

Ergoregion

Two newlyweds with long faces entered George's office. Without letting so much as a smile escape, George beckoned the two to the couch facing the office chair he was sitting on.

"What can I do for you guys today?" George asked in a gruff voice.

The two newlyweds looked at each other a bit anxiously. George was used to this. When most people signed up for couple's therapy, they were expecting their therapist to look a bit... well... different than George.

"Uhm..." the wife started, as she looked back and forth between her husband and the therapist. "We feel like our relationship lost some of its spark. When we first met, Chad gave me these elaborate romantic gestures, and that was how I fell in love with him."

"Of course," George said bluntly. "What do you think has changed?"

"Work," Chad jumped in. "Now I have a full-time job and everything, I feel like I don't have as much time to plan out these gestures for Samantha. I work like sixty-hour weeks, and when I get home, I'm exhausted."

"Makes sense," George said, stroking his goatee. "And what do you think you guys can do differently to fix that?"

"I mean I understand and appreciate all the work that he's doing," Samantha replied. "But I wish that he would have a little more time with me. A little more time to just relax and enjoy life."

"Well, lucky for you guys," George chuckled, "this is by no means a new problem for newly-weds. From my experience, most couples already know the solution, and they more come to therapy for me to confirm the solution that you already know. So, Chad, how do you think you can fix this problem?"

"Well, I can't take off work," Chad said defensively. He looked to George and then his wife and neither said anything. George smiled as he slowly noticed Chad loosening up a bit. George remained silent waiting for Chad to let his guard down. That was always his trick, and that's why George was considered the best therapist in his small town.

"I guess..." Chad sighed. "I guess I can be a little more present when I am home. I guess I can try to be a little less grumpy and..."

"See," George smiled. "You already knew the answer. You both did. And Samantha, what can you do differently?"

"I guess I could show him a bit more appreciation," Samantha sighed. "He works hard for us, and I guess I take him for granted sometimes."

"And there, you guys have it!" George said, leaning back in his chair.

"That's it?" they asked together.

"Yeah, you guys already knew the answers," George said. "So same time next week?"

"Huh?" Chad said. "I thought you said we already knew the answers."

"You do," George responded. "My job is to remind you every week that you know the answers until it sticks."

"So, we..." Samantha started.

"No, it's not going to be an easy fix," George said. "Nothing in life is. You guys are going to try out these new things, and they'll work better but not perfectly. Next week, there is likely going to be some new problem, and you'll be back here. That's what I'm here for."

"Well thanks," Samantha said. "We appreciate it."

The newly-weds left the therapy session holding hands. George smiled. He packed up his briefcase, locked up his office, and walked back to his car to go home.

"What are you doing home so early?" his wife said, smiling at him.

George wrapped his arms around her. Her hair was completely gone from her head, yet George still saw her as beautiful. They were never the super romantic couple, but they always enjoyed each other's company.

"It was a light day today," George said.

"I'm surprised you're still working at all," she rolled her eyes. "You're sixty-six, you have more than enough saved for retirement, yet you go in to work everyday to give the same advice to couples over and over again."

"What about you, Martha?" George laughed. "You're sixty-five and still working."

"My work is different and important," Martha said. "If we don't come up with a solution to climate change soon, our whole planet is going to be uninhabitable."

"Well have you at least made any progress on it?" George asked.

"No," Martha sighed. "Everything renewable is just unreliable. Nuclear energy doesn't pollute that much but one accident and the areas become uninhabitable for centuries. Solar panels rely on the sun being out. Windmills rely on the wind. And even if they were reliable, there is so much politics that goes on with everything."

“So, there’s nothing that is both renewable and reliable?” George asked.

“There’s one,” Martha said. “It’s completely infeasible right now. That was the one we were talking about today, but I don’t fully understand it yet.”

“And what was that?”

“The ergoregion of a Kerr Black Hole,” she replied. “Somehow, we can get energy from that.”

“A what?”

“A Kerr Black Hole is a black hole that is rotating,” Martha explained. “And the ergoregion is a spot similar to the event horizon.”

