

## CounterClockWise

### Chapter 8 – Special Relativity

The Ides of March finds Kevin and Diana sitting at a small table on the patio just east of the main waterfall of the old estate. It is midday and the sun is shining brightly on the cascading waters. Weeks have passed since that awkward night at the beach, and the waves that washed into their relationship have subsided to mere ripples.

Kevin has given considerable thought to how he should proceed. Should he pursue her? ... Or not? Should he coax her to tell him? ...Or not?

He has decided and un-decided many times over the past fortnight. He is usually pragmatic when confronted with a problem. Gather the data and make a decision. But where Diana is concerned, he has decided he can't decide without more data. So, looking into her eyes, he says, "OK, it's your turn."

"My turn to do what?" she asks.

And he replies, "To tell me something about yourself that no one knows. I have deliberately avoided focusing my 'talent' in your direction to respect your privacy. But I can't help noticing that something is bothering you. Tell me about it."

Diana is surprised at the relief she feels as she suddenly decides to tell him, "It isn't as dark as you might imagine, but it has influenced my entire life. Have you read *The DaVinci Code*?"

He answers, "I read some of it and saw the movie 100 years ago."

"Do you remember," she asks, "the part where the Professor is describing the Divine Proportion – a number called phi."

"Not really," he answers, "I probably skipped that part because I already know about phi."

"You may know the mathematics of phi," she says "but as the book explains many people read much more into that number. Ancient cultures as far back as the Ancient Egyptians and Greeks thought there was something mystical about that number. In fact it is named after a Greek sculptor named Phidias."

Kevin is thoughtful as he says, "I always thought of phi as a ratio obtained by dividing a line a certain way or the ratio of the last two terms in the Fibonacci Series. . . Or even more simply the square root of 5 plus 1 divided by 2."

She agrees, "It is that, and so much more."

Kevin stretches out an open hand across the table as he asks, "What has this to do with your innermost secret?"

Diana delicately places her hand in his. And drawing strength from the contact continues,

"Many of the women in my family are secretly mystics. They are modern worshipers of Gaia. In the modern interpretation...Gaia symbolizes all that is good with femininity, nature, fertility and spirit."

Kevin is immediately surprised and relieved and he says, "There is nothing particularly dark about worshipping nature...mankind has done that for thousands of years."

But Diana wants to talk now that she has started. She says, "Thank you. But as long as I'm telling it let me tell it all. "I think I told you that my Mom passed away when I was ten?"

"Yes you did." Agrees Kevin.

Diana continues,

"When my Mother passed away several of my older female relatives thought that created an ideal opportunity to make sure I was raised with their beliefs."

Her thoughts wander back to a time when she was a child, she visualizes as she tells him the story,

"I was in a hallway outside of a back room in this old house. I was peeking around the door casing, and inside the room were three of my aunts. They were dressed in blood-red, hooded robes that came all the way to the floor. I thought they were witches and I was terrified they would take me away.

"I had just come to this house to live with my Grandmother, Nana; and they were arguing loudly with her – about me.

"I could see Nana shake her head vigorously ...No, no, no.

"I ran as fast as I could away from the door and out into the yard and hid under the porch until they left. It must have been hours, and I was shivering and crying the whole time. But I was trying to be quiet so they wouldn't find me."

She pauses for a moment, obviously still visualizing her childhood. She is trembling and her face is as white as a sheet as she tells the story. And she is squeezing his hand -- hard -- with both of hers as if to draw strength from the contact.

“My aunts came over often while I was growing up – each time to make a case for raising me, and Nana always objected strongly and they always argued.

“I frequently ended up under the front porch, terrified and whimpering quietly hoping they wouldn’t take me away.”

Pausing briefly to regain a little composure, she continues a little less emotionally.

“I understood as I got older that the arguments were often about the interpretation of phi.

