

Mathematician Chris McKinlay hacked OKCupid to find the woman of his dreams.

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How a Math Genius Hacked OkCupid to Find True Love

BY KEVIN ROULSEN

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Mathematician Chris McKinlay hacked OKCupid to find the girl of his dreams.  Emily Shur

Chris McKinlay was folded into a cramped fifth-floor cubicle in UCLA's math sciences building, lit by a single bulb and the glow from his monitor. It was 3 in the morning, the optimal time to squeeze cycles out of the supercomputer in Colorado that he was using for his PhD dissertation. (The subject: large-scale data processing and parallel numerical methods.) While the computer chugged, he clicked open a second window to check his OkCupid inbox.

McKinlay, a lanky 35-year-old with tousled hair, was one of about 40 million Americans looking for romance through websites like Match.com, J-Date, and e-Harmony, and he'd been searching in vain since his last breakup nine months earlier. He'd sent dozens of cutesy introductory messages to women touted as potential matches by OkCupid's algorithms. Most were ignored; he'd gone on a total of six first dates.

On that early morning in June 2012, his compiler crunching out machine code in one window, his forlorn dating profile sitting idle in the other, it dawned on him that he was

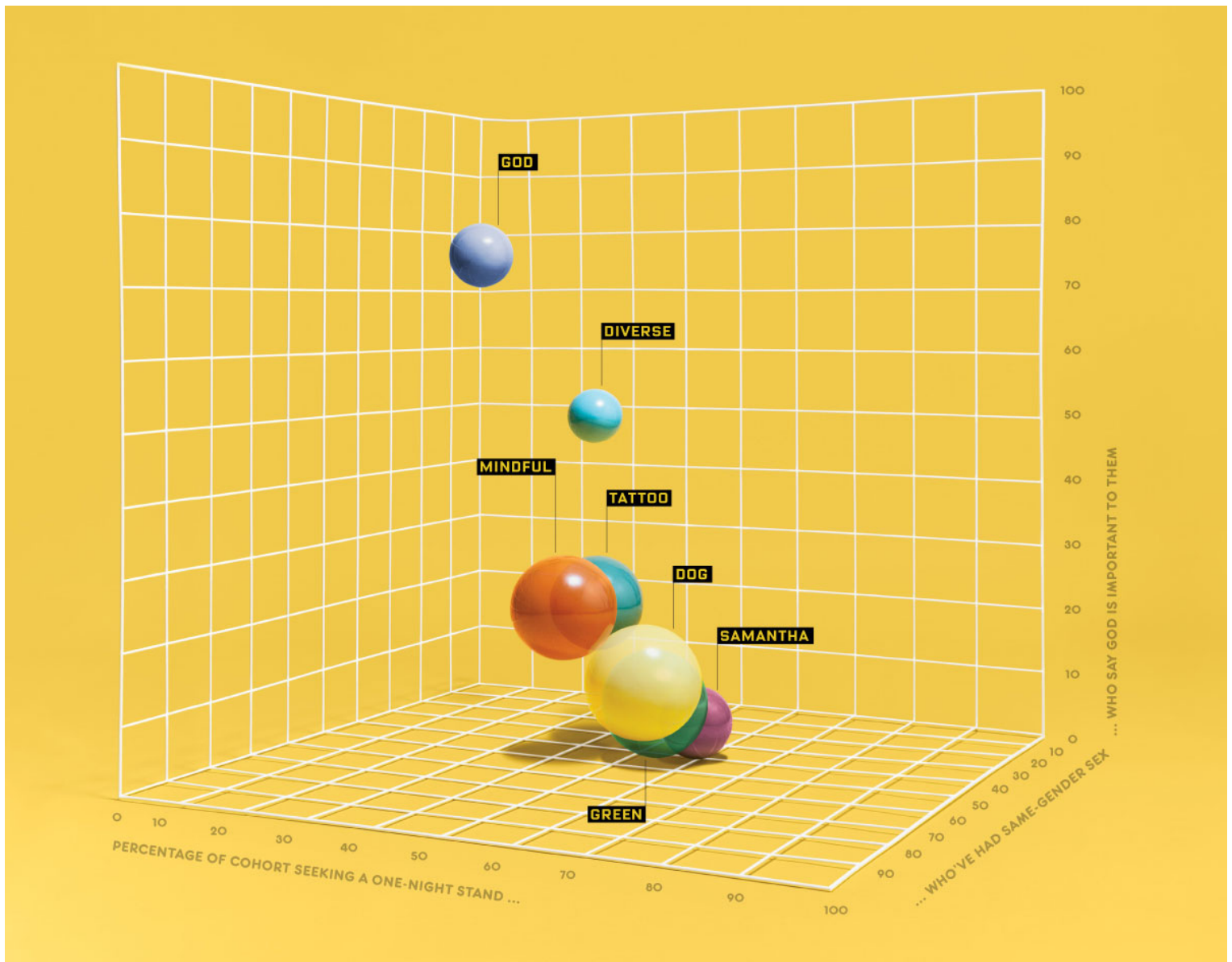
doing it wrong. He'd been approaching online matchmaking like any other user. Instead, he realized, he should be dating like a mathematician.

