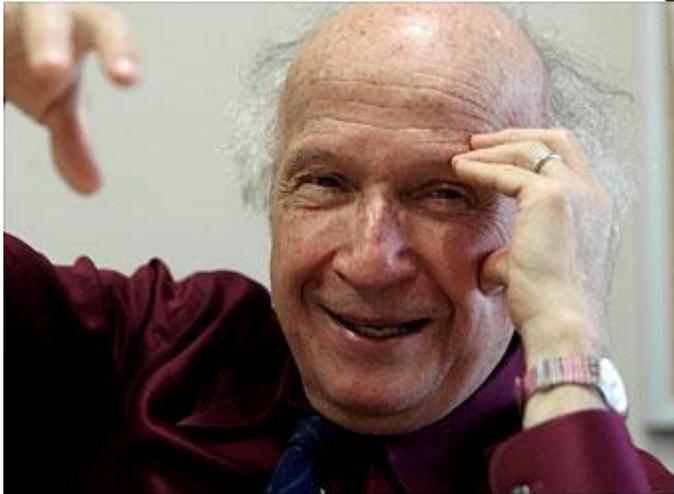


Why crazy ideas are critical: A Nobel-winning chemist's view

By Shelley DuBois, writer-reporter August 30, 2012: 11:53 AM ET

Roald Hoffmann talks to *Fortune* about the benefits of accepting complexity and how to make sure your team feels comfortable with offering seemingly batty



ideas.

PHOTO: JAVIER ETXEZARRETA/EPA/CORBIS

FORTUNE -- Nobel-prize winning chemist Roald Hoffmann has had anything but a simple path to success. He was born in Poland, and survived the Nazi labor camps. He came to America at the age of 12, attended the prestigious Stuyvesant High School in New York, then Columbia, then Harvard.

Hoffmann received a Nobel in Chemistry in 1981 at the age of 44, but certainly didn't rest on his laurels. The 75-year-old scientist has advised over 200 graduate students, Ph.D.s, and postdocs, taught introductory chemistry at Cornell, co-authored plays, and published poetry. Currently, he helps run a science and performance event on the second Sunday of every month at the Cornelia Street cafe in New York. He recently talked to *Fortune* about leadership, molecules, and the psychology of enabling crazy ideas. Here is an edited transcript of the conversation.

Fortune: You can think of your work as a kind of business, can you not?

Roald Hoffmann: Yes, so you can do an economic input-output analysis of what I do. Our product is 560 scientific papers plus countless talks and other things, but really the papers. I am in the business of making ideas and they're not patentable nor copy-writable nor anything. Interesting. Input is perhaps \$200,000 - \$300,000 per-year of research funds to employees and co-workers and the output is 560 scientific papers.

And that requires some of the management skills you see in business?

In science, almost all the papers we publish are written together with several people in research groups. But within that research group, somehow, we have mastered the ethics of collaboration.

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There's something about the way that the group leader tells people that an idea made by one of the other people in the group is not good or not right. The criticism is made in a way which allows the person, first of all, to come up with further evidence, but more importantly, doesn't shake them so that they're afraid of making another idea.

It is a fine line. And probably in management school, one tries to teach the psychological skills by which you create a situation where people aren't afraid to come out with crazy ideas.

How do you stay motivated to produce those papers, given that the funding in the science world is so cutthroat?

Well, it is competitive. But first let me say, in an unpopular view in my own community, I think scientists are filthy rich in terms of funds compared to the arts and humanities. It's because I move in both worlds. The total budget for the National Endowment for the Arts is one half of what Cornell gets from the government in terms of research and support for science and engineering.

But where do we get the energy for research? It is in part that we enter this remarkably addictive, self-propagating, wonderful enterprise of gaining reliable knowledge about the universe around us and within us. It begins in youth and still goes on -- it's fun.

And that research can be lucrative for some chemists, right?

Yes, but the people who are more likely to start a company are the ones who discover a catalyst or a possible pharmaceutical. There is a precedent for exploiting some of those things with very interesting and heartbreaking stories of someone starting a company based on a wonderful idea. Then, the natural course is to move toward an IPO, and as venture capital comes in -- now we're on Fortune ground -- the initial investors are squeezed out of the running of the company and eventually lose it.

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But a lot of them carry over to the commercialization of a product the same single-mindedness about some idea that could conceivably lead to disaster psychologically, if they're too close to what they're studying. I'm sure there are many more stories your readers can tell of such situations.

In business, certainly. But in science, there is something to be said for simply learning more about the world.

Or creating a world. Something I do as part of my work is predict molecules that weren't on Earth before, and that's lots of fun, and I hope that somebody else will make them. But I think that scientists and chemists who make new molecules should worry about the potential use and misuse by others of the molecules they make. I don't think they worry enough. Creation brings with it ethical responsibility, whether it's a child or a molecule or a gun.

What else have you learned from being a chemist?

One thing that chemistry has taught me is that things are complex and you must come to terms with complexity. Even as my mind wants simplicity -- it wants things classified as good or bad -- the world is complex and the solutions to problems, social problems, are not going to be not easy. We're in an election year and everything in those election commercials, it doesn't matter what party, is inclined to simplify a complex world.

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But I think we should resist oversimplification of everything -- human behavior, political solutions, social systems. I think chemistry keeps me aware of that because you need complicated. Why do we need 70 million molecules? Because the human body is complicated and 92 elements, that's very nice. But it's not the elements that matter, it's what you can build from them, and what you build from them is complex structures. That, to me, is one of the lessons of chemistry. And I'm at peace -- I'm at reasonable peace with that.

That sounds like a lesson for politicians and business leaders as well.

Yes, I'd love to get them back in chemistry class.

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