ORAL HISTORY TRANSCRIPT

EDGAR D. MITCHELL
INTERVIEWED BY SHEREE SCARBOROUGH
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The following interview of Dr. Edgar Mitchell was conducted in Houston, Texas, on September 3, 1997, by Sherre Scarborough and assisted by Paul Rollins.

SCARBOROUGH: Maybe we could start with your actual training to become an astronaut and what made you decide to go into that program.

MITCHELL: I made the decision in 1957, when Sputnik went up. I was on a carrier in the Pacific, just about to come back to the States for some test pilot work, and when Sputnik went up I realized humans were going to be right behind it, so I started orienting my career toward that at that time.

SCARBOROUGH: That's amazing, that you had that vision.

MITCHELL: As it turned out, I came back to the States in 1958 when the first selection was starting, and as it turned out, I was still too junior and didn't have enough flight time or jet time. So I set my cap toward amassing qualifications that I thought would be attractive to NASA in 1957. It took nine years, but I got a doctorate, got additional flight experience, additional jet hours, was assigned to the Manned Orbiting Laboratory Program for a while, so, getting space management experience. All of that went on for nine years till I was selected in 1966.

SCARBOROUGH: That shows quite a lot of dedication to stay on that plan.

MITCHELL: Well, I was having fun while I was doing it. I enjoyed my additional academic training. Although I was flying as a test pilot in research and R&D programs, I also finagled my way to Edwards, where I went through their space school while I was also instructor for the MOL astronauts at that point.

SCARBOROUGH: You were doing both at the same time?

MITCHELL: I was doing everything I could to get credentials amassed, and it finally paid off.

SCARBOROUGH: What was it about you in particular that made you so attracted to getting into the program that you would devote ten years, about ten years, to amassing these credentials?

MITCHELL: I don't know. I think it was my—it was just in my blood. It was my parental heritage. My family were pioneers that settled the West. Well, both of my books have been explorer books, I mean, exploration. So, exploring was the idea. This was a magnificent opportunity, and I was—I mean, I was already set. After [President John F.] Kennedy announced the moon program, that's what I wanted, because it was the bear going over the mountain to see what he could see, and what could you learn, and I've been devoted to that, to exploration, education, and discovery since my earliest years, and that's what kept me going. And then I continued it after the space program with the work I report in *The Explorer*.

SCARBOROUGH: I want to get there, but I want to get there gradually if we can.

MITCHELL: Sure.

SCARBOROUGH: How much time do you have, by the way? I forgot to ask.

MITCHELL: As much as you want.

SCARBOROUGH: Okay. Great. There was a question that came to me while you were talking about that. Oh, you were part, in 1966, of what they called the "nineteen."

MITCHELL: Yes, the original nineteen. [Laughter]

SCARBOROUGH: The original nineteen. Who else was involved in that group, if you can remember? I don't have a list here in front of me.

MITCHELL: Well, let's see. I'll go down the list if I can recall. Myself; Ken [Thomas K.] Mattingly; Fred [W.] Haise [Jr.]; Jack [John L.] Swigert [Jr.]; Gerry [Gerald] Carr; Joe [H.] Engle; Ed [Edward G.] Givens [Jr.], now deceased; Jim [James B.] Irwin, now deceased; Charlie [Charles M.] Duke [Jr.]; Ron [Ronald E.] Evans, now deceased. I think—yes, Don Lind was in our group; Bruce McCandless [II].

SCARBOROUGH: You have an incredible memory. It's a matter of historical record, but—

MITCHELL: Yes. I think we're missing one of two there.

SCARBOROUGH: Yes. A lot of those were significant Apollo astronauts.

MITCHELL: Oh, yes. Many of that group got to fly as Apollo astronauts, too.

SCARBOROUGH: And you were a back-up member for several of the Apollo missions.

MITCHELL: Yes. I backed up Apollo 10 and backed up Apollo 16, and then Apollo 13 was our original flight.

SCARBOROUGH: Right. Tell me about that.

MITCHELL: [L.] Gordon Cooper [Jr.], Donn [F.] Eisele, and myself backed up Apollo 10, and in the normal rotation of things, that presumably meant we would get Apollo 13. Gordon retired at that point. Alan [B.] Shepard [Jr.] wanted to fly, so he was assigned to 13 and asked for Stu [Stuart A.] Roosa and myself to fly with him. And then when headquarters reviewed that, because Alan, due to his inner-ear problem, had been grounded for several years and they thought he needed more time in the simulators, more time to train before he went, so they suggested a switch, and we interchanged flights then with Jim [James A.] Lovell's [Jr.] crew, which we weren't very happy about at the time, until it turned out they got the bad bird and we got the good bird.

SCARBOROUGH: I was wondering about that. I mean, at the time I suppose it just feels—I don't know what it feels like. What does it feel like to be bumped?

MITCHELL: It was not a happy time. Well, we weren't happy about it. We were always happy to fly, but everybody wanted to be first. And, of course, I had a personal competition going between all of our group of guys, but Fred Haise, Ken Mattingly, and myself were real buddies and we were in continuous personal competition. We were the dearest of friends,

but in personal competition in who's going to get to fly first, which is always what astronauts are doing. And by being assigned on Apollo 10 and then going to 13, it looked like I would get to fly first, and then we changed missions with Fred and his crew, and so the razzing and carrying on, you know, was—

SCARBOROUGH: Right. You were top dog there for a while.

MITCHELL: I was top dog, and then we switched. [Laughter] But we were always the best of friends. Fact is, Fred and Ken and I really hoped we would get our own flight together, the three of us, because we worked so well together.

SCARBOROUGH: Why did that not come to pass?

MITCHELL: Well, it just never worked out that way. Ken getting bumped from Apollo 13 because of the scare with measles with Charlie [Charles M.] Duke's [Jr.] kids and all of that, things got mixed up.

SCARBOROUGH: That is an intricate story, how that all worked out.

MITCHELL: It's an intricate story, yes. The personal dynamics that went on, the measles and back-up crews, and bumped from back-up crews, and bad birds, and Alan needing training and so forth. I mean, there was a lot of stuff going on.

SCARBOROUGH: Right. How does that work? I'm not really clear. Does Shepard get to pick his crew?

MITCHELL: Well, crew commanders generally had—certainly in those days—had a lot of say as to who they were to fly with. I was already in line to fly, and, yes, Alan had a lot to say as to who he wanted to fly with.

SCARBOROUGH: So were you personal friends, you'd worked together, or—

MITCHELL: No. We hadn't necessarily worked together. Alan was chief of the Astronaut Office and, for his own reasons, whatever they were, he chose Stu [Stuart A. Roosa] and myself. Obviously, we felt we were pretty well-qualified people. So we had a great crew.

SCARBOROUGH: So then you went from being in the dumps about being bumped to—what did you feel?

MITCHELL: Oh, you get over that in a hurry, because there's too much work to do. But then I was in the control room—I guess we were all in the control room when the Apollo 13 problem occurred and immediately recognized we had severe problems.

