

# Advice to a young scientist

By Elisabeth Pain  
May 12, 2015

*“Sometimes, choosing a good research project ... isn’t something that comes out of a rational process.” —Pedro Miguel Echenique*

**BILBAO, SPAIN** — In these days of increased competition and uncertain career prospects in academia, it is easy for young scientists to forget why they do science in the first place. But too much career anxiety can backfire, put young scientists at risk of losing the fun of science, and harm their chances of success.

“Today, in contrast to our days, [young investigators] must be continuously justifying what they do. They find themselves under a great pressure, and I believe that this isn’t good for creativity, which is the essence of the scientific activity,” condensed matter physicist Pedro Miguel Echenique of the University of the Basque Country (UPV), told the audience of young scientists last Thursday at the Science+ event, which was organized by the associations of Spanish scientists in the United Kingdom and Germany and UPV.

Some fields are more competitive than others, but “the abilities to survive in science can be learned,” Echenique, who is the president of the Donostia International Physics Center and a past recipient of the Prince of Asturias Award for Scientific and Technical Research, told his audience. Here, *Science Careers* passes on some of the advice that Echenique gave during his talk. **The most important things, he said, are to cultivate your scientific curiosity, take pride in doing things well, and nurture great but realistic ambitions.**

Here’s the rest:

**Choose well.** When deciding where to do your Ph.D. or postdoc, do not base your decision solely on whether the laboratory has a grant for you or routinely publishes in high-impact journals. Choose “a place where one feels motivated, where one knows that some fascinating things are being done,” Echenique said. Also important is to choose a good supervisor, one who won’t treat you like “cheap labor at the service of a great project,” he added. “To look after the young people and their scientific and personal development ... is the hallmark of the great professors.”

Choosing a good project is equally important. It’s hard to know in advance whether a project is going to be good. You can ensure, though, that the project you choose is significant and can be finished in a reasonable time. It’s also a good idea for postdocs to work on several projects at once so that if one gets stalled you can keep moving forward on the others.

**Learn broadly.** Use the early years of your career to learn as many techniques as you can; they will help you tackle an array of problems in the future. “Technical competency is very important,” Echenique said. Also make sure that you learn the basic concepts in relevant disciplines, but always with a critical mind and without trying to know it all. It is important to bring a fresh perspective, he added.

Expose yourself to other ways of learning, thinking, and doing by exchanging ideas with peers and colleagues, gaining experience abroad, and creating a network of smart friends, Echenique said.

**Allow yourself to ‘waste time.’** The pressure on today’s young scientists is such that many do not dare to leave their workbench or computer to pursue other professional activities, for fear they are wasting their time. Yet it is important to go to as many seminars as you can, Echenique said. “Sometimes, choosing a good research project ... isn’t something that comes out of a rational process. ... One goes to a seminar on something that seems very remote from one’s theme and suddenly realizes, ‘... I have the tools to tackle this problem.’” Get involved in teaching, he added: It will make you a better researcher. Show interest in the work of your colleagues: that will make you more attractive to prospective employers, Echenique added.

While your years as a Ph.D. student or postdoc are the most decisive in your career, do not confuse working hard with working all the time. Research is “hard work in the sense of [having to provide] a great effort of concentration, not long hours of routine work,” Echenique said. Take time to relax now and then, and attend the tea and coffee breaks at work. Those breaks give you opportunities for informal exchanges with other researchers that can prove very productive. “Forgive yourself for ‘wasting time’,” he suggests.

**Establish a name for yourself.** Young scientists must start making a mark in their field, and many attempt to do so by joining a laboratory that is led by a famous researcher or frequently publishes in high-impact journals. A danger of such an approach is that it could make it difficult to step out of your principal investigator's shadow; the papers you produce may add to his or her prestige, not yours. "The best way to make a ... name for yourself is [to do] a solid, rigorous, and honored piece of work," Echenique said. Your research effort must be balanced, though, with an ability to sell your ideas and secure credit where credit is due, he added.

**Hone your communication skills.** Communication is also really important, Echenique said. Learn how to give presentations by taking note of what you liked in other speakers' talks, and practice in front of peers and mentors. Put yourself in the shoes of the audience, neither over- nor underestimating them, and ask yourself, "if I was there, would what I'm going to tell them really interest me?"

Learn how to write papers early in your career, even if it is time-consuming and seems to delay publication at first, Echenique said. While quality is much more important than quantity, keep in mind that there is a minimal amount of novel information that is necessary to publish a new paper. "It isn't a lack of ethics to distribute the results of an investigation in series of articles," he said.

When the referees' comments come back, take their criticisms earnestly and allow yourself a cooling-off time before responding. "Come back to the paper the next day and try to understand what the referee says, because the referee is the most attentive reader of your paper," Echenique said. Even if you don't agree with the critics, writing up your response will help you refine your ideas and become a better researcher, he added.

"Many of my colleagues ... think that [during an academic career] one must go through trials and errors, and that those who will survive will be ... the strongest or the most flexible [scientists]," Echenique said. But "I believe that it is better to learn from the experiences of others than to make all the mistakes" yourself.

In spite of all the pressure and anxiety about securing a permanent, independent position, never lose sight of your primary driver, the thing that really got you into science. "It is very important to have permanent positions, of course ... but they are a means to an end. The aim of a scientist is to advance knowledge and bring something new. We cannot convert the means into an end, because [otherwise] we are perverting the process," Echenique said. It is true that luck also plays a role, but "if you ... do a serious and good piece of work and you communicate it well, you will have all those things."

Above all, perhaps, to be successful in academia you need to develop your persistence and preserve your creativity no matter what. "Creativity ... is to find solutions to problems for which there are no recipes," Echenique said. So be willing to take risks, he added, and regard each errant step you may take as a step closer to the truth.

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10.1126/science.caredit.a1500124

Retrieved on August 4, 2015, from:

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