

No Frames, No Boundaries

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I suppose the reason that a nice, down-to-earth astronaut like me is here in a far out group like this is somehow to share an experience which man has now had. In early 1969 I flew on Apollo 9. I'd like now to take all of you on that trip with me, through that experience, because the experience itself has very little meaning if, in fact, it is an experience only for an individual or a small group of individuals isolated from the rest of humanity.

Apollo 9 was to be the first flight of the lunar module, the first time we would take that spacecraft off the ground and expose it to that strange environment to see whether it was ready to do the job. The setting was interesting. In December of 1968, Frank Borman, Jim Lovell and Bill Anders had circled the moon on Christmas Eve and had read from Genesis and other parts of the Bible, in a sense to sacramentalize that experience and to transmit somehow what they were experiencing to everyone back on Earth, "the good, green Earth," as Frank called it. And those are people you know. They're not heroes out of books - they're next door neighbors. Their children and your children play, and they're out there around the moon reading from the Bible in a way that you know means a great deal to them. And then the next day comes one of those incredible insights. In the *New York Times Magazine*, Archibald MacLeish writes an 'essay about the step that humanity has now taken. He writes that somehow things rather suddenly have changed, and man no longer sees himself in the same way that he saw himself before. He sees "the Earth now as it truly is, bright and blue and beautiful in that eternal silence where it floats," and "men as riders on the Earth together, on that bright loveliness in the eternal cold, brothers who know now they are truly brothers." And as you're preparing to go up into space yourself that's a heavy trip, because you realize that it's not just a physical thing you're doing but that there's a good deal more to it. So in all the other preparations you

make you somehow incorporate that as well.

All this forms the background for that very, very busy foreground, the foreground that involves simulation after simulation - memorizing all those millions of procedures which are required to save your life and the lives of your fellows if you run into this problem or that problem. You attend an incredible number of meetings, going over procedures and detailed check lists and techniques, thinking of everything that can happen or go wrong, and then deciding what you will do in each case. Hour after hour in classrooms, you struggle to keep awake so that you can understand all those systems that go into the spacecraft and that will keep you alive or will kill you if you don't know what you're doing. You take part in testing the spacecraft, not a simulated one now but the real one, and those tests go on and on, until you feel the spacecraft is going to be worn out before it ever gets a chance to perform up there where it was designed to work.

And then finally comes the morning when you get up before dawn. Some people are just starting to come to work. You look out the window, and three or four miles away to the north there is this brilliant, white object standing on its tail with search lights playing on it - and it's somehow a white symbol sitting there on the beach ready for its trip into space. It's the most awe-inspiring thing you've ever seen - beautiful. And you go down the hall and have the last of what seems like an infinite series of physical examinations, you eat breakfast, you go down the hall in the other direction and you put on your suit with the help of all those technicians. You've done it a hundred times before and it's exactly the same, except" somehow this morning is a little bit different. And you go down the elevator with your two friends and you get in a transfer van and you go over to the pad and you go up that tower and you look out across that countryside, the sea in

one direction and the rest of the country in the other direction. And you realize that all, those years and years of work - five years, six years, seven years have - gone for you into this moment. And you are deeply moved.

And then you get into the spacecraft and you jostle around and you joke and play up in - the White Room as you're getting in - you put signs on the back of the guy who's helping you get in, so that everybody watching on TV sees these ridiculous signs - all those things. Then you lie there on your back and they close the door and you're right back in a simulator - you've done it a hundred times. And you lie there. During the countdown you may doze off and catch some sleep, waking up when you're called on to take a reading or something. Then they count backwards down to zero and off you go.

Somehow it's anti-climactic. It's much more exciting from the beach, watching it and seeing all that smoke and fire and feeling the power and the concentration of energy that's taking those three people up into space. From the beach you feel that, and it causes your whole soul to oscillate with the throb of that sound. But you're inside now, you're going up, and everything looks very much like it does in a simulation and you've done this a hundred times. The only difference, at least in most cases, is that it's all working correctly. I mean things aren't going wrong now. The dials read what they should read instead of what some joker outside throws in as a problem.

And so you go into space. You're lying on your back, and you can't really see out until the launch escape tower gets jettisoned part way up. Then your window is clear, and as you pitch over, getting near horizontal, you catch the first glimpse out the window of the Earth from space. And it's a beautiful sight. So you make some comment - everybody has to make a comment when he sees the Earth for the first time - and you make your comment and it's duly noted. And then it's to work, because you don't have time to lollygag and look out the window and sight-see, because you're up there in March of 1969 and the goal is to put a man on the moon and get him back to Earth before the end of the decade. So, on with the job.

