might address, or simply give us feedback. We would love to hear from you.

This month, just in time for the new year's introspection, we feature a piece written by Skip Garibaldi, the director of the Center for Communications Research, La Jolla, a division of the Institute for Defense Analyses. Skip was previously professor of mathematics at Emory University and associate director of the Institute for Pure & Applied Mathematics at UCLA. Skip considers what motivates us to do our work.

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Finding Your Reward

Skip Garibaldi

What is it about doing math that people find really rewarding? Don't answer too quickly. It's easy to get wrapped up in your current interests and lose sight of other opportunities.

Before we get down to business, let's get our terminology straight. Sometimes people conflate "math" with something like "things done by professors in a department of mathematics," but I mean something more inclusive. When I look at my colleagues in business, industry, and government or faculty in departments of computer science or engineering, for example, I see some people who are not only interested in equations or applications but also care deeply about theorems and proofs. I think they are "doing math." I mean math in that broader sense here.

So what are some of the things that people find rewarding about doing math? For some readers, the answer is simple: proving theorems or explaining exciting theorems to others are both pleasurable activities, and we should count ourselves lucky if someone is willing to pay us to do them. One of my friends does math for this reason; his aim is to prove theorems that he personally finds beautiful, and all other considerations, such as publication, are not just secondary but nearly irrelevant. There is an elemental appeal to this approach to mathematics.

There are also earthly rewards to the math life. For one, math can provide the admiration and respect of your peers, such as the prestige that comes with being a professor or receiving a prize. This is a completely normal motivation. (Recall the quote "Give me enough medals and I'll win

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you any war" or look at the reward structure in almost any modern video game.) Another, smaller-scale reward is that the math life can be remarkably flexible when compared with other scientific endeavors; you can prove a theorem at a beach or coffee shop, but it would be tough to do most laboratory work there.

Also, many people find a reward in seeing the effect of their work on others. In education, you might look to the human flourishing you encourage (borrowing the language of [2]) or the successes of your former students. In research, you may write an influential paper or help defend the nation.

Having an effect on others is easier if you work as part of a team. Professors working in pure mathematics may not think of a new theorem as having concrete real-world consequences like saving lives, but it happens all the time when the mathematician proving the theorem is connected with a team to convert it into a more effective medical test or a way to prevent a terrorist attack. I know someone whose goal is for his work to save 10,000 lives; such a challenging goal is more achievable as part of a team. And there can be joy and pride in being a part, even a nameless part, in a big endeavor [1].

It's worth trying to figure out which rewards speak to you. (I confess that I am inspired by all of the ones mentioned here.) Most of us are exposed to only a few of the possibilities in the natural course of our careers, so exploring your options might mean stepping outside your comfort zone, like taking a class in a neighboring subject or finding a project to work on with someone from a different discipline or taking an internship at a company or with the government. Figuring out what will be most fulfilling and getting to a place where that itch gets scratched usually requires planning and dedication. The first step is knowing what you want.

References

[1] de Botton A, *The Pleasures and Sorrows of Work*, Vintage Books, 2008.

[2] Su FE, Mathematics for human flourishing, *Amer. Math. Monthly*, June 2017, https://mathyawp.wordpress.com/2017/01/08/mathematics-for-human-flourishing/.

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Credits

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