On my part, as soon as we diagnosed what the problem was, I immediately went to the lunar module simulator, and if you remember from the Apollo 13 movie, Ken was in the command module simulator right next door, and we spent the next four days figuring out, in my particular case, how to control, fly manually the lunar module with the command module on its nose, because we'd never done that before. It wasn't obvious that we knew how to do it. If the automatic systems could work, then that was fine, but if they didn't work, how were these guys going to manually fly that monster and get home?

And that was my job, just like Ken Mattingly in the command module was figuring out how to get the power down low enough to be able to survive to get home, I was figuring

out how to tell Fred what to look out for if they lost all systems and he or Jim had to manually fly the thing. So that's what we were doing.

SCARBOROUGH: I'm so impressed with that kind of nerves that could carry out an order like that.

MITCHELL: There was no choice. If they were going to come home, we had to have some answers, and we didn't have answers then, if they'd ever had to use that manual procedure, which they did on the very last burn, coming back. If you remember, in the *Apollo 13* movie, when they had the Earth in the window and they burned and it kind of went like that, that's a little bit of an exaggeration, but that was a manual burn, and they flew it by hand.

SCARBOROUGH: And that's what you had been working on for four days to see if it was possible.

MITCHELL: That's what I'd been working on for four days, yes.

SCARBOROUGH: Isn't that fascinating. Were you a consultant at all to the movie, *Apollo 13*?

MITCHELL: No. But Ron Howard made an apology because he had composites of characters, Ken and me. Since Ken was prime crew for that flight, it was appropriate that he'd be the star.

SCARBOROUGH: Right. It's hard to cover every angle in two hours.

MITCHELL: Yes. You can't cover all the angles. It was a very good movie for that purpose.

SCARBOROUGH: Yes, I thought so, too. One thing I wanted to talk about briefly, since we're talking about Apollo 13, what was going on on Earth about the same time, if that impacted the lives of the astronauts or if they were aware. Kent State was happening like the month after Apollo 13 went up, and there was a lot of unrest in American about the [Vietnam] war.

MITCHELL: Yes. I didn't remember that it was exactly that time frame. I personally know, and knew, got acquainted with him shortly thereafter, Glenn Olds, who was brought into Kent State after that, and I worked with Glenn Olds for—

SCARBOROUGH: I'm sorry. I don't know his name.

MITCHELL: He was ambassador to the U.N. [United Nations] at that time and brought into Kent State as president of Kent State University following the Kent State massacre.

SCARBOROUGH: Oh, that's interesting.

MITCHELL: And I was one of the people, a year or so later, after I retired, that Dr. Olds asked me to come up and consult with him and lecture at the university, which I did on some of my interests, not only the NASA program, but my interest in consciousness studies after that. So as you raise that issue, I was somewhat involved in a minor way with Dr. Olds and the reconstruction of the Kent State environment.

SCARBOROUGH: In your lectures, did you address the violence?

MITCHELL: No. I was strictly working in technical areas at that point.

SCARBOROUGH: It's just interesting, as an historian, looking at that era, and, of course, it's been brought up before by other historians, the sixties being such a tumultuous time, and yet what was going on in the space program seemed to be somewhat insulated from what was going on.

MITCHELL: Yes. Just to continue that line for a moment, there was another physicist—well, he actually worked in metallurgy at Kent State, and I'm trying to think of his name; he's now deceased—that I subsequently worked with him at Stanford Research Institute in 1972 and '73. Well, his name will pop up in mind [Dr. Will Franklin]. Anyway, I met him through Glenn Olds at Kent State.

What other concurrent events did you have in mind?

SCARBOROUGH: Well, certainly Kent State was all about the Vietnam War. Something that's interested me—this is really off topic and I can't stay on here long—was in the early sixties, the whole Civil Rights Movement going on. It just seems interesting how these two different—

MITCHELL: Well, we were touched by all of that, too, both the fact of the Vietnamese War, because there were some that wondered why were we out in space when we should be fighting a war, while others were saying why were we fighting a war when we should be exploring more peaceful means and things. So there was, yes, that tension going on.

And even in the Civil Rights Movement, there was the impact on the program of why didn't we have minorities and females in the program. And as a matter of fact, there were candidates, both female and minority, racial minority candidates. Now, I wasn't in charge of

selection, so I have no idea the dynamics of all of that, but we certainly didn't have any minorities in the astronaut program, females or racial minorities, for some time.

SCARBOROUGH: That was to happen later. Right. Interesting. Well, maybe we can move into the topic of Apollo 14.

MITCHELL: Okay.

SCARBOROUGH: Your specific job, lunar module pilot, why did you have an expertise in that, or why were you chosen for that particular role for this flight?

MITCHELL: Well, when we first came in, were first selected in our group, we had a choice—rather, we had the right to state a preference for what technical assignment would we like, and there were lists of technical assignments, concentrating on the lunar module, concentrating on the command module, concentrating on the ancillary equipment like suits and other equipment, and I don't remember them all at this point. But I chose to request lunar module as being my prime technical assignment, and I got that assignment. I think it was also that my years of paying attention to credentials somewhat paid off, too, because, as I remember—I think the historical record will bear me out—I was the only astronaut at that time who had both test pilot credentials and a Ph.D., as well as significant military flight experience.

SCARBOROUGH: Your Ph.D. was in aeronautics?

MITCHELL: Aeronautics. Actually it's an Sc.D., which is the engineering equivalent of a Ph.D. They call it Sc.D., but it's the same as Ph.D. Yes, there were programs set up in the

late fifties at MIT [Massachusetts Institute of Technology], Princeton [University], and Caltech [California Institute of Technology]. Once we had launched the space era, it was realized we don't have any academic career path at the Ph.D. level having to do with space exploration. So these programs were initiated at MIT, Caltech, and Princeton for people who wanted to do that. I was one of the early people to go through that program.

Several of the guys in the astronaut program also went through it. In fact, there's Buzz [Edwin E.] Aldrin [Jr.], myself—he went through a year or so before me. I guess he was a year ahead of me or so. Buzz Aldrin, Dave [David R.] Scott, Charlie Duke, Rusty [Russell L.] Schweikart were all in the aeronautics and astronautics program at MIT. I think Buzz and I are the only ones in the astronaut program that proceeded to the doctoral level, but there was a whole batch of us going through it at that time, either at the—I think at the master's level or the doctoral level.

SCARBOROUGH: Since this was a new program, what kind of training did you receive, or what kind of classes?

MITCHELL: Well, it was an eclectic program of study: orbital mechanics, star formation, exotic fuels. I was privileged to work under [C.] Stark Draper and Walter Wrigley in the Guidance Division. Stark Draper was the man who invented inertial platforms, inertial navigation.

SCARBOROUGH: My goodness.

MITCHELL: So I was directly in his lab under him, and specialized in the navigation phases of it. So my doctoral thesis was in interplanetary navigation. In fact, that thesis is going to

be [displayed] in the Space Hall of Fame when that's opened, the Apollo wing, in October [1997].

SCARBOROUGH: That's great!

MITCHELL: I mean they asked for that, because I wrote my thesis in 1963 on interplanetary low-thrust navigation.