“I don’t know what that is either.”

“Every black hole has an event horizon,” Martha said. “It’s an area surrounding the black hole that once you go in, you can never escape. Now a rotating black hole has another region around the event horizon known as the ergoregion. In the ergoregion, objects can still escape but they have to orbit the black hole in the same direction that the black hole is spinning.”

“Interesting,” George replied. “Now how does this fix our energy crisis?”

“Not sure yet,” Martha said. “They said they were explaining it tomorrow.”

“Okay,” George said smiling at her. “Just don’t work too hard because... well... you know.”

“I know what?”

“You know what I’m talking about.”

“Say it George,” Martha said. “Just say it.”

“Doctor says you have less than a year left before the cancer wins,” George sighed. “So just enjoy life while you can.”

Martha looked at him and put her coffee cup down. A single tear fell from her left eye. George just sat there in silence staring at her, trying to figure out what he should have said instead. He came up with nothing.

The married couple that walked in the next day was much older. They appeared to be in their late forties at least, which seemed to be the most challenging age for George. When they walked in, they weren’t as surprised to see George as the newly-weds were.

“Come on in,” George said. “Have a seat.”

"I'm Bob, and this is my wife Mary," the man announced as the two took a seat.

"George," he said shaking their hands. "So how can I help you guys?"

"It's about our son," Mary started. "He's graduating high school soon, and we're just..."

"He wants to major in creative writing," Bob cut in. "And I think he is talented, but I want to make sure he is setting himself up to make a good living."

George took a sip of his coffee as he let the man finish. This was tricky as he predicted. With the newly-weds, there were only two people involved. Now, there were three and a lot more was at stake.

"So, what do you think he should do?" George asked.

"I want him to do something more practical like engineering," Bob answered. "Or anything else that would give him a good paying job."

"See that's where we disagree," Mary jumped in. "I majored in theatre in college and I still found a job. Granted, it wasn't in theatre, but I found a job that I liked and still made good money with."

"But you're also not the primary income earner," Bob blurted out.

"Ah," George said, as he took another sip of his coffee. "So there lies the real problem. It has nothing to do with your son. Bob, you're an engineer, yes?"

"Correct."

"And Mary?"

"I just work as a receptionist for now, but..."

"There we go," George interrupted. "So, Bob, you want your son to have a stable job just as you did. And you don't want him to have a job like Mary because that is not enough for the primary income."

"Well, uhm..."

"Say it," George said. "We are all being honest year."

"Yes," Bob said. "I'm sorry, honey. I appreciate the work you do as well, but we wouldn't be able to afford the house we live in if not for my income."

Mary first appeared hurt. She took a deep breath and looked her husband in the eyes. But she wasn't upset with him. She was upset with the reality of the situation.

"Let me ask you, Bob," George said. "What made you fall in love with Mary?"

“Well, uhm...” Bob looked to Mary, slightly embarrassed before looking back to George. “She was always spontaneous. She had a creative mind and she was always coming up with stories. It was just something I could never do myself, so I always appreciated it about her.”

“Interesting,” I said. “So, in a way, do you feel like your son has that same creativity about him? You said he likes creative writing.”

“Yes,” Bob admitted. “He’s very creative. I guess, a little like... a little like his mom.”

George remained silent for a second while the older couple shared a glance. He had cracked the code again.

“Perhaps this is a gender thing, but perhaps not,” George said. “But, Bob, it appears you’ve always wanted your son to be just like you, and you’re a little disappointed that he is more like his mother instead. Now you’re disguising it as a concern about income and quality of life, but you know in this country, as bright as your son probably is, he’s bound to find a job somewhere.”

“Maybe you’re...”

“And Mary,” George cut off Bob before he could finish. “Your husband’s concerns are still real. You know yourself that you didn’t get a job in theatre. Any career in the arts like that is always hit or miss. You have to make sure that your son knows the challenges he is about to face.”

“Yeah, I guess you’re...”

