

NEWSMAKER INTERVIEW

Warning: Don't Let Your Elders Brainwash You

Catherine Cesarsky has nothing against scientific road maps. The outgoing president of the International Astronomical Union (IAU) has contributed to several, including last year's report from the European astronomy consortium, Astronet, laying out a 20-year plan for European astronomy.

But Cesarsky, a former director general of the European Southern Observatory (ESO) and currently France's high-commissioner for atomic energy, believes that such documents

avoid killing each other's projects. That is particularly important in Europe, where different countries have competing interests. Astronet's road map also gives us an advantage in raising funds.

Q: What's the downside?

C.C.: You predefine what is important, what should be done, and how it should be done. I am worried that young scientists may be brainwashed as a result. It's like telling them, "Here is this primer, this cookbook—all you have to do to come up with a fundable proposal is read this well." It can do a lot of good, but it may be quenching creativity from the start.

Q: Have you seen the problem occurring?

C.C.: I do see some of it when I serve on panels for fellowships and things like that. You get proposals that are clones of each other.

Q: What's an example of a bandwagon?

C.C.: Dark energy would be one. Space missions are being planned in the U.S. and Europe to learn more about it. A lot of people want to work on the problem, and many of them are thinking along similar lines. It may be that after we have done all these experiments, we may know as little about dark energy as we know now.

Q: Hasn't it always been true that senior researchers define a set of broad research questions and that young scientists start their careers by following those lines of inquiry?

C.C.: When I got my Ph.D. [in astronomy] in 1971, things were not so well organized. All the senior people had their individual ideas. Papers had very few authors. Not everybody knew what everybody else was doing. Even Ph.D. topics were chosen a little more individually. We were, nonetheless, influenced by personalities. When I was a postdoc at Caltech [California Institute of Technology], everybody used to pay attention to what Willie Fowler thought was important.

Now we do this community work. The

documents are very well done. The Internet makes it very easy to find out what everybody is doing. Because road maps and plans are so detailed and comprehensive, it is difficult for individual scientists to come in and do better.

Q: How could the problem be solved?

C.C.: I think young scientists should guard themselves against brainwashing. They should look beyond the road maps, even if we put the best we know in them. Also, they should resist specializing too much at the cost of the big picture. The best way to escape [the] bandwagon effect is to look at things from a distance, to connect different ideas.

When I was in charge of ESO, I tried to encourage innovative projects under the director's discretionary time-allocation program. My expectation was that researchers would propose risky ideas that were completely new. Disappointingly, we got rather little of that. The program quickly became a way for scientists to add observation time to an existing project that would lead to a quick result and publication.

Q: What's your advice to reviewers and telescope time-allocation committees?

C.C.: Think again before you reject proposals that seem outlandish. When committees review ideas that go against the norm—such as pushing an instrument to its limits or trying out a new, untested method of observation—far too often they are quick to say, "Ha, that's undoable, forget it."

Q: Did you try to change that at ESO?

C.C.: I asked committees there twice a year for 8 years to be more open to unconventional projects. I don't think it has worked.

Q: Why not?

C.C.: There are often one or two individuals on each committee who are willing to take risks, but others are not. It is very difficult for a committee to not go for the sure thing.

Q: What about attaching money to scientists instead of proposals?

C.C.: I wouldn't bet entirely on the person. I like the model the European Research Council is following in awarding its new fellowships. Half the points go to the person and half to the proposal. Grantees need not do the project exactly as they have proposed, which allows room to be creative.



Pioneer spirit. Cesarsky says young astronomers should be guided as much by original thinking as by scientific road maps.

can also stifle the creativity of young scientists by forcing them down well-worn research paths. She laid out her concerns this month at the IAU meeting in Rio de Janeiro, Brazil, and elaborated on the dangers of such "bandwagon effects" in a conversation with *Science*. Her remarks have been edited for clarity.

—YUDHIJIT BHATTACHARJEE

Q: Hasn't astronomy benefited from road maps and decadal plans?

C.C.: No doubt. By having a clear set of priorities and a clear rationale for them, we