“My aunts believe that Phi can be found throughout the universe; from the spirals of galaxies to the spiral of a Nautilus seashell; from the harmony of music to the beauty in art. They believe the physicist observes it in the behavior of light and atoms.

“My aunts and older cousins attached a divine significance to phi and wanted me to see it as they saw it... while my grandmother wanted me to study nature and natural laws as a scientist.

“She wanted me to explore the magnificent phi from a scientist’s viewpoint.

“She taught me that a botanist will find phi in the growth patterns of flowers and plants, while the zoologist sees it in the breeding of rabbits. The entomologist views it in the genealogy of a bee.

“But finding it isn’t enough...she taught me to ask ‘Why is it there?’ “

As she pauses, a little color has returned to her face, but she is still squeezing his hand so hard that her nails are biting cruelly into his skin. He feels that, in a small way, it helps him to understand her pain. Worse for him though, as she is telling her story, he has his every talent intently focused on her. His talent is unrelenting and powerful and that makes his mental and emotional reconstruction so incredibly complete, that he feels as if he has literally lived her terrifying childhood along with her. It is an emotional impact like none he has ever experienced. Never before has he focused his talent so thoroughly on one person and certainly not on a person that he loves so deeply. But now is a time for strength, and he says to Diana,

“Your Nana must have been an exceptional woman.

“And I think she would tell you that you can find anything you look for in nature, if you are determined.

“If you are born on January 2, or August 13... your birth date contains the number phi--approximately. Look for ANY two numbers that are adjacent in the Fibonacci series and voila...some might say you have found phi in nature... there are an infinite availability of numbers in nature and there are a lot of numbers in the series...

0,1,1,2,3,5,8,13,21,34,55,89,144,233,377,610...”

Diana smiles weakly as she says, “Enough... enough. I agree...”

And as if to prove her agreement, she continues,  
“Another common error is to find any natural spiral and claim it is the golden spiral. The spiral of a nautilus sea shell for example is a logarithmic spiral but not a golden spiral. Galaxy spirals are not golden spirals.

“People will look for anything in nature that is about 1.6 and immediately say it is exactly phi...which of course it is not since phi is exactly...  
1.61803398875...”

Now it is Kevin’s turn, and grinning he quotes her as he says, “Enough..enough. I agree.”

Diana smiles a genuine smile now and says,  
“And once a ratio becomes popular, people help it to take on greater significance. Phi doesn’t show up in architecture because it is natural...it shows up because the architect explicitly included it in his design.

“Michelangelo and Raphael used it in art intentionally...it doesn’t arise in their art because of some natural mechanism.

Diana finishes her tale by concluding,  
“Anyway, that’s why I am a biologist.”

Kevin lets out a deep breath and says,  
“I want to know more about your Nana when you want to tell me, but can you let go of my hand now... I think it may be dead.”

She looks surprised as she loosens her grip and is even more surprised to see several trickles of blood emerging from where her nails have penetrated his skin.

She is immediately embarrassed and contrite, but he will have none of it. Going around to her side of the table, he guides her to her feet and holds her close to

him. Gradually, he feels the tension leaving her body. When she has returned to normal, he releases her, looks into her teary eyes and says,  
“Let’s head to class, shall we?”

In silence they make their way to Chaucer’s office. Looking up from a complicated equation displayed on his screen he says, “Howdy you two, haven’t seen much of you the last few days – have you been playing hooky?”

Completely recovered, Diana answers,  
“Maybe a little...”  
And she glances gently, lovingly at Kevin.

“We HAVE been enjoying each other’s company,” he agrees, “but there has been plenty of work as well. I am ready to show you a little if you wish?”

Happy to hear this welcome bit of news, Chaucer brightens and says,  
“Sure ...the floor is yours...and the wall too if you wish.”

“OK,” Kevin begins, “Let’s start with a teaser...  
Imagine you and Sky King are flying in The Songbird and you have a 22 caliber rifle with you. You know that you are flying at 150 miles per hour.