“He’s in high school and going to be an adult soon,” George said. “The last thing you want to keep doing is making his decisions for him. So, give him time and give him space. Inform him of the way the world works, but don’t make his decision for him. Bob, if he doesn’t want to do engineering then don’t push him into that track. College engineering drops outs are so high, it’s borderline cliché. Mary, make him aware of the struggle to find a job in the arts. But in the end, you’re both going to have to back off and let him make his own decision.”

“I agree,” Mary said instantly. She turned to Bob and waited for him to respond.

“I agree as well,” Bob said.

“Good,” George said, shutting his notebook. “So same time next week?”

“Huh?” Bob said. “I thought you just gave us the solution.”

George chuckled as he looked to the ground. If there was one thing, he was tired of saying during his career, it was this line. But he knew how important it was, so he said it anyway.

"No, it's not going to be an easy fix," George said. "Nothing in life is. Letting go, of all things, is going to be one of the hardest. But it is necessary. This week, you're going to try to let go, but you're going to fail. And you're going to come back here so I can tell you the same thing again and again until it sticks. That's what I'm here for."

The couple nodded as they slowly left his office. George packed up his stuff to head home and see his wife. As he opened his garage door, he heard his wife coughing violently.

"Martha?" he said in panic, rushing over.

"I'm..." she said whilst still coughing. "I'm fine, George."

"You sound..." George tried carefully to choose his words, "horrible."

"I feel horrible," Martha responded. "I almost left work early."

"You still went in to work today?" George said annoyed. "Martha, the doctor was very clear. If you're not feeling well, you need to rest."

"Cancer is not contagious," Martha argued. "I wasn't hurting anyone else."

"You're hurting yourself," George argued. "You're hurting yourself by over-exerting. Martha, you need to rest."

"I need to work," Martha argued. "I've been working on this my whole life, and we're finally making some sort of breakthrough."

"What breakthrough?" George asked. "You still working on that ergo... thingy?"

"The ergoregion of a Kerr Black Hole," Martha corrected him. "We discussed the method today, and it seems... seems like a good idea."

"Oh," George said, a bit surprised. "That's pretty cool. You wanna tell me about it?"

"Of course, I do," Martha said.

She gave him the smile that he loved the most. She sat up in her cushioned chair as he sat in the rocking chair next to her. George knew how far-fetched this whole ergoregion idea was, but he knew if she believed in it, she would be happy.

"So, if an object is inside the ergoregion of a Kerr Black Hole," Martha started, "then the object has to revolve around the black hole in the same direction as the black hole's angular momentum."

“Okay,” George nodded. “I think that’s what you told me yesterday.”

“Now, apparently,” Martha started, letting out a giant smile, “if you throw an object into the Kerr Black Hole with a very specific set of initial conditions, including velocity and angular momentum, the object-black hole system will actually release energy.”

“Wait, what?” George said, as he leaned forwards in his rocking chair. “That doesn’t even make sense. Where is that energy coming from?”

“Energy is still conserved,” Martha explained. “When you throw the object in with those initial conditions, it’ll actually slow down the rotation of the black hole. So, the black hole loses energy and the person throwing the object receives it. Kerr Black Holes have plenty of angular momentum, so we can do this almost indefinitely before it simply stops spinning. Completely reliable. Don’t have to worry about the weather or anything else. The Kerr Black Hole will always be there.”

“So basically,” George said, stroking his goatee. “Someone can get energy from one of the darkest objects in the universe simply by reducing the amount that it spins?”

“Yes,” Martha said. “Isn’t that beautiful?”

“But where is the nearest Kerr Black Hole?” George asked.

“We don’t know,” Martha sighed. “We’re still trying to find that. I probably... I probably won’t be around for that.”

Another tear fell from her eye, and George used his thumb to wipe it off. After his career as a therapist, he still couldn’t figure out how to make her feel better. Perhaps because this was the one time, he too, had something at stake.

“You ever wish we had children?” George asked, trying to change the subject.

“Sometimes,” Martha responded. “But we were always too busy with work to probably give them the life they deserved. Why the sudden interest?”

