

Unit 10 CHRIS HADFIELD

What I Learned from Going Blind in Space

Part 1

What's the scariest thing you've ever done? Or another way to say it is, what's the most dangerous thing that you've ever done? And why did you do it? I know what the most dangerous thing is that I've ever done because NASA does the math. You look back to the first five shuttle launches, the odds of a catastrophic event during the first five shuttle launches was one in nine. And even when I first flew in the shuttle back in 1995, 74 shuttle flight, the **odds¹** were still now that we look back about 1 in 38 or so—1 in 35, one in 40. Not great odds, so it's a really interesting day when you wake up at the **Kennedy Space Center²** and you're going to go to space that day because you realize by the end of the day you're either going to be floating effortlessly, gloriously in space, or you'll be dead. . . .

Announcer: 12, 11, 10, 9, 8, 7, 6—start, 2, 1, booster ignition, and liftoff of the space shuttle Discovery, returning to the space station, paving the way . . .

Hadfield: It is incredibly powerful to be on board one of these things. You are **in the grip of³** something that is vastly more powerful than yourself. It's shaking you so hard, you can't focus on the instruments in front of you. It's like you're in the jaws of some enormous dog and there's a foot in the small of your back pushing you into space, accelerating wildly straight

up, shouldering your way through the air, and you're in a very complex place—paying attention, watching the vehicle go through each one of its **wickets⁴** with a steadily increasing smile on your face. After two minutes, those solid rockets explode off and then you just have the liquid engines, the hydrogen and oxygen, and it's as if **you're in a dragster with your foot to the floor⁵** and accelerating like you've never accelerated. You get lighter and lighter, the force gets on us heavier and heavier. It feels like someone's pouring cement on you or something. Until finally, after about eight minutes and 40 seconds or so, we are finally at exactly the right altitude, exactly the right speed, the right direction, the engine shut off, and we're weightless. And we're alive.

It's an amazing experience. But why would we take that risk? Why would you do something that dangerous? In my case, the answer is fairly straightforward. I was inspired as a youngster that this is what I wanted to do. I watched the first people walk on the moon and to me, it was just an obvious thing—I want to somehow turn myself into that. But the real question is, how do you deal with the danger of it and the fear that comes from it? How do you deal with fear versus danger?

And having the goal in mind, thinking about where it might lead, directed me to a life of looking at all of the small details

¹ The plural noun “odds” describes a ratio of likelihood that something will happen. The term is commonly used in gambling or betting.

² The Kennedy Space Center, in Florida, is where NASA's shuttles launch from.

³ To be “in the grip of” something describes a state of not being in control of your actions. The “something” has more power than you do in the situation.

⁴ The noun “wicket” here is used to describe the checkpoints or stages along the way that the shuttle must go through in order to safely make it to space.

⁵ A “dragster” refers to a car made for racing, and to have your “foot to the floor” means that you are accelerating that car as fast as it can go.

to allow this to become possible, to be able to launch and go help build a space station where you are on board a million-pound creation that's going around the world at five miles a second, eight kilometers a second, around the world 16 times a day, with **experiments on board that are teaching us what the substance of the universe is made of**⁶ and running 200 experiments inside. But maybe even more importantly, allowing us to see the world in a way that is impossible through any other means, to be able to look down and have—if your jaw could drop, it would—the jaw-dropping gorgeousness of the turning orb like a self-propelled art gallery of fantastic, constantly changing beauty that is the world itself. And you see, because of the speed, a sunrise or a sunset every 45 minutes for half a year. And the most magnificent part of all that is to go outside on a spacewalk.

You are in a one-person spaceship that is your spacesuit, and you're going through space with the world. It's an entirely different perspective, you're not looking up at the universe, you and the Earth are going through the universe together. And you're holding on with one hand, looking at the world turn beside you. It's roaring silently with color and texture as it pours by just mesmerizingly next to you. And if you can tear your eyes away from that and you look under your arm down at the rest of everything, it's unfathomable blackness, with a

texture you feel like you could stick your hand into. And you are holding on with one hand, one link to the other seven billion people.