OkCupid was founded by Harvard math majors in 2004, and it first caught daters' attention because of its computational approach to matchmaking. Members answer droves of multiple-choice survey questions on everything from politics, religion, and family to love, sex, and smartphones.

On average, respondents select 350 questions from a pool of thousands—"Which of the following is most likely to draw you to a movie?" or "How important is religion/God in your life?" For each, the user records an answer, specifies which responses they'd find acceptable in a mate, and rates how important the question is to them on a five-point scale from "irrelevant" to "mandatory." OkCupid's matching engine uses that data to calculate a couple's compatibility. The closer to 100 percent—mathematical soul mate—the better.

But mathematically, McKinlay's compatibility with women in Los Angeles was abysmal. OkCupid's algorithms use only the questions that both potential matches decide to answer, and the match questions McKinlay had chosen—more or less at random—had proven unpopular. When he scrolled through his matches, fewer than 100 women would appear above the 90 percent compatibility mark. And that was in a city containing some 2 million women (approximately 80,000 of them on OkCupid). On a site where compatibility equals visibility, he was practically a ghost.

He realized he'd have to boost that number. If, through statistical sampling, McKinlay could ascertain which questions mattered to the kind of women he liked, he could construct a new profile that honestly answered those questions and ignored the rest. He could match every woman in LA who might be right for him, and none that weren't.



Chris McKinlay used Python scripts to riffle through hundreds of OkCupid survey questions. He then sorted female daters into seven clusters, like “Diverse” and “Mindful,” each with distinct characteristics. 📷 Mauricio Alejo

Even for a mathematician, McKinlay is unusual. Raised in a Boston suburb, he graduated from Middlebury College in 2001 with a degree in Chinese. In August of that year he took a part-time job in New York translating Chinese into English for a company on the 91st floor of the north tower of the World Trade Center. The towers fell five weeks later. (McKinlay wasn’t due at the office until 2 o’clock that day. He was asleep when the first plane hit the north tower at 8:46 am.) “After that I asked myself what I really wanted to be doing,” he says. A

friend at Columbia recruited him into an offshoot of MIT's famed professional blackjack team, and he spent the next few years bouncing between New York and Las Vegas, counting cards and earning up to \$60,000 a year.

The experience kindled his interest in applied math, ultimately inspiring him to earn a master's and then a PhD in the field. "They were capable of using mathematics in lots of different situations," he says. "They could see some new game—like Three Card Pai Gow Poker—then go home, write some code, and come up with a strategy to beat it."

Now he'd do the same for love. First he'd need data. While his dissertation work continued to run on the side, he set up 12 fake OkCupid accounts and wrote a Python script to manage them. The script would search his target demographic (heterosexual and bisexual women between the ages of 25 and 45), visit their pages, and scrape their profiles for every scrap of available information: ethnicity, height, smoker or nonsmoker, astrological sign—"all that crap," he says.

To find the survey answers, he had to do a bit of extra sleuthing. OkCupid lets users see the responses of others, but only to questions they've answered themselves. McKinlay set up his bots to simply answer each question randomly—he wasn't using the dummy profiles to attract any of the women, so the answers didn't matter—then scooped the women's answers into a database.