“Just saw a couple in therapy with kids,” George said. “I feel like we could have made it work.”

“We could have made anything work,” Martha said, smiling at him. “It just was never our priority.”

“If I could go back and do everything again,” George pondered. “Maybe I would have tried to have kids.”

“Maybe we should have,” Martha agreed. “But I guess it’s too late... it’s too late for that now.”

As she said that, she couldn’t hold it in any longer. She started sobbing. George stood up from his rocking chair and shared her chair with her. He put his arms around her and cuddled her until she fell asleep.

He had had to carry her to their bed the previous night, which made him even more surprised that he didn’t see her next to him when he awoke. She still had that ambition to work, even with her days numbered. George admired it and hated it at the same time.

He lay in bed for a while until it was time for him to go to work. He called his wife on the car ride over, but she didn’t respond. He thought about going to see her, but he was alright late for his job.

“What can I do for you?” George said to today’s couple.

This couple was older, and both had grey hair. This couple seemed perfectly fine seeing George as their therapist. George smiled as he figured out the issue the couple had before they even had a chance to explain.

“I’m Eliza and this is my husband Frank,” the wife introduced. “We don’t as much need couple’s therapy more so than retirement therapy.”

“We’re both sixty-six and have been retired a year,” Frank said. “And I guess... I guess I always pictured retirement as more fun than this. I feel like we both feel just...”

“Empty?” George finished his statement.

“Yes,” Eliza said. “How do we...”

“The grass is always greener,” George chuckled. “You see, when you’re working, you spent all your time waking up wishing you didn’t have to go to work. Each morning when your alarm rang, the first thought that came to your head is counting the days until retirement.”

“But now that we have it...”

“It’s boring,” George finished. “And now you are thinking back to your working days and wish you still had some of that excitement.”

“Well,” Eliza said. “What do we do?”

“You haven’t been waiting all your life to just sleep in and not worry about anything,” George explained. “You’ve been waiting all your life to live your life the way you want to. Me – I could have been retired a few years back. But I stayed because I found meaning in helping people. There are others like me, but most people want to find meaning in something else that

they haven't been doing their entire life. Some choose to travel and see the world. Some choose to read..."

George was interrupted by his phone's loud ringtone going off. He took his phone out of his pocket, confused. He always set his phone to 'do not disturb' during his sessions, which means that someone must have called him multiple times. But when he checked the number, it was unknown.

George rolled his eyes and put the phone back in his pocket. He started talking to his clients again, but a few seconds later, his phone rang again. Same number. This time, he pressed the green button and held the phone to his ear.

"Hello?" he grumbled.

"Is this George?" the unknown caller asked.

"Yes, this is he," George said, as he beckoned an apology to his clients.

"Hi George," the caller said. "Uhm, so... George... there is no easy way to say this, but I work at the university with your wife, Martha, and she just passed away."

"What?" George said in shock.

"Yeah, I'm sorry to inform you," the caller said, "she just got more and more drowsy as the day progressed and then she suddenly stopped breathing. We asked her if she needed to go home, but she said..."

"She didn't even go home?" George shouted in frustration. "I can't believe..." George took a deep breath as he calmed himself the way he would teach his patients to do. "Okay, thank you for informing me."

"Yeah, of course," the caller said. "We are dealing with the aftermath now. How soon can you get here?"

"Uhm," George said as he looked at his watch and then back to his clients. "I am in the middle of a session right now, so probably about an hour before I can get there."

"Okay sir," the caller responded. "We will see you then."

George turned back to his clients who looked at him in horror. George's hearing wasn't the best, so the clients had been able to hear the entire conversation. As he continued his statement, his clients sat there in silence.

"Uhm..." Eliza said. "We can reschedule if you want. Like we understand."

“Hmm,” George pondered. But there was never a doubt in his head that he was going to stay. George was a professional and this was his job. Mourning after his late wife would do nothing to save her. “It’s okay. I can finish up the session.”

“Okay,” Frank said. “If you’re sure.”