“You also know that when you fire your rifle at the target range, the bullet leaves the muzzle at only 140 miles per hour.

“So the plane goes faster than the bullet.

“Now you point the rifle in the same direction that you are flying and pull the trigger. What happens ? Does the bullet ever leave the muzzle since you are flying at 150 mph and the bullet only travels at 140??

Diana answers quickly,  
“A fun question, but an easy one. Sure it does --the bullet’s speed from the rifle gets added to the plane’s speed and the bullet takes off at 290 mph.”

Certainly expecting this answer, Kevin continues,  
“OK, but now you are in the same plane and you know that on the ground, light from your flashlight travels at 186,000 miles per second. Now from the plane you point the flashlight forward and turn on the beam. Does the light travel forward at 186,000 mps plus the speed of the plane?”

Again Diana answers his question,  
“I know the answer but I don’t understand it. If that’s what you are going to talk about today... I can’t wait...preach away my hero!”

“OK,” he says, “here we go... Jeeves, help me out please?”

Dutifully, Jeeves picks up the narrative and continues until Diana interrupts asking,

“Can we take a break for a bit? I think I had too much iced tea at lunch.”

And Chaucer says.

“Sure, in fact I have a meeting with the Chief of the optics section. We are working on a way to modulate gravity waves like we do light waves.”

And Kevin turns to Diana and asks

“Since we are free the rest of the afternoon, Diana. Do you want to explore Fort Morgan in the daylight and do a little work there in the fresh air?”

“Great,” she answers, “My **Pride** and I will be right with you.”

After a 45 minute drive in the second of Diana’s two vintage cars, they park in the shadow of the historic old fort. And with each of them carrying a futuristic laptop, they make their way to a point on top of the wall with a great view.

Spreading a blanket on the ground, Diana says,

“This is great. It gives me an opportunity to dabble with the equations of relativity. I can handle those believe it or not...I just don’t feel it in my bones the way I should.”

Kevin agrees, “It definitely defies common sense sometimes.”

They both begin to work on their computers with the magnificent scenery as their companion. The sun gradually makes its way higher in the sky, heating the air and giving rise to a nice breeze blowing in from the water. A shrimp boat with its nets extended on long arms mines the waters for the tasty pink decapod crustaceans.

Diana pauses to watch its progress and her gaze scans the outline of the old fort. “You know,” she says thoughtfully, “the footprint of this fort is the shape of a pentagon.”

Kevin is quick to understand the thought behind her statement and replies, “I am surprised you didn’t say pentagram! Look, You need to change the way that you view this part of your past. You are NOT a witch. Your family members are NOT witches.”

“Thanks,” she says appreciatively, “I know that of course, but it’s hard to escape the things that are ingrained into your psyche when you are young. It’s a BIG change for me”

Looking gently at her, he asks,  
“Did you read the book *Contact*?”

She grins and answers, “The one by that good-looking astronomer? I saw the movie about 100 years ago.”

“Well,” he says “you need to take the advice offered to Jodie Foster’s character...’Small moves, Sparks...make small moves.’ “

Still smiling she says, “I’ll try, Dad.”

They both resume to work on their computers as the sun continues its journey across the sky. As the afternoon wears on, the temperature begins to drop. Kevin pauses in his work and stretches mightily to loosen his cramped back and arms.

“OK,” he says, “I have made some real progress on Brane Theory.”

And Diana replies, “I have made progress within MY brain as well.”

Spelling it for her, he says, “That’s B-R-A-N-E theory, my brainy companion. Wanna head back?”

She quickly agrees, “Sure. I’m pretty tired and I want to be fresh for the rest of your briefing in the morning.”

Diana sleeps well that night and wakes with a happy smile on her face. As she is combing her luxurious head of hair, she talks to her own reflection in the mirror. “Well, girl, I guess you didn’t ruin it after all. And it’s a good thing too, cause if you had, I would never speak to you again!”

