Interdisciplinary work is a key part of computing, but it often demands that we drop old conceptions and learn to think as others do.

Only later did the group justify its choice of project by trying to connect synthetic biology to computer science. At the start, its leader, a young woman named Priya, used personal reasons to justify the decision. She claimed that the field would expose them to new ideas, teach them new concepts, and expand their abilities. She concluded that the project would probably take them “well outside of our comfort zone,” something that she thought was a good idea.

Of course, all scientific work is supposed to take you out of your comfort zone because it’s intended to uproot all the false ideas that you hold thanks to fashion, education, or mere conviction. Even if you hold the wrong idea for all the right reasons, you should be able to change your mind when you examine that idea with scientific processes.

Initially, I had believed that synthetic biology was a direct descendant of Frankenstein’s lab. As one who avoided biology, I thought it probably involved grave robbing, unpleasant chemicals, and lightning bolts from passing thunderstorms. I put that idea to rest with a quick review of the literature, which showed that synthetic biology was a branch of molecular biology that attempted to build systems with biological entities. As such, it seemed to be strongly influenced by electrical and mechanical engineering.

Only these researchers built systems using standard biological parts, such as strings of DNA, viruses, and proteins.

In the process of reviewing the literature, I concocted a second hypothesis. I reasoned that synthetic biology was indeed influenced by the ideas and methods of computer science. In fact, I found several articles that seemed to support this idea strongly: one described computing with living hardware; another a formal language for expressing synthetic biological systems; and a third, how to create a half-adder circuit with biological switches.

To me, the half-adder paper seemed to cement the connection between computer science and synthetic biology. The half-adder problem, which takes two single-digit numbers and adds them together, is a classic problem in computer science. It taught many young computer scientists their first lessons in logic.

As I explored synthetic biology, I never really left my own comfort zone. I looked for papers that dealt with information processing, and I mapped the basic ideas of the field to the concepts of symbolic logic. I ignored the biological concepts not only because I didn’t understand them but also because I felt that they weren’t important. The power of symbolism trumped the details of physical molecules.

However, those physical details—bimodular transcriptions, protease cleavage, DNA-binding domains—slowly undermined my confidence and seemed to undermine that of Priya’s group as well. The biology didn’t seem to be a perfect analogue to the logic. It needed to be carefully engineered to perform the functions of AND, OR, and NOT gates.

The final step out of my comfort zone came when I found a 20-year-old paper that reversed the flow of knowledge to synthetic biology, arguing that the new field had influenced engineering practice, not the other way around. Even computer science, its authors wrote, “shows the pervasive influence of this new paradigm.”

We step out of our comfort zones not just when we tackle some difficult problem but also when we try to take a different point of view. We don’t do this as much as we should, as computing is a diverse field that has absorbed the ideas from many activities. It’s far too comfortable to believe that everything else is just like computing, which makes it that much more surprising when you move to a community that believes it isn’t.

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