McKinlay watched with satisfaction as his bots purred along. Then, after about a thousand profiles were collected, he hit his first roadblock. OkCupid has a system in place to prevent exactly this kind of data harvesting: It can spot rapid-fire use easily. One by one, his bots started getting banned.

He would have to train them to act human.

He turned to his friend Sam Torrisi, a neuroscientist who'd recently taught McKinlay music theory in exchange for advanced math lessons. Torrisi was also on OkCupid, and he agreed to install spyware on his computer to monitor his use of the site. With the data in hand, McKinlay programmed his bots to simulate Torrisi's click-rates and typing speed. He brought in a second computer from home and plugged it into the math department's

broadband line so it could run uninterrupted 24 hours a day.

After three weeks he'd harvested 6 million questions and answers from 20,000 women all over the country. McKinlay's dissertation was relegated to a side project as he dove into the data. He was already sleeping in his cubicle most nights. Now he gave up his apartment entirely and moved into the dingy beige cell, laying a thin mattress across his desk when it was time to sleep.

For McKinlay's plan to work, he'd have to find a pattern in the survey data—a way to roughly group the women according to their similarities. The breakthrough came when he coded up a modified Bell Labs algorithm called K-Modes. First used in 1998 to analyze diseased soybean crops, it takes categorical data and clumps it like the colored wax swimming in a Lava Lamp. With some fine-tuning he could adjust the viscosity of the results, thinning it into a slick or coagulating it into a single, solid glob.

He played with the dial and found a natural resting point where the 20,000 women clumped into seven statistically distinct clusters based on their questions and answers. "I was ecstatic," he says. "That was the high point of June."

He retasked his bots to gather another sample: 5,000 women in Los Angeles and San Francisco who'd logged on to OkCupid in the past month. Another pass through K-Modes confirmed that they clustered in a similar way. His statistical sampling had worked.

Now he just had to decide which cluster best suited him. He checked out some profiles from each. One cluster was too young, two were too old, another was too Christian. But he lingered over a cluster dominated by women in their mid-twenties who looked like indie types, musicians and artists. This was the golden cluster. The haystack in which he'd find his needle. Somewhere within, he'd find true love.

Actually, a neighboring cluster looked pretty cool too—slightly older women who held professional creative jobs, like editors and designers. He decided to go for both. He'd set up two profiles and optimize one for the A group and one for the B group.

He text-mined the two clusters to learn what interested them; teaching turned out to be a

popular topic, so he wrote a bio that emphasized his work as a math professor. The important part, though, would be the survey. He picked out the 500 questions that were most popular with both clusters. He'd already decided he would fill out his answers honestly—he didn't want to build his future relationship on a foundation of computer-generated lies. But he'd let his computer figure out how much importance to assign each question, using a machine-learning algorithm called adaptive boosting to derive the best weightings.

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Read This Before Zapping Your Brain



China: "Stop Looking in Our Underwear!"



Paul Walker Was Wrong To Date A 16-Year Old...And I Know That From Experience

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Tueksta · a day ago

Maybe the gist of this article is, that when you go with 88 people on a date, there's probably the one among them? Or perhaps rather that dating sites should analyze their data better, care about clusters and optimize for that. In germany there's a study that identified 9 clusters by raw data analysis: <http://www.sinus-institut.de/u...> that would be an interesting clusterbased matchmaking

approach, too.

122 ^ | v · Reply · Share ›



WantonWonton → Tueksta · 11 hours ago

To be fair, without massaging his profile, he wouldn't've been able to get those 88 dates.

64 ^ | v · Reply · Share ›



jacklaughing → WantonWonton · an hour ago

To be fair, he was always stuck behind the biases in OKCupid's system to begin with. While it was likely beneficial to have the question/answer data to mine from, OKCupid's system is obviously very poor if it couldn't initially match him with more than 100 women when there apparently were 1000's of potential matches.

1 ^ | v · Reply · Share ›



DH Aryn Diaz → Tueksta · a day ago

Thanks for the link you posted, I'm going to check it out. I met mine the old-fashioned way, though -- friend of a friend when I wasn't even looking.

14 ^ | v · Reply · Share ›



VicB3 → Tueksta · 7 hours ago

Of course, he could have simply bagged the whole (probably agoraphobic) dating website thing, forced himself out of his dark cubicle, hung out at the beach, the bars, the gym or something, and met a lot of real girls.