SCARBOROUGH: And now your interest in a lunar module command post.

MITCHELL: Well, as soon as I came into NASA, then my interest was in the lunar module, and the reason was that I thought that would get me on the moon for sure.

SCARBOROUGH: Right. Yes, I've read elsewhere that you were very interested in actually going to Mars.

MITCHELL: As a matter of fact, I wrote my thesis, illustrated my thesis by a navigational program that would go to Mars with low-thrust engines, and there was no reason, with high hopes, why Mars, in its nearest conjunction after that period, which would be 1982—would have been 1982—that we couldn't have launched a mission to Mars in 1982.

SCARBOROUGH: A human mission.

MITCHELL: Well, any mission, but a human mission to Mars was what I had in mind, of course. Obviously that was terribly optimistic and not in the realm of reality.

SCARBOROUGH: Possibly a budgetary—

MITCHELL: Well, if we'd continued the progression and interest and putting the funds into it that we did in the sixties following Kennedy's commitment to a lunar landing, had we made a similar commitment to going to Mars during that period, we could have done so. It's interesting that—well, we won't discuss that, but why we haven't and why we probably won't for a while is another story.

SCARBOROUGH: Well, I think that's an interesting topic to explore a little bit today if you'd like to, and especially while we're on Mars right now, not humans, but—was anything you wrote about in your thesis maybe used to this latest Mars mission?

MITCHELL: I doubt it, because we haven't even progressed to using low-thrust engines yet.

SCARBOROUGH: My goodness! That's very impressive.

MITCHELL: We're still using chemical engines primarily and talking about nuclear engines, but low-thrust engines are not—

SCARBOROUGH: Still to come.

MITCHELL: —are still to come, yes. Low-thrust engines, for your information, would permit us to move much larger payloads with less expenditure. Your fuel sources don't have to consume all your payload weight. So it's kind of like the slow boat to China. It takes a long time to get there, but you can carry enormous payloads with it, and you'd have to have very, very large spacecraft like the—what's the science fiction series? *Star Trek*. You'd have to

have very large spacecraft constructed in space or assembled in space, because you couldn't launch them all at once from Earth.

SCARBOROUGH: Sort of like the space station that they're talking about constructing.

MITCHELL: It would be very much like a mobile space station, yes, and a very, very large craft powered by nuclear generally, but with, say, IM propulsion, in other words, very low thrust, but very, very high specific impulse engines. And we're not there yet. We haven't reached that stage.

SCARBOROUGH: But you see that as a direction that we may go.

MITCHELL: Oh, it's a possibility. It's a real possibility, yes.

SCARBOROUGH: And would you like to see us go into—

MITCHELL: Well, I think we're probably going to find better ways to do it than that, but at that time, that was probably the most exotic controllable fuel propulsion that we could envision. Solar sails, being like sails of any sort, can only take you so far. You have to have an active propulsion system, and low thrust ion engines still represent an exotic possibility.

SCARBOROUGH: Now, in 1963, you said, you wrote this thesis, and forgive me if I'm wrong, but I don't believe the *Star Trek* series had come out yet, or I don't know if Gene Roddenbury's book had—

MITCHELL: No, it didn't come out until a few years later.

SCARBOROUGH: So you sort of envisioned this before that.

MITCHELL: Well, we were talking about what were the possible propulsion sources in those days in these programs, so I was reading Ernst Stuhlinger's work. There were a number of qualified people, scientists, writing in these areas at that point, which I picked up with their work and started to apply and use it in actual space propulsion problems.

SCARBOROUGH: Did you read any science fiction at all?

MITCHELL: No, I don't recall ever reading science fiction. I was trying to make fact, not fiction. [Laughter]

SCARBOROUGH: Interesting. The Mars connection continues, in my mind, at least, with seeing the Sojourner Truth [Mars Rover] pick up these rock samples and you guys on the moon picking up rock samples, that it came to mind to ask you a question about the human versus machine.

MITCHELL: Well, I think there's no question that we always must use machines to pioneer the way, because we're going into totally unknown environments. We must make our probes. We must find out what that environment is, because it's much less expensive and much safer to do it that way, but ultimately, ultimately, you're always going to want to send humans because that's the human experience. The fact is, as we get into talk later about my more recent work, I can even point more clearly why that's actually essential. But humans will always want to go because we are perceptive beings and we can make judgments on the spot and decisions on the spot, and even we proved in the Apollo Program that when it comes to

things going wrong—and they always go wrong—there's nothing like a human to be there as a problem-solver, and solving the problem in real time, on site, will save missions that you would not save otherwise. Sure, at the risk of life, but we all knew what the risk was.

SCARBOROUGH: You can't explore without risk.

MITCHELL: You can't explore without risk. There's no way.

SCARBOROUGH: Let's talk about some of those times in Apollo 14 where human ingenuity came into play.

MITCHELL: Okay.

SCARBOROUGH: I guess one of the first ones that comes to my mind, and maybe you can help me with some others, is the docking problem.

MITCHELL: Yes. That was the very first one that we ran into. I don't know, I haven't researched the archives recently, I don't know that we ever really knew for sure what caused that problem, but the likelihood it was, it was moisture from the storm that passed overhead and delayed the launch in the docking mechanism that simply caused it to freeze, and perhaps in the intervening time, the ice sublimated away and/or our constant hammering on it four or five times—

SCARBOROUGH: Knocked it?

MITCHELL: —knocked it loose. Or since we used an alternative procedure—

SCARBOROUGH: And tell me what that was.

MITCHELL: Well, our alternative procedure on about the fourth time was to slide in on the end of the probe where the capture latches, which capture the two spacecraft, but they weren't firmly docked together. It was the capture latches that were not locking, and we eventually got around it by ignoring the capture latches, and Roosa did a magnificent job of bring the spacecraft together well enough and pushing them together, and we fired the final locking, the locks on it. In other words, hard-docked in one "swell foop," as it were, and it worked. And it could be that if, indeed, the capture latches were frozen, that by the time we got the probe inside the command module to examine it, it had warmed up, melted, and there wasn't anything left to see by the time we got it in.

SCARBOROUGH: That makes sense.

MITCHELL: So we'll really never know what the problem was. It appeared a perfectly good probe when we got it inside the command module.

SCARBOROUGH: And it was just the desire to go ahead and do a hard dock, rather than letting—

MITCHELL: Well, that was an alternative that was suggested to us. When we had rammed it several times and the capture latches hadn't latched—see, the capture latches went inside the drogue and snapped into place to hold that drogue, and then we pulled it together and hard-docked it, but these capture latches were not popping out in here to hold it. So we'd come in and bounce back out again, come in and bounce back out again. It was only when we pulled

the whole thing in—we tracked the probe and drove them right together and then got all of the latches to fire simultaneously. We were hard-docked, if that makes any sense to you.

SCARBOROUGH: You explained it very well, actually. In reading Andy Chakin's book about this, *A Man on the Moon*, it sounded like this was the big kind of dramatic event and that the mission could have failed right then.