As she is exiting her door into the hallway, Kevin is also entering the hall from his bedroom.

“Hello, Beautiful,” he says, “you look happy this morning.”

“I am,” she agrees. “All is right with the world!”

After a quick breakfast together, they walk hand-in-hand to Chaucer’s office where Kevin resumes his briefing: “Ok, Jeeves pick it up where we left off please.”

And Jeeves continues uninterrupted for almost 30 minutes with snatches of that sounding like:

“Here are two star ships... laser...The crew of the ship at rest...we may have to disagree on the measure of time...LENGTH CONTRACTION...time dilation ... 186,000 miles per second.”

Jeeves pauses as Diana finally interrupts. “Does time really slow down?”

And Kevin responds, “Sure does. Thousands of experiments have been done since Einstein stated his postulate and every one has shown time dilation and length contraction are real and really happen.

“For example, back in 1971, four cesium atomic clocks were synchronized and flown on commercial planes that circled the earth twice, and then compared to the reference clock at the U.S. Naval observatory. Sure enough, the moving clocks differed from the reference clock by exactly the amount predicted by relativity. Let’s look at it a little differently. Jeeves pick it up at graphic D-12 please.

“Will do, Kevin,” says Jeeves.

“Here is a graphic of a car traveling due East at it’s maximum speed of 100 miles per hour.

“It is making NO progress in the Northward direction – all of its speed is going East

“Next here is the same car traveling to the Northeast.

“Now -- even though the car is still doing 100mph it is going LESS than 100mph in the East direction because some of its speed is being used to go North as well.

“Space and time can be thought of in the same way. Everything in the universe is traveling through space AND time at the speed of light – the maximum speed available.

“Picture time replacing East and Space replacing North in the car example. If you are sitting still in space (not going North), you are traveling at the maximum speed through time (East).

“But if you start moving in space too (North), then your progress through time will slow down since some of your speed has been diverted.

“The faster you go through space, the slower is your progress through time.

“If you could travel at the speed of light in the space direction, you would make no progress in the time direction at all – time would stand still (as it does for a beam of light)!

“And if you could go faster than the speed of light, YOU COULD TRAVEL BACKWARDS IN TIME!”

Again Diana interrupts, “But we can’t do that right?”

And Kevin agrees, “Right!”

And Chaucer says,

“Let’s quit for now, Kevin, you can pick it up right here after lunch.

“OK, Kevin concurs, “Diana, let’s go get some ice cream.”

And she replies, “Ice Cream yes...but have you ever tasted home-made ice-cream?”

“No I haven’t,” he says.

Diana says, “When I was little, My Grandmother, Nana...the one who used to own this house...made the world’s best homemade peach ice-cream.”

Her eyes sparkle as she recalls a happy time,

“I remember Nana and me on the front porch of the house making ice cream. I would prepare the bucket with ice and rock salt and Nana would bring the pudding out the front door.

“She would put the pudding -- already in its container -- into its place in the bucket.

Then she and I took turns adding more ice and rock salt while the other one turned the crank – stirring the pudding and making it rotate so it would freeze evenly.

As it froze, it got harder and harder to turn the crank and I would say ‘But, Nana, its getting so hard to turn.’

“ She would just laugh and say, ‘I’ll be glad to take over, but remember whoever is cranking when it is ready gets to lick the paddles’

“And wanting that special treat for myself I would say ‘I can do it...isn’t it ready though?’

“And she would finally take pity on me and say, ‘OK, let’s see’

“She would open the container and there it would be -- soft, delicious, home-made peach ice cream!

“I would always make a huge mess as I got to lick the ice cream off of the paddles”

Kevin smiles as he feels the change in her. It will probably take a long time, but Diana is already remembering the happy times of her childhood rather than dwelling on the memories that terrified her so. He thinks to himself, “Remember...’Small moves, Sparks...make small moves.’ “

## End Chapter 8