Part 2

And I was outside on my first spacewalk when my left eye went blind, and I didn't know why. Suddenly my left eye **slammed shut**⁷ in great pain and I couldn't figure out why my eye wasn't working. I was thinking, what do I do next? I thought, well, maybe that's why we have two eyes, so I kept working. But unfortunately, without gravity, tears don't fall. So you just get a bigger and bigger ball of whatever that is mixed with your tears on your eye until eventually, the ball becomes so big that the surface tension takes it across the bridge of your nose like a tiny little waterfall and goes "**goosh**"⁸ into your other eye, and now I was completely blind outside the spaceship. . . .

If you're outside on a spacewalk and you're blinded, your natural reaction would be to panic, I think. It would make you nervous and worried. But we had considered **all the venom, and we had practiced with a whole variety of different spider webs**.⁹ We knew everything there is to know about the spacesuit and we trained underwater thousands of times.

⁶ Hadfield is referring to the experiments being conducted by the scientists living aboard the space station. These experiments are literally teaching us about space and the universe.

⁷ The expression "slammed shut" gives us the understanding that Hadfield's eye problem was unexpected, sudden, and dramatic.

⁸ The word "goosh" is the sound that liquid makes when a large amount of it falls down.

⁹ Hadfield is referring to the preparation work he did in training as being analogous to walking through spider webs to deal with spider phobia. This is covered in Lesson A.

And we don't just practice things going right, we practice things going wrong all the time, so that you are constantly walking through those spider webs. And not just underwater, but also in **virtual reality labs**¹⁰ with the helmet and the gloves so you feel like it's realistic. So when you finally actually get outside on a spacewalk, it feels much different than it would if you just went out first time. And even if you're blinded, your natural, panicky reaction doesn't happen. Instead you kind of look around and go, "OK, I can't see, but I can hear, I can talk, **Scott Parazynski**¹¹ is out here with me. He could come over and help me." We actually practiced incapacitated crew rescue, so he could float me like a blimp and stuff me into the **airlock**¹² if he had to. I could find my own way back. It's not nearly as big a deal. And actually, if you keep on crying for a while, whatever that **gunk**¹³ was that's in your eye starts to dilute and you can start to see again, and Houston, if you negotiate with them, they will let you then keep working. We finished everything on the spacewalk and when we came back inside, Jeff got some cotton batting and took the crusty stuff around my eyes, and

it turned out it was just the anti-fog, sort of a mixture of oil and soap, that got in my eye. And now we use **Johnson's No More Tears**,¹⁴ which we probably should've been using right from the very beginning.

But the key to that is by looking at the difference between perceived danger and actual danger, where is the real risk? What is the real thing that you should be afraid of? Not just a generic fear of bad things happening. You can fundamentally change your reaction to things so that it allows you to go places and see things and do things that otherwise would be completely denied to you . . . where you can see the hardpan south of the Sahara, or you can see New York City in a way that is almost dreamlike, or the unconscious gingham of Eastern Europe fields or the Great Lakes as a collection of small puddles. You can see the fault lines of San Francisco and the way the water pours out under the bridge, just entirely different than any other way that you could have if you had not found a way to conquer your fear. You see a beauty that otherwise never would have happened. . . .

¹⁰ A "virtual reality lab" is a room where computers create fake realities to test human reactions and skills in different situations.

¹¹ Scott Parazynski, Hadfield's partner on the spacewalk when he went blind, is an American astronaut who has been on over five shuttle flights.

¹² An "airlock" is a space with doors on either end in which the pressure is controlled so that a person can pass between two places with varying degrees of pressure.

¹³ The term "gunk" is a colloquial one used to refer to substances that are sticky.

¹⁴ "Johnson's No More Tears" is a brand of children's soap and shampoo that does not sting when it gets in the eyes.