You get up there in orbit, you separate from the booster, and you turn around to dock with the lunar module. And you have a little problem docking, because a couple of thrusters got shut off

inadvertently during launch, and you can't understand why you can't control the vehicle. So there's a moment. of panic; you go madly around checking switches, throwing switches, trying anything, until somebody notices a little flag that's the wrong way, and you throw the right switches and you dock. You extract the lunar module and now you have to change orbit, so you go through all those procedures. You take out the check list, you read down the list, you leave nothing to memory. And you change the orbit. You light the main engine of the command module with the lunar module now on the nose for the first time, and you wonder whether maybe it'll break apart, but it doesn't. You were part of the design - you knew it wouldn't, but now you really know. And that first night in orbit you eat, doff your pressure suits, stow them under the couches, climb into the sleeping bags, go to sleep.

Up the next morning, eat breakfast for what it's worth, don the suits. And now you've got a full day of checkout again. You're testing the system that held together the first time you lit the engine, but now you're not just going to light the engine; you're going to wiggle it, testing and stressing and straining that tunnel between the command module and the lunar module to make sure it will really hold together. And again you know it will, but after you've done it now you really know - it did. So you've had a busy day there, and again it's eat, doff the suit (you had put on the suit because the spacecraft might have broken apart and it's hard to live in a vacuum, so, just in case, you do it that way). And you go to bed.

And the next morning it's the same process. You haven't quite gotten enough sleep, but it's up and hurry up because you're late. You eat while you get the suits on, then open up that tunnel and go into the lunar module for the first time. It's an amazing sight out those windows because they're much bigger windows. But again don't stop; you don't have time for that. And so out with the check list and down through that day, checking out all those same systems that you know so well from paper - but now you're there and you're throwing the switch. And you check out the guidance and control system and the navigation system and the communication system and the environmental control system and on and on and on. By the end of the day you're ready for the grand finale - you're going to light up the main engine on the bottom of the lunar module, the engine that will

take two of your friends down to the surface of the moon if everything goes right. And you have to demonstrate that that engine will work and that it can also push both the lunar module and the command module around, in case one day that has to be done - little knowing that only the next year that will have to be done to save the lives of three of your friends. And you light off that engine and it works, just the way it did in the simulator. It's amazing. So you go back into the command module and you're a little behind again and you hurry - up and eat and take off the suits and get to sleep, because, again, the next day is a big day. .

And up the next day and back through the cycle. Today is the day you check out the portable life support system, the back pack that will be used to walk around on the surface of the moon and will allow people to live and operate and work and observe - to be human in that hostile environment. So you put on the suit that morning knowing that you're going to go outside. And you get over in the lunar module and you go through all of those procedures. You check out the portable life support system and everything seems to work, and you strap it on your back and you hook all the hoses and connections and wires and cables and antennae and all those things to your body. And you sever the connection with the spacecraft which has become home to you and switch on this pack you're carrying on your back. You let all of that precious oxygen flow out the door of the lunar module, and now you're living in your own spaceship and you go out the door. And outside on the front porch of the lunar module, you watch the sun rise over the Pacific and it's an incredible sight, beautiful, beautiful sight. But don't look at it, because you really don't have time, you see - you've really got to get moving. That flight plan says you're behind again and you've only got forty - five minutes out there to do all those things you have to do. And so you collect the thermal samples and you start taking the photographs - and then you have a stroke of luck. Across the way in the command module where your friend is standing, also in his space suit, taking pictures of you while you take pictures of him, his camera jams and he has to fix that camera. So you have just a moment to think about what it is you're doing. But then he gets it fixed and off you go again and you're back inside the spacecraft and you know you really need to get moving and get everything back together and taken care of and

put away and get the food eaten and the suits off and stowed and get to sleep, because the next day is the big test.