Socializing and dating is nowhere near complicated as he thinks it is.

Just saying....

Just a thought.

VicB3

13 ^ | 4 v · Reply · Share ›



Matt → VicB3 · 6 hours ago

I get what you are saying and if you have a good personality and are out going and good looking. Yeah it can be very easy to meet girls all over the place. But that wasn't the point of what he was looking for he didn't want a date he wanted to find his soul-mate. That is a totally different thing to be searching for. When you are wanting to enter a life long relationship and with 1/2 of marriages ending in divorce. I get why he did what he did he wanted to find someone he can spend the rest of his life with and be happy. Also not everyone has the same level of charm or charisma. We all have our talents and gifts. and his was in math. and

props to him for finding someone he's a great match with. No dating isn't as complicated as he made it out, but I bet this was the most simple way for him to do it.

31 ^ | v • Reply • Share ›



VicB3 → Matt • 6 hours ago

Charm and charisma - confidence in other words - like most things come with practice, something that won't happen if you avoid public places. And being a numbers guy who's good with figuring the odds - the divorce rate in L.A. is something more like 70% if you factor in couples who cohabitate for short periods of time - why he'd want to tempt personal disaster with marriage only goes to show that emotions and insecurity can override facts.

Kudos to him for cracking and gaming the system; he obviously has a talent for it. Given that, perhaps he'd be better served by focusing on his career and monetizing it to his benefit.* And with that, he'd discover that money and success are the biggest aphrodisiacs of all.

"Az men hot gelt, iz men i klug, i sheyn, i men ken gut zingen."

With money in your pocket, you are wise and you are handsome and you sing well, too - Yiddish Proverb, often shortened to "money makes you handsome and smart."

Just a thought.

VicB3

*No doubt he's already received, or will shortly receive, several lucrative offers from brokerage houses with HST operations; he's exactly what they look for, so his future prosperity is assured.

5 ^ | 2 v • Reply • Share ›



Target_Blondie → VicB3 • 5 hours ago

That's a bit cynical, don't you think? The dude wasn't looking just for sex, it sounded like he was looking for an actual relationship and used his particular skillset to his advantage to find it through an online dating website. And after numerous dates he finally someone he connected with and now has the relationship he was looking for. That sounds pretty successful to me. Why would he need to spin that into a lucrative side career if he's found what he was looking for?

6 ^ | v • Reply • Share ›



Rolande Deschaine → VicB3 · 2 hours ago

Nope. Charm and Charisma are NOT confidence and no amount of confidence will make you charming.

Some people "think" they are charming when in the end they are annoying and off-putting. I know a few people who have tons of confidence and to be quite honest I can only take small amounts of exposure to them.

Not surprisingly they are both single 25 odd years past college.

Also although charm can be learned charisma is NOT a teachable skill. You either are or your not.

Your statement is an oversimplification that leaves out the socially awkward who can be extremely charming, once someone gets to know them.

3 ^ | v · Reply · Share ›



P Eugene Manning → VicB3 · 4 hours ago

So much win in this post. Thank you, sir.

1 ^ | 2 v · Reply · Share ›



Trisha Lynn → VicB3 · 6 hours ago

Yeah, but I think I dig his approach because he knew he had two types of people he was interested and it's so difficult to tell at a glance whether or not one person at the beach fits those categories. This way, he was guaranteed to know that they met at least the minimum qualifications and he had a lot of data to go off of.

2 ^ | v · Reply · Share ›



DOSboot → Tueksta · 4 hours ago

Good point, but I think they're fine with not analyzing optimally - they've a vested interest in drawing out a matching as long as possible. Monthly subscriptions and all.

4 ^ | v · Reply · Share ›



Ben Hain · a day ago

And then he was hired by OkCupid to work full time.

105 ^ | v · Reply · Share ›



Joeyjoejoeshabadoo → Ben Hain · an hour ago

This is going to be turned into a RomCom... I can feel it

You've got mail, 2014 edition

2 ^ | v · Reply · Share ›



Guest · a day ago

He wrote a book about how to use OKC called Optimal Cupid

<http://www.amazon.com/dp/B00HY...>

57 ^ | 1 v · Reply · Share ›



Graham Freeman → Guest · 21 hours ago

Thanks for that link Ms Wang. I was wondering if all this was marketing for something, as he led up to a relationship with someone called Ms Wang.

