

AirSpace Bonus: My Mom the Rocket Scientist

AirSpace theme in then under

Matt: Welcome to AirSpace from the Smithsonian's National Air and Space Museum, I'm Matt. Earlier this month I got an opportunity to talk to Jack Black and his brother Neil Siegal about their mom, Judith Love Cohen, who was an aerospace engineer who worked, you know, some of the big projects like Apollo, Minuteman, and Hubble and so many others.

An excerpt of this was in our latest episode, but we talked for almost an hour, it was a great chat and Judy is just too cool of a person not to give you some more. So here's an extended cut of my conversation with Jack and Neil, enjoy!

AirSpace theme up and out

Neil: Well, my name is Neil and Jack and I are brothers and, and, uh, we're here to talk about our mother who passed away a few years ago, but, uh, was an amazing and interesting person.

Jack: I'm Jack Black. I'm Judy's youngest son. And, um, I take every opportunity, if someone says, 'Hey, we want to do a story about, about your mom.' How can I refuse? Uh, I love it that, uh, her legacy lives on and that people still want to know more about her.

Matt: All right, great. We first learned of this story about Jack's birth from what's been shared on the internet. But we know that the memes aren't exactly accurate. Can you tell us, the story as you heard it?

Neil: So I heard it twice. Um, I heard it on the day that Jack was born from, from our mom when she came home from the hospital. Um, because I think she had thought she had been very clever. She had she had worked through her whole pregnancy.

And she actually went to work the day that she ended up giving birth and she was working on a programming problem. That's one of the things that gets misquoted sometimes. I don't know that she was actually working on the Apollo program. Jack was born in August. And remember the first moon landing was in July, a month before he was born. So the, the part of the Apollo she was working on was done. Right?

And so when she left the office to go to the hospital, Jack was her fourth child, so she knew, knew the signs, right? So she, she, she took a printout of the programming problem she was working on, right? And so when she got home, uh, with the baby, my stepfather went and met her at the, Jack's father went and met her at the hospital.

And, um, brought them home. And she said, um, she called her, she had called her boss from the hospital to tell him that she had solved the problem that she was working on, the programming problem. And oh, by the way, it was a boy, I guess in those days, they didn't always know in advance. Anyway, so she was very proud of that.

So she told that to me when she got home, I was 15 and a half, so I'm old enough to remember. But strangely enough, I became friends with a person who was her boss at the time, many, many years later.

And so he, many many years later when we became friends, he told me the story. So I actually got it from both ends of the phone conversation. And of course he told it exactly the same way.

Matt: And Jack, did you hear the story many times growing up or, no?

Jack: No, my mom was not one to, uh, brag about her, uh, achievements. She didn't, uh, tell, remind me about the incredible feats of intellect while I was being born, uh, but she did tell me once and I heard it more, much more from other people, actually more recently. There's been this resurgence of, uh, interest in, in, uh, in Judy's life and works.

But, uh, the way I heard it was, uh, know, that she, uh, she went into labor and went to the hospital and she kept thinking about this mathematical problem or engineering problem. And, uh, she made it through the labor successfully, had a, had a, had a good birth. Also, by the way, I want to add a little tidbit that has nothing to do with the problem solving, but she was proud of never having an epidural and never having any painkillers during the procedure of the delivery, because she had an incredible threshold for pain apparently. And also she, she was, uh, really deep into meditation and, uh, yoga and she felt like she could overcome the pain obstacles just by calming the mind.

Did she ever tell you about that, Neil?

Neil: Well, one thing I know that she told me is that she never got novocaine for dentistry. So that's very consistent with your idea that she was willing to put up with it.

Jack: It never surprised me when I found out that my mom did, uh, supernatural things. She was a incredible human being filled with passion and, and, uh, And, uh, uh, loved

puzzles, um, of all kinds, the hardest possible crossword puzzles, the, uh, any kind of mathematical equation puzzles.

And, and it was, uh, it ran in the family. Her, her, uh, her father Morris was a, uh, a chess wizard. He loved, he loved puzzles as well. And she said to me that. Early on, when she, uh, was doing, some studies in engineering, but also really into ballet and trying to decide which way to go, that her, her mother, uh, uh, Sarah, uh, Encouraged her to go into engineering because the, the, uh, the career was longer lasting.

She said, 'you'll be done with the ballet. And when you're 30, you're done, you retire. But with the, uh, with the engineering, it goes much longer.' And I think maybe Morris, uh, might've had some frustrated ambitions in, to have a career in, in engineering or mathematics of some kind, cause he had the brain for it.