The next day you have to prove that you can rendezvous - that you can take those two spacecraft and separate them by a couple of hundred miles and bring them back together again after four or five hours. One of them doesn't have a heat shield so two of you can't come back home unless you get back together. So you get into the lunar module, which has now become a friend, and you go through all the preparation for that rendezvous and you separate. Except when you get to the end of the stroke on the docking mechanism, it goes clunk and you say, "What was that? That wasn't in the simulation." About the time you're wondering what it was and if maybe discretion is the better part of valor and you ought to go back in and start over, your friend goes clunk and opens up the fingers. And you say, "Well, we'll find out in five hours whether it's all okay." So off you go. And five hours later everything has worked right again. It's been a long five hours and you've gone through a lot of tests, but everything has worked and here you come. You're coming back together again and there's no reunion like that reunion - not only because it's your heat shield out there, which is the only way to get back home, but because that's your friend over there. Dave Scott is your next - door neighbor, but he was never a neighbor like he's a neighbor now. And so you dock, you get back together, and you open the tunnel and there's a reunion that can't be topped. And you get everything done and get back into the command module. And you're tired. You're absolutely exhausted. You haven't had enough sleep. You haven't had a good meal. In fact, you probably haven't eaten that day. And you sit there and you take off your suit.

And now you've got a piece of that lunar module left sticking on the nose of the command module, and you throw a switch and it's gone - there's a piece of you that just floats off. It's a machine; so are we. And it goes away, floats off into the distance, having done its job. And now your thoughts turn to things like a shower and a bed to sleep in and all those things that you realize you haven't been thinking of for those five hectic days that you've just been through. But all that is five days away, because the flight plan says now you show that you can go for ten days - you

show you can do the whole mission, the endurance part. So for the next five days, while you're thinking about a steak and a shower and a bed and all those things, you float around the Earth doing other tests.

And now, for the first time, you have a chance to look out that window. And you look out at that incredibly beautiful Earth down below. You reach down into the cabinet alongside the seat and you pull out a world map and a play tour guide. You set up the little overlay which has your orbit traces on it on top of the map, and you look ahead to where you're going, what countries you're going to pass over, what sights you're going to see. And while the other guys are busy you say, "Hey, in ten minutes we're going to be over the Mediterranean again and you might want to look out." So you look forward to that. And you go around the world, around and around and around, performing these tests. Every hour and a half you go around the Earth and you look down at it. And finally, after ten days, 151 times around the world, 151 sunrises and sunsets, you turn around and you light the main engine again for the last time, and you slow down just enough to graze that womb of the Earth, the atmosphere.

And down you come into the atmosphere. As you come back in you experience deceleration and it seems as though you're under an incredible pressure. You know that you're experiencing at least four g's, four times the force of gravity, and you say, "Jim, what is it now?" And he says, "Two tenths of a g." By the time you reach four or five g's you begin to realize the burden that man has lived under for millions of years. As you look out the window you see your heat shield trailing out behind you in little bright particles, flaking off, glowing, the whole atmosphere behind you glowing, this glowing sheath sort of cork-screwing back up toward space. And finally you slow down enough so that all of the bright lights outside the window, the fireball that you've been encapsulated in, have now dissipated. And you cross your fingers because all through the flight you've been throwing switches and various pyrotechnic devices, explosive devices that have sealed one fluid from another and one portion of the spacecraft from another, have been going pop or bang or whatever. And

you've a couple more of those to go, the ones that control your parachutes. So you throw the -next to last switch and it goes pop and the drag chutes come out. And you slow down to a couple of hundred miles an hour, and then you throw one more switch and pop, out go the main chutes, and they work. And you realize that the last explosive device, the last switch that you've had to throw, the last surge of electrons through all the wiring has worked. Now that whole thing is behind you and, splash, you're on the surface of the Atlantic and there are people circling around in helicopters and ships. You're back in humanity again. It's an incredible feeling.

And what's it all meant? You know, will man now after that experience be able to set foot on the moon and return to Earth by 1970? Yes. All of those things that had to work and to be proven have worked and have been proven, and you're that much nearer to that incredible goal of putting man on another planet. Have you opened the door to the future? Have you changed the nature of exploration? Yeah. You've done that. Man will not step back through that door and close it, except perhaps for short periods of time. Are there any practical benefits from it? Yeah. Lots of practical benefits, ad infinitum - you get tired of talking about them, but they're there. And they make a big difference in the world; in fact, you're dedicated to them because they will make that difference.

But I think that in some ways there are other benefits which are more significant. I think that you've played a part in changing the concept of man and the nature of life, by redefining a relationship that you have assumed all these years, and not just you, but man, humanity, the whole of history has assumed - that relationship to a planet, which is now changed. And you now know that, because it's a part of your gut, not a part of your head. And you wonder, you marvel that an Archibald MacLeish somehow knew that. How did he know that? That's a miracle.