MITCHELL: Yes, because if we couldn't dock them together, that was a failure, but, as importantly, if we couldn't assure ourselves that this latching mechanism was going to work, Mission Control would never have permitted us to undock in the lunar environment, going around the moon and go down, because there was no assurance we could come back up. It would have been a very, very risky maneuver to go to the moon, separate, go to the surface, go ahead and complete the mission, and then find we couldn't get back together when we came back up off the lunar surface.

SCARBOROUGH: Right. Well, you said Mission Control was concerned. Were you concerned?

MITCHELL: Well, we were all concerned, but being there, we were already being committed. Perhaps we were not foolhardy men, but on the other hand, once you're in a position, you are willing to take personal risks that people on the ground would not want you to take. So, sure, we were anxious to keep going, but, as it turns out, there was no reason not to keep going. It worked. Everything was working.

SCARBOROUGH: Right. Did it flash through your mind at some point that the mission wasn't going to happen?

MITCHELL: Well, that was the fear, and we were doing everything we could to convince them, "Hey, we're going to make this thing work one way or the other."

SCARBOROUGH: What other events happened during—

MITCHELL: Well, we had a battery start to fail in the lunar module. I think we had one little cell—each battery is made up of many cells. I think we had one cell that went bad on one of the batteries and dropped the voltage just a fraction. As it turned out, it didn't continue to degrade, and that wasn't a major issue. I did have to go into the lunar module on the way out and do a double check on the batteries. As it turned out, it was okay.

Our next major problem was the well-known one of the solder ball in the abort switch, which happened just two hours before we were scheduled to go down to the lunar surface, and we noticed as we were on our last circuit of the moon before starting down, while checking out the lunar module and getting ready, that the abort light came on in the lunar module. And that was a surprise. It shouldn't do that. My intuitive reaction was, I pulled my penlight—I don't know whether you've seen them. They're heavy-duty little flashlights which are brass—and I tapped on the instrument with it, kind of like a hammer or the heel of your shoe or something and, sure enough, the light went out, kind of like kicking your washing machine when it won't run.

SCARBOROUGH: Right.

MITCHELL: And about thirty seconds later it came back on again, and I tapped it, and it went off again. And Houston said, "Hey, what's going on up there? You've got an abort light that's blinking, going on and off."

I said, "Yes, I know. I'm tapping the instrument panel when it comes on, and it goes off and then it comes back on." That helped us realize very quickly that we had some foreign object floating inside the switch that was lodging and causing the malfunction, and I could jar it loose by tapping on the panel. The significance of that problem was that if we had started down to the lunar surface, in other words, had we ignited the descent engines and that malfunction occurred, presumably it would trigger a whole series of events that started us back toward the command module. In other words, it was a single-point abort: push one button and a number of events took place which shut off the descent engine, separated the descent stage, ignited the ascent engine, set all the computer programs toward "return to orbit" instead of going down, and etc., and on and on and on. So if we wanted to land on the lunar surface, there was no way we could allow that problem to persist.

The problem was, we had less than two hours to figure out what to do about it, and for an hour of that, Alan and I were going to be-well, a little more than an hour, Alan and I were going to be behind the moon and out of communication with Earth. We all knew what would have to take place, that we'd have to find a way for the computer to ignore that signal, then we'd have to disarm those circuits, but only by cooperation with the ground was it possible to do that.

So, Houston and the computer program writers and the computer people and the systems people who knew those systems—now, I knew the systems, too, like the back of my hand, but I didn't know how to write programs to change the computer so that it could ignore those. So Houston had to come up with all of that, Control. So Alan and I merely used the time that we had to get ahead on our checklist, and we knew that I would be the one that would have to reprogram the computer on Houston's command, so we got ahead on our checklist. We agreed that he would take over some of my cabin duties, and he would then prepare the cabin for descent, because when we came out from behind the moon, we had about ten minutes, fifteen minutes to get all this done if we were going to start down on time.

We wanted to be prepared to go down on time if Houston got through with everything we had to do.

So we did that. We got ahead on our checklist. We transferred duties from me to him. He took over flying the spacecraft while I got ready to copy commands and throw switches on Houston's command to isolate the circuit. We did, and we had something like thirty seconds to spare when we got all of that done, and we started deorbit then and fired the engines to start down, with just a few seconds left to spare, and it worked. Except what we didn't realize—we didn't know it till later—was that in that procedure we had reset the computer such that it wouldn't recognize the landing radar signals. So when we got down to 20,000 feet, we had no landing radar, and that caused another emergency bash with about 90 to 100 seconds to go before we reached our mandatory abort point, because we had to, at 10,000 feet, abort if we didn't have landing radar.

SCARBOROUGH: My goodness. Just from one crisis to the next.

MITCHELL: It was one crisis to the next in that last two hours, yes. But fortunately, with Houston's help, they saw what was going to happen to us if the radar wasn't coming in, and there were only two things to do, and that was to recycle the switch or recycle the circuit breaker, and likely either one would have done it, but it was Houston's call to tell us which one to do, and so, very shortly, just before we had to have it, Fred Haise, who was capsule communicator at that point, called the right one, and we recycled the circuit breaker, and it worked. So we pulled that one off at the last minute.

SCARBOROUGH: That is amazing. I think that story illustrates what you were saying earlier so beautifully about the difference between humans and machines.

MITCHELL: Yes. That illustrates precisely the sort of thing.

SCARBOROUGH: Because the machine would not think of taking their shoe off or their penlight off and tapping the glass.

MITCHELL: And from my more recent work—I mean my last twenty years of work—intuition plays an enormous role in this. We now know how intuition works, and we didn't then. Scientists don't rely very much on intuition—well, we didn't until that, we knew how, but that's precisely it. Fred Haise and I both knew the cockpit of the lunar module and the systems of the lunar module so well that we could intuitively, in these situations, in new situations—I know I was doing it, like tapping with the penlight, like knowing what the call was on the landing radar even before the call came of what to do, because we knew the system so well that we could intuit a solution and have it confirmed by other people, and we were ready to go at that instant, just virtually had your hand on the switch just waiting for them to verify this is what you're going to do. And that's where this human equation comes in, that you'll simply never be able to replace the human intuitive faculty with robot devices, and that's what we are. It needs a human.

SCARBOROUGH: That's right. That's a very good point. The beauty, too, is that you allowed yourself to act on your intuition at that moment.

MITCHELL: Yes. Learning to do that is quite a lesson that we scientists and technical people really need to learn, putting the left and right hemisphere together in a coherent fashion.

SCARBOROUGH: But in some of those—I'm thinking back now at the movie, because those are the images I have, when they're looking for the solutions to the problem and they're

creating all these devices, certainly they must have been relying not only on their scientific facts and figures, but on intuiting how something might work.

MITCHELL: Of course. The point is, in the classical scientific mind, [whispering] yes, you use your intuition. But you never say—

SCARBOROUGH: But you don't tell anybody about it.

MITCHELL: You don't tell anybody. The greatest scientists and the greatest technologists are always highly intuitive.

SCARBOROUGH: Right. Creativity.