“Okay,” George said as he composed himself internally. “So, as I said before, some retired people like to travel, some like to read, some like to take up a new hobby. Whatever you choose to do, you need to find a way to be productive. For me, that’s continuing to help people. For you... well you’ll have to find what that is. But if you’re not productive, you’ll always feel like your life is missing something. And that emptiness... that boredom... that will eat away at you.”

“I’ve always wanted to travel,” Eliza said, looking to her husband.

“Yeah,” Frank said, smiling at her. “And there were all those books we wanted to read that we never got around to.”

The session was only supposed to last twenty more minutes, but George stayed there for thirty to make sure the couple had all the information they needed. He gave them their assignment and scheduled them for the session the same time next week. As they were leaving, they tried to ask about his wife, but George simply dodged every question.

George took his time leaving his office before going to his wife’s old workplace. As he saw her body, he turned his face away and shed a single tear. He didn’t look back.

As they drove her body away, George stood there in silence with her colleagues. Many tried to give him a hug or comfort him, but he turned them all day.

“She was really sick all day,” one of her coworkers told George. “I’m surprised she even made it in.”

“Yep,” George said. “I warned her, but she didn’t listen.”

“Are you okay?” he asked. “You...”

“Ergoregion,” George tried to change the topic. “She kept talking about this ergoregion thing. Is that a real thing?”

“It is indeed,” the coworker said. “I’m actually the physicist in the group. Just like the solution to a Schwartzchild metric yields the event horizon nearby a Schwartzchild Black Hold, the Kerr metric yields an area known as the ergoregion near a rotating black hole.”

“And can we actually yield energy from this?” George asked again.

“Indeed, we can,” he said. “If the object that we throw in has a very particular set of initial conditions including velocity and angular momentum.”

“And how would we actually go about doing that?” George asked. “Do we even have a rotating black hole near us?”

“I have no idea,” he laughed. “I’m just the theoretical physicist.”

George forced a laugh too, as he beckoned to end the conversation. The university contacted Martha’s few relatives and they arranged for the funeral. George did nothing. After the body was cleared, he went home.

George struggled to get out of bed the next day. For a moment, he considered calling off work. But only for a moment.

He got to his office fifteen minutes early instead of thirty like he usually did. For the first time this month, the person who entered the office looked older than him. It was a singular male with balding white hair.

“I’m Gary,” the guy said shaking his hand.

“George,” the therapist said. “What can do I for you today?”

“Well...” Gary sighed as he took a seat. “I’m seventy years old and retired. My wife passed away last year, and we never really had any kids. I guess... I guess, I’m just having a hard time. I’m having a hard time trying to figure out what to do with the rest of my life. It just feels so... empty.”

“Actually... my wife...” George started but caught himself. It was unprofessional for therapists to share too much of their personal lives, and he knew better.

“How long were you married?”

“Almost fifty years.”

“That’s a long time,” George said. “So, I guess the first thing you’ll have to remember is that you can never actually replace her. She was a big part of your life, but she was not your entire life. There is still a part of you that existed independently of her. What would that part be for you?”

“I always enjoyed playing golf,” Gary said. “And that was one thing she never got into.”

“Perfect,” George said. “So, play more golf then. And then keep brainstorming. This time in your life is for you, so make the most of it. Don’t spend the entire time mourning the dead.”

“I just feel that if I don’t mourn her, it’s disrespectful,” Gary said. “It’s like... I don’t want to forget her.”

"You don't have to mourn someone to remember them," George said. "Your wife's body might be dead, but her spirit lives within you. Let me ask you. Now tell me, if your wife were with you right now, what would she want you to do?"

"Be happy," Gary replied. "That's all she ever wanted."

"Then do that," George said. "Life is short, and there's so many things you always wanted to do. So, don't waste that mourning. Spend that time being happy. When you're working, there's always so much people want to do that they never had time for. Even in retirement, it's tough, because you always must coordinate with everyone. Now, you're free. So, do what your wife would want you to do, and do things that make you happy."

"But how do I do that without feeling guilty?" Gary asked.