And, uh, maybe he encouraged her to. Uh, as a way to kind of, uh, I don't know,

Neil: Yeah, he had always wanted to go to college, but nobody in the family could afford to send him and he had to work, you know, he, all four of my grandparents, including Morris and Sarah, Judy's parents, um, came from Tsarist Russia. They were born in Tsarist Russia and came as children about 1906.

Uh, when there was a lot of pogroms, uh, anti Semitic actions by the Russian government. And their fathers our great grandfather, had come beforehand. And as he would save money, he would send money over for one child after another to Morris, I think it was one of five or six to come.

And so Morris was about six when he got here. And the family of course was desperately poor. Uh, Morris used to say that he and his younger brother, Saul, um, when they were kids in Brooklyn to help the family make ends meet, would have a bottle of seltzer water on his little wagon and one cup, and they would go around selling a sip of seltzer water on the street for a penny that's just kind of where they were at in terms of finances.

But so, so, so all, uh, Morris always wanted to go to college and, um, and when, what Judy used to say, you probably heard this too, Jack, right? When, when she was born, she was a daughter, right? And, and, um, but he, he, he definitely had that kind of latent frustrated desire, instead of just reading books to her, he would play arithmetic games with her. And stuff like that. And, and so, um, he kind of grew up being comfortable that girls could do arithmetic and girls could do geometry and stuff like that.

Matt: So you said that, you know, it, it never, you know, occurred to her that a girl couldn't go into engineering, couldn't be good at math. Um, but we know that, you know,

when she was in her engineering program, she was only one of a very few women who were in, I think it's one of eight women in a class of 800.

Neil: Well, let's see. I, I actually, I, she gave me her college yearbook, so you go to the back and see the, the three or four pages of the class of 1957 bachelor degrees in in engineering. I guess there were about 200 graduates and she, as far as I tell by thumbing through the pages of look at three was the only woman.

What USC has told me is that she was the eighth woman ever to graduate from their program. The first one was in 1948. Um, but she went to night school. So she says that the whole time she went to USC, she never saw another female student.

In fact, here's a funny little story. Um, in that corner of campus, I teach there now in the engineering school so I know that corner of campus as well. Um, she says in those days, none of the buildings on that corner of campus had a women's bathroom. And they had to walk all the way across campus to the. You know, to some other part of the school school because all the bathrooms in that corner of campus for men.

Jack: Yeah, it's pretty incredible that she was able to make it in that world.

Neil: Well, she was Jack, Jack can amplify this, but I would say that her absolutely distinguishing characteristic is that she was completely dedicated to doing what she wanted.

Jack: Yeah, nothing was gonna stop her.

Neil: Nothing was gonna-- a mere mere people or, or, or whatever, we're never going to stop her from doing what she wanted. No matter what it was, right? And, you know, so she got, she got all interested in, in promoting women in engineering and she did all kinds of amazing things. She just did a lot of things to help promote women in the workplace.

And so, when she retired, she wrote a book called *You Can Be a Woman Engineer*, kind of about herself, but really about the idea that, you know, 'you little girl, you can become an engineer, too,' aimed at like seven year old girls, and she could not find a publisher.

Nobody was interested in this book, so Jack knows what happened. She and her, and her third husband, started a book company, right?

Jack: My stepfather, David Katz.

Neil: Right. So by the time she died, they had done 20, I'm looking at the shelf here, I've got all of them right here, 20 or so books. Uh, you can be a woman engineer, you can be a woman architect, you can be a woman astronomer, all about this theme.

But it all started with, she wrote this little book, and nobody would publish it

Jack: Really cool books. It's interesting when I think back to when Judy was a kid and, uh, that she got encouragement from her parents, but like Neil says, the main thing was her, uh, drive and her fervent, uh, ambition to do whatever she wanted, you know, and she, she had these interests when she, when she was young and, and nothing could have stopped her.

She had an incredible force of will. And, um, she told me a story about when she was around 10 years old and went to the market with her mom, Sarah. And, uh, she, she thought her mom was, like, counting the change too slowly, and, or she had some opinion about what was being bought and what was, and she said, 'No! It has to be this way!' And she would have little temper tantrums, but also, like, focused tantrums. To get what she wanted.

Neil: Yeah.

Jack: I think that kind of carried through her whole life where she had this fire in her belly

Neil: And nothing was going to stop her from getting what she wanted. Right. Nothing.

Jack: Yeah, I was always really impressed with her passion and her love of, of, science, but I'm not, I was also a little scared sometimes cause she had this passion and this fire and this temper that sometimes would come up and it'd be like, you know, she was a force of nature. Let's put it that way.