MITCHELL: That's what creativity is, but no one ever wants to admit, because it didn't fit within the scientific model. I propose how it does that, but nevertheless, in their older models, classical models, it doesn't set at all.

SCARBOROUGH: Isn't that fascinating. Are there any other problems you wanted to explore?

MITCHELL: Well, those were the major ones that we had. And we had communication problems, missed circuit breakers on the checklist that we had to go back and spend twenty minutes trying to find that it's sitting there right in front of you and you couldn't see it. Those sorts of things, we had those little problems. Purely [unclear]—

SCARBOROUGH: But the mission was such a success. I was wondering, because of the failure of the previous mission, was there a lot of expectation riding on you?

MITCHELL: Yes. We tried to downplay that. Everybody tried to downplay that, "It's just another mission," but it wasn't. Had we blown it, had it failed for whatever reason, that would probably have been the end of the Apollo Program right there. Congress certainly would not have allowed us to continue, certainly without a long hiatus and a long congressional examination of "Okay. How'd you guys screw up?"

SCARBOROUGH: Did that affect you?

MITCHELL: We didn't let it affect us for a minute. We were concerned enough about, are we ready to go? Are we doing our job? When you're carrying that personal load, you just don't have room to carry a national load as well. I mean, you don't allow yourself to do that. If you do, you're foolish. You can't carry that burden.

SCARBOROUGH: Was it ever spoken aloud to you from NASA administrators?

MITCHELL: Maybe to Alan. Well, we discussed it, "Hey, we've got to make this one work," but we didn't dwell on it. There was no dwelling on it, no emphasizing it at all, just, "Hey, we're going to fly a mission, and we're going to do it well."

SCARBOROUGH: It must have felt really good to come home and have done that.

MITCHELL: Yes. It's very nice to succeed.

SCARBOROUGH: Well, one of my colleagues wants me to ask you a question. What did it feel like to be the one and only caddie to ever exist on the moon?

MITCHELL: [Laughter] Well, not only the one and only caddie, the one any only javelin-thrower on the moon, too.

SCARBOROUGH: Tell me about that. I may have issued that in my research.

MITCHELL: You probably did. When Alan hit his golf balls and I kvetched to his golf balls, I then picked up the staff from the solar wind experiment, which we had already folded up and put in the return bay, and used that tall staff as a javelin and threw it after his golf ball. If you want to look in the records, there is a photograph showing the both of them.

SCARBOROUGH: Really? You guys took photos of it afterward?

MITCHELL: I took photos of it from the lunar module cockpit, and the javelin's about that much further than the golf ball [about 6"]. [Laughter] And I reminded Alan of that on the twenty-fifth anniversary, and he's not very happy to be reminded of it. That's a private insight.

SCARBOROUGH: So the competition just exists—

MITCHELL: Exists all the time.

SCARBOROUGH: Whatever planet you may go to or moon or whatever.

MITCHELL: That's right. I carried that around in my briefcase for a long time. I don't know where it is now, the photograph.

SCARBOROUGH: Oh, I thought the javelin. [Laughter]

MITCHELL: No, I didn't get the javelin.

SCARBOROUGH: I would love to have seen that. That's a great story.

MITCHELL: Yes. That's a good story.

SCARBOROUGH: Well, you know one of the inevitable questions that I have to ask today, you were one of twelve people to walk on the moon. What about that?

MITCHELL: What about it?

SCARBOROUGH: Is it an incredible experience?

MITCHELL: Oh, sure. Sure. I would first have to say, because the public has asked us over and over again, we deliberately were so operationally oriented that you're really only looking at the clock, looking at the checklist, looking at what's next, and putting one foot in front of the other.

SCARBOROUGH: The scientific experience.

MITCHELL: The scientific, the technological. You're working your butt off because we programmed to 120 percent of capacity, and we then expect ourselves to accomplish every bit of it. And we programmed to 120 percent capacity in case something went wrong, we

still had plenty to do. If it doesn't go wrong, you expect to do 120 percent of what you can do. [Laughter] So it was "[unclear]. Go, go, go," all the time, and if you had moments to reflect, introspect, to "aha!" to "wow!" or gawk, you grabbed them, but they were fleeting moments, but we grabbed them. So the experience of, "Wow, I'm on a pristine surface where humans have never been. I'm where humans may never be again, at least for a long, long time. Wow, there's an Earth up there. Look at that little planet. It's so much smaller than ours, you can see the curvature of the horizon from the surface." Yes, with one-sixth gravity, you can bounce like a trampoline even in all this heavy regalia. Yes, there's a lot of awesomeness, there's "Wow!", there's exhilaration. Well, there's the sense of being the first to ever be at this place. That's awesome.

SCARBOROUGH: Much like, as you mentioned earlier, the Western explorers must have felt walking along the Sahara or something.

MITCHELL: Yes. That's a powerful experience, and to me, that was the culmination of my being, and what can I learn from this? What is it we are learning? That's important, because I think what we're trying to do is discover ourselves and our place in the cosmos, and we don't know. We're still looking for that. And that was a major effort. Even though we might have talked in technological and political terms and financial terms and how many billions of bucks are we spending, the real purpose is to find ourselves and our place in the larger scheme of things.

SCARBOROUGH: Right.

MITCHELL: To me, that's what it's all about. And it's why, following that, I turned to the inner exploration of taking the next biggest problem I could see as confronting us and presenting an enigma of enormous proportion to tackle, which I spent twenty-five years in.

SCARBOROUGH: Changing your focus from exploration of outer space to what we might call "inner space."

MITCHELL: The inner functions.

SCARBOROUGH: What you're saying now and what I've read a little bit about how you might have felt or not felt—I think it was Eddy Chapin who said that you might have been the only person in the astronaut program to actually miss the psychologist being a part of it, or psychology being a part of it.

MITCHELL: Well, I did think that was—perhaps our psychology was too primitive at that point, but, nevertheless, it was a major omission to not have good psychological following of the entire program from the point of view of what we're doing right now, from the first person. In other words, journaling. Journaling the first-person experience throughout the entire program. A major, major omission. And I'll have to admit that at that point, the state of psychology was not conducive to doing that.

SCARBOROUGH: Right. But just hearing you talk about the experiments and having to be on this time schedule to explore the universe, pick up these rocks, find out what they're made out of, maybe have omitted what was actually going on within you at that moment.

MITCHELL: Oh, it absolutely did. But, you see, that is the fault of the scientific method, because in the classical scientific protocol, the first-person experience doesn't amount to a hill of beans. It's only the measurable third-person experience, and the flaw in the protocol is there is no such thing as a third-person experience. There's only a first-person experience. And the third-person experience is a consensus reality. And it's only now have we finally started to get the leading thinkers in science to recognize that the first-person experience is all there is. There is no other type of experience.

SCARBOROUGH: I'm jumping way ahead to a question. Do you think the space program will ever embrace that idea?

MITCHELL: Oh, it has to. I mean, we must, in due course, integrate. That's what integration of science and knowledge is all about. Hegel the philosopher said it a long time ago: thesis, antithesis, synthesis. We're seeing a new synthesis, and quantum mechanics has forced the notion that the experiment is not complete without the role of the experimentor, and you can't understand the role of the experimentor until you understand the first-person experience, which is what the nature of consciousness is all about.

