

and develop your own identity. If you are close enough mathematically to collaborate, by default prioritize separate projects; this makes it harder for people to artificially decide that one of you is stronger if you are at the same mathematical level. There are obvious exceptions to this rule; I know at least one couple who owe their career success to an early joint paper in the *Annals*. For most of us, though, relying on publishing in the *Annals* is a risky strategy!

- **Don't overdetermine the problem.** Decide what your true priorities are and leave everything else at least theoretically open. You may not know your true priorities at the start, so stay flexible. Apply to jobs you're not sure about; you can decide if you get an offer. Don't rule out locations (and countries) unless you're actually sure that they are leave-academia-level deal breakers. This also applies to living apart for short periods of time. This used to be almost compulsory to solve a two-body problem. While this is almost no one's first choice, there is a silver lining in focusing 100 percent on math midweek, and it being clear when you're in math mode and when you're in non-math mode.
- **Money buys options.** It's standard advice to continue to live like a graduate student after graduation for as long as you can bear. When you are trying to solve a two-body problem, those extra savings can buy extra time to solve the problem—by, for example, letting one of you take unpaid leave to spend a semester at the other person's institution if you have jobs at different places. Knowing that you have this option reduces some of the stress of the situation.
- **Your story is yours to tell.** We don't yet live in a perfect world. Don't reveal that you have a two-body problem before you feel comfortable, even if you get conflicting advice on this point. There are very few situations in which it makes sense to mention it before you have an interview arranged.

Advice to Departments Looking to Hire

- **Don't rule out hiring one member of a couple.** If you have only one position, don't rule out people who you've heard have a two-body problem on the assumption that they won't come, even if you're worried that you'll lose the position if that happens. You don't know their long-term career strategy. Next year the other body may look much more attractive, and you may have a new dean and unexpectedly more positions. The person you hire instead may leave for completely unrelated reasons. Two-body problems disproportionately affect women in mathematics, so letting two-body status influence your hiring means hiring fewer women.
- **Remember that you have all the power.** This can be hard to remember when you're worried about not hiring at all that year. It is unreasonable to expect someone to reveal all their cards before you've made them an offer.

This is true even if you know that you are on a particular candidate's side; they have no way of knowing that they can trust you.

Advice for Mentors

- **Don't reveal information without consent.** See the comment above about not living in a perfect world. Do not mention two-body problems in your recommendation letters unless you've been explicitly asked to do so. This is true even if you think mentioning it makes the file stronger.

A Nonacademic Career Track and the Balance It Brings

Kelly B. Yancey

"Next to love, balance is the most important thing."

—John Wooden

Balance between career and the rest of life, a goal that is difficult to achieve, looks different for every person. My journey for balance started at the end of graduate school when my partner and I committed to "solving" our two-body problem.

In this article I outline the outcome of that commitment, specifically how I came to be a research staff member at the Center for Computing Sciences (CCS), working alongside my husband, and what my work-life balance looks like as I juggle two roles: an early-career mathematician working in industry and a new mom. I discuss strategies for solving the two-body problem outside academia and for returning to work after having a baby, and I'll discuss as well what I've learned in the process.

My Career Track and Two-Body Solution

Like many math couples, my husband and I met in graduate school; we married after our fourth year and went on the job market our fifth year. We made the decision that living apart was not for us and proceeded to apply to more than 120 postings each. I applied to academic positions exclusively, and he applied to a variety of mathematics research positions, mostly academic, but including the national labs, NSA, IDA, et cetera. In the end we were very fortunate in being able to solve our two-body problem, at least for the short term: he started as a (permanent) research staff member at the Center for Computing Sciences (CCS) in August 2013 at the same time that I became a postdoctoral researcher at the University of Maryland, College Park. As

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these locations are about 40 minutes apart, our two-body problem was temporarily delayed, for three years, until my postdoc ended.

We were very fortunate that the positions we accepted were great fits for each of us and exactly what we wanted. However, to get to that outcome we made many tough decisions; we turned down two other two-body solutions because they were not right for us, and I accepted my postdoc at UMD before my husband completed his interview at CCS. In the end they offered him a position, but we were committed to moving to the DC area before that with the idea that he would look for other research jobs within the Department of Defense if necessary.

Having an open mind about what it means to be a research mathematician has been crucial to our success in finding positions in the same area. There are many jobs where you can do research in mathematics and applied mathematics outside the university setting, but it helps to be flexible. The chances of being hired by government and industry greatly increase if you prepare ahead of time by participating in summer internships in graduate school or during a postdoc, by taking a few courses in data science or machine learning or statistics, and by learning to program. These are experiences that I wish I had engaged in during graduate school, but it's never too late. After the second year of my postdoc, I participated in SCAMP at CCS, as I explain below. As it turned out, this summer internship was incredibly important to my career.

SCAMP is a 10-week summer workshop, hosted by CCS every summer, where researchers tackle difficult problems in support of the National Security Agency's mission. I loved several things about this opportunity: the research environment, my collaborators, and the hard problems that needed to be solved. After the summer I applied for a permanent research staff member position at CCS. I was immediately offered a job, to start after my postdoc was completed.

This job offer left me and my husband in a great position; we had a permanent solution to our two-body problem that we were both excited about. However, I was not ready to give up on my dream of being a professor and wanted to try the job market one more time. I talked to CCS about this situation, and they were very supportive. The job offer that they gave me did not have an immediate deadline; I could let them know my decision in the spring. My husband and I agreed to apply to a small number of academic positions, around 25 each, that were our most ideal fits. I did not apply for a second research postdoc, as is common in mathematics these days, because we wanted to start a family and settle down in one location. In the end, we were not offered academic positions in the same area, and I accepted the offer from CCS in February 2016. Almost every week since working at CCS I find myself thinking back to this time and being grateful that things worked out the

way they did. I love my job, and I still maintain connections with my academic colleagues.