18 ^ | 1 v · Reply · Share ›



xared → Graham Freeman · 18 hours ago

There could be more than one Ms Wang in the world dont you think? ;)

10 ^ | v · Reply · Share ›



Daniel Richards → xared · 4 hours ago

Bit cheeky, but you can actually click through to her facebook profile, and she lives in Qatar - so I'd think it's highly likely it is her.

4 ^ | v · Reply · Share ›



punstress → xared · 17 hours ago

Same first name, too. There could be infinitely many Christine Wangs who know he wrote a book, though. ;-)

4 ^ | v · Reply · Share ›



Qverk → punstress · 11 hours ago

There are Wangs all over the world. *Snicker*

15 ^ | v · Reply · Share ›



disqus_MTPj0XYmZw → punstress · 8 hours ago

Not really *infinitely* many, don't you think? (Sorry, but we just read a math article)

4 ^ | v · Reply · Share ›



Ahmed Sayid → Graham Freeman · 7 hours ago

so he wrote a book and he/she/they are promoting it. Hardly a sin

4 ^ | v · Reply · Share ›



Graham Freeman → Ahmed Sayid · 7 hours ago



So wired published what is in effect an advertisement for someone's book. Yeah, that's not in the 'reputable journalism' handbook.

7 ^ | 1 v · Reply · Share ›



Ian Taylor → Graham Freeman · 6 hours ago

Wired isn't promoting the book. The article doesn't mention the book. Only the comments section does...

11 ^ | v · Reply · Share ›



Graham Freeman → Ian Taylor · 6 hours ago

The article includes a link to his site, where the very first words are: "Projects-I published a short book discussing how to the implement the techniques I used here".

5 ^ | v · Reply · Share ›



Dogen83 → Graham Freeman · 5 hours ago

I don't know... Wired never mentions the book. It was brought up in the comments and on his own site (which seems natural). Is it weird that Wired linked to his site in an article about him? Not to me. So maybe McKinlay and Wang are making it promotional, but it doesn't seem like that's Wired's fault.

6 ^ | v · Reply · Share ›



Ian Taylor → Graham Freeman · 5 hours ago

How many sites does Wired link to in a day? How many of those sites have some sort of commerce or 'buy my thing' element? Are the articles containing those links all just advertisements? If they are, and you find the practice so detestable, why do you visit Wired?

5 ^ | v · Reply · Share ›



Graham Freeman → Ian Taylor · 5 hours ago

Why do you care enough to comment on my wired reading habits? Why are you putting words into my mouth? Why didn't you go for a fifth question there?

2 ^ | v · Reply · Share ›



Ahmed Sayid → Graham Freeman · 6 hours ago

and what do you have to say about every apple fart that is getting published? Or every tech company that gets an article here? how is that different? At lease this story has a happy ending (so far) and its interesting on how this individual used his math skills to tackle the problem of love.

1 ^ | v • Reply • Share ›



Mogeek • a day ago

I wonder if the fact that he slept in his cubicle turned some women off and ruined his chance for a second/third date...

82 ^ | 3 v • Reply • Share ›



Nyarlathotep → Mogeek • a day ago

I know. Some women can't handle a guy that devoted to ensuring his (and her) livelihood.

45 ^ | 5 v • Reply • Share ›



Mogeek → Nyarlathotep • a day ago

Nope - most women would like to think they're meeting a guy who will have time for them. Makes you wonder when he lives at work. LIMH

49 ^ | 2 v • Reply • Share ›



jc → Mogeek • 20 hours ago

It's called the life of a grad student.

67 ^ | 1 v • Reply • Share ›



Jericho Cain → Mogeek • 7 hours ago

I see you are unfamiliar with the life of a science/math grad student?

8 ^ | v • Reply • Share ›



Black Poison Soul → Mogeek • 3 hours ago

Interesting that you instantly thought: "This guy has no time for a woman." Well chickie, you find the one you want and then you stop floating around on OkCupid. You also then have time for a whole lotta something with her. It escaped you that this is what he did.