SCARBOROUGH: This is what you called the dyadic—

MITCHELL: What I came up to help explain that, is we call the dyadic model.

SCARBOROUGH: Can you tell me a little bit about that?

MITCHELL: Sure. The dyadic model suggests that the Cartesian reality, dated back to Rene Descartes in the sixteenth century, which says that body and mind, physicality and

spirituality, are two independent realms of reality, is simply a flawed model. Now, science has tacitly—well, I'm getting ahead of myself. That model is flawed. What the dyadic model says is that reality consists of two faces of the same thing: energy. On the one hand we have quantum fluctuation, which is the basis of physicality that we experience as matter, but quantum fluctuation and electromagnetic energy is basis for information because information is just patterns of energy. One is a more energy-dense structured form we call matter, the other is a more ephemeral form we call information, but they're two parts of the same thing.

And it turns out if you follow that model all the way through, you get a universe that looks like the one we live in, whereas what happened in the classical period was that the Cartesian duality allowed, in the late sixteenth, early seventeenth century, science to arise and Newton and others to follow, because the intellectual elite invested in the church and policed by the Inquisition didn't permit any dissent. So physical science could not have arisen without the Cartesian duality. And as a result, physical science and theology have progressed parallel paths, non-interfering almost, for 400 years, allowed the classical period of science to do what it was going to do in the Industrial Revolution and all of that.

But along come Einstein and quantum science in the beginning of this century and shows that mind and matter cannot be separate; they must interact. In other words, we live in an interactive universe, not a universe in which mind and matter do not interact, and that is the basis for what I have done and the basis for the Hegelian synthesis of two opposing points of view, and that means that science has had to rethink its fundamental assumptions about the role of mind, which in the classical scientific period of Newton it played no part in physical investigations.

We now understand that mentality and physicality are an interactive system, and the dyadic model presents it as a learning system, that the universe then comes out self-organizing, learning, trial and error, intelligent, evolving system and that our perception and

our volition are indeed intrinsic to that learning system, whereas in the classical systems, we have argued does free will or choice make any different at all, and in both our classical systems, both in theology and science, we've said, no, human choice really isn't important. If it's important at all, it's kind of like the whitecaps on the waves, but basically it's a deterministic system. And it turns out that's not true. Our choice *does* make a difference, and it is a self-organizing, creative, learning universe that we live in. So the dyadic model brings these diverse things together for the first time, I believe, in a modern model.

SCARBOROUGH: Well, that's fascinating. Can you take me back to that moment in Apollo 14 where you experienced that personal epiphany that then led to this theoretical model?

MITCHELL: Yes. Well, it was on the way home after the successful mission was completed, and being the lunar module pilot, my heaviest responsibilities were then complete, and the lunar module was gone. It had crashed back into the surface. The rocks were on board. The data was on board. So essentially my job was to be a systems engineer on the command module, and it was working fine. So all I had to do was watch a few needles now and then, and I think this was generally true of the lunar module pilots. Those that had insights and large experiences were lunar module pilots.

SCARBOROUGH: That's interesting.

MITCHELL: Well, it's very explainable. We can explain that data. They didn't have as heavy a command responsibility. We could be tourists. Wow! We could look at the scenery, the Earth, the moon, the sun, and the cosmos flowing through the window as we rotated, and that's what happened. As I watched the cosmos, which is ten times brighter than—ten times more stars than you can see from Earth, it was "Wow!" And from my training at MIT, I

knew what stellar formations—how that worked, as best we knew at that time, and I knew that the chemicals, or the elements that we experience on Earth were manufactured in ancient stars since the Big Bang, that this stellar formation produced the matter that formed our world, but all of a sudden I realized that the molecules of my body and the spacecraft and my companion were prototyped in an ancient generation of stars. And somehow it suddenly became very personal instead of an objective, "Oh, yes. Molecules and atoms were made in those stars." No. *My* molecules were made in those stars, and this was a "wow!"

It's a shift of perspective that suddenly made the universe seem very personal, intelligent, harmonious. It made it living. And with that was an ebullience, a high, and the intellectual process was to recognize that our scientific cosmology is incomplete and is flawed, and our religious cosmologies are archaic and flawed, and that what was the great unknown and mysterious thing in here was consciousness. What is it that allows us to be aware of all of it?

My question was, what kind of a brain is this that allows me to see what I already know from a different perspective, say, "Wow!" feel exhilarated, recognize I'm an evolutionary product of all of that, but why is it letting me get excited and insightful and creative and intuitive and feeling like Archimedes in the bathtub? Why? What causes that? Well, that was what was going through my head. Now, it wasn't full blown as I'm describing it now; it was bits and sketches of ideas. But I knew that I had work to do when I came back, because that was a great question.

SCARBOROUGH: And that's when you started the Institute?

MITCHELL: That's when I started the Institute for Noetic Sciences, was to figure out what in the world was this all about. And I'd had enough psychic experience at that point to know that science is dead wrong on this issue. That was real. Even though we didn't have a

modeling for it, it was dead real. And all of a sudden, what is intuition? What is this insight? What allows a brain to reorganize its perspective, give you an "Aha!" and an insight? How does that work? That's what set me off on this last twenty-five years of inner exploration, is to answer those questions. And I think we've done a pretty good job here.

SCARBOROUGH: Of exploring that issue?

MITCHELL: Well, I think the dyadic model—I won't say it's the final model for anything, but it's the first one that brings quantum physics—in fact, with all of science we're starting with quantum physics, and the first-person experience, which is the route to the mystical experience, into a common model and seems to produce a model that fits the universe we live in.

SCARBOROUGH: I'm very fascinated that your mystical experience happened. [Brief interruption]

You were back in that moment of epiphany which then led you on your course for twenty-five years.

MITCHELL: Obviously I'm stating it in retrospect. At the time it was phenomenology that I was looking at and saying, "What does this mean?" and recognizing that probably intuition, creativity, and the psychic functions were all interrelated and a fundamental process of nature that we simply had no insight into before.

SCARBOROUGH: You were already open to that idea before you went up.

MITCHELL: Yes. I was open to it because I had been exposed to the psychic function. Well, I was raised in a Fundamentalist religious tradition, and there were problems between what my science was telling me and what my religion was telling me. I knew there was something amiss here, I just didn't know what. What the epiphany on the flight allowed me to do was to focus on what is the issue, and it is the nature of consciousness. Looking at the model that both science was using and most theology was using, I recognized that it's the nature of the inner experience, of the first-person experience, that is at issue here, and fundamentally what is the nature of ourselves or our nature that allows us to be conscious beings. So, immediately in my own mind the great enigma, the great issue, centered right around what is the nature of consciousness, and that's what I formulated the Institute of Noetic Sciences around. That was the founding idea.

SCARBOROUGH: To look at that question?

MITCHELL: To look at that question, but from a multi-disciplinary point of view since it goes across all disciplines of scholarly inquiry to all of the sciences.