"You won't forget about her, I promise," George said. "And if it helps, imagine her there with you. Imagine her talking to you about the one thing that always got her excited. What was your wife always passionate about?"

"She really liked reading," Gary said. "She was always going on and on about a book she was reading."

"Interesting," George said. "Did you do a lot of reading also?"

"Sometimes," Gary said. "But I was always too busy to read as much as her."

"But did you enjoy it?"

"Yes," Gary said. "But again, just not as much as her."

"Well if reading was the one thing that she was passionate about," George said, "then that might be the pathway to seeing her again. After golf, read all her favorite books and really try to understand why she enjoyed them so much. Then you can imagine talking to her about it. If you want to honor and respect her, that is your answer, not mourning."

"Wow," Gary said, smiling. "I never thought of that."

"Good," George said, smiling back. "So, your assignment for next week is to make a list of all the things you enjoy in life and want to accomplish before you die. And your second assignment is to start reading your wife's favorite book."

"I can do that," Gary said.

"Perfect," George said. "I'll see you at the same time next week then."

Gary smiled as he packed up his stuff and walked out. That smile was worth it for George to have come in today. George could have retired over a year ago, but that smile was worth it to him.

George continued to stare at Gary through the window. He saw Gary leaving his office and slowly driving away. George continued staring at the window. Normally, he would have packed up his stuff and gone home. Now, he had no one to go home to.

George leaned back in his chair as a tear came to his eye. There was no therapist he could go to for help. He was his own therapist.

And so George did the same exercise he had told Gary to do. He closed his eyes and pictured Martha's face. He imagined her talking to him. What was the one thing Martha was always passionate about?

Saving the environment, he heard his wife's voice in his head. *Clean energy*.

"No," George said out loud. "Be more specific."

Ergoregion, she said, *the ergoregion of a Kerr Black Hole*.

The ergoregion. George never had enough background knowledge in physics to ever understand it, and the one person who could explain it to him was now dead. But to George, unlike the theoretical physicist he had spoken to yesterday, the ergoregion solution to clean energy had never been about physics.

What was the ergoregion? It was an area around a rotating black hole just outside the event horizon. What was the event horizon? It was an area around a black hole that you could never truly escape from.

George was a therapist and a rather good one at that. George liked to think that no matter how bad the problem was, he would be able to fix it. But sometimes, there was no solution. Sometimes in life, no matter how hard you work to overcome your problem, there was no way out. Death for example, was one of these things. Overcoming those problems would be as difficult as escaping the event horizon of a black hole.

But the ergoregion? One could escape from the ergoregion. But so long as one was in the ergoregion, they had to rotate in the same direction as the black hole. Certain things in life were like that too. Those problems were not un-escapable, and they did have solutions. But so long as they existed, you had no choice but to let it affect you. Certain people were like that too. Certain people were so negative that when you were around them, you became negative as well.

George leaned further back in his chair as he continued to think. Throughout the years, Martha had told George so many different solutions to clean energy. But she had never been nearly as passionate about any of

them as she had been about the ergoregion solution. So why was she so passionate about the ergoregion solution? There were no black holes around and there was no experimental evidence that it would even work. It was completely infeasible.

Perhaps to Martha, it had nothing to do with clean energy at all, but rather the elegance of the solution. Black holes are among the most ominous objects in the entire universe. They suck up everything and nothing can ever escape them. They have some regions where nothing can escape and some regions where things must rotate in the same direction... or in other words... start acting like them.

And yet, we can get energy from them. We can get energy from the one type of object that is known to suck in energy and never release any. And while that process occurs, the black hole slows down its rotation, something else we didn't think could happen. And maybe to Martha, that was progress. That was making the impossible possible.

But for George, it was a bit different. Approaching some of the most ominous things in the universe? Having to mimic the behavior of them without getting too close where you get sucked in completely? Delicately finding a way to make these objects slightly less ominous and slightly less powerful? And while they become less ominous, you find a way to take a little of that energy for yourself? Perhaps even the energy that you receive is the very particular form of energy that you so desperately need? This was nothing new to George. This was simply George's life.