reduces to dollars and cents. The “passion” and “the lust for

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physics” have no national borders and that is why I believe that many of the future, new, great ideas will come from the developing countries. It is inevitable.

So I tried to summarize below my advice to young researchers in 13 simple rules, keeping in synch with the Twitter generation:

1. Physics is like painting, so the key is passion.
2. Never give up, even when the situation looks desperate . . . something will happen.
3. You cannot control genetics i.e. your IQ, but you can control how hard you work. So have an illusion to drive you.
4. Do what you like, but above all like what you do. As the Spanish poet Machado said it “Caminante, no hay camino, se hace camino al andar”. Paraphrasing: the important thing is the process, not necessarily the end results.
5. Don’t worry about your pedigree. It is possible to move to first rate institutions even from lowly origins.
6. Have sanity checks of your science by explaining it to non experts. You should be able to do this, at all levels, without being condescending. If you can’t explain it to non experts, it probably has no lasting value.
7. You can do excellent science, even if you are not at the top institution.
8. One can make infinite excuses why something will not work. A good scientist does it in spite of the excuses.
9. Don’t try to prove a result, but discover what nature wants to reveal to you. The interesting and exciting result is whatever nature hands you, not what you want it to be.
10. Keep in touch with your classmates; they will be your future colleagues.
11. Don’t agonize over things you can’t control; rejected proposals, stupid referees, aggressive old men, difficult colleagues. . . . File them as they come, and go to the next thing.
12. Remember that there is nothing like that solitary knowledge at night after you uncovered a secret which only you know. No other one in the universe.
13. Above all don’t try to get payment for every single thing you do. It is a law of physics that whatever you do for others eventually comes back to you. So help out those after you, the same way you were helped.

Regarding the philosophical stage of my life, do not count me out yet. I am still in the race competing with all you guys and I do use all the rules outlined above.