SCARBOROUGH: Is it a think tank, or is it a university, or—

MITCHELL: No. It is more an organization that—it's a membership organization now that promoted and supported frontier research and tried to raise seed money for frontier research at universities generally that would contribute in a multidisciplinary fashion to somehow resolving these issues, because they're too great for any one group of individuals to work on.

So, for example, in the early stage, we were sponsoring work in biofeedback with Elmer Green and Joe Kamea. We sponsored work in acupuncture in the Oriental forms. I took the position that everything we're dealing with is a natural function, and human

experience is valid, but the interpretation of human experience may not be valid. In other words, we are correctly gathering information, but we may not be interpreting that information or our experience in a valid way. That was the founding idea, and it turned out it's paid off marvelously because it's allowed us to work with the mystical experience from a scientific point of view and try to look for what is—oh, and even challenging the fundamental assumptions of science, but not challenging the fundamental protocols by which science discovers itself.

SCARBOROUGH: Interesting. I think it's also interesting that you went up—and it's quoted in all the books that you had these ESP experiments that you hadn't shared with Shepard, that you were conducting, that they failed—I mean, that they didn't actually pan out, but you yourself had this incredible experience that was—

MITCHELL: But as a matter of fact, they did pan out.

SCARBOROUGH: Oh, they did? I'm sorry. I must have read that wrong.

MITCHELL: Well, the popular press misinterpreted—again misinterpreted—out of ignorance, misinterpreted the data. The data was very profound, but the fact that it got into the press before the scientific data was properly analyzed put it in a totally wrong flavor.

SCARBOROUGH: Maybe you can set the record straight here.

MITCHELL: Well, I'll try. I mean, the technical write-up in the *Journal of Parapsychology* in July of 1971 set the record very straight, but the press never reads technical journals.

SCARBOROUGH: Right. Now, and I only—I had a science [unclear].

MITCHELL: Right. As it turns out, as virtually with all good experiments in parapsychology—by the way, I no longer ever use the word "para" for anything.

SCARBOROUGH: Right.

MITCHELL: Because it's all natural.

SCARBOROUGH: It sorts of dates that period.

MITCHELL: Yes, it dates that period. All of the evidence for the parapsychological, psychic function is so overwhelming that were it any other branch of science, it would have been long ago accepted. I mean, all of the investigators, impartial investigators, recognize that and it is stated over and over and over again, that the data is overwhelming. The problem is, what is a theoretical model that permits us to explain it and still be compatible with the scientific data we understand? That's what [unclear], and the problem is in the fundamental assumptions of science, not in the scientific data.

What was a breakthrough concept only occurred fifteen years ago, and that's, in quantum physics, a concept called nonlocality, which means at the quantum level—am I talking over your head?

SCARBOROUGH: Yes. Can you spell that? Nonlocality.

MITCHELL: Nonlocality. Which means that things are both here and everywhere simultaneously. It derives from the quantum physics experiment of the wave/particle duality,

going back to Einstein, to the beginning of the century, that light behaves as though both a wave and a particle. A particle is here, now, and physical. A wave is everywhere at the same time. Okay? And matter has both characteristics. That's called the wave/particle duality, which is the basis of quantum science. And it was only demonstrated in 1982 conclusively that all matter has a nonlocal characteristic. Quantum physicists said, "Well, that just occurs at the subatomic level." Not true. We have now demonstrated that it occurs at all levels, and it is precisely responsible for the intuitive, creative, the psychic, the parapsychological effects that we've noted throughout all time, but not had a model for.

And now we do have a model, although it is not well known to most of the scientific community yet, but it does provide a model for it, and this is the breakthrough that we've been looking for, and has stated most succinctly what we have called the sixth sense, the intuitive sense, if you will. Actually, it should be called the first sense, because it's based upon quantum nonlocality and was how nature created information management or information transfer before we evolved the other five senses.

SCARBOROUGH: Interesting.

MITCHELL: This is highly evolved. The intuitive or nonlocal correlation at the quantum level and the intuition at a more evolved level are all part of the same process, and that's what we now know, and that's what I explain in there. And we now use the word, because we can now demonstrate it physically in a laboratory, something called a "quantum hologram," which is precisely the mechanism by which all this takes place.

SCARBOROUGH: In fact, I was speaking with Ken Cox last weekend. He told me a little bit about this concept. In fact, he said to say hello to you today.

Well, if you don't mind me just kind of looping this back into the space program, it doesn't surprise me at all that one would have a mystical experience breaking free of the boundaries of our [unclear], putting yourself in a different realm. Did you find that any other astronauts had been through that experience and had the same—

MITCHELL: Yes. Sure. Well, first of all, it did surprise me, because the question was, why, why is this happening? And then eventually I realized it's no different than a mountain-top experience or Archimedes in his bathtub, or any epiphany, any "Aha!" First of all, the nature of that experience is the integration of information into a larger fabric of reality. Therapists discover this all the time when they take people with traumatic experiences and fragmented personalities and they help them integrate it into a bigger picture. They get an increase in emotional well-being and emotional tone. In other words, they become happy.

SCARBOROUGH: So let me follow you. By putting yourself out into the universe, you were integrating your experience into a larger scheme?

MITCHELL: A larger picture, scheme, a larger view, and as it turns out, as we know from all sorts of therapy, that raises you on the emotional tone scale. Now, you can ask, "Well, why does nature permit that, too?" Well, try to go to that, because that is the—

SCARBOROUGH: Explore that in the way of the explorer.

MITCHELL: That is exactly what the mystical experience claims, that when you perceive the God experience or the Sumadhi in mystical literature, in the Hindu—Sanskrit literature, it's an ecstasy. It's the ultimate ecstasy. You're perceiving the biggest picture of all.

SCARBOROUGH: So you're enlarging your picture—

MITCHELL: You're enlarging your picture.

SCARBOROUGH: —by being out there. Did Shepard and Roosa—

MITCHELL: Now, it's interesting. As I said, most of the lunar module pilots had the experience, but it took about fifteen years to discover that, not from what they said, but from what they did.

SCARBOROUGH: After they got back?

MITCHELL: After they got back. Alan Bean goes to painting, becomes a very, very fine artist. Rusty Schweikart suddenly is very environmentally interested. Al [Alfred M.] Worden started writing poetry. Jim Irwin became an evangelist. Charlie Duke became an evangelist.

SCARBOROUGH: Fascinating.

MITCHELL: Now, did we have the same experience? Absolutely. Did we experience it and describe it in different ways according to our own thought structure? Absolutely. In my talking with them, I'm convinced, exactly the same expansive experience. Now, did others have it? Yes, but here comes the command function. The more focused you are on the job at hand, the less time you have for contemplative, meditative structure.

SCARBOROUGH: So that part of the brain—

MITCHELL: That part of the brain is not being brought into play, because generally the commanders and, to a lesser extent, the command module pilots are operationally focused pretty much throughout the entire mission and don't have time, or didn't have time, for the contemplation required, although they all come back saying, "Yes. Wow."