But up there you go around every hour and a half, time after time after time. And you wake up usually in the mornings, just the way the track of your orbit goes, over the Middle East and over North Africa. As you eat breakfast you look out the window as you're going past, and

there's the Mediterranean area, Greece and Rome and North Africa and the Sinai, that whole area. And you realize that in one glance what you're seeing is what was the whole history of man for years - the cradle of civilization. And you go down across North Africa and out over the Indian Ocean and look up at that great subcontinent of India pointed down toward you as you go past it, Ceylon off to the side, then Burma, Southeast Asia, out over the, Philippines and up across that monstrous Pacific Ocean, that vast body of water - you've never realized how big that is before. And you finally come up across the coast of California, and you look for those friendly things, Los Angeles and Phoenix and on across to El Paso. And there's Houston, there's home, you know, and you look and sure enough there's the Astrodome - and you identify with that, it's an attachment. And on across New Orleans and then you look down to the south and there's the whole peninsula of Florida laid out. And all the hundreds of hours you've spent flying across that route down in the atmosphere, all that is friendly again. And you go out across the Atlantic Ocean and back across Africa, and you do it again and again and again.

And you identify with Houston and then you identify with Los Angeles and Phoenix and New Orleans. And the next thing you recognize in yourself is that you're identifying with North Africa - you look forward to that, you anticipate it, and there it is. And that whole process of what it is you identify with begins to shift. When you go around the Earth in an hour and a half, you begin to recognize that your identity is with that whole thing. And that makes a change.

You look down there and you can't imagine how many borders and boundaries you cross, again and again and again, and you don't even see them. There you are - hundreds of people in the Mid-East killing each other over some imaginary line that you're not even aware of, that you can't see. And from where you see it, the thing is a whole, and it's so beautiful. You wish you could take one in each hand, one from each side in the various conflicts, and say, "Look. Look at it from this perspective. Look at that. What's important?"

And a little later on, your friend, again one of those same neighbors, the person next to you, goes out to the moon. And now he looks back and

he sees the Earth not as something big, where he can see the beautiful details, but now he sees the Earth as a small thing out there. And the contrast between that bright blue and white Christmas tree ornament and the black sky, that infinite universe, really comes through, and the size of it, the significance of it. It is so small and so fragile and such a precious little spot in that universe that you can block it out with your thumb, and you realize that on that small spot, that little blue and white thing, is everything that means anything to you - all of history and music and poetry and art and death and birth and love, tears, joy, games, all of it on that little spot out there that you can cover with your thumb. And you realize from that perspective that you've changed, that there's something new there, that the relationship is no longer what it was.

And then you look back on the time you were outside on that EVA and on those few moments that you could take, because a camera malfunctioned, to think about what was happening. And you recall staring out there at the spectacle that went before your eyes, because now you're no longer inside something with a window looking out at a picture. Now you're out there and there are no frames, there are no limits, there are no boundaries. You're really out there, going 25,000 miles an hour, ripping through space, a vacuum. And there's not a sound. There's a silence the depth of which you've never experienced before, and that silence contrasts so markedly with the scenery you're seeing and with the speed with which you know you're moving.

And you think about what you're experiencing and why. Do you deserve this, this fantastic experience? Have you earned this in some way? Are you separated out to be touched by God, to have some special experience that others cannot have? And you know the answer to that is no. There's nothing that you've done that deserves that, that earned that; it's not a special thing for you. You know very well at that moment, and it comes through to you so powerfully, that you're the sensing element for man. You look down and see the surface of that globe that you've lived on all this time, and you know all those people down there and they are like you, they are you - and somehow you represent them. You are up there as the sensing element, that point out on the end, and that's a humbling feeling. It's a feeling that says you have a responsibility. It's not for

yourself. The eye that doesn't see doesn't do justice to the body. That's why it's there; that's why you are out there. And somehow you recognize that you're a piece of this total life. And you're out there on that forefront and you have to bring that back somehow. And that becomes a rather special responsibility and it tells you something about your relationship with this thing we call life." So that's a change. That's something new. And when you come back there's a difference in that world now. There's a difference in that relationship between you and that planet and you and all those other forms of life on that planet, because you've had that kind of experience. It's a difference and it's so precious.

And all through this I've used the word "you" because it's not me, it's not Dave Scott, it's not Dick Gordon, Pete Conrad, John Glenn - it's you, it's we. It's life that's had that experience.

I'd like to close now with a poem by e. e. cummings. It's just become a part of me somehow out of all this and I'm not really sure how. He says:

i thank you God for most this
amazing day:
for the leaping greenly spirits of trees
and a blue true dream of sky;
and for everything which is natural
which is infinite
which is yes

Thank you