Matt: Well, what did her career look like to you growing up? I mean, Neil, you saw her working on Apollo and Jack, you probably saw her working on the Hubble Space Telescope and other projects, what did that look like to you as a kid, that your mom was working on these space missions?

Jack: I'd never really got to go to the laboratories to see behind the curtain. Neil had the benefit of when he grew up, he, he got to go and actually, uh, work on, on super, uh, Uh, uh, complicated, uh, uh, aerospace engineering programs.

And, uh, so you do, you have a knowledge and a understanding of what mom did that I never, I still don't understand what she was doing. You, you kind of understand the inside, inside and out of all of that world. But, uh, I just had bragging rights when I would go to school and say, my mom worked on Apollo and my mom did this and that, but I didn't really know what she did.

Neil: Well, you know, from the point of view of a kid, you know, your parents get up in the morning and in our house, both of them went to work. And so I just grew up thinking that that was absolutely, completely normal. It took me quite a while to even realize that that's not what all my friend's parents did.

And then when I got it, you know, to be 11, 12, she would actually talk to me about work. And that's when I became aware that, it was a tough environment at times for a woman to get ahead. but she was still had that fire in her belly that she was going to do what she wanted. And eventually she found, um, ended up with a boss. I must have been 12 or 13, who would give her a chance. And that was actually the boss she, she worked for her years and years thereafter, followed him from job to job. And he was the one who she was working for on the day that Jack was born, with whom I later became acquainted. Um, and, and that, and under him, she finally got a chance to actually be a manager as well as an engineer. Um, and so by the time she retired, by the way, another, another little thing I get misquoted on.

Um, she never worked on the Hubble Space Telescope. She worked on something called the Science Orbital Ground Station, which is the science ground station. It took the data from the Hubble and from other satellites and processed it for the scientists to use. Um, so it's, it was kind of in the stream of stuff.

The Hubble was connected to it and all the scientists who used the photos. So the Hubble actually interacted with it. So, um, the last job she had in her career, uh, she had worked on the system engineering team for that. And when, uh, the guy who was the head of the system engineering team got promoted to be the project manager for the whole ground station project, she became the system engineering manager.

And that was her last job, the job from which she retired.

Jack: I'm gonna say that counts as working on the Hubble, the ground, the groundskeepers.

Neil: Yeah, NASA would say it was a different contract, but, but she works, certainly worked on get getting the data for the hubble at the hands of the, of the scientists. So, that was actually kind of an oddball job for her because the whole first half of her career was

guidance. First for missiles, and then for Apollo, right, the whole business of you're here and I want to get here and how do I command the motors and stuff like that to get you from here to there.

That's what for she did for the Minuteman missile and she did it for the Atlas missile, and she did it for the Apollo abort guidance computer, which was so famous. Um, and, and she spent the first 15 or 20 years of her career just doing guidance systems, um, and became, you know, kind of a recognized, really good practitioner at it. In the last 10 years of her career, she did some different things.

Jack: Wasn't she also part of the pitching of the abort guidance system to TRW or, uh, uh, the powers that be, wasn't she part of the initial um. Concept, conceptual, pitching of that?

Neil: Well, let's see. So, so, so TRW, the company she was working for at the time, my, my father was also working for the time, did three major things for the Apollo program. They did the abort guidance computer. They did what's called orbitology. That is, what is the path we're going to use to get from here to the Moon and back?

And there's a very interesting story about that that I'll get to in a second. And then they did the motor that actually landed the astronauts on the Moon. So my mom worked on not only a board and scratch computer, but she worked on the orbitology team as well.

But the orbitology thing is perhaps what Jack is thinking of, because there was a, there was a guy at TRW, and remember my mom was a young engineer for 30 years or two, something like that, right? Not senior but the, orbitology team was a guy named Dr. John Norton. And, and I knew John later on in his, John worked at TRW until he was in his 80s. So I had a chance to meet him later in his career. Um, and he used to tell a story that NASA at first was completely fixated on the problem of getting enough energy in the rocket to get the astronauts to the Moon and back.

And this guy, John Norton, and the people who work for him, a guy named Marty Kenahan and our mom, um, came up with a strategy that they called a Return to Earth Orbit.

They said that, you know, if you were going to spend 5 percent more energy, some really small amount more, you could design the orbit so that it would go from the Earth towards the Moon. And if something went wrong and you couldn't fire any of the rockets, it It would circle exactly around the Moon and come back and end up back in orbit around the Earth and maybe you could do something to rescue the astronauts.

And NASA said, we hate this idea. We're not going to do this. We absolutely refuse, you know, even four percent more energy or five percent more energy. You know, we don't want to do it. And, and John Norton got pretty, pretty out. He thought my, our mom was out there. So John got out there. Um, basically he pounded the table in front of the nest and people said, you're going to kill the astronauts.