The timeline to apply for industry jobs is different from the timeline for academic positions. In particular, if you are interested in a position in government or a federally funded research and development center, like CCS, you should apply early. If your current position ends in August and you are applying to a posting that requires you to obtain a security clearance, then I recommend applying the summer before. Or, as mentioned previously, apply for a summer internship while you are still in graduate school or a postdoc. In general, remember to keep an open mind about the variety of positions available.

Early Career Balance: Coming Back to Work after Baby

Academia is known for having a flexible schedule; however, many, if not most, academics work in the evening and on the weekends. At CCS researchers are not expected to work beyond the 40-hour work week. Most of the research that we do is classified and has to be done on-site. That means that I have clear boundaries between work life and home life, so when I am home with my 2-year-old daughter, I am fully present; I do not feel guilty for not working, and I do not check my professional email. This imposed boundary helps me maintain balance between my work and my family.

When I started my new position as research staff member at CCS in August 2016, I was newly pregnant. My daughter was born in April 2017, and I took 12 weeks of maternity leave after her birth (8 weeks were paid leave from Short Term Disability, and 4 weeks were leave without pay). Returning to work 12 weeks after having a baby was difficult for me, but CCS was both supportive and flexible; CCS allows me and other new parents to work part-time while at the same time maintaining benefits. I worked 24 hours a week for the first year after I returned to work and currently work 30 hours a week. This schedule suits my family well and provides me the opportunity to pick up my daughter from daycare by 3:30 pm so that we can spend time together in the afternoon and make dinner. My husband worked 32 hours a week for the first 1.5 years after our daughter was born and now works 36 hours a week. This gives him time to do daycare drop-off in the mornings. We are lucky that we make enough money so that we can both work a reduced schedule and still live comfortably.

A supportive environment at work has also been key to my success. Upon first returning to work, I had a restricted schedule because of my working part-time and pumping milk for my baby during the day. My colleagues respected these time constraints and were very amenable to planning meetings for times when I was available. Also, my PTO (paid time off) is easy to schedule and can be planned at the last minute, which is especially important given how often babies get sick.

Once back at work after parental leave, managing your time there is vital, and in your early career in general, time management helps you be more efficient at work, which in turn contributes to balance. The first strategy that helped me after returning to work was knowing where I was going to focus my effort. Before I went on maternity leave, I finished a project with a few colleagues, and I planned to start a follow-on project after my return. Having a problem lined up that I already knew how to attack was helpful for me, because I was still trying to adjust to being a new mom and not getting very much sleep. Another strategy that I used was closing my door at work so that I could focus. Since I was working only part-time, my work time was very precious. I caught up with coworkers the first couple of weeks after returning from leave, and then I put my head down and worked. I learned to make the most of my work hours during the day by planning my time. I thought about short-term research goals, long-term research goals, talks that I planned to give, paper due dates, conferences scheduled, et cetera, and sectioned off certain dates in my calendar to accomplish these tasks. I still employ this strategy; I get accomplished in 6 hours what used to take me 8 hours at work. For example, I started a new project at the beginning of the year and knew it was going to take a concentrated effort. So in the fall when I was planning my calendar for the next 6 months, I blocked off the whole of January and February for this project. I allowed time for a handful of non-negotiable meetings, but otherwise I said no to working on other things during these months.

It's also extremely important to stay connected to the mathematics community during this time. For me, that meant continuing to speak at conferences and seminars in the academic world, as well as speaking about my work in the intelligence community. My husband and I traveled together, along with our daughter, to several conferences the first two years after she was born. Various family members would often travel with us to watch our daughter while we worked. It was important for me to talk to collaborators and harness the collective energy that we generated and apply that energy to new projects.

Going Forward

Work-life balance is not static; it is a dynamic process. I think Albert Einstein said it best: "It is the same with people as it is with riding a bike. Only when moving can one comfortably maintain one's balance." I still have many things to work on as I strive for a balanced life. Before working part-time, I used to take a walk or go to the gym on-site at CCS every day. I have not done this since returning to work after maternity leave. I plan to incorporate exercise back into my life, as it is essential to being my best self and best mathematician. Also, I plan to continue working 30 hours a week for the foreseeable future, which will allow me to be the parent that I want to be. This schedule, for example, will allow me to meet my daughter, after she starts school,

as she gets off the school bus. In making all these decisions, the goal is the same: to balance my time so that I can enjoy my family at home and make mathematical contributions that bring me pride.



Kelly B. Yancey

Credits

Author photo is courtesy of the author.

Congratulations! You Have Tenure! And Now What?

Jessica Sidman

In academia we talk a lot about issues that early-career mathematicians face, focusing on the support that people need navigating job applications and the tenure process. Those are both intense, high-stakes periods of time. We talk less about what happens after tenure, which usually is the longest period of an academic mathematician's career. However, I think that early-career folks making decisions about what kinds of jobs they want can benefit from knowing more about opportunities, expectations, and experiences post-tenure and that folks arriving at that moment can benefit from hearing voices of peers dealing with similar situations.

I invited four mathematicians—Rachelle DeCoste at Wheaton College (MA), Ravi Ramakrishna at Cornell, Will Traves at the US Naval Academy, and Julianna Tymoczko at Smith College—to talk about what life is like after tenure. Wheaton and Smith are both liberal arts colleges with small departments of 7 and 11, respectively. The math department at Cornell has roughly 40 faculty, and the department at the Naval Academy is even larger at 70.

I am extremely grateful to Rachelle, Ravi, Julianna, and Will for their time, candor, and advice. Please read on to hear what they had to say!

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