SCARBOROUGH: So your experience and the path you took since your experience, has it been pretty well accepted by the others in the program?

MITCHELL: I think so now, yes. Well, as a matter of fact, shortly after I came back and the unfortunate newsbreak on the ESP experience in space, interestingly enough, nothing was ever said, but you'd be surprised at the dozens of engineers, astronauts, and NASA personnel who came to my office and furtively looked both ways, popped in, and said, "Tell me about it."

You see, as I pointed out earlier in the forming of the Institute, we were looking at biofeedback, we were looking at psychic stuff, we were looking at Uri Geller. He's a pretty powerful guy, very real. I looked at shamans and medicine men and primitive cultures—I've lived with them for year—to understand that level of functioning. And today that's becoming mainstream stuff. Twenty-five years ago it was pretty kooky frontier stuff, but today it's pretty mainstream stuff, and we have a model to show how it works.

SCARBOROUGH: That's why I wondered about the reaction then.

MITCHELL: Well, the reaction then was—frankly, the direction then, he is too damned bright to ignore, "God, this sounds crazy." And today it's much more accepted.

SCARBOROUGH: What about the ESP experience?

MITCHELL: Well, the *a priori* results were that chance could have produced our results one out of 3,000 experiments. That's good statistics in anybody's book. It turns out, in a post *priori* analysis, in other words, looking at what really happened, the proper statistics would be one out of 13,000 experiments, even more compelling.

Now, what confused the issue was that we got a classic result called psi-missing. Let me explain that to you. If you guess a flipped coin, it's 50-50 chance it will come up heads or tails. If you get 90 percent right, that's way beyond chance in a positive sense. If you get 90 percent wrong, that's way beyond chance and equally significant, but you've missed instead of hit. Why? It turns out, it's called the sheep/goat effect. It has to do with if you don't believe you can do it, you will get a psi-missing result. If you do believe you can do it, you will get positive results. So what it means is, when you're doing those sorts of things, if you don't want to believe it and you don't want it to come out, you will screw yourself by making the psi-missing.

SCARBOROUGH: Again, that makes your point that one affects the universe.

MITCHELL: That you affect the result. Right. But, see, the press didn't understand what psy-missing was, although it's a well-documented phenomenon. And what we were getting was a psy-missing result that told us, because I only did—while we planned to do six experiments, going out and coming back, three out and three coming back, I only had time to do four. So the question was, which four of my results do I match up with six results? And the psy-missing told us how to do it. If we did it sequentially, we got powerful results. If we tried to match up day by day on time, we got simply chance results. Okay? So, in a sense, the psychics knew at this level, at a deep level, that I wasn't doing it but four times and they were

doing it six, but they didn't know which four or which six. Rationally they did at the intuitive level and guessed it correctly. It takes these sort of screwball results, but you have to understand how it functions. You have to have a model for how it functions, and then it makes perfect sense.

SCARBOROUGH: How did Alan Shepard respond after he found out that you'd been performing that experiment?

MITCHELL: Essentially this took place while we were in the lunar receiving lab in isolation, and it was in the paper, and he was laughing and said, "Ed, what's this all about?"

I said, "Sorry, boss. That's the way it happened."

"Oh, shit." [Laughter] I mean, that was his response, and nothing more was ever said.

SCARBOROUGH: Interesting. What is the purpose of sending humans into space?

MITCHELL: Because, as I say in my lectures often, Earth is our cradle; it's not our destiny. This planet's not going to be here but another five billion years if we're lucky, and much shorter if we screw it up, and we're screwing it up. So the whole idea in discovering ourselves and our place in the cosmos is to get the story of ourselves right. How can we have value systems and priorities if we don't have a proper cosmology? And our scientific cosmology has been incomplete because it doesn't take any account of the first-person experience, and our mystical cosmologies are flawed because they're archaic and they didn't have benefit of modern knowledge.

So, to follow the great writer Joseph Campbell, whom you probably know about, Joe said we need a new story, we need a new myth, but myth, when it's brand new, is called

truth. We have to have a new understanding. Are we alone in the universe? Is the universe, as I propose, aware, learning, intelligent? We're products of the universe, and we're intelligent, learning, aware, so the universe must be aware, intelligent, learning, and we need a new story that encompasses that. That's what we're evolving.

When we have a better story, we'll have a better value system that's in tune with the processes of the universe that we're a part of. Right now we're at odds with the processes of the universe. We're trying to control and manipulate, and that's what science is all about, predict and control, but we're really in a universe where we have to experience and live in harmony with if we want to survive. So, we're not on a sustainable path for civilization right now. We'd better find a sustainable path.

SCARBOROUGH: How will we do that?

MITCHELL: By becoming aware and tuning into the very basic principles that I try to talk about.

SCARBOROUGH: In your book?

MITCHELL: Yes. The environmentalists have a part of it. The spiritual people have a part of it, although they get off the track, too. I mean, the fundamentalists of all traditions are of the same ilk, and they are taking us in the wrong path, and the real problem there is that in virtually all the theological and mystical traditions, responsibility is not here, it's out there. The deity makes the big decisions, we just make the little decisions. Sorry. We make all the decisions. Until we learn to accept that responsibility, we keep treating it badly.

SCARBOROUGH: What would that look like in the space program itself, if we did create a new story?

MITCHELL: In the space program, it would look like about what we're doing now if we'd emphasize it more: learning to use our technology to heal the processes of Earth that are so damaging and to begin to explore the larger venue, the nature of our reality, the solar system, eventually the galaxy on to the galaxies at large, which will happen if we survive long enough. That's going to happen.

SCARBOROUGH: So you see space stations and—

MITCHELL: Sure. Those are appropriate. It is not appropriate right now, I don't think, to plan manned missions to Mars and the outer planets. Probes like we're doing? Sure. That's fine. But right now, with limited resources, we'd better pull this planet together or we're not going to have one. And I say in my lectures quite continuously, if you stand on Mars and look back and you see Earth no bigger than that, it's kind of foolish to say, "I came from the United States," the Soviet Union, or France, or anyplace else. "I came from Earth." And until we're ready to approach it in that fashion, we're not together.

SCARBOROUGH: That does seem to be a very positive effect of the space program.

MITCHELL: Yes.

SCARBOROUGH: Seeing the Earth as one unit—

MITCHELL: Yes.

SCARBOROUGH: —and a fragile unit at that.

MITCHELL: Yes. That is *the*—well, the pictures of Earth from space are *the* most published pictures humankind has ever known. Why? Because of exactly what we're talking about. It resonates with people at a deeper level.

See, by the way, back to a statement I missed in the previous discussion, what the physicists would call nonlocality is what the mystic would say is our interconnectedness, that the universe is interconnected with each other. To the physicist, nonlocality is exactly that. So here, with just that simple idea, we're finding the conjunction or the synthesis of a scientific idea with a mystical experience of interconnectedness and interrelatedness, [unclear].

SCARBOROUGH: Well, there's lots of questions I would like to ask, but maybe we should just end on that note.

MITCHELL: Yes. We could probably go for hours on this stuff, because it goes to the nature of time and how time is really—

[End of Interview]