And, and the NASA guys kept saying it never happened for so many things to go wrong. You know, we could do a thousand launches and it would never happen. But of course, John was right. This is only on the fifth or sixth launch, right? That Apollo 13 happened, had an accident. And if the TRW team led by John and Marty, um, which our mom participated, had not insisted, NASA would have stuck with an orbit that, what would have happened is they would have just gone past the moon and out into space forever. They would have been unrescuable.

Um, it turns out there was a little compromise and they didn't exactly adopt John's orbit. So they had to have a small engine burn on the way back to get the astronauts exactly home. And the engine they used for that because the, the main engine, the thing in the Command and Service Module were completely destroyed by the explosion. All they had left was the Lunar Excursion Module, the thing that was supposed to actually land on the moon.

So they needed an engine. So there was the, the engine that my father had worked on that was supposed to do the actual landing called the Lunar Excursion Module Descent Engine. That was the only engine they had. So they used that engine, but they needed a computer to do the guidance. And the only computer on there was the abort guidance system that our mom had worked on. So they actually reprogrammed it in Redondo Beach and read, you know, the 16 digit codes over the radio to the astronauts who reprogrammed the computer in the, in the Lunar Excursion Module.

So it was the, the computer that our mom worked on and the orbit that our mom worked on and also the engine that my father worked on that got the Apollo 13 astronauts home.

And so after they got home, um, they made a visit to Grumman in Long Island, who built the Lunar Excursion Module. And then they came to Redondo Beach to visit The TRW team.

And so you can find this picture or I can send it to you. This picture's on the web of this meeting with the three astronauts and there's this big crowd outside between some, you, you recognize the buildings in the picture, Jack and, and. I got to go. My mom took, I didn't get to meet the astronauts, but I got to be in the crowd when the astronauts got up there and thanked the TRW team for their efforts to get them home.

So she worked not only on the abort guidance computer, but on the orbital. And that's what you're probably thinking of

Jack: And astronauts thanked the team, including mom. She got a thank you from the astronauts for saving their lives. Not too shabby.

Neil: Not too shabby. Yeah, and especially since NASA, if they'd done it their way, it, they wouldn't have been able to rescue them. So, you know.

Jack: It also came up in conversation when I, I took her to the, uh, Golden Globes as my date, when I got, uh, a nomination, she got to have a little chit chat time with Tom Hanks, who was there, and they talked about it, because he had been in a movie about the Apollo mission, and, uh, yeah, so it was cool that there was a celebrity on the red carpet that was blown away that he was talking to someone who worked on the abort guidance system

Neil: Yeah, yeah, you, you were backstage. Um, but when you had the opening for your movie, Orange County, which is around the same time,

Jack: Oh, maybe that's what it was!

Neil: Right, because Colin, Colin Hanks was in the movie, right?

Jack: Of course, of course

Neil: So I, so, so I drove straight from work to wherever the studio, the showing was. It was at the Columbia studio, I think in Hollywood, right?

And, and I walked into the lobby and there's, there's mom talking to some middle aged guy I didn't know. You know, I, I walked up and after a few minutes I realized it was Tom Hanks

Matt: The last question is just, you know, for you to tell us anything that we haven't given you an opportunity to tell us about your mom, her impact, her life, uh, her achievements, uh, whatever you want to tell us.

Neil: Well, of course she, she was really for the last half of her life, let's call it, uh, you know, from age 60, when she retired from engineering on, she was really into three things, I think. Right.

So one was the books, the books were an incredible passion. It was sometimes hard to get her. To have a conversation about anything but the books, right? You remember that Jack. And that was the first thing.

Jack's career, she was really into Jack's career and David too her third husband um Did a lot drove Jack around to auditions and and all that kind of stuff, right? But she was really into that.

Um, but the third thing was, was grandkids. She was really into the grandkids, right? Jack's two kids and my sister has a daughter. So for the last 25 years of her life, that those are the three big things.

And so, you know, it wasn't all engineering, but she was just as intense about those things as she had been about everything before that. Jack, what's your thought?

Jack: My, my parting thought would just be, uh, when I think of her, uh, what I got from her was unconditional love. And I think, uh, she gave that to her kids. Um, didn't matter, uh, what kind of trouble I got in. And I got into some trouble. I was a problem child in a lot of ways. Didn't matter. She always welcomed me back home with open arms, even though I probably deserved to be smacked around a bit.

And uh that uh, is the thing that, uh, that I miss the most. Nobody loves you like your mama.

Pause

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Matt: AirSpace is from the Smithsonian's National Air and Space Museum.

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