Your automatic assumption is amusing: "at this point he is sleeping in his cubical" = "he will forever and ever be sleeping in his cubical" = illogical fallacy. This shows a mentality of: "It is raining today, therefore it will be raining every day forever more." You need a serious reality-check girl.

Thanks for the in-depth look into your self-centered soul and lack of common-sense thinking. Also your basic cynicism and nihilism and mentality of trash-talking people who succeed. Your tall-poppy syndrome is running at 1000%, keep it up.

Overall it appears that your moniker is a lie, there's no thought or mindfulness here. I doubt that you would make it to first-base with any halfway thoughtful man

halfway-thoughtful man.

2 ^ | 2 v · Reply · Share ›



jacklaughing → Black Poison Soul · an hour ago

Way to be a jerk and make a lot of broad assumptions about someone based on one comment. Maybe she's the sort of person who doesn't want to date someone who lives in a cubicle? Dating is hard when only one person can do the hosting of a sleepover, dinner, etc.

1 ^ | v · Reply · Share ›



Yeni Sleidi → Black Poison Soul · an hour ago

Well, it appears that your moniker is true: you're a black poisoned soul.

You need to chill out.

^ | v · Reply · Share ›



Yeni Sleidi → Nyarlathotep · 2 hours ago

Women don't need a guy to ensure their livelihood. In case you didn't know, it's 2014 and we're quite self-sufficient. People want companionship, and it's reasonable for someone to be a little weary of dating a person who spends a significant amount of their time in a cubicle. Yeah, that's the life of a grad student, but it's not a very compatible lifestyle with those who've completed their education.

2 ^ | v · Reply · Share ›



anthonydoan → Mogeek · 14 hours ago

That's what most graduate student go through especially Phd ones.

8 ^ | v · Reply · Share ›



Mogeek → anthonydoan · 8 hours ago

I didn't realize. Seems like a rough time to try & date / find true love. That's some dedication.

6 ^ | v · Reply · Share ›



musterion → Mogeek · 6 hours ago

In some cases, your Ph.D. advisor will advise to wait until you are done before you go looking for a mate. They don't want you to be distracted whilst you are slave labor.

4 ^ | v · Reply · Share ›



Jericho Cain → Mogeek · 7 hours ago



I got married while in graduate school. My time was divided between my work and my SO.

1 ^ | v · Reply · Share ›



Dogen83 → anthonydoan · 6 hours ago

I'm glad I picked medicine instead of math! I've never slept in an office.

1 ^ | v · Reply · Share ›



P Eugene Manning → Mogeek · 21 hours ago

What does where you sleep have to do with your worth as a person or a lover? Why do women complain about everything?

38 ^ | 10 v · Reply · Share ›



Mogeek → P Eugene Manning · 19 hours ago

It was the lack of a home that I would think women might find unappealing. I think that's a legitimate concern. Are you saying you'd be totally cool dating a woman who gave up her apt to work all hours & sleep in her cube? I actually think he sounds like a cool guy but that part would concern me.

45 ^ | 1 v · Reply · Share ›



xared → Mogeek · 18 hours ago

He had an apartment as mentioned. He just preferred sleeping off in the department later as that allowed him to work late on his quest.

11 ^ | 3 v · Reply · Share ›



Mogeek → xared · 8 hours ago

Actually he gave up his apt during the project: "He was already sleeping in his cubicle most nights. Now he gave up his apartment entirely and moved into the dingy beige cell, laying a thin mattress across his desk when it was time to sleep."

I admit I'm a lowly BA grad and had no idea this was the life of a grad/PhD student.

16 ^ | v · Reply · Share ›



disqus_MTPj0XYmZw → Mogeek · 8 hours ago

I don't think they mean 'gave up' as in sold/stopped leasing. It's probably meant as 'rarely ever went there to sleep'

6 ^ | v · Reply · Share ›



xared → Mogeek · 8 hours ago

As disqus MTPi0XYmZw said, he probably just gave up sleeping in his

apartment, and moved his bed to the cell.

4 ^ | v • Reply • Share ›



Rob De → Mogeek • 7 hours ago

I must say that I agree with your assessment. However, if this couple are a happy couple then I assume the end justifies the means.

2 ^ | v • Reply • Share ›

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